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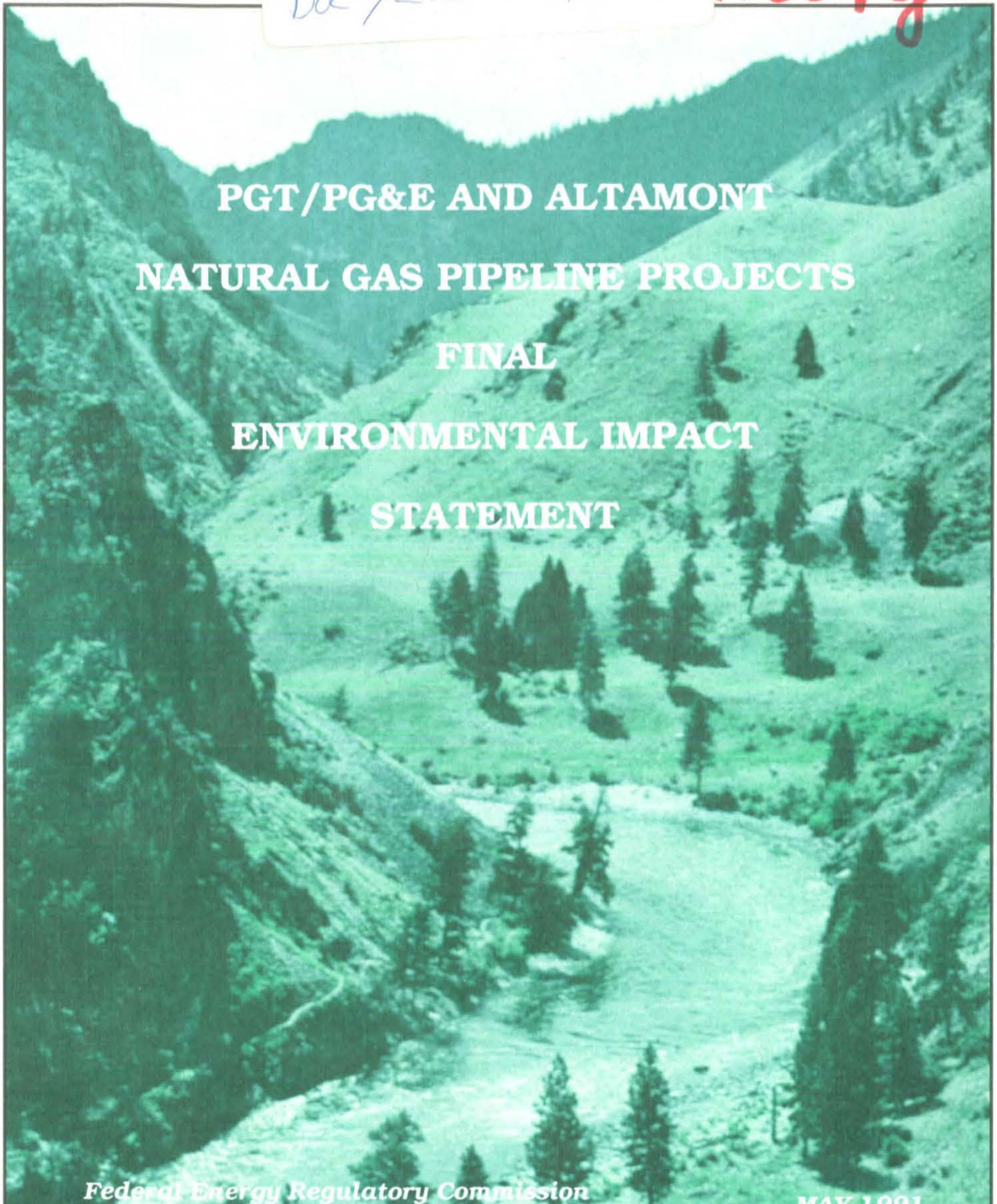


PGT/PG&E AND ALTAMONT NATURAL GAS PIPELINE PROJECTS

FINAL ENVIRONMENTAL IMPACT STATEMENT

Federal Energy Regulatory Commission
Washington, D.C.

MAY 1991

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Pacific Gas Transmission Company) Docket No. CP89-460-001

Altamont Gas Transmission Company) Docket No. CP90-1375-000

NOTICE OF AVAILABILITY OF THE
FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE
PGT/PG&E EXPANSION - ALTAMONT NATURAL GAS PIPELINE PROJECTS

(May 24, 1991)

Notice is hereby given that the staff of the Federal Energy Regulatory Commission (FERC) has made available a final environmental impact statement (FEIS) on the natural gas pipeline facilities proposed in the above-referenced dockets, and related nonjurisdictional facilities.

The FEIS was prepared to satisfy the requirements of the National Environmental Policy Act. Construction of either of the proposed projects would be a "major Federal action significantly affecting the quality of the human environment." However, the staff concludes that approval of one or both of the proposed projects, with appropriate mitigating measures, including receipt of necessary permits and approvals, would have limited adverse environmental impact. The FEIS evaluates alternatives to each proposal, including the No Action alternative.

Pacific Gas Transmission Company (PGT) proposes, in Docket No. CP89-460-001, to expand the capacity of its existing natural gas pipeline transmission system which extends from the United States/Canadian border at Kingsgate, British Columbia to the Oregon/California border at Malin, Oregon. In order to transport up to an additional 903 million cubic feet per day (MMcf/d) of natural gas, PGT would construct 430 miles of 42-inch-diameter pipeline loop in 7 segments through the states of Idaho, Washington, and Oregon, and replace/install additional compression at 3 existing compressor stations. Minor modifications would also be required at nine additional stations. The new gas would be received at Kingsgate from Alberta Natural Gas Company, Ltd. and transported for delivery at existing interconnections with Northwest Pipeline Corporation (Northwest) at Stanfield, Oregon and with Pacific Gas and Electric Company (PG&E) at Malin, Oregon. Northwest would deliver 148 MMcf/d of the gas to customers in the Pacific Northwest and intermountain region, while PG&E would deliver 755 MMcf/d of the gas to customers within the state of California.

In order to accommodate the additional gas deliveries from PGT, PG&E proposes to construct 415 miles of 42- and 36-inch-diameter pipeline loop in 5 segments between the Oregon-California border and a point near Panoche Station, California. Additionally, PG&E proposes to make minor modifications at three existing compressor stations, install additional compression at its Delevan Compressor Station, and either expand its Brentwood Compressor Station or construct an additional station at a new location. PG&E is not regulated by the FERC. However, because their facilities would not be constructed without FERC approval of the PGT expansion, the FEIS discusses the potential impact of the nonjurisdictional PG&E facilities on federally listed threatened and endangered species, cultural resources, and federally administered lands within California. The FEIS also incorporates by reference relevant portions of the Final Environmental Impact Report (FEIR) prepared by the California Public Utilities Commission (CPUC) for the facilities proposed by PG&E. The FEIR was issued by the CPUC on November 19, 1990, and the CPUC authorized the construction of PG&E's facilities on December 27, 1990. Incorporation of the FEIR will eliminate duplication of this information in the FEIS. With the exception of the three limited issues concerning the non-jurisdictional facilities in California, all other issues/comments concerning the California facilities should be directed to the CPUC.

Altamont Gas Transmission Company (Altamont) proposes, in Docket No. CP90-1375-000, to construct a new natural gas transmission system from the United States/Canadian border near Wild Horse, Montana to a point in southwest Wyoming near Opal. Altamont's system would consist of 620 miles of 30-inch-diameter pipeline, 6 compressor stations, 1 meter station, and related appurtenant facilities. Gas would be received at Wild Horse from NOVA Corporation of Alberta and transported for delivery to Kern River Gas Transmission Company (Kern River) at its certificated interconnection with Northwest near Opal. Kern River would then transport up to 700 MMcf/d of natural gas for Altamont to customers in southern California. Incremental facilities required on the certificated Kern River system in order to accommodate gas received from Altamont at the proposed Opal interconnection would consist of installing additional compression at two compressor stations and construction of five new compressor stations.

Detailed listings of the facilities associated with each project, land requirements, and counties affected by the proposed construction were published in the Federal Register on August 14, 1989 (54 FR 33272). Issuance of the FERC's Draft EIS was noticed by the FERC on January 16, 1991 (56 FR 1623), and by the U.S. Environmental Protection Agency on January 18, 1991 (56 FR 2017).

The FEIS will be used in the regulatory decision-making process at the FERC. While the period for filing motions to intervene in these cases has expired, motions to intervene out-of-time can be filed with the FERC in accordance with the requirements of Rule 214 of the Commission's Rules of Practice and Procedure [18 CFR 385.214(d)].

The FEIS is available for public inspection in the FERC's Division of Public Information, Room 3104, 941 North Capitol Street, N.E., Washington, DC 20426. Copies have been mailed to Federal, state and local agencies, public interest groups, libraries, parties in the FERC proceedings interested in environmental issues, and other interested individuals. The FEIS is also available for public inspection at the CPUC in San Francisco, CA.

A limited number of copies of the FEIS are also available from Mr. Mark C. Kalpin, PGT/PG&E Expansion Project Manager, or Mr. Laurence J. Sauter, Jr., Altamont Project Manager. Messrs. Kalpin and Sauter can be reached either at (202) 208-0918 or (202) 208-0205, respectively, or by writing to them at the following address:

Federal Energy Regulatory Commission
Office of Pipeline and Producer Regulation
Environmental Compliance and Project Analysis Branch
Room 7312 - PR21.4
825 North Capitol Street, N.E.
Washington, DC 20426.

An Executive Summary of the FEIS was also prepared and sent to approximately 1400 property owners directly affected by the projects, as well as 600 other environmental groups and organizations and the remaining parties in the FERC proceedings. Those individuals receiving the Executive Summary who wish to receive the entire FEIS may request copies from Messrs. Kalpin or Sauter while supplies last.

Lois D. Cashell
Lois D. Cashell,
Secretary

PGT/PG&E and Altamont Natural Gas Pipeline Projects Final Environmental Impact Statement

Federal Energy Regulatory Commission
825 North Capitol Street, NE
Washington, D.C. 20426

May 1991

Master Table of Contents

Table of Contents

Table of Contents (Continued)

Page

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Page

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

Table of Contents (Continued)

List of Figures

List of Figures (continued)

List of Tables

List of Tables (continued)

List of Tables (continued)

List of Tables (continued)

List of Tables (continued)

List of Tables (continued)

List of Tables (continued)

List of Acronyms

AB	-	Assembly Bill
ACEC	-	Area of critical environmental concern
ACHP	-	Advisory Council on Historic Preservation
ADT	-	Average daily traffic
AGA	-	American Gas Association
AIRFA	-	American Indian Freedom of Religion Act
ALTAMONT	-	Altamont Gas Transmission Company
ANG	-	Alberta Natural Gas Company, Ltd.
ANGTS	-	Alaska Natural Gas Transportation System
ANSI	-	American National Standards Institute
APCD	-	Air Pollution Control District
APE	-	Area of potential effect
APEX	-	Alternative Pipeline Expansion
ARB	-	California Air Resources Board
BA	-	Biological Assessment
BACT	-	Best available control technology
BIA	-	Bureau of Indian Affairs
BioSystems	-	BioSystems Analysis, Inc.
BLM	-	Bureau of Land Management
BOR	-	Bureau of Reclamation
BRPU	-	Biennial Resource Plan Update
Btu	-	British Thermal Unit
$CaCO_3$	-	Calcium carbonate (lime)
CEC	-	California Energy Commission
CEQ	-	Council on Environmental Quality
CEQA	-	California Environmental Quality Act
CFR	-	Code of Federal Regulations
cfs	-	Cubic foot per second
CGR	-	California Gas Report
CNPS	-	California Native Plant Society
CO	-	Carbon monoxide
CO_2	-	Carbon dioxide
COE	-	U. S. Army Corps of Engineers
CPUC	-	California Public Utilities Commission
CSLC	-	California State Lands Commission

dB	-	Decibel
dBA	-	A-weighted decibel scale
dbh	-	Diameter at breast height
Delta	-	Sacramento-San Joaquin River Delta
DFG	-	California Department of Fish and Game
DGGB	-	Delta green ground beetle
DEQ	-	Wyoming Department of Environmental Quality
DFWP	-	Montana Department of Fish, Wildlife, and Parks
DHES	-	Montana Department of Health and Environmental Sciences
DNRC	-	Montana Department of Natural Resources and Conservation
DOD	-	U. S. Department of Defense
DOE	-	U. S. Department of Energy
DOT	-	U. S. Department of Transportation
DSM	-	Demand-side management
EA	-	Environmental assessment
EC	-	Electrical conductivity
ECR	-	Erosion control and restoration
EFU	-	Exclusive farm use
EIR	-	Environmental impact report
EIS		Environmental impact statement
El Dorado	-	El Dorado Interstate Transmission Company
El Paso	-	El Paso Natural Gas Company
EOR	-	Enhanced oil recovery
EPA	-	U. S. Environmental Protection Agency
ESA	-	Endangered Species Act
FEIR	-	Final environmental impact report
FEIS		Final environmental impact statement
FEMA	-	Federal Emergency Management Agency
FERC	-	Federal Energy Regulatory Commission
FR	-	Federal Register
FS	-	U.S.D.A. Forest Service
FWS	-	U.S. Fish and Wildlife Service
gpm	-	Gallons per minute
GFD	-	Wyoming Game and Fish Department
GLO	-	General Land Office
HC	-	Hydrocarbon
hp	-	Horsepower

I	-	Interstate
IDEQ	-	Idaho Department of Environmental Quality
INFOTEC	-	Infotec Research, Inc.
ISO	-	International Standards Organization
JDV	-	John Day Variation
JPV	-	Jepson Prairie Variation
Kern River	-	Kern River Gas Transmission Company
kV	-	Kilovolt
LDC	-	Local distribution company
L_{dn}	-	Day-night average sound level
L_{eq}	-	Equivalent noise level
MAOP	-	Maximum allowable operating pressure
MDU	-	Montana-Dakota Utilities
MexUS	-	MexUS Interstate Pipeline, Inc.
$\mu g/m^3$	-	Micrograms per cubic meter
mg/l	-	Milligrams per liter
mg/m^3	-	Milligrams per cubic meter
Mbf	-	Thousand board feet
Mbf/ac	-	Thousand board feet per acre
MDH	-	Montana Department of Highways
MMcf/d	-	Million cubic feet per day
MMcf/yr	-	Million cubic feet per year
Mojave	-	Mojave Pipeline Company
MOU	-	Memorandum of Understanding
MP	-	Milepost
NAAQS	-	National Ambient Air Quality Standards
NDDB	-	Natural Diversity Data Base
NEPA	-	National Environmental Policy Act
NFS	-	National Forest Service
NHDB	-	Natural Heritage Data Base
NHDS	-	Natural Heritage Data System
NHL	-	National Historic Landmark
NHP	-	Natural Heritage Program
NHPA	-	National Historic Preservation Act
NMFS	-	National Marine Fisheries Service
NO_2	-	Nitrogen dioxide
NOI	-	Notice of Intent
NOP	-	Notice of Preparation
Northwest	-	Northwest Pipeline Corporation
NOVA	-	NOVA Corporation of Alberta
NO_x	-	Nitrogen oxide

NPDES	-	National Pollutant Discharge Elimination System
NPS	-	National Park Service
NRHP	-	National Register of Historic Places
NSA	-	Noise Sensitive Area
NSR	-	New source review
NWI	-	National Wetland Inventory
NWR	-	National wildlife refuge
O_3	-	Ozone
OC	-	Optional Certificate
OD	-	Outside Diameter
ODEQ	-	Oregon Department of Environmental Quality
ODFW	-	Oregon Department of Fish and Wildlife
OPPR	-	FERC's Office of Pipeline and Producer Regulation
ORV	-	Off-road vehicle
OSHA	-	Occupational Safety and Health Administration
PG&E	-	Pacific Gas and Electric Company
PGT	-	Pacific Gas Transmission Company
PL	-	Public law
PM10	-	Particles less than 10 microns in diameter
PPL	-	Pacific Power and Light Company
ppm	-	Parts per million
PSD	-	Prevention of significant deterioration
psig	-	Pounds per square inch gage
RBDD	-	Red Bluff Diversion Dam
RMP	-	Resource management plan
ROS	-	Recreational Opportunity Spectrum
RV	-	Recreational Vehicle
SCAQMD	-	South Coast Air Quality Management District
SCS	-	U. S. Soil Conservation Service
sf	-	Square feet
SHPO	-	State Historic Preservation Officer
SIP	-	State implementation plan
SO_2	-	Sulfur dioxide
SoCal	-	Southern California Gas Company
SOHA	-	Spotted owl habitat area
Southcoast	-	Southcoast Transmission Corporation
SPC	-	Spill Prevention Control
SR	-	State Route
SRMA	-	Special recreation management area
SWP	-	State Water Project
SWRCB	-	California State Water Resources Control Board

TDS	-	Total dissolved solids
tpy	-	Tons per year
Transwestern	-	Transwestern Pipeline Company
TSP	-	Total suspended particulates
TSS	-	Total suspended solids
UEG	-	Utility electric generation
UMNWSR	-	Upper Missouri National Wild and Scenic River
US	-	U. S. Highway
U. S.	-	United States
USGS	-	U. S. Geological Survey
VELB	-	Valley elderberry longhorn beetle
VQO	-	Visual quality objective
VRM	-	Visual resource management
WDE	-	Washington Department of Ecology
WGS	-	Wyoming Geologic Survey
WMA	-	Wildlife management area
WRA	-	Wildlife recreation area
WSA	-	Wilderness study area
WyCal	-	Wyoming-California Pipeline Company

EXECUTIVE SUMMARY

INTRODUCTION

The PGT/PG&E and Altamont Natural Gas Pipeline Projects Environmental Impact Statement (EIS) has been prepared by the Federal Energy Regulatory Commission (FERC) to assess the effects of the two proposals to transport natural gas from Canada to southern California. FERC is the lead federal agency for the preparation of the Final EIS in compliance with the requirements of the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality regulations for implementing NEPA (40 CFR 1500-1508). The U.S. Bureau of Land Management, U.S. Forest Service, U.S. Army Corps of Engineers (Omaha District), U.S. Department of Energy, and the State of Montana have cooperated in the preparation of the EIS.

The FERC has issued the Final EIS (see attached notice). Approximately 750 copies of the Final EIS are being circulated to various federal, state and local agencies, public interest groups, libraries, parties to the FERC proceeding interested in environmental issues, and other interested individuals. The Executive Summary is being sent separately to approximately 1,400 property owners directly affected by the projects as well as 600 other environmental groups and organizations and the remaining parties to the FERC proceedings.

Those individuals receiving the Executive Summary only who wish to receive the entire Final EIS may request copies while supplies last. Copies of the Final EIS may be obtained from:

Mark Kalpin (PGT/PG&E Project)
Laurence J. Sauter, Jr. (Altamont Project)
Federal Energy Regulatory Commission
825 North Capitol Street, NE, Room 7312
Washington, DC 20426
(202) 208-0918 or (202) 208-0205

The California Public Utilities Commission (CPUC) is serving as lead agency for the PG&E portion of the project. These facilities would be located entirely within the State of California. This agency has prepared a Final Environmental Impact Report (FEIR) on this project, and has already authorized the construction of PG&E's facilities. Portions of the PG&E

route have been analyzed by the FERC document when federal involvement is warranted, e.g., Endangered Species Act (ESA) and National Historic Protection Act (NHPA).

The proposed PGT/PG&E and Altamont pipeline projects are proposing to transport up to 755 and 700 MMcf/d, respectively, of natural gas from various Canadian sources to southern California for a variety of uses including local distribution companies (LDCs), power generation facilities, electric utilities, industrial gas users, and enhanced oil recovery operations (EOR) throughout southern California. PGT/PG&E's proposal also includes transporting natural gas from Canada to customers in the Pacific Northwest.

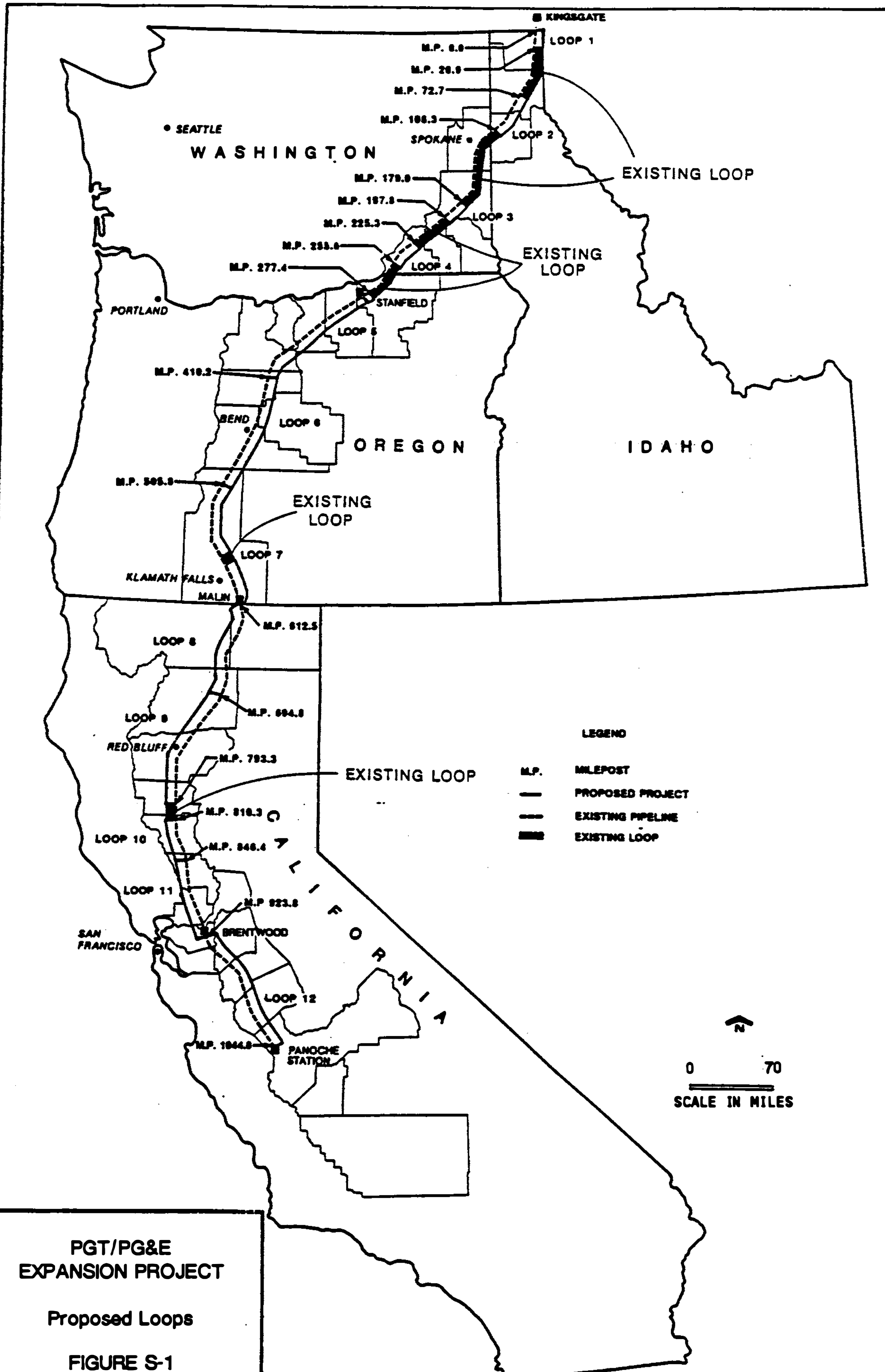
The PGT/PG&E System

PGT and PG&E own and operate an existing system of pipelines between the Canada-U.S. border and southern California, as shown in Figure S-1. PGT's facilities are in Idaho, Washington, and Oregon; PG&E's facilities are in California. The major components of the PGT/PG&E system include the U.S. portion of the Alberta-California Pipeline between the International Boundary near Eastport, Idaho, and Antioch, California; Line 303 between Antioch and Brentwood, California; the Stanpac No. 2 Pipeline between the Brentwood Compressor Station and Panoche Metering Station in Fresno County, California; and Lines 300 A and B between the Panoche and Kern River Metering Stations near Bakersfield, California.

The proposed PGT/PG&E gas pipeline project would transport annually an average of 903 MMcf/d of natural gas produced in the provinces of Alberta and British Columbia to the Pacific Northwest, intermountain region, and California. This project would connect with the Alberta Natural Gas Company, Ltd. (ANG) pipeline at Kingsgate, British Columbia. Approximately 48 miles of pipeline are proposed to be constructed by ANG, parallel to their existing pipeline, providing gas to the PGT/PG&E from fields located in British Columbia and Alberta. The environmental impacts of the ANG project are beyond the scope of this EIS.

PGT proposes to expand its facilities and service areas to provide additional firm transportation capacity to deliver Canadian gas to four natural gas utility concerns located in Idaho, Washington, and Oregon. These markets would receive access to approximately 148 MMcf/d (on an average annual basis) of Canadian gas.

PGT and PG&E also propose to provide firm transportation service for utilities and the oil and gas industry in California. Approximately 755 MMcf/d (on an average annual basis) of natural gas would be supplied by the PGT/PG&E project to end users in both northern and southern California. In northern California, 100 MMcf/d would be delivered to PG&E, with customers throughout the Sacramento and San Joaquin Valleys and in the San Francisco Bay Area. Of the remaining 655 MMcf/d contracted by southern California entities, approximately 30 MMcf/d would be delivered to municipalities, 300 MMcf/d would be delivered to two utilities (San Diego Gas and Electric Company [SDG&E] and Southern California Edison Company [SoCal Edison]), and the remainder would be delivered to nonutility shippers.



PGT/PG&E EXPANSION PROJECT

Proposed Loops

FIGURE S-1

The proposed facilities include 845 miles (including compressor tie-ins) of new pipeline in 12 loops along the existing 1,044-mile, the 86.7-acre expansion of the existing Brentwood Compressor Station facilities, the relocation of the fenceline at the existing Compressor Station No. 12, and the modification of all other compressor stations along the existing Alberta-California Pipeline system.

PGT proposes to complete the looping of all unlooped portions of its existing pipeline with 42-inch-diameter gas pipeline. At Malin, Oregon, the PGT line interconnects with that of PG&E, where the looping with 42-inch-diameter gas pipeline would continue on PG&E's system to a terminus at the Brentwood Compressor Station near Antioch, California. South of the Brentwood Compressor Station, the PG&E system would be looped with 36-inch-diameter gas pipeline to a terminus at the Panoche Metering Station in Fresno County, California. The 12 proposed loops generally would be installed adjacent to and interconnected with existing gas pipelines. Seven of the loops, involving 430 miles of new pipeline, would be located on the PGT system. Five of the loops, involving 415 miles of new pipeline, would be located on the PG&E system.

PGT/PG&E proposes to modify 17 of the existing compressor stations along the pipeline route. The modifications at 12 of the stations would consist of installing additional metering and instrumentation; adding electrical and control equipment; and modifying compressor cases, piping, valves, and fittings to accommodate the additional gas flow. Additional compressor units would be required at Compressor Station No. 3 (one 30,000-horsepower [hp] unit), Compressor Station No. 16 (one 14,365-hp unit) and the Brentwood Compressor Station (three 4,500-hp units). At Compressor Stations No. 5 and 7, existing 9,100-hp units would be replaced with 30,000-hp units.

Piping modifications would also be required at PGT's existing Malin Meter Station and at PG&E's existing Panoche and Kern River Metering Stations because of the proposed increase in gas volumes. Five existing pressure-limiting stations would be expanded to include the new loops.

Several pipeline routing alternatives were examined in detail in California. These include two alternatives in the vicinity of the Jepson Prairie Reserve and four alternative routes in the rapidly urbanizing Brentwood-Antioch area.

The total cost estimate for PGT's part of the expansion project, which covers Idaho, Washington, and Oregon, is approximately $635 million in 1988 dollars. The total cost estimate for the PG&E section of the expansion, which covers California, is approximately $545 million in 1988 dollars. The cost estimate for the entire project is approximately $1.18 billion in 1988 dollars.

The Altamont System

Altamont represents a consortium consisting of Tenneco-Altamont Corporation (40%), Amoco Altamont Company (25%), Petro-Canada Altamont Inc. (25%), and Entech Altamont, Inc. (10%)[1/]. The latter company represents Montana Power Company.

Altamont proposes to construct, own, and operate a 30-inch-diameter interstate natural gas pipeline transmission system with design capacity to transport approximately 719 MMcf/d of natural gas. The pipeline would extend for 620 miles from the Canada-U.S. border near Wild Horse, Montana, to the southwest corner of Wyoming near Opal (Figure S-2). The system would link expanded Canadian transmission facilities owned by NOVA Corporation of Alberta (NOVA), with proposed interstate facilities between the Opal area and the Bakersfield area of Kern County in southern California. Gas would be delivered to LDCs, EOR operations, industrial gas users, and power generation facilities throughout southern California.

Both Kern River Gas Transmission Company (Kern River) and the Wyoming-California Pipeline Company (WyCal) have proposed interconnection facilities at or near Opal, Wyoming. Although Altamont has entered into an agreement with Kern River for an interconnection at Opal and the necessary expansion of Kern River's system to accommodate the Altamont volumes, Altamont has indicated that use of either the Kern River or the WyCal projects would ultimately be determined by which system is constructed. Given that the Kern River System is presently under construction while the WyCal system appears to remain as a proposal, gas transported by Altamont would probably be delivered to Kern River for subsequent delivery to southern California. Nevertheless, both Kern River and WyCal have been certificated by the FERC to construct facilities and transport natural gas to southern California. The Kern River facilities (part of the Joint Mojave-Kern River Project) will begin at the Opal Meter Station where Altamont's system would terminate. Kern River's portion of the Joint Mojave-Kern River Project would have the capacity to transport up to 700 MMcf/d from Opal. WyCal would begin immediately to the west of the proposed Altamont/Kern River interconnection, and would require a short interconnection along Northwest's right-of-way to join with WyCal's certificated system. WyCal proposed to construct a system with the capacity to transport up to 400 MMcf/d (WyCal I) or up to 600 MMcf/d (WyCal II) from the southwest Wyoming/northeast Utah area. Kern River has begun construction.

Altamont could potentially be supplied by at least two existing sources of natural gas, including supplies imported from the western Canadian provinces of Alberta and British Columbia, or domestic gas produced in Montana or Wyoming. Because Altamont would act solely as a natural gas transporter, supply arrangements would be the responsibility of individual shippers in southern California. A major portion of Altamont's capacity is expected to be used to transport imported Canadian gas. However, the origin of the gas transported would ultimately

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1/ In early 1991, Petro-Canada left the Altamont Consortium. Its 25 percent share has not yet been reassigned.

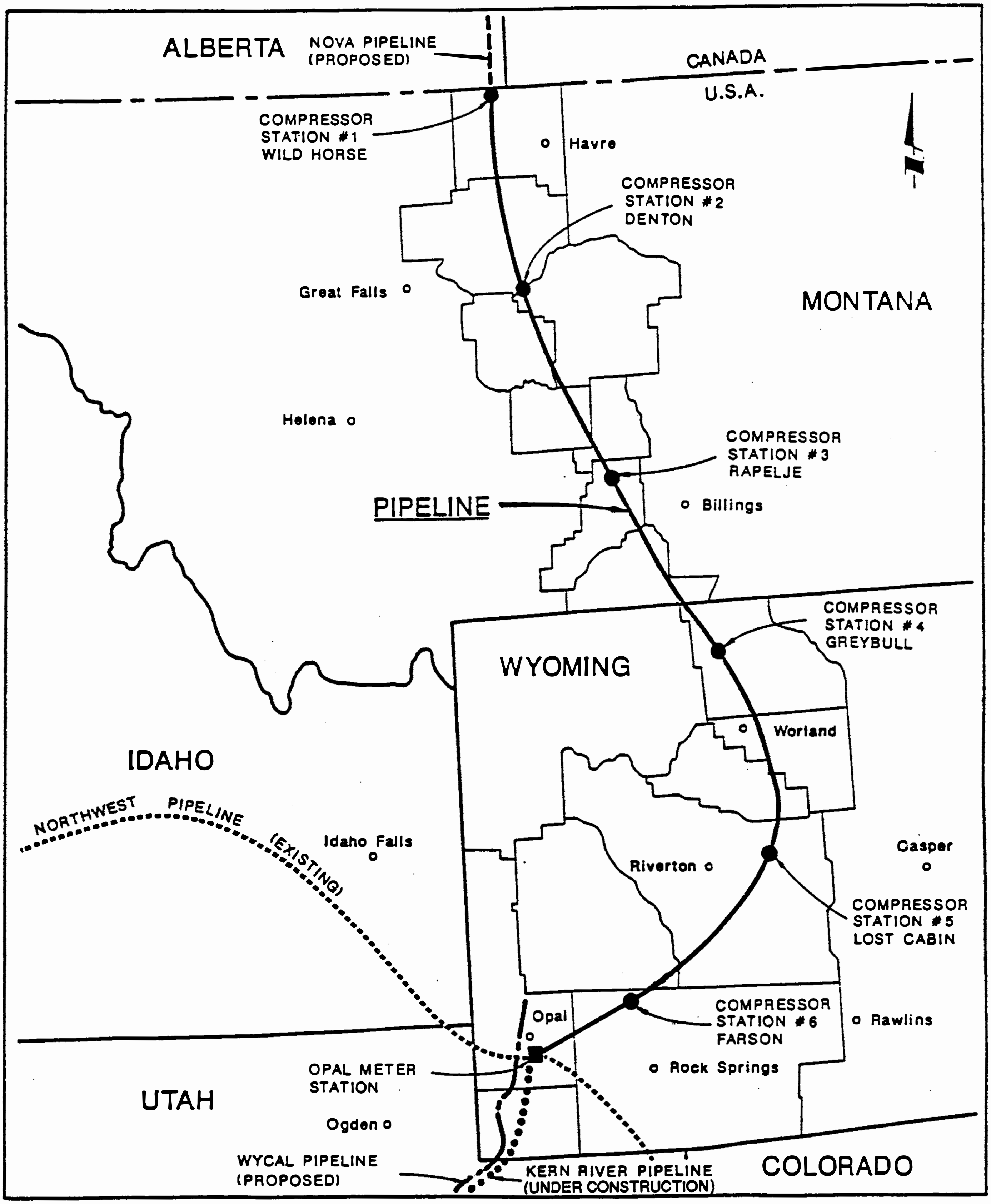


FIGURE S-2. PROJECT LOCATION - ALTAMONT NATURAL GAS PIPELINE PROJECT

be determined by shippers who would use the system and the location of producers from whom the shippers would purchase gas.

The proposed system would extend through 15 counties in two states. Six compressor stations providing a total of 113,400 (ISO) hp would be constructed as part of Altamont's proposal. The estimated cost of the Altamont system is $573.4 million in 1990 dollars.

In addition to the route proposed by Altamont, alternative routes which the Lander and Rock Springs District BLM Offices had proposed to circumvent the South Pass area were included in the EIS. The four alternatives were subsequently refined and presented in the EIS: the Jeffrey City, Alkali Butte, Northern Utilities, and Route 28 Variations.

Altamont has entered into an agreement with Kern River for an interconnection at Opal and the necessary expansion of Kern River's system to transport incremental volumes of natural gas delivered by the Altamont pipeline system downstream of the Opal Metering Station. Information provided to Altamont by Kern River indicates that Kern River would require additional compression facilities to transport Altamont gas. These facilities would include incremental hp additions at two of the three certificated compressor stations and the installation of five new compressor stations along the pipeline. This would allow Kern River to achieve a 1,200-MMcf/d level of design throughput capability. Because all of the additional stations would be located within Kern River's one-mile-wide corridor studied during the preparation of the EOR FEIR/FEIS and the Mojave-Kern River-WyCal EA, environmental resource area discussions of Kern River's downstream facilities in Chapters 3 and 4 were limited and focus on the new station sites. Kern River has not filed an application for the required facilities with the FERC.

Information is not available to determine what expansion of WyCal's system would be necessary to accommodate 700 MMcf/d of natural gas from Altamont, however, it is expected to be at least similar to the incremental facilities required on the Kern River system.

SYSTEM ALTERNATIVES

Ten system alternatives were considered that could potentially provide most or all of the proposed natural gas services to California (Table S-1). The initial list of alternatives was based on applications submitted to FERC and CPUC, previous studies, and public scoping meetings conducted for this EIS. The screening looked at a broad range of system alternatives and was based on the following initial criteria:

- o Alternative systems must provide most or all of the proposed long-term 700 to 755 MMcf/d of natural gas to California.
- o Interstate pipeline alternatives must have filed an application for a Certificate of Public Convenience and Necessity with FERC and said application must be one that has not been dismissed or determined to be incomplete by FERC.
- o Alternatives must not involve proceedings which are considered inactive or effectively in abeyance.

Table S-1

POTENTIAL SYSTEM ALTERNATIVES TO THE PROPOSED PGT/PG&E AND ALTAMONT PIPELINE PROJECTS

Mojave Pipeline Project
Kern River Pipeline Project
Joint Mojave-Kern River Pipeline Project
WyCal I Pipeline Project
WyCal II Pipeline Project
El Dorado Interstate Transmission Company Project
Southcoast Transmission Corporation Project
MexUs Interstate Pipeline Project
APEX Pipeline Project
Integrated Intrastate System Alternative

System alternatives that were found to meet these criteria include:

- the Mojave Pipeline Project [2/]
- the Kern River Pipeline Project
- the Joint Mojave-Kern River Pipeline Project
- the WyCal I and II Projects [3/]

Alternatives that were eliminated from detailed study in this EIS are described and the reasons for their elimination are explained below in "Alternatives Considered but Eliminated from Detailed Analysis."

2/ Mojave Pipeline Company (Docket No. CP89-1-000). FERC optional certificate issued May 8, 1989. There is also a Mojave application (Docket No. CP85-437-000) filed in 1985 under the FERC's traditional Section 7(c) regulation. It has never been certificated. From an environmental standpoint, there are no significant differences between the two dockets.

3/ There was also a Wycal III filed before the FERC and the California State Lands Commission (CSLC). However, the project sponsors are no longer pursuing this alternative. On December 3, 1990, WyCal notified the CSLC that it was suspending all activities on its proposed project(s) pending further study of the markets involved, and formally withdrew its application before the CSLC, including WyCal I and II.

NO-ACTION ALTERNATIVE

The FERC can take three basic actions on an application for a Certificate of Public Convenience and Necessity. It can grant the certificate, grant the certificate with conditions, or deny the certificate. The No-Action Alternative assures that the FERC would not grant a Certificate of Public Convenience and Necessity for a proposed project. In this instance where two discrete applications are involved, the FERC could deny authorization of either one or both projects under the No-Action Alternative.

If the FERC denied authorization to PGT, then its portion of the PGT/PG&E project would not be constructed. It is assumed that the lack of upstream facilities would have the effect of avoiding construction of the PG&E portion of the project as well. As a result, FERC denial of PGT's authorization would not only avoid the construction and operational impacts associated with PGT's portion of the project, but also those associated with PG&E's portion.

In the case of Altamont, FERC denial of the requested authorization would prohibit construction of Altamont's proposed project. Should Kern River in the future propose to expand its system capacity to accommodate gas volumes over the 700 MMcf/d for which it is currently certificated, denial here would effect this expansion. Construction and operational impacts associated with both of these actions would therefore not occur.

If neither of the proposed projects was constructed, the projected need for energy services in the markets that each of the projects propose to serve would have to be met by other means or go unmet. This would result in one of the following two scenarios: either alternative projects would be implemented to meet part or all of the projected need, or no action would be taken to meet the projected need. If additional supplies of natural gas were not made available, existing energy sources and/or conservation efforts would continue to be used. Natural gas would not be available to supplement these sources or for fuel switching. The impacts associated with construction and operation of one or both of the proposed projects would not occur. The benefits of increased gas use in attaining air quality standards for California in the future could be effected if other fuels, such as oil, were used instead of gas.

The potential would also exist for energy demand to exceed available supply, thus driving up energy prices and exerting an indirect limiting effect on growth. This could result in either positive or negative impacts on resources, depending on how policymakers and end users deal with a curtailment in future natural gas availability. Indirect impacts on biological resources may be positive in that future land disturbance would be curtailed. If, on the other hand, alternative projects were implemented, each would result in its own set of specific impacts which would be greater than those associated with the current proposals. It would be purely speculative and therefore beyond the scope of this EIS to attempt to predict what actions may be taken by policymakers or end users in response to the No-Action Alternative. The assessment of impacts associated with these scenarios would also be speculative.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Five system alternatives were rejected from detailed study because no application for certification was filed with FERC or the application for certification before FERC or CSLC was dismissed, or the proposal was considered inactive because the applicant failed to pursue its application. These include:

- the El Dorado Interstate Transmission Company (El Dorado) proposal,
- the Southcoast Transmission Corporation (Southcoast) proposal,
- the MexUS Interstate Pipeline (MexUS) proposal,
- the Alternative Pipeline Expansion (APEX) proposal, and
- the Integrated Intrastate System Alternative.

Several route variations or alternatives were rejected from detailed study because they were determined to be infeasible for economic or technical reasons, or they lacked environmental advantage over other alignments. These include five PGT/PG&E project variations and five Altamont project variations:

- the Moyie River Valley Camp Nine Alternative (PGT),
- the Hannafin Canyon Alternative (PGT),
- the John Day River Canyon Existing Alignment (PGT),
- the Jepson Prairie Preserve Existing Alignment (PG&E),
- the San Joaquin West Variation (PG&E),
- the West Route Variation (Altamont),
- the Middle Route Variation (Altamont),
- the East Route Variation (Altamont),
- the Abandoned Railroad Variation (Altamont), and
- the Opal Bench/Hams Fork River Variation (Altamont).

AREAS OF CONCERN

Areas of concern involve impacts resulting from the construction and operation of the pipelines at several locations along the proposed routes. These areas of concern were identified through a series of public scoping meetings jointly held by FERC and the CPUC in September of 1989, through the preparation and distribution of a Notice of Intent (NOI) published by FERC in the Federal Register which was available to all agencies, the DEIS letter of comment process, and additional public meetings to solicit comments on the DEIS.

The intent of public scoping meetings was to allow state and local governments and the general public an opportunity to provide information regarding the range of environmental issues and concerns that should be addressed in the EIS. Based on the comments received, the issues that were evaluated include the following:

- geology and soils
- hydrology and water quality
- land use
- vegetation and wildlife
- fisheries
- socioeconomics
- air quality and noise
- transportation
- public safety
- visual resources
- cultural resources
- paleontology

Specific areas of controversy identified for the PGT/PG&E route include geologically related impacts associated with potential landslides; hydrological concerns associated with increased sediment loading of perennial streams; and impacts to environmentally sensitive areas associated with federally listed or proposed threatened or endangered fish, wildlife, and eight plant species.

Areas of controversy associated with the proposed Altamont route include slope stability and faulting; soil reclamation concerns; increased sedimentation along certain water courses; impacts to environmentally sensitive areas associated with federally listed wildlife and fish species.

MAJOR IMPACT CONCLUSIONS

Significant impacts have been analyzed in detail in Section 4 of the Final EIS and mitigation measures have been developed. Tables S-2 and S-3 presents data relevant to the impacts that would result from implementation of the staff's preferred routing of the two proposals.

Summary of Environmental Impact Associated with the PGT Project

The information presented below summarizes, by resource category, the environmental impact associated with the construction of the PGT project. This information is also presented in tabular form in Table S-2. Due to the close interrelationship between the PGT project and PG&E's nonjurisdictional facilities, information concerning the environmental impact associated with the construction of PG&E's facilities, which was obtained from the CPUC's Final EIR, is presented below as well. However, because the criteria that the CPUC utilized to identify potentially significant impacts were different in some respects (e.g., wildlife, vegetation, land use) than the criteria utilized by the FERC staff, we have not attempted to summarize the potential significance of any environmental impact associated with the construction of PG&E's nonjurisdictional facilities.

Geology-related impacts with the greatest potential to adversely affect the PGT project included potentially active faults, areas with a high liquefaction potential, and potential landslide areas. With the exception of potential landslide and slope stability concerns associated with the John Day Variation route, geologic hazards are not expected to significantly impact pipeline construction or operation as pipeline design and installation criteria would adequately mitigate potential hazards.

Table S-2

SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE CONSTRUCTION OF THE PGT PROJECT

Resource Area/Impact	PGT's Facilities	PG&E Facilities [a]
GEOLOGY		
Potential active faults crossed	2	2
Miles of liquefaction potential	40.4	46.2
Miles of landslide potential	12.2	3.5
SOILS		
Miles of prime farmland crossed	138.7	166.1
Miles of soil disturbed with poor or poor-to-fair rehabilitation potential	278.3	34.5
WATER QUALITY		
Number of perennial stream crossings	33	37
Number of intermittent stream crossings [b]	110	95
Number of major river crossings	13	4
Number of waterbody crossings with contaminated sediments [c]	1	2
LAND USE		
Number of residential structures located within 50 feet of construction right-of-way	34	90
Total acres of land temporarily disturbed	6673	6111.7
Miles of cropland temporarily disturbed	151.3	173.4
Miles of federal land crossed	92.4	49.4
Miles of state/local land crossed	4.5	6.3
Number of land use policy/regulatory conflicts	0	0

Table S-2
(continued)
SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED
WITH THE CONSTRUCTION OF THE PGT PROJECT

Resource Area/Impact	PGT's Facilities	PG&E Facilities [a]
VEGETATION AND WILDLIFE		
Acres of wetland/riparian habitat crossed	23.5	23.7 [d]
Acres of forest temporarily disturbed	1743	888
Number of federally listed or proposed threatened or endangered plant species affected[e]	0	0
Number of federally listed or proposed threatened or endangered wildlife species affected[e]	0	3
Acres of big game habitat significantly affected[f]	150	0
Acres of upland game bird habitat significantly affected	94.5	0
Acres of waterfowl habitat significantly affected	63	4
FISHERIES		
Number of federally listed or proposed threatened or endangered fish species affected[e]	0	1
Number of anadromous fisheries crossed	3	15
Number of important spawning streams crossed	9	14
Number of important recreational fisheries crossed	14	10
SOCIOECONOMICS	NSI[g]	NSI
AIR QUALITY		
Number of new compressor stations	0	1
Number of compressor station additions	3	1
Number of compressor stations requiring PSD review	3	1
NOISE QUALITY		
Number of compressor stations exceeding 55 dBA	1	0

Table S-2
(continued)
SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE CONSTRUCTION OF THE PGT PROJECT

Resource Area/Impact	PGT's Facilities	PG&E Facilities [a]
TRANSPORTATION	NSI	NSI
PUBLIC SAFETY	NSI	NSI
CULTURAL RESOURCES		
Number of known sites within APE	155	68
Miles of significant paleontologic formations crossed	216	324
VISUAL RESOURCES		
Miles of high or moderate visual impact	66.2	UNK[h]

a Number taken from information presented in the CPUC's DEIR and FEIR.
b Includes ephemeral streams and canals. Only major intermittent streams are included.
c Only includes waterbodies with known contaminated sediments.
d Does not include vernal pool habitat.
e Numbers taken from FERC staff's Biological Assessment for the PGT/PG&E Project.
f Does not include significant beneficial impacts, or any significant impact on migration corridors.
g No significant impact.
h Unknown.

Adverse soil-related impacts that could occur along the PGT and PG&E project routes include the disturbance or conversion of prime farmland to nonagricultural uses and the disturbance of soils with a poor or poor-to-fair rehabilitation potential.

PGT and PG&E would not locate any aboveground facilities on prime farmland. Implementation of PGT's proposed mitigation measures, in conjunction with the FERC-prepared Erosion Control, Revegetation, and Maintenance Plan, would ensure that vegetation would be reestablished on all areas disturbed by construction, and that impacts associated with wind and water erosion, soil structure damage, soil compaction, and drainage alterations would not be significant. Nevertheless, adequate revegetation on some portions of the PGT project route may take several years to become reestablished due to historically low precipitation rates in the region.

Construction across perennial waterbodies, intermittent waterbodies, major rivers, and waterbodies with contaminated sediments have the greatest potential to result in adverse hydrologic- and water quality-related environmental impact. Table S-2 presents information on the impacts associated with the PGT and PG&E routes.

The potential impact on these waterbodies includes increased turbidity, sedimentation, decreased dissolved oxygen concentrations, releases of chemical and nutrient pollutants from sediments, and introduction of chemical contaminants, such as fuels and lubricants. By implementing the measures outlined in the Erosion Control, Revegetation, and Maintenance Plan, as well as the Stream and Wetland Construction and Mitigation Procedures, the majority of the above-listed impacts would be eliminated or reduced to less-than-significant levels. Where the potential exists for residual significant impacts to occur, recommendations have been made that require additional mitigation measures be implemented. However, even with the implementation of these mitigation measures it is likely that some level of increased sediment loading would continue for a short period of time after construction was completed.

The primary adverse land use-related impact present along the PGT project route involves construction activities within 50 feet of one or more residential structures. Additional land use concerns include construction across federal or state owned or managed property; potential conflict between the project and existing or planned land use designations, or government land management plans, policies, and regulations; the amount of land temporarily disturbed during construction; and the disturbance of agricultural cropland during construction (see Table S-2 for a breakdown of land use impacts).

Adverse vegetation and wildlife-related impacts associated with the construction of the PGT project include impact on wetland and riparian habitat and forested areas; disturbance of three federally listed endangered wildlife species by PG&E's nonjurisdictional facilities; and big game, upland bird, and waterfowl habitat that would be significantly affected (see Table S-2).

Construction of PGT's facilities would not affect any federally listed fish species. In addition, PGT's facilities would cross three waterbodies that support anadromous fish populations, nine waterbodies that provide important spawning habitat for fish, and 14 waterbodies that are considered to be important recreational fisheries. Meanwhile, our

Biological Assessment determined that construction of PG&E's nonjurisdictional facilities would affect one federally listed threatened fish species. Additionally, PG&E's nonjurisdictional facilities would cross 15 waterbodies that support anadromous fish populations, 14 waterbodies that provide important spawning habitat for fish, and 10 waterbodies that are considered to be important recreational fisheries.

Implementation of the FERC Stream and Wetland Construction and Mitigation Procedures would ensure that the majority of wetland-related impacts are temporary and minor, and would prevent the filling or resulting loss of any wetland acreage. Where impacts to important wildlife habitat are significant, recommendations that PGT utilize timing constraints in order to reduce these impacts to a less-than-significant level have also been made. Finally, the FERC staff has prepared a Biological Assessment (BA), as required by the Endangered Species Act (ESA), to determine whether the proposed project would affect federally listed or proposed threatened or endangered species, or their designated critical habitat. This BA also included potential impacts associated with the construction of PG&E's nonjurisdictional facilities. Based on the information developed in the BA, FERC has formulated mitigation measures to minimize impact of federally listed species as necessary, and has entered into Formal Consultation with the U.S. Fish and Wildlife Service (FWS) or the National Marine Fisheries Service where we determined that the proposed projects would affect a federally listed species.

Construction of the PGT project would not result in significant impact on socioeconomic resources. The influx of workers associated with construction of the project would not result in temporary population increases of 10 percent or more, nor would local vacancy rates for temporary housing decrease below 5 percent. In addition, construction of the PGT project would not exceed the ability of local communities and/or county governments to provide essential public services. Finally, the amount of agricultural land and commercial forest land permanently removed from production would not exceed 1 percent of the total amount available.

PGT proposes to install additional compression facilities at three existing compressor stations. All three of these additions may be significant enough to require Prevention of Significant Deterioration of Air Quality (PSD) review. Compliance with the PSD permitting process would ensure that air quality impacts are reduced to a less-than-significant level.

The primary noise-related impact associated with the PGT project involves the construction of additional compression facilities at existing compressor stations. Compressor station operational noise caused by the construction of additional compression facilities could cause a significant impact at one station on the PGT project route. Mitigation measures have been recommended that PGT must implement at this location in order to minimize this impact.

Construction of either the PGT project or PG&E's nonjurisdictional facilities would not result in adverse impact on transportation or public safety.

The potentially significant adverse impacts on cultural resources that could occur as a result of the construction of the PGT project involve the presence of NRHP listed, nominated, or eligible resources within the Area of Potential Effect (APE) (see Table S-2). The FERC is currently working with the respective SHPOs and the appropriate federal land management agencies to determine which, if any, of these sites are eligible for inclusion on the National Register of Historic Places (NRHP).

Construction of the PGT project would result in impact to numerous significant paleontologic formations (see Table S-2). Mitigation measures have been developed for the protection of paleontologic resources where such is required by federal law and where the potential for impact is considered to be high.

The PGT project would result in approximately 66.2 miles of moderate to high visual impact. PGT must implement several mitigation measures at these locations in order to reduce impacts to a less-than-significant levels.

Summary of Environmental Impact Associated with the Altamont Project

The following discussion summarizes the environmental impact associated with construction of the Altamont project. The information is presented by resource category and, where appropriate, identifies potentially significant impacts. Table S-3 presents this summary in tabular form. Because additional compression facilities would be required on Kern River's system in order to transport the Altamont gas between Opal, Wyoming and California, the environmental impact associated with these incremental facilities is also presented. These downstream facilities would be constructed within a certificated pipeline corridor which was analyzed in the EOR FEIR/FEIS, and consist of installing additional compression at two stations and construction of five new compressor stations. As a result, impacts would be limited and would not occur in all resource areas.

Geology-related impacts posing the greatest potential hazard to Altamont's pipeline include potentially active faults, areas with high liquefaction potential, and areas of landslide potential. Table S-3 presents the potential impacts associated with these hazards. Where concerns persist, additional geologic/geotechnical studies are recommended. Facility relocation and/or pipeline design criteria would adequately mitigate potential hazards to the Altamont pipeline and any new facilities proposed by Kern River.

The potential for adverse soil-related impacts is greatest wherever construction would disturb soils rated as having poor or poor-to-fair rehabilitation potentials. Additional concerns include impact to prime farmlands and the permanent conversion of prime farmland parcels to nonagricultural uses (see Table S-3).

Eight miles of the proposed route in Montana is designated as "potentially" prime farmland, depending on whether or not the parcels are irrigated. No prime farmland has been designated along the proposed route in Wyoming. Neither project would site major aboveground facilities on land designated as prime farmland. Implementation of Altamont's proposed mitigation measures, as supplemented by the FERC Erosion Control, Revegetation and Maintenance Plan, and other recommendations would ensure that all areas disturbed by construction would be revegetated, and that significant impacts associated with erosion, soil structure damage and compaction, and drainage alterations would be minimized. However, given the minimal rainfall available to most of the project area, adequate revegetation on

Table S-3

SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE CONSTRUCTION OF THE ALTAMONT PROJECT

Resource Area/Impact	Altamont Facilities	Kern River Facilities [a]
GEOLOGY		
Potential active faults crossed	0 [b]	0
Miles of liquefaction potential	7.8	0 [c]
Miles of landslide potential	3.2	0
SOILS		
Miles of prime farmland crossed	8 [d]	0
Miles of soil disturbed with poor or poor-to-fair rehabilitation potential	264	0 [e]
WATER QUALITY		
Number of perennial stream crossings	61	NR
Number of intermittent stream crossings [f]	127	NR
Number of major river crossings	9	NR
Number of waterbody crossings with contaminated sediments [g]	2	NR
LAND USE		
Number of residential structures located within 50 feet of construction right-of-way	0	0
Total acres of land temporarily disturbed	7515	50
Miles of cropland temporarily disturbed	205.8	NR
Miles of federal land crossed	206	0 [h]
Miles of state/local land crossed	60	0
Number of land use policy/regulatory conflicts	0	0

Table S-3
(continued)
SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED
WITH THE CONSTRUCTION OF THE ALTAMONT PROJECT

Resource Area/Impact	Altamont Facilities	Kern River Facilities [a]
VEGETATION AND WILDLIFE		
Acres of wetland/riparian habitat crossed	192	0
Acres of forest temporarily disturbed	10.8	20
Number of federally listed or proposed threatened or endangered plant species affected	0 [i]	0
Number of federally listed or proposed threatened or endangered wildlife species affected	0 [i]	5
Acres of big game habitat significantly affected [j]	0	10 [k]
Acres of upland game bird habitat significantly affected	0	10 [k]
Acres of waterfowl habitat significantly affected	0	0
FISHERIES		
Number of federally listed or proposed threatened or endangered fish species affected	0 [i]	NR
Number of anadromous fisheries crossed	0	NR
Number of important spawning streams crossed	8	NR
Number of important recreational fisheries crossed	14	NR
SOCIOECONOMICS	NSI [l]	NSI
AIR QUALITY		
Number of new compressor stations	6	5
Number of compressor station additions	0	2
Number of compressor stations requiring PSD review	1	5
NOISE QUALITY		
Number of compressor stations exceeding 55 dBA	0	0

Table S-3
(continued)
SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED
WITH THE CONSTRUCTION OF THE ALTAMONT PROJECT

Resource Area/Impact	Altamont Facilities	Kern River Facilities [a]
TRANSPORTATION	NSI	NSI
PUBLIC SAFETY	NSI	NSI
CULTURAL RESOURCES		
Number of known sites within APE	194	UNK [m]
Miles of significant paleontologic formations crossed	241	0 [n]
VISUAL RESOURCES		
Miles of high or moderate visual impact	32.0	UNK

a Kern River facilities include construction of five new compressor stations and installation of additional compression at two other stations. Because all facilities would be located at discrete sites, some parameters are not relevant and are therefore marked "NR".
b While the two fault systems that the Altamont route would cross are believed to be inactive, data is inconclusive.
c Liquefiable sediments are found at the preliminary location of Kern River Compressor Station No. 3 in Utah County, Utah.
d Potentially prime farmland in Montana (requires irrigation to be designated as "prime").
e Poor or poor-to-fair rehabilitation potential soils may be encountered at five of the preliminary Kern River compressor station sites.
f Includes ephemeral streams and canals. Only major intermittent streams are included.
g Only includes waterbodies with known contaminated sediments.
h The preliminary location of Kern River Compressor Station Nos. 6 and 8 is on land administered by the BLM.
i Number take from the FERC staff's Biological Assessment for the Altamont Project.
j Does not include significant beneficial impacts, or any significant impact on migration corridors.
k Kern River's Compressor Station No. 2 in Morgan County, Utah, appears to be situated in an area designated as high priority big game wintering range. Critical upland bird breeding habitat could also be significantly affected by construction at this preliminary site location. Twenty acres of impact are assumed.
l NSI=No significant impact
m UNK=Unknown
n Potentially significant paleontological resources may be encountered at the preliminary location of Kern River Compressor Station Nos. 3 and 6.

portions of Altamont's proposed right-of-way may take years. While the same may be true at several of the new Kern River compressor station sites, actual ground disturbance at these locations would be quite limited.

Construction across perennial and intermittent streams, major rivers, and waterbodies having contaminated sediments have the greatest potential to result in adverse hydrologic and water quality-related impact. Potential impacts associated with construction at these locations include a decrease in dissolved oxygen levels, an increase in turbidity and subsequent sedimentation, the opportunity to transfer pollutants sorbed on the sediments to the water column, and the accidental introduction of chemicals such as fuels and lubricants used during construction. Most of these potential impacts would be eliminated or reduced to less-than-significant levels by implementing the measures found in the Erosion Control, Revegetation, and Maintenance Plan and the Stream and Wetland Construction and Mitigation Procedures. In those instances where the potential for significant impact remains, additional site-specific mitigation, such as realignment of the proposed route, has been recommended. Nevertheless, it is likely that some level of increased sediment loading would continue for a period after construction is completed.

A major land use issue associated with establishment of a new pipeline right-of-way is the project's conformance or compliance with existing policies and regulations of governmental entities whose lands would be crossed. Other issues included the potential for conflict with existing or planned development policies, conflict with recreational areas, and whether construction would occur within 50 feet of any residential structure. Additional concerns focused on construction across federal or state owned or managed property, the total amount of land temporarily disturbed during construction, and construction disturbance to cropland. These data are presented in Table S-3.

Altamont's proposed route would not conflict with any existing policies or regulations, existing or proposed developments, or designated recreational areas. No construction activities would occur within 50 feet of any residence.

Because Kern River has not yet filed an application with the Commission to install the necessary additional compression, the new locations have only been identified preliminarily. No land use conflicts are apparent at any of the sites. There are no residences within 50 feet of any station boundary. All station sites appear to be on privately owned land except for Compressor Station Nos. 6 and 8 which would be located on land administered by the BLM. Although Kern River would acquire between 20 and 50 acres for each compressor station, actual land disturbance would be limited to about 50 acres altogether.

Adverse vegetation- and wildlife-related impacts associated with Altamont's project involve construction impact on wetland and riparian habitat and forested areas, and disturbance of federally listed candidate plant species or their habitat. Table S-3 summarizes impacts in these categories. No federally listed or proposed threatened or endangered species or their habitat would be affected by the project.

Kern River's incremental facilities have the potential to affect five federally listed or proposed threatened or endangered animal species. Additionally, Kern River's Compressor Station No. 2 appears to be situated in an area designated as high priority big game wintering range. Critical upland bird breeding habitat could also be significantly affected by construction at this preliminary site location. No waterfowl habitat would be significantly affected by any of the incremental facilities.

Altamont's facilities would cross eight rivers that provide important spawning habitat for fish and 14 waterbodies that are considered to be important recreational fisheries. Six other fish species of special concern to Montana could be affected.

Implementation of the FERC Stream and Wetland Construction and Mitigation Procedures, in conjunction with recommendations for minor realignments at several areas, would ensure that the majority of wetland-related impacts are temporary and minor. These measures would prevent the filling or resulting loss of any wetland acreage and minimize disturbance to riparian vegetation. Where impacts to important wildlife habitat are significant, timing constraints in order to reduce these impacts to less-than-significant levels have been recommended. In addition, FERC prepared a BA, as required by the ESA, to determine whether the proposed project would affect federally listed or proposed threatened or endangered species, or their designated critical habitat. On April 2, 1991, the USFWS concurred with our conclusions in the BA that the construction of the Altamont Project is not likely to adversely affect the endangered bad eagle, peregrine falcon, whooping crane, pallid sturgen, or black-footed ferret. Therefore, formal consultation with the USFWS for the Altamont Project will not be necessary. Based on the information developed in the BA, mitigation measures to avoid impact on federally listed or proposed species were formulated.

Construction of the Altamont Project would not result in significant impact on socioeconomic resources. While the Altamont workforce would make demands on available temporary housing and possibly strain local governments' capacity to provide basic public services, this impact would be temporary and limited to the construction period. The influx of workers associated with the project would not result in temporary population increases of 10 percent or more along any construction spread, nor would temporary housing vacancy rates in the project area decrease below 5 percent. And with the exception of small parcels needed to accommodate aboveground facilities (i.e., six compressor stations, 31 mainline valves, and the Opal Meter Station), no agricultural land would be permanently removed from production. No commercial forestland would be affected by the Altamont project.

Altamont proposes to construct six compressor stations. Of the six, only the Wild Horse Compressor Station in northern Montana would be considered a major emission source, requiring a PSD review of its air quality impact. Compliance with the PSD permitting process would ensure that air quality impacts are reduced to a less-than-significant level. PSD review of air quality impacts would be required at four of Kern River's five new compressor stations and one of its existing stations where additional compression would be needed.

The only potentially significant noise-related impact associated with Altamont's proposal involves operation of the six new compressor stations. Although sufficient distance for noise attenuation appears to be available between all proposed station locations and the nearest noise sensitive areas (NSAs), recommendations that Altamont conduct additional analyses to verify that proposed noise controls perform as projected have been made. The FERC would also require Kern River to conduct appropriate noise analyses at all of its compressor stations where compression would be necessary to transport the Altamont gas volumes and to include these analyses for review as part of any application to construct the incremental facilities.

Construction of the Altamont Project would not result in adverse impact on transportation systems or public safety.

Significant adverse impacts on cultural resources that could occur as a result of Altamont's proposed construction involve the potential for encountering NRHP-listed, nominated, or eligible resources within the APE. To date, Altamont has conducted a background literature search that identified previously recorded cultural and historic resources within 1,000 feet of the proposed route. Information on the potential impacts to cultural resources is presented in Table S-3. In addition, an updated SHPO file search has been conducted for both the proposed route and the South Pass Route Variations in Wyoming. Little of the proposed route, however, has been previously surveyed. FERC is currently working with the respective SHPOs and the appropriate federal land management agencies to review a work plan for surveying those portions of the route which have not been previously surveyed, and for identifying and evaluating resources encountered for NRHP eligibility. As lead federal agency for the project, we are responsible, under the National Historic Preservation Act (NHPA) and its implementing regulations, for Section 106 compliance. This process is designed to mitigate adverse effects on cultural resources.

The Altamont project would cross or pass in close proximity to approximately 241 miles of formations that contain potentially significant paleontologic resources. Mitigation measures have been developed for the protection of significant paleontologic resources where such is required by federal law, and where the potential for impact is considered to be high. A similar approach will be implemented at such time as Kern River files an application to construct its incremental facilities.

Construction of the Altamont project would involve crossing approximately 32 miles of land designated as moderate to highly sensitive to visual impact. In order to reduce visual impact to a less-than-significant level, mitigation measures have been recommended that Altamont implement at locations sensitive to long-term effects of pipeline construction.

Summary of Environmental Impact Associated with the South Pass Route Variations

The following discussion summarizes the environmental impacts associated with construction of the Altamont project along each of the four South Pass Route Variations, and contrasts these impacts with those which would occur along the proposed route. Table S-4 presents this summary in tabular form.

Table S-4

SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE SOUTH PASS ROUTE VARIATIONS

Resource Area/Impact	Proposed Route	Jeffrey City	Alkali Butte	Northern Utilities	Route 28
Pipeline Length, Miles	192	231	226	243	192.5
GEOLOGY					
Potential active faults crossed [a]	0	0	0	0	2
Miles of liquefaction potential	0	0	0	0	0
Miles of landslide potential	0.7	0	1.0	1.0	1.1
SOILS					
Miles of prime farmland crossed	0	0	0	0	0
Miles percent of soil disturbed with poor or poor-to-fair rehabilitation potential	107 (56%)	139 (60%)	145 (64%)	155 (64%)	107 (56%)
WATER QUALITY					
Number of perennial stream crossings	18	7	6	7	17
Number of intermittent stream crossings [b]	42	48	31	47	40
Number of major river crossings	1	1	1	1	1
Number of waterbody crossings with contaminated sediments [c]	2	0	0	0	2
LAND USE					
Number of residential structures located within 50 feet of construction right-of-way	0	0	0	0	0
Total acres of land temporarily disturbed	2327	2803	2733	2939	2333
Miles of cropland temporarily disturbed	5.6	0	<1	<1	5.8
Miles of federal land crossed	113.1	199.8	160.3	166.0	152.3
Miles of state/local land crossed	9.7	13.5	10.6	13.0	11.1
Number of land use policy/regulatory conflicts	0	0	0	0	1

Table S-4
(continued)
SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED
WITH THE SOUTH PASS ROUTE VARIATIONS

Resource Area/Impact	Proposed Route	Jeffrey City	Alkali Butte	Northern Utilities	Route 28
Miles (percent) parallel to existing rights-of-way	66 (35%)	227 (98%)	163 (73%)	215 (89%)	73 (38%)
VEGETATION AND WILDLIFE					
Acres of wetland/riparian habitat crossed	36.4	29.4	44.8	45.6	39.2
Acres of forest temporarily disturbed	0	0	0	0	11.8
Number of federally listed or proposed threatened or endangered plant species affected	0	0	0	0	0
Number of federally listed or proposed threatened or endangered wildlife species affected	0	0	0	0	0
Acres of big game habitat significantly affected [d]	0	0	0	0	0
Acres of upland game bird habitat significantly affected	0	0	0	0	0
Acres of waterfowl habitat significantly affected	0	0	0	0	0
FISHERIES					
Number of federally listed or proposed threatened or endangered fish species affected	0	0	0	0	0
Number of anadromous fisheries crossed	0	0	0	0	0
Number of important spawning streams crossed	3	1	1	1	3
Number of important recreational fisheries crossed	6	2	2	2	6
SOCIOECONOMICS	NSI [e]	NSI	NSI	NSI	NSI

Table S-4
(continued)
SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED
WITH THE SOUTH PASS ROUTE VARIATIONS

Resource Area/Impact	Proposed Route	Jeffrey City	Alkali Butte	Northern Utilities	Route 28
AIR QUALITY					
Number of new compressor stations	2	3	3	3	2
Number of compressor station additions	0	0	0	0	0
Number of compressor stations requiring PSD review	0	0	0	0	0
NOISE QUALITY					
Number of compressor stations exceeding 55 dBA	0	0	0	0	0
TRANSPORTATION	NSI	NSI	NSI	NSI	NSI
PUBLIC SAFETY	NSI	NSI	NSI	NSI	NSI
CULTURAL RESOURCES					
Number of known sites within 1 mile	296	370	284	368	313
Miles of significant paleontologic formations crossed	117	117	117	117	117
VISUAL RESOURCES					
Miles of high or moderate visual impact	30.8	0.4	0.6	0.6	36.9
Estimated capitol cost increase over proposed route (million of dollars)	--	37.5	36.1	46.6	7.65

a Only the Route 28 Variation would cross faults thought to be active in Holocene times. Fault systems crossed by the remaining routes are believed to be inactive, but data is inconclusive.
b Includes ephemeral streams and canals. Only major intermittent streams are included.
c Only includes waterbodies with known contaminated sediments.
d Does not include significant beneficial impacts, or any significant impact on migration corridors.
e No significant impact (NSI).

Of the four variations and the proposed route, only Route 28 would cross geologic faults known to be active during Holocene times. Adoption of this variation would therefore pose a significant hazard to the pipeline at two locations. The Jeffrey City, Alkali Butte, and Northern Utilities Variations would cross five, six, and six fault systems, respectively, while the proposed route would cross two. While all are considered inactive, data are inconclusive and further study is recommended at the identified fault crossings if one of the route variations ultimately is adopted.

Use of the Alkali Butte, Northern Utilities, and Route 28 Variations would all involve about one mile of routing across ancient landslides or potentially unstable slopes, compared to 0.7 mile on the proposed route. No landslide-prone areas were identified along the Jeffrey City Variation. Again, further study is recommended if one of the variation is adopted.

The Jeffrey City, Alkali Butte, and Northern Utilities Variations would disturb more poor and poor-to-fair rehabilitation potential soils than would the proposed route; about 139, 145, and 155 miles, respectively. Mileage of soils with these potentials for both the proposed route and the Route 28 Variation would be 107 miles. While all of the routes under review would involve disturbance to poor rehabilitation potential soils, the additional amounts associated with the Jeffrey City, Alkali Butte, and Northern Utilities Variations would be significant and are a result of the substantial increase in pipeline length required by these variations. Mitigation to restore vegetation and minimize impact has been proposed by the applicant and recommended by staff.

The proposed route and the Route 28 Variation would require 18 and 17 perennial stream crossings, respectively, compared with seven, seven, and six perennial stream crossings for the Jeffrey City, Northern Utilities, and Alkali Butte Variations. Only the proposed route and the Route 28 Variation would cross streams known to have contaminated sediments. Although testing at the crossing locations has not yet been conducted, it is recommended and would be required by state and federal authorities prior to issuance of crossing permits.

Only the Route 28 Variation would encounter a land use conflict. Between RT MPs 510.3 and 521.2, this variation would cross the South Pass Area of Critical Environmental Concern (ACEC) in an area designated for avoidance by major utilities in the BLM's Lander District Resource Management Plan (RMP). None of the other routes reviewed would conflict with any existing policies or regulations, existing or proposed developments, or designated recreational areas.

All four of the route variations would parallel, within 0.25 mile, existing rights-of-way for a larger percentage of their respective total lengths than the proposed route. The Jeffrey City Variation would parallel existing right-of-way for approximately 227 miles (98 percent); Alkali Butte, 163 miles (73 percent); Northern Utilities, 215 miles (89 percent); and Route 28, 73 miles (38 percent). The proposed route would parallel existing right-of-way for 66 miles (35 percent).

The Jeffrey City, Alkali Butte, and Northern Utilities Variations would disturb substantially more acres of land during construction than the proposed route. Use of these variations would temporarily disturb 2,803, 2,733, and 2,939 acres of land, respectively, compared with 2,327 and 2,333 acres along the proposed route and Route 28 Variation. This increased disturbance is directly proporational to the additional mileage associated with each of these variations.

The only unique vegetational impact associated with construction along any of the five routes under review involves disturbance to forested areas. In this regard, the Route 28 Variation would temporarily disturb almost 12 acres of forest, compared with essentially none along any of the other routes. This impact would be long-term. The Northern Utilities, Alkali Butte and Route 28 Variations would cross the greatest acreage of wetland/riparian habitat (at about 46, 45 and 39 acres each), while the Jeffrey City Variation would cross the least (at about 29 acres). The proposed route falls almost halfway between the extremes at about 36 acres of wetland/riparian habitat crossed.

No federally listed threatened or endangered species would be potentially affected by construction along any of the five routes under review. All four variations and the proposed route would cross the same two streams important for fish spawning. The proposed route and Route 28 Variation would cross the largest number of recreational fishery streams at six, followed by two streams each on the Jeffrey City, Alkali Butte, and Northern Utilities Variations.

Because use of the Jeffrey City, Alkali Butte, or Northern Utilities Variations would significantly increase the length of the proposed route, all three would require that an additional compressor station be constructed to maintain the proposed delivery volumes and pipeline pressure at the Opal interconnection with the Kern River System.

In order to provide a set of comparable cultural resource data for the proposed route and the South Pass Route Variations, an updated file search was undertaken in October, 1990 and March, 1991. This information was provided by the Wyoming SHPO and was based on both a computer search and a manual search of all relevant files of known sites by Township, Range and Section. This file search revealed that within a mile, 370 sites were present along the Jeffrey City Variation, 284 sites were present along the Northern Butte Variation, 368 sites were present along the Northern Utilities Variation and 133 sites were present along the Route 28 Variation. This compares with 296 sites present along the proposed route.

The Route 28 Variation would involve the most miles of lands designated as moderate-to-highly sensitive to visual impact of any of the routes under review, totaling 36.9 miles. Based on information presently available, use of the Jeffrey City, Alkali Butte, and Northern Utilities Variations would reduce the miles of land designated moderate-to-highly sensitive visual impact to less than one. Between MPs 428 and 620, the proposed route would cross 30.8 miles of land considered sensitive to visual impact.

SOUTH PASS ROUTE CONCLUSIONS

The driving force for our consideration of alternatives to Altamont's proposed route between MPs 428 and 620 has been the potential for significant, long-term adverse impact to "the South Pass area." While public comments received prior to release of the Draft EIS largely focused on this area, very few commentors provided specific examples or illustrations of how construction of the pipeline would result in significant impact to specific features. Without attempting to summarize the many comments received, those most critical of the proposed route frequently cited the "pristine" nature of the Oregon-Mormon Trail in the area where it crosses the Continental Divide (the historic "South Pass") and referenced the many historical sites (e.g., Pacific Springs, South Pass and Atlantic Cities, Miners Delight, Fort Stambaugh, Willie's Handcart, and others) that would be damaged or degraded by construction through the area. As a result, four alternatives to the proposed route between MPs 428 and 620 have been reviewed.

The previous discussion and Table S-4 indicates that three of the four alternatives (the Jeffrey City, Alkali Butte, and Northern Utilities Variations) would substantially increase the length of the Altamont route. This fact is reflected in the increased acreage of total land disturbed by construction, and by the need to construct an additional compressor station in order to maintain the proposed gas delivery pressure. These route variations would also involve disturbance to significantly more miles of soils with poor or poor-to-fair rehabilitation potentials. Proposed and recommended mitigation measures would minimize impact along whichever route was selected. However, even with the best efforts at mitigation, more land disturbance and more poor reclamation soils equate to more sediment mobilization, erosion, and water quality impact until revegetation is accomplished.

Other resource areas where differences between the proposed route and the variations are noteworthy include the number of stream crossings, number of crossings having potentially contaminated sediments and the miles of land designated high or moderately sensitive to visual impact. While perennial stream crossings are a legitimate concern, impact associated with this activity is largely controllable through proper timing and construction/restoration practices. Timing and use of specialized construction practices would also remedy the issue of contaminated sediments, if testing substantiates this concern at the proposed crossing locations. These measures have either been proposed by Altamont or are recommended as certificate conditions. All five routes have only one major waterbody crossing, the Green River.

Both the proposed route and the Route 28 Variation cross more miles of land designated as moderate to highly sensitive to visual impact than the Jeffrey City, Alkali Butte, or Northern Utilities Variation. Our use of this parameter recognizes the sensitivity of the South Pass area and the potential to significantly alter its "feeling" through uncontrolled or poorly planned activities. From a relative standpoint, the Route 28 Variation would cross more lands sensitive to visual impact than the proposed route, while the other three variations would cross less.

As a result of our preliminary findings made during preparation of the Draft EIS and the concerns which continue to be expressed about this issue, we implemented a program to reanalyze the potential visual impacts of Altamont's proposal on the South Pass area and develop appropriate mitigation to reduce or eliminate these impacts. This program included an additional field investigation (which subsequently resulted in Altamont's November 1990 realignment of the proposed route between the Sweetwater River and the Fremont-Sublette County line in Wyoming), negotiations with Altamont to refine its proposed action and mitigation, and the development of additional mitigation which we are recommending.

This effort resulted in a substantial refinement of the construction plans outlined in Altamont's application, which includes Altamont's commitment to implement specific construction and rehabilitation measures in the South Pass area. (These measures are discussed in chapters 4B and 4L, and presented in Appendix B-5.) It also lead to Altamont's realignment of the proposed route in the viewshed where the route would originally have descended from the Continental Divide, and crossed the South Pass National Historic Landmark (NHL) and the Oregon-Mormon Trail. Although this viewshed is presently riddled with unimproved two-track roads, a two-pole overhead electrical powerline, a buried AT&T cable right-of-way (marked by large metal poles at intervals of about 1,000 feet), an abandoned (although still quite prominent) railroad grade, and SR 28, it was nevertheless considered sensitive and the object of much public concern. We believe that the mitigation now developed would reduce visual impacts to less-than-significant levels.

We must also consider our responsibilities under the NHPA. This requires that a federal licensing agency give consideration to the effect which a proposed action would have on properties listed or eligible for listing in the NRHP. While this process is under way, it will not culminate until well after the Final EIS is issued. Nevertheless, we believe that the area's cultural resources can be protected through well-defined procedural mechanisms which are underway. The vast majority of known cultural sites in the area are spatially discrete. Minor route realignments are generally quite effective in preserving the integrity of such sites. This approach is already apparent in Altamont's realignment of the proposed route to avoid the South Pass NHL. For the area's major linear feature (the Oregon-Mormon Trail), one mitigating strategy is to cross the trail in a previously disturbed location. We believe that crossing where the Trail and SR 28 intersect, coupled with a bored crossing and the implementation of other construction/restoration measures to which Altamont has committed would provide adequate protection for this resource.

The Route 28 Variation deserves an additional comment. If the impetus for this variation was concern for cultural/historic resources, then we question how routing the pipeline significantly **closer** to major historical sites and through a BLM ACEC (designated for the protection of historical resources and three NRHP-listed sites) improves on the proposed route. Further, its relative visual impact would be greater because of its proximity to SR 28 and major tourist sites served from SR 28. Although fewer perennial streams would be crossed, the crossing of Willow Creek would require development of special construction and restoration plans to mitigate impact. This variation would require a substantial amount of blasting, and almost 12 acres of forest to be cleared for construction. We therefore do not agree that the Route 28 Variation would offer any advantage over the proposed route. Public comment on the Draft EIS appears to support this conclusion.

Substantial public comment was received on the Draft EIS. We have carefully considered all comments (see Comments/Responses Volume of this FEIS) and made numerous changes to the EIS, including the addition of new material. At this juncture, we are confident that the Altamont proposal, as modified by this EIS, could be constructed and operated in an environmentally acceptable fashion. However, we note that some segments of the public are vehemently opposed to any consideration of routing a utility through the South Pass "area". (The "area" is often defined as a circle centered on South Pass City with a radius of almost 40 miles, which was the focus of the Wyoming Recreation Commission's January 1990 South Pass Heritage Area Master Plan.) This position is evident in a number of the comment letters received on the Draft EIS. Unresolved concerns include the proposed project's impact on visual and historic resources, and the resultant potential to adversely affect further tourism development. While our analysis found that construction between MPs 511-541 would result in long-term visual impact (more than 3 years), we believe that this impact would be similar in appearance to other existing human disturbances such as roads, rail, and existing rights-of-way in this area until restoration is completed. Altamont has proposed a sophisticated impact mitigation and right-of-way rehabilitation plan for the South Pass area. This plan will be further refined during the BLM's Plan of Development process. If the mitigation which Altamont proposes and other recommended mitigation is implemented, we feel that visual impact on the South Pass area would be reduced to less-than-significant levels. As previously stated, compliance with Section 106 of the NHPA would protect the area's historic resources. We therefore disagree with the position that the only acceptable route is one which avoids the South Pass area altogether and follows one of the route variations, as does the BLM who administers the majority of this land (see below).

In light of the analysis presented in this EIS and the mitigation which has been developed (either by Altamont, the FERC staff, or one of the other federal or state land managing agencies) and would be imposed on Altamont, we see no reason to recommend the adoption of one of the South Pass Route Variations. We believe that the environmental impacts associated with the proposed route would not outweigh the environmental disadvantages associated with any of the four alternative routes, not to mention the significant engineering and economic penalties which adoption of the Jeffrey City, Alkali Butte, or Northern Utilities Variation would involve.

BLM Conclusions Regarding the South Pass Route Variations

At the request of the Rock Springs and Rawlins BLM Districts, the EIS analyzed three route variations to the South Pass portion of Altamont's proposed route. While sentiment exists favoring the Jeffrey City Variation for reasons including that it avoids South Pass and parallels existing rights-of-way to a greater degree, it is the official determination of the BLM that Altamont's proposed route (with the realignments recommended by the FERC staff) represents the BLM preferred alterative. The proposed route, as modified, is not inconsistent with the current planning decisions of the affected BLM resource areas. Inclusion of the FERC staff's recommended mitigation measures in combination with any BLM right-of-way conditions and compliance with all applicable local, state, and federal laws and regulations would result in an environmentally acceptable project. Where performance standards, mitigation measures, and right-of-way grant conditions are properly employed and enforced, the proposed route would not result in environmental impacts exceeding those that would occur under any of the route variations.

ENVIRONMENTAL STAFF CONCLUSIONS

The conclusions and recommendations presented herein are those of the staff of the FERC. This EIS evaluates the environmental impact associated with the construction of two natural gas pipeline projects - the PGT/PG&E project and the Altamont project.

The FERC can take three basic actions on an application for a Certificate of Public Convenience and Necessity. It can grant the certificate, grant the certificate with conditions, or deny the certificate. Alternatives considered that would avoid the need to construct the PGT and/or Altamont project(s) include no action and energy alternatives. The No-Action Alternative assures that the FERC would not grant a Certificate of Public Convenience and Necessity for a proposed project. In this instance where two discrete applications are involved, the FERC could deny authorization of either one or both projects under the No-Action Alternative.

If the FERC denied authorization to PGT, then its jurisdictional portion of the PGT/PG&E project would not be constructed. It is assumed that the lack of upstream facilities would have the effect of avoiding construction of the PG&E nonjurisdictional portion of the project as well. As a result, FERC denial of PGT's authorization would not only avoid the construction and operational impacts associated with PGT's portion of the project, but also those associated with PG&E's portion.

In the case of Altamont, FERC denial of the requested authorization would prohibit construction of Altamont's proposed project. Should Kern River in the future propose to expand its system capacity to accommodate gas volumes by Altamont over the 700 MMcf/d for which it is currently certificated, denial here would effect this expansion. Construction and operational impacts associated with both of these actions would therefore not occur.

If neither of the proposed projects was constructed, the projected increased need for energy services in the Pacific Northwest and California markets that each project would serve may not be met by the increased access to Canadian supplies of natural gas. This would result in one of the following two scenarios: either alternative projects would be implemented to meet part or all of the projected need, or no action would be taken to meet the projected need. If additional supplies of Canadian natural gas were not made available, existing energy sources would continue to be used, and Canadian natural gas would not be available to supplement these sources or for fuel switching. The impacts associated with construction and operation of one or both of the proposed projects would not occur. The benefits of increased gas use in attaining air quality standards for California in the future could be effected if other fuels, such as oil, were used instead of gas.

The potential would also exist for energy demand to exceed available supply, thus driving up energy prices and exerting an indirect limiting effect on growth. This could result in either positive or negative impacts on resources, depending on how policymakers and end users deal with a curtailment in future natural gas availability. Indirect impacts on biological resources may be positive in that future land disturbance would be curtailed. If, on the other hand, alternative projects were implemented, each would result in its own set of specific impacts which would be greater than those associated with the current proposals. It would be purely speculative and therefore beyond the scope of this EIS to attempt to predict what actions may be taken by policymakers or end users in response to the No-Action Alternative. The assessment of impacts associated with these scenarios would also be speculative.

Review of the environmental consequences associated with not building the PGT and/or Altamont project does not extend in this EIS to the customer's need for service and the potential need to construct potentially related pipeline facilities. These issues will be addressed by the Commission at such time as it considers the entirety of each proposal, including such areas as markets, transportation rates, adequacy of gas supply, urgency of the project, the need for competition, and environmental effects, depending on the appropriateness of these issues at that time.

At a hearing held on January 16, 1991, these non-environmental issues were considered by the Commission for both projects and preliminary determinations were issued respectively on January 17, 1991 and January 22, 1991 for the Altamont and PGT projects. In both orders, the Commission concluded that the issuance of certificates to Altamont and PGT, on the basis of all non-environmental issues, would be in the public convenience and necessity. Final orders upon completion of the FEIS will address all environmental and appropriate non-environmental aspects of the projects. Certificates will then be issued if the Commission, in accordance with Section 7(c) of the NGA and NEPA, determines that the proposed new facilities and services of each project continue to be required by the public convenience and necessity. This phased approach to consider the applications promotes administrative efficiency and ensures timely and effective consideration of potential certificates. Also, as evidenced in both preliminary determinations and this FEIS, the Commission's ultimate decision does not preclude the examination of alternatives and route variations.

System alternatives considered to the PGT/PG&E and Altamont Projects include the Mojave, Kern River, Joint Mojave/Kern River, and WyCal I and II Projects, as well as the PGT and Altamont Projects as originally proposed by the two applicants. In view of our conclusions regarding the environmental acceptability of both proposals, as modified by our recommended mitigation measures, we have determined that none of the system alternatives presented in Chapter 2 (including the original proposals by PGT and Altamont) would be preferable to the proposals developed in this FEIS.

Alternative sites for aboveground facilities also were considered in the evaluation of both projects. We concluded that the proposed site locations for aboveground facilities with our recommended mitigation measures would be acceptable and would result in minimal impact on the surrounding area.

Alternative pipeline alignments were identified and evaluated where construction of either project would result in residual significant impacts on environmental resources, even after the implementation of our conventional mitigation measures, and where reasonable alternative route alignments were available. Environmental resources which necessitated the development and evaluation of alternative route alignments and alternative site locations included geology, water resources, wetlands, wildlife, fisheries, cultural resources, and visual resources. The Draft EIS actively solicited comments and suggestions regarding the need for, and the environmental impacts associated with, the construction of alternative route alignments. All comments were considered and assessed by the staff in this Final EIS.

Information provided by the applicants and further developed from field investigations, literature research, alternatives analysis, and contacts with federal, state, and local agencies, public interest groups, and individual members of the public indicates that construction of the proposed PGT project and/or Altamont project would result in a limited, although in some cases significant, adverse environmental impact. Most of this impact would occur during the construction period. However, based on the information contained in this document, we have concluded that assuming that the FERC finds that the projects remain in the public convenience and necessity, both of the proposed projects would be environmentally acceptable if they are constructed and operated in accordance with our recommendations.

Several important factors were considered closely in our determination. A major consideration was the extent to which we were able to recommend modifications to the proposed pipeline alignments or develop mitigation which minimized impact on wetlands, visual resources, historic areas, threatened or endangered species, sensitive stream crossings, and other areas of concern. In addition, we have developed, in conjunction with other federal cooperating agencies, a clearly defined, standardized set of construction procedures for stream and wetland crossings that would significantly reduce the impact of pipeline construction on these valuable resources. Specific erosion control, revegetation, and right-of-way maintenance procedures have also been developed and recommended.

The FERC staff's responsibility in this proceeding is to identify significant environmental impacts so that these can be considered in the Commission's decisionmaking process. As part of our analysis, we have developed mitigation measures, including additional studies, that we believe to be appropriate and reasonable for the construction and operation of the natural gas pipeline facilities to proceed. We believe that these measures would significantly reduce the environmental impact that would result from construction of either project as proposed. Where additional studies are recommended, significant impacts would either be avoided or mitigated to non-significant levels. Our determination of environmental acceptability would therefore be unaffected by the outcome of the recommended studies, which typically results in further site-specific mitigation and further reduction of impacts. We are recommending that these measures be attached as conditions to any certificate(s) issued by the Commission.

Chapter 1. Introduction

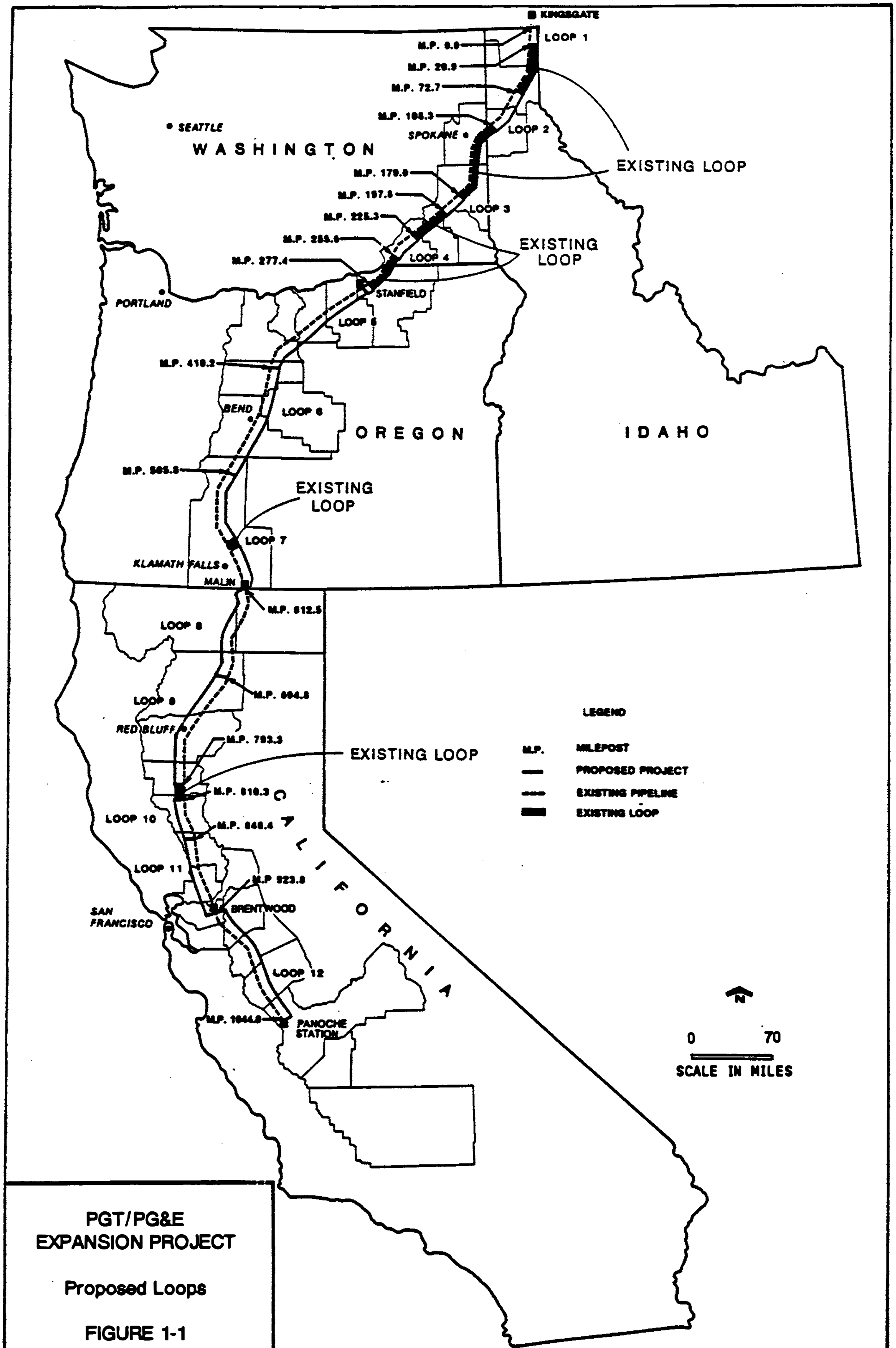
The Federal Energy Regulatory Commission (FERC) has prepared this environmental impact statement (EIS) to assess the environmental effects of two proposals to transport natural gas from Canada to southern California: the Pacific Gas Transmission Company/Pacific Gas and Electric Company (PGT/PG&E) Pipeline Expansion Project and the Altamont Gas Transmission Company (Altamont) Project.

FERC is the lead federal agency for preparation of the Final EIS in compliance with the requirements of the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1500-1508). Agencies which cooperated with the FERC included the U.S. Bureau of Land Management, the U.S. Forest Service, the U.S. Army Corps of Engineers (Omaho District), the U.S. Department of Energy, and the State of Montana.

Approximately 750 copies of the Final EIS are being circulated to various federal, state, and local government agencies, elected officials, environmental groups and organizations, universities, local libraries, private citizens, applicants, and environmental intervenors to the FERC's proceeding. In addition, approximately 1,400 copies of an Executive Summary are being sent to property owners directly affected by the projects, as well as some 600 summaries to other environmental groups, organizations, and the media. Those receiving the Executive Summary will have the opportunity to request the Final EIS while supplies last. Due to the length of the list of names and addresses receiving the Final EIS, the list is available for viewing at the California Public Utilities Commission (CPUC) in San Francisco, California, the FERC in Washington, D.C., and the Environmental Protection Agency (EPA) in Washington, D.C. The Final EIS itself is also available for viewing at the CPUC, EPA, and FERC.

BACKGROUND

On January 24, 1989, PGT filed an application with FERC in Docket No. CP89-460-001 for a Certificate of Public Convenience and Necessity to construct and operate pipeline facilities in Idaho, Washington, and Oregon. On April 14, 1989, PG&E filed an application (No. 89-04-033) with the CPUC requesting a Certificate of Public Convenience and Necessity to construct and operate pipeline facilities in California. Together, the two companies would individually construct and operate facilities in order to jointly transport gas from Canada to southern California. The joint project is called the PGT/PG&E Pipeline Expansion Project (Figure 1-1).



PGT/PG&E EXPANSION PROJECT

Proposed Loops

FIGURE 1-1

On October 3, 1989, PGT filed an application (Docket CP90-1-000) under Section 3 of the Natural Gas Act for a Presidential Permit to locate, construct, operate, connect, and maintain pipeline facilities on the International Boundary between the State of Idaho and Kingsgate, British Columbia for the purpose of importing natural gas into the United States (U.S.) from Canada. PGT proposes to install 42-inch outside diameter (OD) pipeline on both sides of the International Boundary. On the U.S. side, this pipe will connect with PGT's existing Compressor Station No. 3 approximately 2.5 miles from the border. On the Canadian side, this pipe will connect with a new 42-inch OD pipe of Alberta Natural Gas Company Ltd/Foothills Pipeline (South B.C.) Ltd system approximately 118 feet from the existing Kingsgate Meter Station just north of the International Boundary.

PGT/PG&E proposes to construct 845 miles of pipeline from the Canada-U.S. border at Kingsgate, British Columbia, through Idaho, Washington, Oregon, and California to PG&E's Panoche Metering Station in Fresno County, California (Figure 1-1 and the Map Volume). The gas would be obtained from the Alberta Natural Gas Company, Ltd. (ANG). The proposed pipeline would be constructed primarily parallel and adjacent to (looping) an existing PGT/PG&E pipeline and would be constructed within the existing PGT/PG&E right-of-way for approximately 87 percent of the proposed route.

Annually, the PGT/PG&E project would transport an average of 903 million cubic feet per day (MMcf/d) of natural gas, including 148 MMcf/d delivered to the Pacific Northwest and 755 MMcf/d delivered to southern California. The PGT portion of the pipeline would include those sections of the pipeline in Idaho, Washington, and Oregon. The PG&E portion of the proposed pipeline would begin at the Oregon-California border and extend to the Panoche Metering Station. Construction of portions of the proposed pipeline project would begin in mid-1992, and operation would begin in November 1993.

On July 21, 1989, Altamont filed an application with FERC in Docket No. CP89-1851-000 for a Certificate of Public Convenience and Necessity to construct and operate 620 miles of pipeline from the US-Canadian border near Port of Wild Horse, Montana to Opal, Wyoming (Figure 1-2 and the Map Volume). The pipeline system would be capable of transporting 700 MMcf/d of natural gas between Canada and Opal, Wyoming. The gas would then be delivered to facilities owned and operated by Kern River Gas Transmission Company (Kern River) who has a FERC certificate to construct and operate natural gas pipeline facilities from Opal, Wyoming to southern California. Construction of the Altamont pipeline would begin in early 1993, and operation would begin in December 1993. On May 15, 1990, Altamont modified its proposal in Docket No. CP89-1851-002 to permit the delivery of 719 MMcf/d to the Kern River system; the additional 19 MMcf/d would be used as fuel by Kern River to deliver the gas for ultimate use by the California markets. This application (CP89-1851-002) has since been dismissed by the FERC and superseded by Docket No. CP90-1375-000.

On May 15, 1990, Altamont filed companion applications with FERC in Docket No. CP90-1373-000 and CP90-1374-000 for a Presidential Permit to locate, construct, operate, and maintain pipeline facilities on the International Boundary between the state of Montana and Wild Horse, Alberta, Canada for the purpose of importing natural gas into the United States from

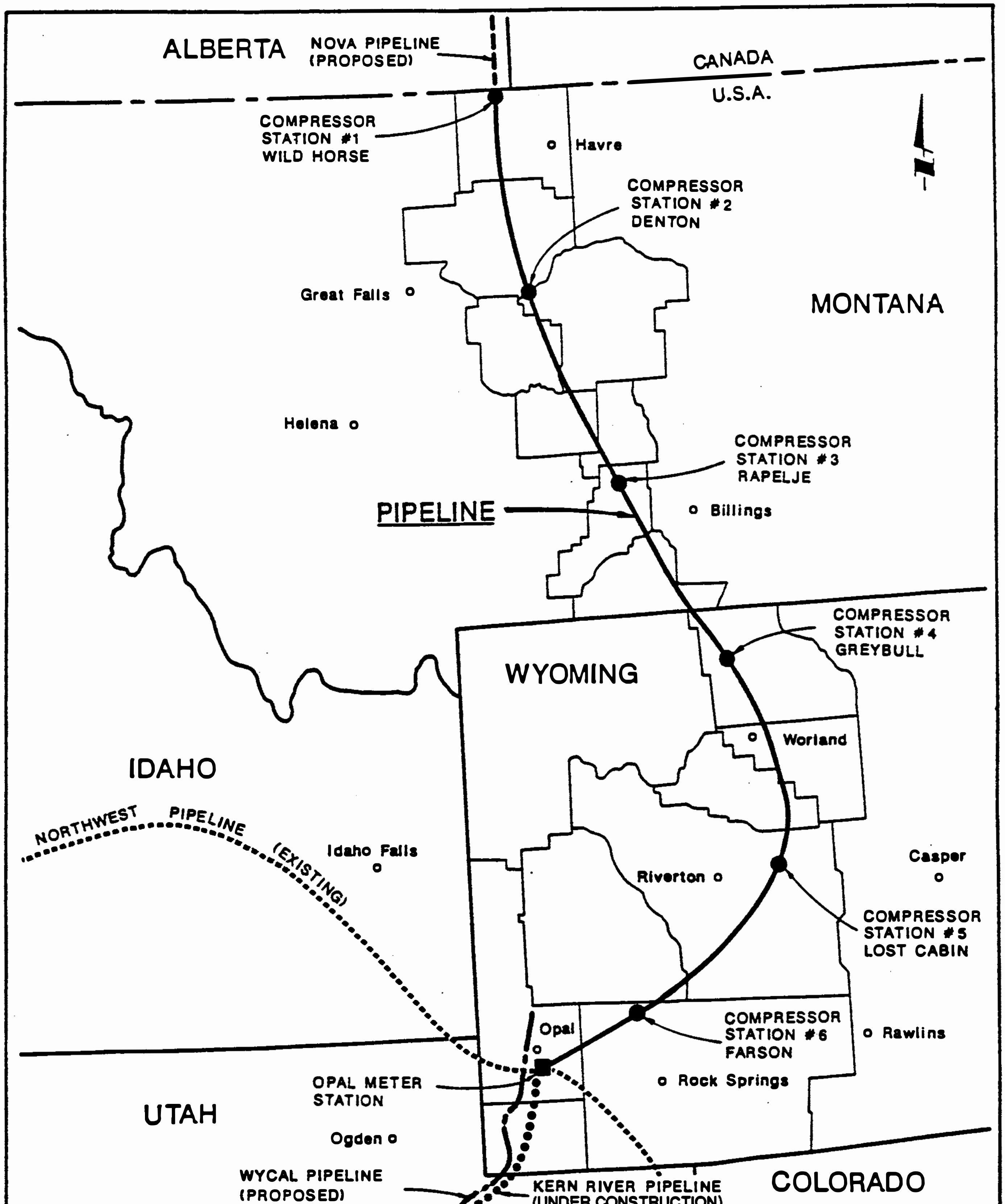


FIGURE 1-2. PROJECT LOCATION - ALTAMONT NATURAL GAS PIPELINE PROJECT

Canada. Altamont proposes to construct a 30-inch OD pipeline on both sides of the InternationalBoundary. On the Canadian side, Altamont facilities will interconnect with facilities owned and operated by NOVA Corporation of Alberta (NOVA).

Additionally, on May 15, 1990, Altamont filed an application with FERC in Docket No. CP90-1375-000 for an Optional Certificate of Public Convenience and Necessity (OC) to 1) construct and operate the identical facilities applied for in Docket No. CP89-1851-000 (as modified by CP89-1851-002) from the Montana/Canadian border to Opal, Wyoming, and 2) transport natural gas on an open-access basis for local distribution companies (LDCs), gas producers, marketers, end-users, and others. OCs are different than the "traditional" certificates issued by FERC and are discussed later in this chapter. Also, on May 15, 1990, Altamont filed a companion application with FERC in Docket No. CP90-1372-000 for a blanket Certificate of Public Convenience and Necessity authorizing it to provide transportation service between Port of Wild Horse, Montana to a point of interconnection with the facilities of Kern River at Opal, Wyoming.

PURPOSE OF THE PROPOSED PROJECTS

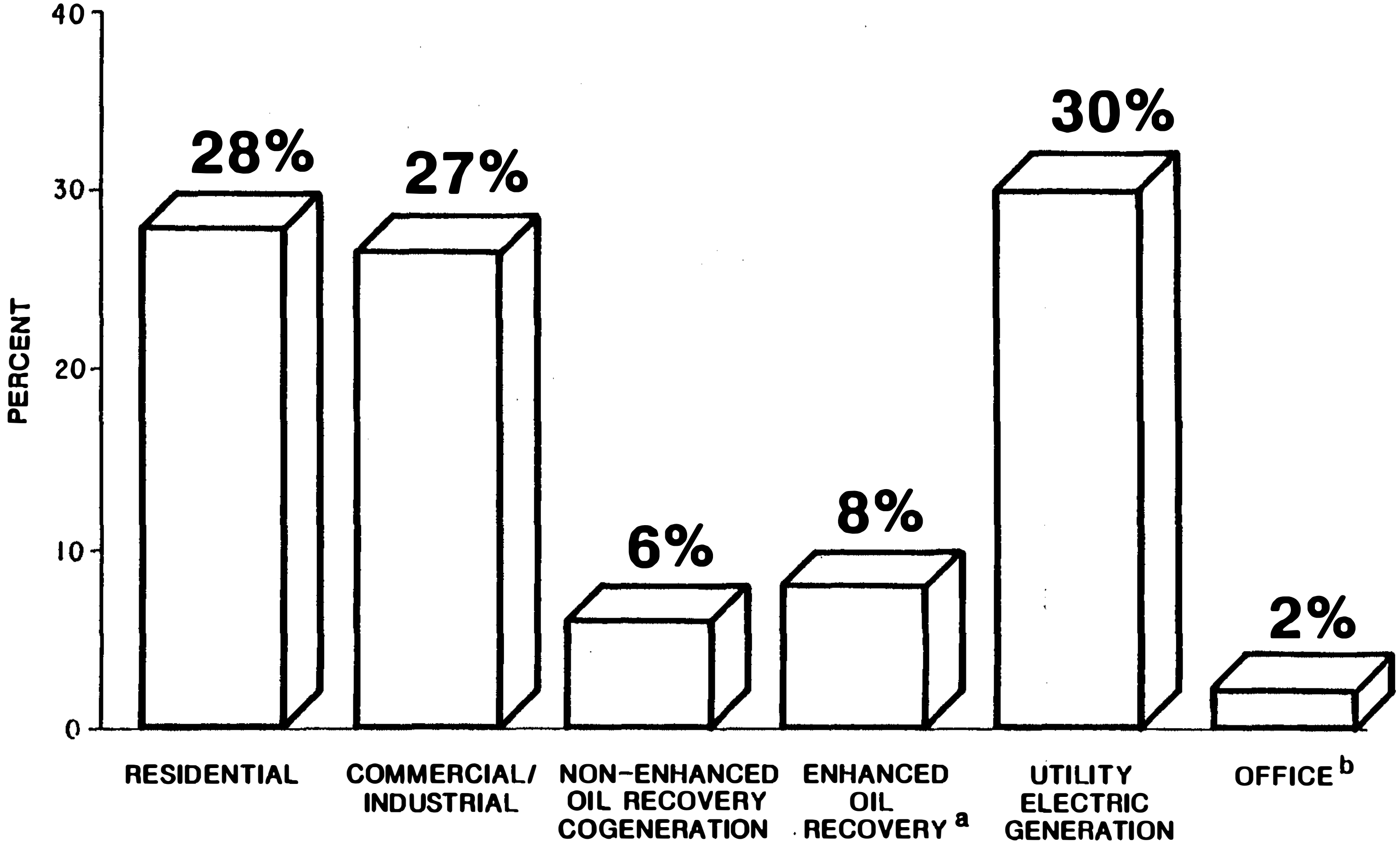
The PGT/PG&E and Altamont projects are proposing to provide a long-term, firm supply of 755 and 700 MMcf/d, respectively, of natural gas from Canada to LDCs, power generation facilities, electric utilities, industrial gas users, and enhanced oil recovery (EOR) operations throughout southern California. PGT/PG&E's proposal also includes transporting 148 MMcf/d of natural gas from Canada to customers in the Pacific Northwest.

NEED FOR THE PROPOSED PROJECTS

California's Natural Gas Demand

Table 1-1 outlines the historic natural gas demand in California by market sector for 1984-1988. Figure 1-3 illustrates the percent of natural gas demand by market sector for 1988. The largest market segments are commercial/industrial, utility electric generation (UEG), and residential segments, each representing approximately 30 percent of demand. The fastest growing market segments are EOR and non-EOR cogeneration. Together, these segments make up more than 10 percent of current statewide demand. In EOR processes in Kern County, California, natural gas is used to generate steam that is used for underground injection to enhance the extraction of heavy oil.

A forecast of California's gas requirements through 2000 is shown in Table 1-2. This forecast is derived from the 1989 California Gas Report, which is prepared by California gas and electric utilities for long-range planning. This forecast shows a need for an additional 561 MMcf/d of natural gas between 1990 and 1995.



NOTE: Total 1988 Natural Gas Demand = 4,907 MMcf/d

a Includes Associated Cogeneration Demand

b Gas Company Use and Unaccounted for Volumes

FIGURE 1-3. COMPOSITION OF 1988 CALIFORNIA NATURAL GAS DEMAND BY MARKET SHARE

Table 1-1

CALIFORNIA GAS DEMAND BY MARKET SECTOR
(MMcf/d)

Market Sector	1984	1985	1986	1987	1988
Residential	1,300	1,455	1,255	1,377	1,353
Commercial/Industrial	1,258	1,337	1,301	1,442	1,346
Nonenhanced Oil Recovery Cogeneration	44	81	104	90	288
Enhanced Oil Recovery [a]	10	84	151	261	374
Utility Electric Generation	1,511	1,746	1,161	1,683	1,458
Other [b]	143	104	121	155	88
Total	4,266	4,807	4,093	5,008	4,907

[a] Includes associated cogeneration demand
[b] Gas company use and use that is unaccounted for

Source: California Gas Report, 1989

Table 1-2

CALIFORNIA GAS DEMAND FORECASTS FOR 1990-2000 (MMcf/d)

Market Sector	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Residential	1,368	1,378	1,388	1,400	1,410	1,422	1,432	1,448	1,463	1,478	1,492
Commercial/Industrial	1,180	1,157	1,153	1,144	1,148	1,157	1,163	1,170	1,176	1,184	1,192
Nonenhanced Oil Recovery Cogeneration	470	518	526	532	538	544	550	555	559	564	569
Enhanced Oil Recovery *	541	571	604	621	648	649	647	649	651	654	656
Utility Electric Generation	811	767	860	901	1,024	1,010	1,191	1,254	1,316	1,351	1,385
Wholesale	348	420	441	455	475	494	516	537	558	555	551
Gas Company Use and Use Unaccounted For	116	115	125	117	119	119	133	130	127	127	127
Total	4,834	4,926	5,097	5,170	5,362	5,395	5,632	5,732	5,850	5,913	5,972

Note: The forecast assumes that average-temperature and weather conditions will prevail in California throughout the 1990-2000 period.

* Includes associated cogeneration.

Source: California Gas Report, 1989.

CPUC, in its order instituting investigation (CPUC, 1990), analyzed the long-term trends in the California natural gas market and the interstate natural gas pipeline supply and capacity available to California. On February 7, 1990, in Decision 90-02-016, CPUC concluded that an additional 900 MMcf/d of natural gas services would be needed in California by 1995. This estimate is based on average requirements in a cold-temperature year plus a 10-percent margin of total demand, or about 500 MMcf/d, to provide enhanced service for noncore customers and to provide slack capacity to enable LDCs and end users to purchase low-price gas when available. Using this method, CPUC also concluded that California would have an estimated need of between 1,600 and 2,100 MMcf/d by 2005.

California's Natural Gas Supply

In addition to producing its own gas, California receives its gas supplies from the southwest United States, Canada, and the Rocky Mountain area (Table 1-3). The southwest United States has traditionally been the mainstay of California's gas supply; it provides over 60 percent of the total California supply. This gas originates primarily in west Texas, New Mexico, and the Texas Panhandle-Oklahoma region.

Table 1-3

HISTORIC GAS SUPPLIES IN THE CALIFORNIA MARKET (MMcf/d)

Market Sector	1984	1985	1986	1987	1988
Southwest	2,711	2,912	2,298	3,075	3,069
Canada	738	1,056	865	1,147	1,262
California	746	767	779	703	643
Rocky Mountains	39	30	38	15	4
Net Storage	32	45	14	68	-71
Total	4,266	4,810	3,994	5,008	4,907
Source: California Gas Report, 1989					

The current interstate pipeline systems that supply natural gas to California include the PGT/PG&E pipeline from the Canada-U. S. border, the El Paso Natural Gas Company (El Paso) pipeline from the Colorado-New Mexico area, and the Transwestern Pipeline Company (Transwestern) pipeline from Texas. The capacity of the current interstate pipeline systems is 4,657 MMcf/d. The firm-delivery capacity of the PGT system is 1,066 MMcf/d at the Oregon-California border. The certificated capacity of the El Paso interstate system at the California-Arizona border is 2,890 MMcf/d. The capacity of the Transwestern system is 750 MMcf/d.

Canada is California's second largest supply source, accounting for one-fourth of its total gas supply. California producers are the third largest supply source. In-state producers supplied 643 MMcf/d in 1988, which is about 13 percent of the state's gas requirements. Roughly one-half of the in-state supply consists of gas produced and consumed in northern California. Onshore production of gas in southern California accounts for 32 percent of the in-state supply. Southern California receives additional volumes of gas from oil production platforms located in federal offshore waters.

Recent Curtailments in California. Curtailments of gas service occurred to noncore customers in southern California during winter 1987-1988, summer 1988, winter 1988-1989, winter 1989-1990, and again in winter 1990-1991. Curtailments of gas service to noncore customers in northern California also occurred during winter 1988-1989, winter 1989-1990, and winter 1990-1991. A summary of recent statewide curtailments as reported in the 1990 California Gas Report is shown in the following table. These events have focused attention on whether present gas service is sufficient to meet California energy needs.

RECENT GAS CURTAILMENT IN CALIFORNIA
(MMcf)

Calendar Year	Northern California	Southern California	Total
1987	4,745	4,015	8,760
1988	31,025	14,235	45,260
1989	29,200	59,860	89,060

The 1987-1988 winter curtailment by Southern California Gas Company (SoCal) affected service to more than 800 major customers, including all utility electric generation (UEG) noncore customers on the SoCal system and a large number of industrial end users. During this period, SoCal was curtailed by both El Paso and Transwestern because of supply shortages. SoCal received both sales and transportation services from PG&E. PG&E's assistance prevented further curtailments in southern California.

The 1988 summer curtailment in southern California required partial interruptions in service by SoCal to UEG noncore customers. SoCal implemented the curtailment to divert gas supplies to its underground storage fields so that the reservoirs could be brought up to levels necessary to enter the 1988-1989 winter heating season. In February 1989, SoCal instituted a supply curtailment to UEG noncore customers and Priority 2B-4 noncore customers. SoCal sought a supply emergency declaration from CPUC and instituted a partial-capacity curtailment of gas to UEG noncore customers during March 1989 to facilitate increases in gas storage.

Air Quality Considerations

Gas use in California will be affected by the continued tightening of air quality controls. This will have the greatest impact on southern California, which has some of the most serious air pollution problems in the nation. To promote attainment of federal air quality standards by 2007, the South Coast Air Quality Management District (SCAQMD), which is responsible for maintaining an acceptable level of air quality in the densely populated South Coast Air Basin, recently adopted an ambitious air quality management plan.

SCAQMD'S 20-year plan is designed to bring the area into compliance with federal air quality standards. In addition, Assembly Bill (AB) 2595 (the California Clean Air Act) requires that each air district prepare a plan showing how it will attain state air quality standards by the "earliest practicable date." AB 2595 also requires that nonattainment areas reduce emissions (of nonattainment area pollutants) by 5 percent per year, using 1987 as the base year. The requirements of AB 2595 have not yet been incorporated into SCAQMD's plan.

SCAQMD's 20-year plan includes increasingly stringent restrictions on diesel and other petroleum fuels from all stationary sources. While these rules do not specifically prohibit the use of petroleum fuels, they require industry to meet emission limits that are based on emissions from natural gas combustion. In May 1990, SCAQMD adopted Rule 431.2, which limits the sulfur content of fuels to 0.05 percent. While not specifically excluding petroleum fuels, Rule 431.2 will force industries to use either extremely low sulfur petroleum fuels or natural gas.

SCAQMD is also developing a Best Fuels Standard, which will require that all stationary sources meet emission limits based on the use of natural gas fitted with emission controls. Although this regulation will not specifically exclude the use of petroleum fuels, it will force firms that wish to burn petroleum fuels to control emissions beyond the control levels required for natural gas.

CPUC AND FERC CERTIFICATION PROCESSES

CPUC Certification Process

Under Sections 1001 et seq. of the California Public Utilities Code, CPUC is responsible for determining whether a public utility's proposed plant facilities or transportation services in California are in the public interest. Before a public utility begins construction, the project applicant is usually required to obtain a Certificate of Public Convenience and Necessity. An application for a certificate must be filed with CPUC in accordance with its rules of practice and procedure. The applicant must provide CPUC with certain information. The applicant should demonstrate that the public welfare would be served by the project, that the operation is financially sound and able to provide the proposed service, and that the project would not unreasonably interfere with the operation of a nearby or competing public utility.

Because applicants are subject to the California Environmental Quality Act (CEQA), an environmental review of an application must also be conducted. In the case of the PGT/PG&E project, CPUC must prepare and adopt an environmental impact report (EIR) for the PG&E

segment of the PGT/PG&E project prior to acting on the Certificate of Public Convenience and Necessity. Through formal hearings held at the same time as the environmental review process, CPUC will resolve nonenvironmental issues, including economic justification and benefits, cost recovery, effect on core and noncore ratepayers, enhancement of transportation reliability, and market demand and need. On November 27, 1990, Administrative Law Judge Lee of the CPUC issued a proposed decision recommending certification. The CPUC issued a certificate of public convenience and necessity authorizing the construction and operation of PG&E's facilities on December 27, 1990.

FERC Certification Process

Under Section 7 of the Natural Gas Act [15 USC 717(c)], FERC is responsible for determining that interstate natural gas transportation facilities are in the public interest. If FERC determines that there is or will be a need for a proposed service, it will issue a Certificate of Public Convenience and Necessity authorizing the construction and operation of a proposed project. Environmental impacts are also an important and integral part of the overall determination. A certificate is granted only if FERC finds that the evidence produced on technical competence, financing, rates, market demand, gas supply, existing facilities and service, environmental impacts, long-term feasibility and other issues demonstrate that a project or projects are required by the public convenience and necessity.

As part of its Order No. 436 program, FERC has adopted regulations for OCs. The goals of the OC program, as stated by FERC in its notice of proposed rulemaking (Docket No. RM85-1-000), are:

- to provide the full benefits of competition to consumers by facilitating easier access to services,
- to ensure the most efficient scale for facilities by removing certification as a barrier to entry, and
- to provide incentives for competition where none exists by maximizing the use of alternative market access for producers and consumers.

A pipeline is eligible for an OC if its proponents agree to provide nondiscriminatory, open access transportation under an Order No. 436 blanket certificate, and if the proposed rates for the service are designed so that no inappropriate costs are borne by the pipeline's customers.

The basic premise of the OC regulations is that a project can be presumed to be in the public convenience and necessity if the applicant has assumed the full risk of the project or successfully negotiated the sharing of that risk. The provisions for an OC, namely the rate conditions and the filing requirements, are tied to that premise. No market or gas supply data are required to be filed by an OC applicant, which are required for traditional Section 7 applications.

The PGT portion of the PGT/PG&E Project is a traditional Section 7 application and therefore is required to include market and gas supply data. Altamont's remaining application was filed under the OC program, and as such, does not require market and gas supply data. The proponents of some of the alternatives to the two proposed projects, which are discussed in Chapter 2, have already received certificates under FERC's OC program.

At a hearing held on January 16, 1991, these non-environmental issues were considered by the Commission for both projects and preliminary determinations were issued respectively on January 17, 1991 and January 22, 1991 for the Altamont and PGT projects. In both orders, the Commission concluded that the issuance of certificates to Altamont and PGT, on the basis of all nonenvironmental issues, would be in the public convenience and necessity. A final order(s) upon completion of this EIS will address all environmental aspects of the projects. Certificates will then be issued if the Commission, in accordance with Section 7(c) of the NGA and NEPA, determines that the proposed new facilities and services of each project continue to be required by the public convenience and necessity. This phased approach to consideration of the applications promotes administrative efficiency and ensures timely and effective consideration of certificates. Also, as evidenced in this Final EIS, it does not preclude the examination of alternatives and route variations.

COMPLIANCE WITH CEQA AND NEPA

On June 13, 1989, CPUC and FERC entered into a memorandum of understanding (MOU) to combine their efforts to prepare a joint EIR/EIS in accordance with CEQA and NEPA for the proposed PGT/PG&E Project. At the same time, Altamont was preparing to file its application with FERC. CPUC and FERC therefore agreed to include the Altamont Project in the proposed joint EIR/EIS so that both projects could be evaluated at the same time for administrative efficiency. No conclusion should be drawn that because the two projects are being studied together, the projects are competitive with each other. Until the markets are developed for each project, such a conclusion cannot be made. At the present time, the two projects are at different developmental stages -- PGT is fully subscribed and Altamont is still developing its marketing and signing up customers.

On August 8, 1989, CPUC issued a notice of preparation (NOP), as required under CEQA, to all agencies and persons likely to be interested in the PG&E segment of the PGT/PG&E project. The notice described the PGT/PG&E and Altamont projects and explained the scope of the proposed Draft EIR/EIS. On August 14, 1989, FERC published a notice of intent (NOI) in the Federal Register (54 FR 33272) to prepare a joint EIR/EIS for the PGT/PG&E and Altamont projects and announced tentative scoping meeting dates and locations. Notification of the schedule for public meetings to be held jointly with CPUC on the proposed projects was published by FERC in the Federal Register (54 FR 36855) on September 5, 1989.

From June 1989, when the MOU was signed, the two agencies worked jointly preparing the initial chapters of a joint EIR/EIS. In May 1990, it was decided that for regulatory purposes each agency would prepare its own environmental document for separate use by each respective agency. In essence, the baseline environmental data collected to that date would still be used jointly by both agencies; however, each agency would conduct its own independent analysis of the baseline data, and reach its own independent conclusions and recommendations. On June 29, 1990, the CPUC issued its Draft EIR for public comment. Local public meetings to receive comments on the Draft EIR were held in California. On November 19, 1990, the CPUC issued its Final EIR.

The FERC staff intends to eliminate duplication between NEPA and State efforts, as encouraged by Sections 1506.2, 1506.3, and 1506.4 of the CEQ regulations for implementing NEPA, by incorporating by reference the CPUC EIR which addressed the PG&E portion of the PGT/PG&E project. This mechanism for avoiding repetition and eliminating duplication was one of the provisions of the MOU, as amended on October 9, 1990. In addition to the CPUC EIR, the FERC staff intends to incorporate by reference several of the EISs previously prepared by the FERC for the various EOR projects which have received certificates from FERC and/or are considered potential alternatives to the proposed projects being discussed in this EIS. The CPUC EIR and the various EOR EISs/EAs are readily available, and those readers interested in reviewing the affected environment and environmental impact chapters of those documents are invited to do so. Those sections are not being reproduced or summarized in this EIS, although the summary impact tables from the EOR Final EIS/Supplement are reproduced in Appendix A of this EIS. Each of the project descriptions presented in the EOR FEIS/Supplement will, however, be summarized in this EIS. The reader will therefore be able to identify each project along with associated impacts identified in Appendix A.

As discussed above, the PG&E portion of the PG&E/PGT project constitutes a "project" under CEQA. The facilities proposed by PG&E are not jurisdictional facilities under FERC but are under CPUC's jurisdiction. Under normal procedures, if these nonjurisdictional facilities have been approved or are in the process of detailed review at the state or local level, the FERC staff would limit its review of these facilities. Such is the case here, where the CPUC is conducting the "hard look" as required by both CEQA and NEPA over these facilities. However, as required by the Endangered Species Act of 1973, as amended (ESA) and the National Historic Preservation Act (NHPA), the FERC staff will still address in this EIS the potential indirect effects on federally listed or proposed threatened and endangered species, and cultural resources associated with these nonjurisdictional facilities.

The Commission is obligated by statute to consider the potential impact of a proposed pipeline project on federally listed endangered and threatened species. Under the U.S. Fish and Wildlife Service (FWS) regulations implementing the ESA (50 CFR Part 402), the Commission is required to ensure that certificated projects are not likely to jeopardize the continued existence of federally listed endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. This requirement extends to related nonjurisdictional projects.

The Commission is also required to evaluate the potential for historic and cultural resources to be adversely affected. Section 106 of the NHPA requires the Commission to take into account the effects of the proposed project on properties included in or eligible for listing in the National Register of Historic Places (NRHP) and, before issuing final approval of the project, to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on the project. The regulations implementing the NHPA (36 CFR Part 800) also require the Commission to consider the impact of nonjurisdictional projects that are directly related to the jurisdictional proposal.

Based upon the above discussion, the FERC staff herein incorporates the CPUC Final EIR as it relates to the PG&E facilities, and alternatives within California. This will eliminate duplication of this information in this document. The FERC staff is not incorporating any discussion in the CPUC EIR of the facilities proposed outside California. Such facilities, and alternatives to interstate facilities, are the subject matter of this FERC EIS. With the exception of the two limited issues described above, the readers should direct any comments with respect to the facilities within California to the CPUC. The staff does not intend to use this EIS to resurrect old issues which the CPUC has jurisdiction over, nor entertain comments on old issues which appropriately belong before the CPUC. The staff also notes that the CPUC approved the PG&E portion of the project on December 27, 1990.

In order to minimize confusion between the CPUC EIR and the FERC EIS, the CPUC limited the circulation of its EIR outside California and the FERC is circulating its EIS primarily outside California. The only FERC exceptions are that the FERC EIS is being sent to the California State Clearinghouse and federal agencies within California for their information and their use via the federal process. The CPUC has also stated in the MOU that mitigation adopted by the CPUC shall only apply to impacts identified in California.

USE OF THE EIS

This EIS is intended to provide decision makers and the public with information regarding the environmental effects of construction, operation, and maintenance of the PGT/PG&E and Altamont projects, possible ways to reduce or avoid those effects, and alternatives to the proposed project. In compliance with NEPA, this EIS also discloses significant environmental effects that cannot be avoided; effects found to be non-significant; growth-inducing impacts; significant cumulative impacts of the projects considering past, present, and reasonably anticipated future projects; and mitigation measures that would avoid or reduce significant impacts.

This EIS will also be used by various responsible agencies in approving all or portions of the proposed PGT/PG&E and Altamont projects and issuing authorizations necessary to implement the projects. (See "Permit, Approval and Consultation Requirements" below.) Agencies in California that will use the CPUC's EIR include CPUC, the California State Lands Commission (CSLC), several California regional water quality control boards, the California Department of Transportation, and a variety of local and regional agencies. State and local agencies in Idaho, Washington, Oregon, Montana, and Wyoming may use this EIS, as appropriate, in approving the projects and issuing authorizations.

As stated previously, the following federal and state agencies cooperated with the FERC staff in the preparation of this EIS:

- o U.S. Army Corps of Engineers (Omaha District)
- o U.S. Bureau of Land Management
- o U.S. Forest Service
- o U.S. Department of Energy[1/]
- o State of Montana

PERMIT, APPROVAL, AND CONSULTATION REQUIREMENTS

Table 1-4 presents those international, federal, state, regional, and county permits, authorizations, and regulations that would apply to the proposed projects. Permit and regulation information for the PGT project is provided for local and regional jurisdictions in Idaho, Washington, and Oregon. The CPUC EIR addresses permit and regulation information for the PG&E segment in California. Permit and approval requirements in Montana and Wyoming for the Altamont project are also listed in Table 1-4.

SCOPE OF THE EIS

As previously stated, on August 8, 1989, CPUC issued a NOP, as required under CEQA, to all agencies and persons likely to be interested in the PG&E segment of the PGT/PG&E project. The notice described the PGT/PG&E and Altamont projects and explained the scope of the proposed Draft EIR/EIS. On August 14, 1989, FERC published a NOI to prepare a joint EIR/EIS for the PGT/PG&E and Altamont projects and announced tentative scoping meeting dates and locations. Notification of the schedule for public meetings to be held jointly with CPUC on the proposed projects was published by FERC on September 5, 1989.

The intent of the public scoping meetings was to allow state and local governments and the general public an opportunity to provide information regarding the range of environmental issues and concerns that should be addressed in the Draft EIR/EIS.

1/ The Department of Energy is a cooperating Agency in the preparation of this EIS. Section 19(c) of the Natural Gas Act (NGA) applies to DOE's action of authorizing import/export of natural gas. Section 19(a) of the NGA provides that any person, State, Municipality, or State Commission aggrieved by order issued in a proceeding under the NGA in which they are a party, may apply for a rehearing of the decision within 30 days after the issuance of the order. CFR part 590, subpart E, provides the guidance for making such a request for rehearing of any of the final orders issued in conjunction with this EIS.

Table 1-4

PERMIT, APPROVAL, AND CONSULTATION REQUIREMENTS FOR THE PROPOSED PGT AND ALTAMONT PROJECTS

Agency	Permit/Authority	Agency Action
INTERNATIONAL		
International Boundary Commission	Boundary commission permission	Grant permission for pipeline and related facilities to cross the Canada-U.S. border.
U.S. GOVERNMENT		
Advisory Council on Historic Preservation (ACHP)	Section 106, National Historic Preservation Act (NHPA)	Participates in consultation under Section 106 for all project features that may potentially affect cultural resources that are either eligible for listing or listed in the National Register of Historic Places (NRHP).
U.S. Army Corps of Engineers (COE)	Section 404 (Clean Water Act) individual permits	Consider issuance of Section 404 individual permits for the placement of dredge or fill material in Waters of the United States. This permit is applicable to any physical feature or activity that results in the placement of fill or dredge material in Waters of the U.S. The U.S. Environmental Protection Agency (EPA) would advise COE regarding permit issuance.
	Section 404 (Clean Water Act) nationwide permits	Confirm the applicability of Section 404 nationwide permits for the placement of dredge or fill material in a water of the United States. This permit could apply to any physical feature or activity that results in the placement of fill or dredge material in Waters of the U.S. EPA would advise COE regarding permit issuance.
	Section 10 permit (Rivers and Harbors Act of 1899)	Consider issuance of Section 10 permits for the pipeline crossing of navigable waters.
U.S. Department of the Interior Bureau of Land Management (BLM)	Rights-of-way grant and use permit under Section 28 (Mineral Leasing Act) (Altamont only)	Grant rights-of-way and issue temporary use permits under Section 28 of the Mineral Leasing Act for the portions of the project that would encroach on BLM lands.
	Temporary use permit	Renew temporary use permit for temporary activities in a construction right-of-way. The project was issued a temporary use permit in 1985. The renewal would be valid for 3 years. The state director of BLM is the authorized project officer and would issue the renewal.
	Amend the U.S. Department of the Interior right-of-way grant (PGT only)	Consider issuance of a federal right-of-way grant for permanent pipeline right-of-way requirements on BLM lands.

Table 1-4
(continued)
PERMIT, APPROVAL, AND CONSULTATION REQUIREMENTS FOR THE PROPOSED PGT AND ALTAMONT PROJECTS

Agency	Permit/Authority	Agency Action
Bureau of Land Management (BLM) (continued)	Notice to proceed	Following issuance of the right-of-way grant, the project applicant must prepare site-specific impact analyses and must recommend mitigation measures as necessary (i.e., plans and programs). Once BLM approves the plans and programs, it will issue a notice to proceed with all project development activities.
	Antiquities and cultural resources use permit	Consider issuance of antiquities and cultural resources use permit to excavate or remove cultural resources on federal lands under FLPMA and ARPA, as necessary during site preparation activities.
	Consultation	Approve detailed Construction, Operation, Rehabilitation, and Environmental Protection Plan.
U.S. Department of the Interior Bureau of Reclamation (USBR)	Review authority in consultation with BLM and applicant.	Review construction, land use, and rehabilitation plans. Provide mitigating measures and stipulations to BLM to be included in right-of-way grant. Conduct onsite inspection prior to construction.
	Perpetual license for canal and electric transmission line crossing	Grant special land use licenses for the pipeline and access road crossing of canals, electric transmission lines, and BLM lands.
	Easement for irrigation district crossing	Grant special land use license for the pipeline crossing of the Hermisson Irrigation District in the Pacific Northwest region in Idaho.
U.S. Department of Defense and U.S. Air Force	Review authority	Review construction plans to ensure that trenching would not disturb buried cables connecting minuteman missile silos in northern Montana.
U.S. Department of Energy	Natural Gas Act Import License	Consider issuance of a license to import Canadian gas, which is dependent upon adoption of the FERC's EIS.
U.S. Department of the Interior, Bonneville Power Administration	Encroachment permit	Issue an encroachment permit for pipeline and access road crossing of the electrical transmission line.
U.S. Department of Transportation, Federal Highway Administration	Encroachment permits	Consider issuance of permits for pipeline and access road crossing of federally funded highways.
U.S. Department of Treasury, Bureau of Alcohol, Tobacco, and Firearms	Permit	Consider issuance of permits to purchase, store, and use explosives for site preparation during pipeline construction.

Table 1-4
(continued)
PERMIT, APPROVAL, AND CONSULTATION REQUIREMENTS FOR THE PROPOSED PGT AND ALTAMONT PROJECTS

Agency	Permit/Authority	Agency Action
EPA, Region 10	National Pollution Discharge Elimination Systems (NPDES) permits	Review and issue NPDES permit for discharge of hydrostatic test water in Idaho (the only state where permitting authority has not been delegated to the affected state).
EPA	Section 309 (per Clean Air Act)	Ensure the environmental impact statement and the project comply with Section 309 of the Clean Air Act with regard to pipeline construction and operation activities.
Federal Communications Commission	License for fixed microwave stations and service	Grant a license to operate industrial radio service for fixed microwave stations and service.
Federal Energy Regulatory Commission	Certificate of Public Convenience and Necessity	Determine whether the construction and operation of a natural gas pipeline project is in the public interest.
U.S. Department of the Interior Fish and Wildlife Service (USFWS)	Section 7, Endangered Species Act (ESA)	Provide biological opinion on species of wildlife and plants that are federally listed. This act would apply to all project features that may affect federally listed species or their habitats.
	Section 10, ESA, permit for incidental taking of federally listed threatened, endangered, or candidate species, if necessary.	Consider issuance of a permit for the incidental take of federally listed species, for project features and activities that may require the incidental take of federally listed species.
U.S. Forest Service (FS) and BLM	Consultation and concurrence	Concur with BLM pipeline and access road right-of-way grant and notices-to-proceed prior to issuance for FS lands.
FS	Special use permits	Consider issuance of special use permits for construction activities outside the pipeline right-of-way and construction of related facilities as defined by 43 CFR Subpart 2880 for FS lands.
IDAHO		
Idaho Department of Health and Welfare, Air Quality Bureau (review authority) and EPA (permit authority)	Prevention of Significant Deterioration (PSD) permit and related air quality permits	Consider issuance of air quality construction and operation permits, including PSD permits, where required for project facilities that would emit air pollutants in certain quantities.
Idaho Department of Water Resources (DWR), Northern District	Permit	Consider issuance of a permit to alter stream channels for all portions of the project that would physically affect stream channels.
Idaho DWR	Permit to appropriate water	Consider issuance of a permit to appropriate hydrostatic test water.

Table 1-4
(continued)
PERMIT, APPROVAL, AND CONSULTATION REQUIREMENTS FOR THE PROPOSED PGT AND ALTAMONT PROJECTS

Agency	Permit/Authority	Agency Action
Idaho Office of State Historic Preservation	Consultation under Section 106 of the NHPA	Consult with project applicants and FERC regarding impacts on cultural resources that are either listed, or eligible for listing, on the NRHP.
Idaho State Lands Commission	Easement approval	Consider issuance of an easement for the Moyie River crossings.
Boundary County Planning and Zoning Department	Conditional use permit	Consider issuance of a conditional use permit for a material storage site.
Kootenai County engineering and technical staff	Conditional use permit	Consider issuance of a conditional use permit for a material storage site.
WASHINGTON		
Washington Department of Ecology	SEPA review process	Act as lead state agency for purposes of the State Environmental Policy Act. Consider the impact of projects which may potentially result in significant impacts to resources within the state.
	PSD permit	Consider issuance of air quality construction and operation permits, including PSD permits, where required for project facilities that would emit air pollutants in certain quantities.
	Permit to appropriate water	Consider issuance of a permit to appropriate hydrostatic test water.
	NPDES permit	Review and issue NPDES permit for discharge of hydrostatic test wastewater.
Office of Historic Preservation	Consultation under Section 106, NHPA	Consult with project applicants and FERC regarding impacts on cultural resources that are either listed, or eligible for listing, on the NRHP.
Whitman and Walla Walla Counties	Washington Shoreline Management Act, Shoreline Management Program, and shoreline management substantial development permit	Counties would issue shoreline crossing permits for activities involving shoreline or streambed disturbance on Union Flat Creek (Whitman County) and the Walla Walla River (Walla Walla County).
Walla Walla County Planning Department	Conditional use permit	Consider issuance of a conditional use permit for a material storage site.
Whitman County Department of Public Works	Conditional use permit	Consider issuance of a conditional use permit for a material storage site.
Consolidated Irrigation District	Easement	Consider issuance of an easement grant for drainage or canal crossings for access roads and the pipeline.

Table 1-4
(continued)
PERMIT, APPROVAL, AND CONSULTATION REQUIREMENTS FOR THE PROPOSED PGT AND ALTAMONT PROJECTS

Agency	Permit/Authority	Agency Action
OREGON		
Oregon Department of Environmental Quality	NPDES permit	Consider issuance of a permit for discharge of hydrostatic test water.
Oregon Division of State Lands	Easement	Consider issuance of an easement grant for the John Day River crossing by the pipeline.
Oregon Game Commission	Letter of approval	Prepare letter of approval for stream crossings by access roads and the pipeline.
Oregon Office of Historic Preservation	Consultation under Section 106, NHPA	Consult with project applicants and FERC regarding impacts on cultural resources that are either listed, or eligible for listing on the NRHP.
Oregon Department of Water Resources	Section 401 Certification (Clean Water Act)	Consider issuance of a permit for appropriation of water used in hydrostatic testing.
Oregon Department of Fish and Wildlife	In-Water Blasting Permit	Assures that adequate safeguards will be taken to protect fish life during blasting operations.
Oregon Department of Parks and Recreation	Change Land Use, or Engage in Regulated Activities Within the Oregon Scenic Waterways System	Consider issuance of a permit for a John Day River crossing.
Oregon Division of State Lands	Submerged/Submersible Land Easement	In addition to considering an easement to cross the John Day River, DSL will consider an easement to cross the Lost River and Williamson River.
	Permit for Removal or Filling in Scenic Waterways	Consider issuance of a joint permit with the Portland District Corps of Engineers for the John Day River crossing.
Umatilla County Planning Department	Conditional Use Permit	Consider issuance of conditional use permit for material storage site.
Morrow County Planning Department	Conditional Use Permit	Consider issuance of conditional use permit for material storage site.
Gilliam County Planning Department	Conditional Use Permit	Consider issuance of conditional use permit for material storage site.
Deschutes County Planning Department	Conditional Use Permit	Consider issuance of conditional use permit for materials storage site.
Jefferson County Planning Department	Conditional use permit	Consider issuance of conditional use permit for material storage site.
Klamath County Planning Department	Conditional use permit	Consider issuance of a permit for material storage site

Table 1-4
(continued)
PERMIT, APPROVAL, AND CONSULTATION REQUIREMENTS FOR THE PROPOSED PGT AND ALTAMONT PROJECTS

Agency	Permit/Authority	Agency Action
Horsefly, Westland, Arnold, and Malin Irrigation Districts	Easement	Consider issuance of an easement grant for drainage or canal crossings by the pipeline and access roads.
MONTANA		
Montana Department of Health and Environmental Sciences, Air Quality Bureau	Prevention of Significant Deterioration (PSD) permit	Consider issuance of air quality construction and operation permits, including PSD permits, where required for project facilities that would emit air pollutants in certain quantities.
	Montana Water Quality Act, 3A authorization	Consider issuance of a 3A authorization with development conditions designed to maintain water quality standards during construction activities that would affect stream water quality. A 3A authorization is required only if the 310 stream crossing permit denies a turbidity exemption.
Montana Department of Health and Environmental Sciences, Water Quality Bureau	Montana Pollution Discharge Elimination System (MPDES) permit (authority delegated by EPA from the National Pollution Discharge Elimination System [NPDES]).	Grant an MPDES permit for hydrostatic testing wastewater discharge.
	Section 401 certification, Clean Water Act	Consider issuance of Clean Water Act, Section 401 certification for all activities that may result in discharge to navigable waters.
Montana Department of Highways	Encroachment permits	Grant state highway encroachment permits for pipeline and access roads that may encroach on state highway rights-of-way.
Department of Natural Resources and Conservation (DNRC)	Water appropriation permit	Grant a water appropriation permit for use of water during hydrostatic testing of the pipeline.
	Floodplain development permit (Floodplain and Floodway Management Act, Title 76, Chapter 5 of the Montana Code)	Grant a permit to construct in the 100-year floodplain.
Montana Department of State Lands	Easement grant	Grant right-of-way easement for crossing state lands and state waters.
	Notification of intent	Consider issuance of a "notification of intent" to clear right-of-way on private lands for all project components.
	Permit	Grant permit to excavate 10,000 cubic feet or more of select fill for pipe bedding and padding materials.

Table 1-4
(continued)
PERMIT, APPROVAL, AND CONSULTATION REQUIREMENTS FOR THE PROPOSED PGT AND ALTAMONT PROJECTS

Agency	Permit/Authority	Agency Action
Montana Office of Historic Preservation	Section 106 National Historic Preservation Action (NHPA) Consultation	Consult with project applicants and FERC regarding impacts on cultural resources that are either listed, or eligible for listing on the National Register of Historic Places (NRHP).
	Antiquities permit	Consider issuance of an antiquities permit to excavate or remove cultural resources on non-BLM lands for all project features that may affect cultural resources.
Montana boards of county commissioners for Hill, Chouteau, Fergus, Judith Basin, Wheatland, Golden Valley, Stillwater, and Carbon Counties	Easement grants and road-crossing permits	Consider issuance of right-of-way easement grants and road-crossing permits for county property and roadways.
Hill County, Big Sandy, Chouteau, Fergus County, Judith Basin, Upper and Lower Musselshell, Stillwater, and Carbon Conservation Districts	310 permit under the Natural Streambed and Land Preservation Act (Senate Bill 310)	Consider issuance of 310 permits for stream crossings and identify turbidity exemptions from the 3A authorizations for pipeline and maintenance road development that may affect stream corridors.
	Surface water turbidity exemption	Grant a short-term exemption (part of the 310 permit for stream crossings) from surface water turbidity standards during construction. If a short-term turbidity exemption is not granted, a 3A authorization is required to ensure maintenance of water quality.
Chouteau County Planning Department	Development permit grant	Consider issuance of a development permit for all project features.
WYOMING		
Wyoming Department of Environmental Quality	Permit	Consider issuance of a permit for the creation of a sediment pond for erosion control.
Wyoming Department of Environmental Quality, Air Quality Division	PDS and related air quality permits	Consider issuance of air quality construction and operation permits, including PSD permits, where required for project facilities that would emit air pollutants in certain quantities.
Wyoming Department of Environmental Quality, Water Quality Division	NPDES permit, authorized by federal Clean Water Act	Consider issuance of a NPDES permit for point source discharge.
Wyoming Department of Transportation	Encroachment permit	Consider issuance of a license for encroachment on state highways.
	Oversized and overweight load permit	Consider issuance of permits for transport of oversized and overweight loads (consisting of construction materials) on public roadways.

Table 1-4
(continued)
PERMIT, APPROVAL, AND CONSULTATION REQUIREMENTS FOR THE PROPOSED PGT AND ALTAMONT PROJECTS

Agency	Permit/Authority	Agency Action
Wyoming Office of Historic Preservation	Section 106 NHPA consultation	Consult with project applicants and FERC regarding impacts on cultural resources that are either listed, or eligible for listing in the NRHP.
Public Lands Commission	Right-of-way grant	Consider issuance of a grant of right-of-way across state lands.
Public Service Commission	Administration role in the development process	Oversee engineering, construction, and safety matters.
	Groundwater appropriation permit	Consider issuance of a permit to appropriate groundwater.
	Surface water appropriation permit	Consider issuance of a permit to appropriate surface waters.
Wyoming Waste Management Agency	Landfill permit	Consider issuance of a landfill permit for solid waste disposal.
Wyoming county commissions for Big Horn, Washakie, Hot Springs, Fremont, Sublette, Sweet Water, and Lincoln Counties	Road crossing permits	Consider issuance of a permit for pipeline and access road crossings.
	Development permits	Consider issuance of a permit for project development.
	Oil and gas transmission line permits (as required)	Consider issuance of permits for project development.
Wyoming county commissions for Big Horn, Washakie, Hot Springs, Fremont, Sublette, Sweet Water, and Lincoln Counties (continued)	Floodplain permits	Consider issuance of permits for encroachment upon 100-year floodplains.
Hot Springs County Planning Department	Development permit	Consider issuance of a development permit for all project features.
Lincoln County Planning Department	Oil and gas location permit	Consider issuance of an oil and gas location permit for project.
Sublette County Planning Department	Utility corridor permit	Consider issuance of a utility corridor permit for the project.
Conservation Districts	Floodplain permits	Consider issuance of floodplain permits for construction or development activities in 100-year floodplains.

Joint public scoping meetings were conducted by CPUC and FERC in Antioch, California, and Riverton, Wyoming (September 18, 1989); in Bend, Oregon, and Billings, Montana (September 19, 1989); and in Spokane, Washington (September 20, 1989). A total of 153 persons attended the five public scoping meetings. Additional public meetings were held jointly by the Bureau of Land Management (BLM) and the Montana Department of Natural Resources and Conservation (DNRC) in Lewistown, Havre, and Helena, Montana on October 17, 18, and 19, 1989. Public meetings were also held jointly by the BLM and the Wyoming governor's office in Worland and Kemmerer on October 19 and 20, 1989. A joint meeting forWyoming state agencies was held in Cheyenne on October 20, 1989. Over 50 letters of comment were also received in response to the NOP and NOI. Comments received at the public scoping meetings and the letters of comment assisted in defining the scope of the Final EIR/EIS.

On January 11, 1991, the FERC issued its Draft EIS for public comments. Public meetings to receive comments were also held during February 26-28, 1991 in Ferry, Idaho and Bend, Oregon for the PGT project and Riverton, Wyoming and Billings, Montana for the Altamont project.

Based on the comments received during the scoping and comment process, the issues that the Final EIS evaluates include the following:

- geology and soils
- hydrology and water quality
- land use
- vegetation and wildlife
- fisheries
- socioeconomics
- air quality and noise
- transportation
- public safety
- visual resources
- cultural resources and paleontology

The specific approaches and methodologies of each evaluation are discussed in their respective chapters.

ORGANIZATION OF THE REPORT

The Final EIS is divided into four volumes. This volume contains project descriptions, environmental baseline and consequences, and mitigation concerning the PGT/PG&E and Altamont proposals and their alternatives. It also contains the staff's conclusions and recommendations for the two projects. Given that both projects were found to be acceptable, provided that the mitigation measures proposed in the Final EIR are implemented, a tabular comparison of the two projects is not presented and was deemed unnecessary. If the reader so chooses, the information is contained in the Final EIS to make such comparisons.

A Map Volume was circulated with the Draft EIS. Inasmuch as there were not changes to the Map Volume, and to reduce costs, the Map Volume is not being reproduced for the Final EIS but is incorporated by reference from the Draft EIS.

An Appendix Volume is provided which contains Appendices A through F to the Final EIS.

The comments to the Draft EIS were extensive enough to warrant a separate Comments/ Responses Volume. It contains all the letters of comment received on the Draft EIS, as well as summaries of the transcripts of the public meetings to receive comment staff responses to these comments are also provided in this volume.

REVISIONS TO THE DRAFT EIS

As a result of the number of public comments received on the Draft EIS, a system was developed which would assist the reader in determining what we did with each specific comment and, more importantly, precisely where we made revisions, deletions, etc. The following system was developed for the Final EIS:

- If wording was deleted, the old wording is presented but crossed out by use of hyphens (strikeout in word processing terminology);

- All inserted wording, whether replacement or totally new, is "gray shaded". This is commonly termed "redlining" (in word processing terminology).

There are some exceptions to the above. The Introduction and Conclusion sections were extensively modified such that old working is not presented. Neither does the Appendix Volume use this system. The Appendices are presented in final form. Another exception is that changes to tables were simply made without showing the old numbers. Editorial changes also were not gray shaded/hyphenated.

Chapter 2. Description of the Proposed Projects and Natural Gas Pipeline Alternatives

2.1 INTRODUCTION

A description of general pipeline and support facility construction, operation, and maintenance procedures common to the two proposed projects is first presented. The project facilities and project-specific construction, operation, and maintenance procedures are then described for each of the PGT/PG&E and Altamont projects, along with a description of retained route variations which will be studied in this EIS for each project. Potential system alternatives to these two projects are then identified. The No Action Alternative is also examined. The chapter concludes with an identification of those PGT/PG&E and Altamont route variations and other pipeline and nonpipeline alternatives that were considered but eliminated from detailed analysis. Route variations for the California portions of the PG&E project are studied in the CPUC EIR and the reader is referred to that document for those variations.

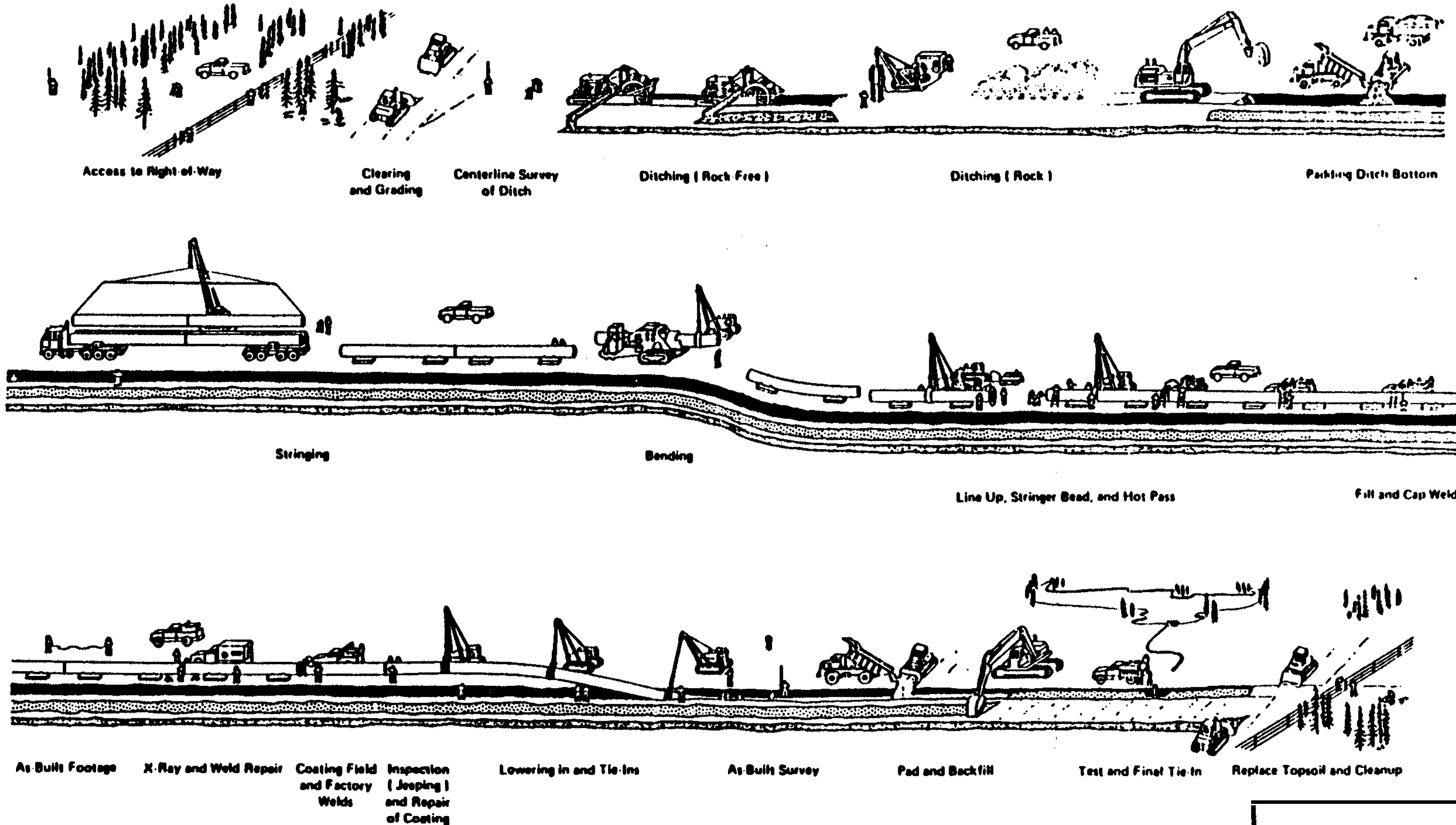
2.2 GENERAL CONSTRUCTION, OPERATION, AND MAINTENANCE PROCEDURES

The following is a description of general pipeline and support facility construction, operation, and maintenance procedures common to all the pipeline projects discussed in this EIS. Each pipeline project would comply with these procedures except as noted in the respective project-specific sections below.

2.2.1 Pipeline Construction Procedures

Figure 2-1 illustrates the construction sequence for a typical project. Generally, construction activities include clearing and grading the right-of-way, ditching and preparing pipeline trenches, pipe installation and backfilling, pipeline marking, final cleanup, restoration, and revegetation.

To minimize conflicts between construction of the pipeline and other land activities, the owners, tenants and lessees, and managers of public lands would be informed of the construction schedule before commencement of construction. Ranchers and farmers would be ~~told~~ consulted with and informed of fence openings, disturbances to range or farmland, improvements, and other range or farmland use-related activities before construction. In addition, other utilities that would be crossed by the proposed project(s) would be contacted prior to construction.



TYPICAL PIPELINE CONSTRUCTION SEQUENCE

FIGURE 2-1

Fences along a right-of-way would be adequately braced before any opening to a fence is made. Access and livestock control would be employed during construction to reduce impacts on other uses of the land. If damaged, natural barriers for livestock control would be replaced by adequate measures of equal effectiveness. Existing livestock access to water and adjacent grazing areas would not be prevented unless agreed to by the owner and/or lessee in advance. Fences, gates, and cattle guards would be restored to their original condition or replaced when construction in the area has been completed. If disturbed, all highway and road surfaces would be restored to their former condition.

Clearing. Clearing would be performed in accordance with permits issued by land-administering agencies or agreements with each landowner. Following placement of a staked, on-ground engineering survey line, the construction right-of-way would be cleared and graded. Vegetation and obstacles would be cleared to the extent necessary to allow safe and efficient use of construction equipment.

In areas where timber clearing is required, the trees would be bucked and stacked in accordance with the owner's preference. Stump profiles would be kept as low as possible. Stumps would be removed only as required by pipeline installation. Debris and slash created from right-of-way preparation would be disposed of in accordance with any applicable regulations, permits, or landowner agreements.

Grading. Right-of-way grading would be limited to the work necessary to ensure the safe movement of machinery and ditching equipment. Construction of temporary bridges or culverts across creeks on the right-of-way may be required to ensure vehicle safety and reduce harmful environmental effects. Grading and cut-and-fill excavation would be performed to minimize effects on natural drainage and slope stability. On steep terrain where the right-of-way would be graded at two elevations (two-toning), the area would be restored after construction to approximate original contours. Excavation and grading would be undertaken where necessary to increase stability and decrease the gradient of unstable slopes.

Ditching. The pipeline would typically be installed in a trench, unless specific circumstances supported construction of aboveground sections.

The width and depth of a pipeline trench vary according to the diameter of the pipe used, the soil type, and the minimum cover requirements of the pipe. The width of the pipeline trench would be approximately 12 inches greater than the diameter of the pipe. The depth of the trench must be sufficient to allow adequate soil cover over the pipe. The following ~~thickness~~ depth of ~~soil~~ cover is the minimum that would be provided for various soil conditions:

- uncultivated areas - 2.5-3 feet ~~of soil~~;
- cultivated areas - 3-6 feet ~~of soil~~;
- rock excavation - 1.5-2 feet ~~of soil~~; and
- stream crossings - 6 feet below scour depth, minimum.

The bottom of the trench would be cleared of loose rocks and, when necessary, common excavation material or other suitable bedding material would be provided as a cushion for the pipe.

The process of excavating a trench varies depending on soils and terrain. Self-propelled trenching machines or backhoes would be used for trench excavation on moderate terrain. River crossing trenches would be excavated using a backhoe, dragline, or clamshell. If rock or rocky formations are encountered, tractor-mounted mechanical rippers would be used to expedite excavation. In areas where mechanical rippers are not practical or sufficient, blasting or rock trenching equipment may be employed. Backhoes would be used to clean the trench after ripping or blasting. To prevent damage to adjacent structures and power and communication lines, blasting mats would be used. Advance notice would be provided to adjacent landowners or tenants so that property or livestock may be protected. Flaggers would be posted at safe distances from the work site to protect the public and to control traffic when blasting is underway adjacent to public or private roads.

Access across the trench would be provided at convenient intervals as required by property owners or tenants so that livestock and equipment may be safely moved across excavated trenches. In addition, ramps may be installed in the open trench to allow cattle and wildlife which fall into the trench to escape.

In areas where it is necessary to separate topsoil and subsoil, a two-pass trenching process would be used. The first pass would remove topsoil, and the second pass would remove subsoil. Removed soils (spoil) from each of the excavations would be placed in separate banks. This technique allows for proper soil restoration after backfilling. Spoil banks would contain gaps at appropriate locations to prevent storm runoff water from backing up or flooding. In cultivated and improved areas and areas where the topsoil layer is thin, it may become necessary to remove and stockpile all topsoil from the disturbed area of the construction right-of-way. The stockpiled topsoil would then be replaced across the right-of-way during cleanup activities. In agricultural areas with drainage tile systems, any drain tiles damaged, cut, or removed during pipeline construction would be repaired or replaced to the satisfaction of the landowner. During construction, temporary measures would be used to ensure that drainage systems continue to function effectively.

Special Construction Techniques. The construction methods described above apply to most of the terrain encountered during construction, with the exception of crossings. Crossings are generally grouped in the following categories: rivers, streams, backwaters, and washes; faults; roads, railroads, and utilities; and aqueducts and canals. Typical construction methods associated with each of these categories are described below.

Rivers, Streams, Backwaters, and Wash Crossings. River crossing methods vary according to specific river characteristics, such as width, depth, flow, and riverbed geology. All construction methods would be in accordance with Clean Water Act Section 404 permits issued by U. S. Army Corp of Engineers (COE) (and Rivers and Harbors Act of 1899 Section 10 permits, where necessary).

The open trench technique is proposed to be used for almost all river crossings. A trench would be opened in the streambed using backhoes, backhoes on barges, clamshells, or draglines, depending on the streamflow characteristics. Flow would be maintained at all water crossings during construction. The pipeline would be placed a minimum of 6 feet below scour depth. A plug of unexcavated soils would be left at each bank of the stream or river crossing to preserve the integrity of the streambank. These plugs would not be removed until necessary for the installation of the pipe. The entire length of pipe for the stream crossing would be assembled as a unit, tested, and then placed in the trench. After installation, the trench and the streambank would be backfilled, stabilized, and restored to approximate preconstruction contours. Pipelines crossing major streams and rivers would be concrete coated to provide negative buoyancy and protection from erosion. Temporary vehicle crossings would be installed at water crossings for construction traffic if, and only if, an existing crossing, such as a bridge, is not available in the vicinity. Temporary vehicle crossings would consist of clean rock fill, culvert bridges, or flexifloat or portable bridges.

Where use of the open trench technique would seriously conflict with environmental resource concerns, an alternative is to directionally drill the crossing. This technique uses a drilling rig set up on an inclined platform to drill from one side of the stream to the other, in effect tunneling under the stream bed. Once a drill hole is established under the stream, the pipe is winched through. Concrete-coated pipe is often utilized to protect the pipeline coating from abrasion damage during the winching operation. When constructed properly, a directionally drilled crossing has no impact on either the stream banks or bed. Because of the depth at which the pipeline is placed beneath the stream bed, the potential for damage due to scour or man-made hazards is minimized.

Fault Crossings. Where geologic studies suggest a high potential for ground rupture, the design of the fault crossing would avoid overstressing the pipe in the event of differential movement. The designs of fault crossings depend on the type of fault and the likelihood, amount, and potential consequences of expected fault displacement. Three major active fault types occur within the project area: reverse, strike slip, and normal.

The design for mitigating the effects of fault displacement for these fault types is a pipeline trench widened and deepened sufficiently to accommodate the anticipated fault displacements. The enlarged trench shape is continued through the zone where the fault displacement may take place. The pipeline within the fault zone is completely suspended in granular bedding material to minimize the resistance of the trench backfill to displacement of the pipeline within. The pipe is expected to remain indifferent to movement of the trench as fault displacement takes place.

If the axial component of the fault displacement is of concern, the axial restraint of the pipe may be minimized by using minimum soil cover depth and loose granular backfill over a few hundred feet on each side of the location of potential displacement.

Road, Railroad, and Utility Crossings. The open-cut method would be used when crossing roads with light traffic and where permitted by local authorities or owners of private roads. A temporary road detour to the shoulder of the road would be provided, or a construction bridge consisting of plating would be provided for thoroughfares that are open cut. The boring method would be used to cross major highway systems (all federal and state highways) and railroads, where open cuts are prohibited, and where geology permits. In the boring method, each side of the crossing would be excavated to accommodate the boring equipment (a boring auger). Casing pipe, sized larger than the carrier pipe, would be installed as a sleeve for the boring auger. The pipe would then be installed through the casing. The cased crossings have vent pipes and cathodic protection and are appropriately marked. Where traffic load factors and soil conditions permit, heavy-walled pipe would be used instead of casing the pipe. Underground utilities would generally be undercrossed by boring or by hand-exposing the pipe or cable.

Aqueduct and Canal Crossings. The construction method used for crossing aqueducts and canals would be determined by the specific circumstances of each crossing. In most cases, the boring method would be appropriate. Where required or necessary, an aerial suspension system would be constructed for the pipeline.

Pipe Installation. An external coating of fusion-bonded epoxy would be applied to the pipe to prevent corrosion. This coating would be applied either at the manufacturer's plant or at a special coating yard. The external coating likely to be used is a thin film epoxy resin coating with a minimum film thickness of 14 mils. An internal coating would also be applied to improve surface smoothness and reduce hydraulic friction. The internal coating would consist of 3-4 mils of epoxy paint.

Pipe would be shipped either directly from the manufacturer or from the port of entry, by rail or by truck, to storage sites along the right-of-way, or shipped to the field plants for coating and double-jointing. It would then be hauled to the right-of-way on trucks with specially designed cradles to prevent damage to the pipe and the coating. The pipe would be unloaded by cranes fitted with special hooks, or by tractors fitted with side booms and slings.

After the joints of pipe are strung along the trench, and before they are joined together, individual joints of the pipe would be bent to allow for either a horizontal or vertical change in direction. The actual bend would be made by a set of clamps, or shoes, that grip the outside surface of the pipe at the point where the bend is to be made. Where the deflection of a bend would exceed the allowable design limits for field-bent pipe, fabricated bends would be installed.

After the pipe joints are bent, they would be lined-up end-to-end in preparation for welding. The pipe would then be clamped into position, welded (in conformance with U. S. Department of Transportation [DOT] regulations contained in 49 CFR 192, Subchapter D, "Pipeline Safety"), and lowered into the prepared trench.

The overall integrity of the pipeline depends on the welding process. Each weld must exhibit the same structural integrity as the pipe with respect to strength and ductility. Welds would be inspected by quality control personnel to determine the grade of the weld, in accordance with DOT regulations. Welds on 6-inch-diameter pipe or larger would be subject to radiographic inspection, which is a nondestructive method of inspecting the internal structure of welds and determining or inferring the presence of defects. Defects would be repaired or removed, as required in DOT regulations.

Each weld seam would be protected from corrosion. Once the field coating process or wrapping of the weld (compatible with factory-applied coating materials) is completed and inspected for defects, the pipeline would be lowered into the trench. Special side-boom tractors spread out along the pipeline would simultaneously lift the pipe string and move it over the open trench. The string of pipe would then be lowered into the trench.

When the pipe is in place in the trench, backfill would be placed over its top. Enough backfill would be deposited to avoid potential settlement that would leave a surface depression. In rocky areas, it may be necessary to place select backfill immediately over the pipe to protect the external coating from rock damage. Selected backfill material may be obtained by screenings from the spoil bank, from commercial borrow sites, or from sites agreed to in negotiations between the contractor and landowners. The remainder of the trench would be filled with excavated or other native material.

Pipeline Marking. Identifying markers would be installed over the centerline of the pipeline at rivers, roads, fences, and public access crossings. Where the new pipeline is located immediately adjacent to an existing pipeline, the markers would be installed near those for the existing pipeline.

Markers showing the exact location of the pipeline would be installed at fence crossings, road crossings, and other areas of activity to identify the owner of the pipeline and convey emergency information in accordance with applicable governmental regulations. Special markers providing information and guidance to aerial patrol pilots also would be installed.

Corrosion Protection. Corrosion protection would be achieved by using a cathodic protection system consisting of an impressed current ~~with~~ produced by a rectifier or sacrificial ~~magnesium~~ anodes. Whichever system is chosen would meet the requirements of the DOT regulations at 49 CFR Part 192, Subpart I. Cathodic protection test lead stations would typically be installed at 1- to 2-mile intervals along the pipeline.

Cleanup. The final phase of pipeline construction involves cleanup and restoration of the right-of-way. Because the pipe displaces a portion of the excavated material, not all of the original material removed can be returned to the trench. The surplus soil would normally be evenly distributed over the right-of-way. If a property owner objects to this arrangement, the construction contractor would deposit the spoil at a local dumping site or another locality, in accordance with the property owner's request.

Restoration of the right-of-way surface involves smoothing with motor graders, disc harrows, or other equipment, and stabilizing slopes when necessary using earth-filled sacks, rock riprap, or other materials. On cultivated or improved lands, measures would be taken to relieve compaction, pick out rocks, and leave the ground surface in a condition satisfactory to landowners. When needed, sack breakers and diversion ditches would be installed on slopes after installation of the pipeline. These techniques stabilize the soil and channel runoff away from disturbed areas. After cleanup, disturbed areas would be stabilized, smoothed, mulched, reseeded, and fertilized as required.

Restoration and revegetation of the construction area would be completed to the satisfaction of the landowner or the authorities having jurisdiction. Revegetation would be accomplished in a manner compatible with preconstruction vegetation patterns in accordance with the guidelines of 18 CFR Part 2.69 and standard procedures approved by FERC or other authorities having jurisdiction.

Quality Control Procedures. Quality control of pipeline construction is accomplished through visual inspection, radiographic inspection of girth welds, and hydrostatic testing. All work would meet the requirements of the DOT regulations.

After backfilling and all construction work that may affect the pipe have been completed, the pipeline would be hydrostatically tested in accordance with DOT regulations by the construction contractor to ensure that the system is capable of operating at the design pressure. Should a leak or break occur, the line would be repaired and retested until the specifications are met. Test segment lengths would be determined by topography and water availability. Water would be obtained through agreements consistent with federal, state, and local regulations and codes. After testing a segment, the water may be pumped into the next segment for testing. The water would ultimately be disposed of in accordance with applicable codes concerning water quality.

2.2.2 Support Facility Construction Procedures

The turbine-driven compressor units would be designed to comply with applicable air quality standards. Buildings and equipment would be designed and installed to minimize impacts from operating noise, including addition of silencers for the blowdown facilities.

Preconstruction activities at new compressor facilities sites would include site selection, land acquisition, and topographic surveying. After grading the site, foundations and pipe support piers would be installed, followed by the installation of equipment, piping, and erection of permanent buildings. After completion of service lines, pipe tie-ins, and testing, final construction operations would include painting, road surfacing, finish grading, and graveling of graded yard surfaces.

2.2.3 Pipeline and Support Facility Specifications

Pipe Specifications. Pipe wall thickness varies with design pressure, class location, and hydrostatic test requirements. Typically, pipe is manufactured by the factory in lengths or joints of approximately 40 feet. Two lengths often are joined at the pipe mill, or in a field facility, forming lengths of approximately 80 feet (double jointed). This length is the maximum legal length (with permit) that can be transported by carriers over federal and state highways. Three double joints of 42-inch-diameter pipe can be carried on a truck, with the capacity of the truck depending on the pipe's weight, diameter, and length.

Valve Specifications. Mainline valves for the loops would be installed at various locations, generally at 20-mile intervals. These valves would have the same diameter as the pipe. Full-opening, weld-end ball valves with stem extensions and manually actuated gas-powered operators would be used for aboveground operation.

2.2.4 Operation and Maintenance Procedures

Operation and maintenance plans would comply with the DOT regulations and with the applicable state regulatory requirements.

The project would be designed so that all facilities would be monitored, controlled, and operated in a safe and reliable manner through a telemetry system linked to a control center. Communications, supervisory control, and data acquisition would be accomplished through microwave- or satellite-based communication systems. The system would be augmented by very high frequency radio and telephone voice and data channels. Facility sites would be checked on an established schedule.

Maintenance and operating personnel would be coordinated from district offices in communities along the systems so that any area could be reached within a short period in case of an emergency or malfunction. All equipment containing moving parts, such as the compressors, would receive periodic maintenance on a scheduled, time-of-use basis. The pipeline right-of-way would be surveyed on a set schedule for evidence of leaks, erosion damage, and right-of-way encroachment. The pipeline's corrosion control system would be routinely monitored.

The mainline block valves at compressor stations, pressure-limiting stations, and major meter stations would be equipped with automatically controlled power operators. These valves would be used to isolate pipeline segments between compressor stations in the event of system emergencies.

Surveillance. Communications and detection systems for the proposed facilities would be developed. The frequency of aerial patrols and ground inspections of the pipeline would be in compliance with the latest revision of the DOT regulations and state requirements. All buildings intended for human occupancy within 220 yards on either side of the pipeline would be identified as required by the appropriate regulations. This information would be used to determine the location classification, which would be used in turn as a criterion for selecting frequencies of various inspection procedures, designing new pipeline facilities, and upgrading existing facilities.

The following inspection intervals would be used for pipeline systems:

- Aerial patrols. Aerial patrols would be conducted once a month.

- o Surface patrols. Facilities that cannot be observed properly by air patrol would be patrolled by surface patrol annually or more frequently if necessary. Freeway crossings, major highway crossings, and railroad crossings would be inspected at about 3-month intervals.

Compressor stations, pressure-limiting stations, and other facilities would be routinely inspected. Such inspections may involve testing of controls and equipment, which may result in gas being vented to the atmosphere for brief periods.

All compressor stations and other critical facilities would be under constant observation and surveillance by telemetry systems. This surveillance would be conducted automatically by detection equipment and computer interrogation and manually by operating personnel headquartered at control facilities on a 24-hour basis. Surveys would be conducted routinely to detect possible pipeline leaks. Such surveys would include visual inspection and instrument checks for possible gas leaks.

Pipeline and Site Maintenance and Repair. A gas pipeline built to current standards and under cathodic protection requires minimal maintenance. Repairs required because of minor corrosion and slight external mechanical damage to pipe and coating material can be made without interruption or with minimum interruption of service. Repairs are usually made under a reduced pipeline pressure and require a minimum amount of excavation and heavy equipment. Other minor repairs include correction of erosion, repairs to erosion checks, replacement of pipeline markers, and removal of debris from the right-of-way. These repairs may require earth-moving equipment or hand tools.

Pipeline failures or external mechanical damage needing major repairs may require shutdown of the pipeline. In these instances, the pipeline segment would be isolated between mainline valves and the natural gas in the segment needing repair would be vented to the atmosphere.

Some settling of the backfilled trench would occur, particularly after the first winter following construction. In this case, subsidence and potholes would be filled and the surface restored to normal grade.

The only maintenance access roads that would be maintained are those for access to critical facilities, such as mainline valves, pressure-limiting stations, and compressor stations. These facilities must be visited frequently, requiring the roads to be maintained.

Corrosion Checks. The cathodic protection system would be surveyed periodically to verify the effectiveness of the system. The electrical outputs of the rectifier installations would be checked, and readings would be taken of test leads attached to the pipe.

Whenever buried pipe becomes exposed, an inspection would be made of the pipe and its coating. When the pipeline must be cut for maintenance or reconstruction, the interior walls of the pipe would be inspected for evidence of corrosion.

2.2.5 Environmental and Safety Controls

A number of environmental and safety controls would be standard measures for the proposed pipeline projects. Projects would conform with air and water quality standards and related plans for implementation, including, but not limited to, standards adopted pursuant to the Clean Air Act, as amended (42 USC 7401, et seq.) and the Federal Water Pollution Control Act, as amended (33 USC 1251, et seq.).

Regulatory agency-approved herbicides are sometimes used to control plant growth in the pipeline right-of-way, within fenced areas at compressor and metering stations, and around safety signs and valve locations to maintain visibility. When herbicide use is specifically prohibited by a land management agency, mechanical means of vegetation control would be employed.

Where the right-of-way includes public lands on which cadastral survey monuments and survey markers are located, project construction engineers would avoid disturbance or removal of such monuments or markers. Should it be necessary to remove markers or monuments during construction activities, removal and restoration would be completed in accordance with instructions established by the appropriate agency.

Environmental restoration measures within agricultural areas would include (at a minimum) returning farmland to normal cultivation levels and minimizing the effects on natural drainage. Where terraces are cut, they would be completely restored, and under no circumstances would natural drainage be permanently diverted.

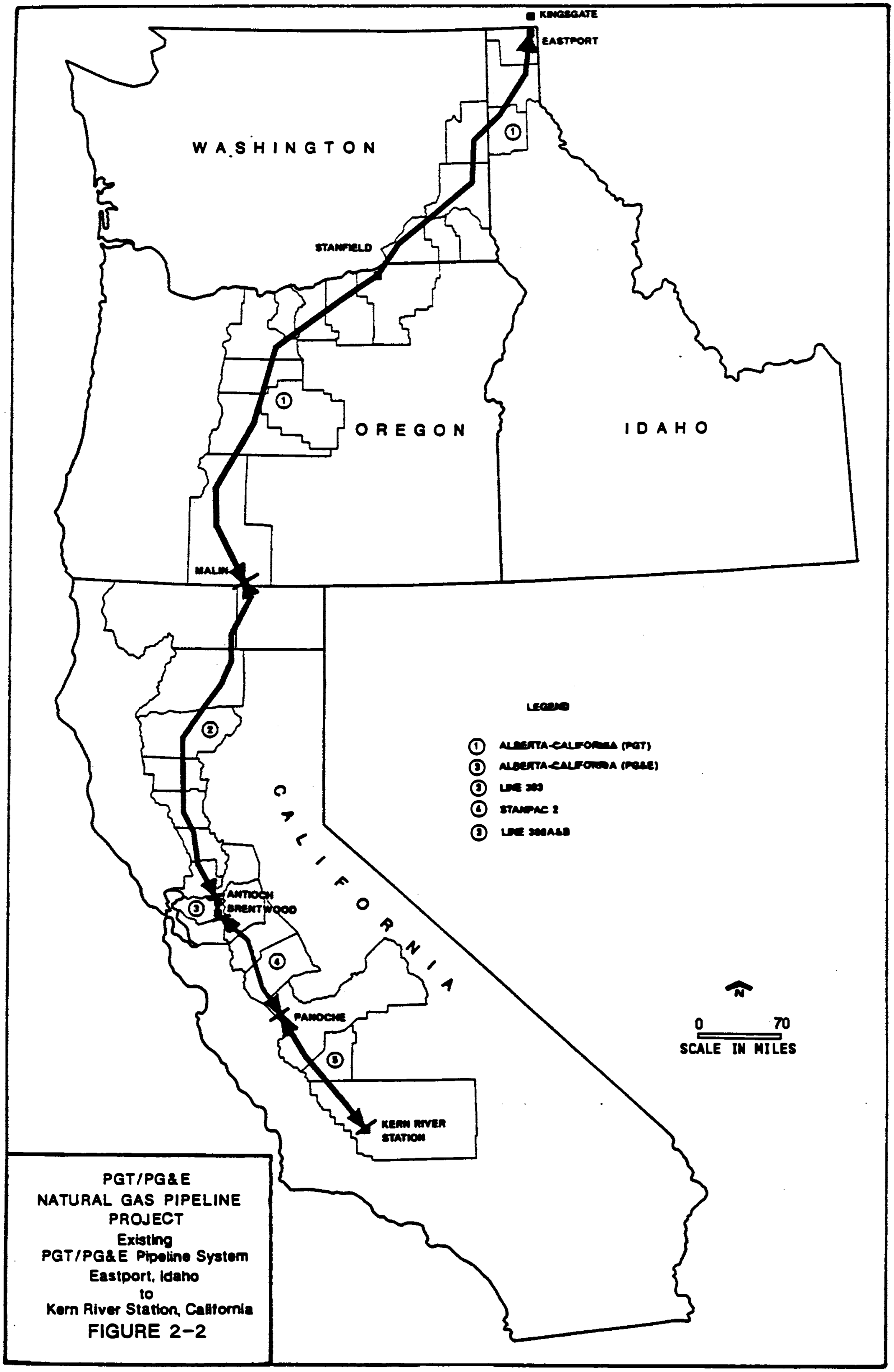
Mulching and seeding of land surfaces to quickly produce vegetative cover for erosion control and restore normal conditions would be performed where necessary and appropriate.

Several safety design factors would be built into the pipeline engineering. The pipe would conform to the minimum pipeline safety standards set by DOT regulations, which specify minimum pipe wall thickness, strength, and depth of burial for river and fault crossings and for different population densities along the route. Construction, operation, and maintenance procedures would also conform to DOT regulations, as well as to applicable state regulatory requirements.

2.3 PGT/PG&E PROJECT

2.3.1 Project Characteristics

Description of Existing Facilities. PGT and PG&E own and operate an existing system of pipelines between the Canada-U. S. border and southern California, as shown in Figure 2-2. PGT's facilities are in Idaho, Washington, and Oregon; PG&E's facilities are in California. The major components of the PGT/PG&E system include the U. S. portion of the Alberta-California Pipeline between the International Boundary near Eastport, Idaho, and Antioch, California; Line 303 between Antioch and Brentwood, California; the Stanpac No. 2 Pipeline between the



PGT/PG&E
NATURAL GAS PIPELINE
PROJECT
Existing
PGT/PG&E Pipeline System
Eastport, Idaho
to
Kern River Station, California
FIGURE 2-2

Brentwood Compressor Station and Panoche Metering Station in Fresno County, California; and Lines 300 A and B between the Panoche and Kern River Metering Stations near Bakersfield, California.

Alberta-California Pipeline System. The Alberta-California Pipeline system consists of a 36-inch-diameter gas pipeline extending from the province of Alberta, Canada, to Antioch. The PGT portion of the system is approximately 612 miles long, passing through the states of Idaho, Washington, and Oregon. Twelve compressor stations are on the PGT portion of the system. PGT's pipeline connects with the facilities of ANG in the north and with the facilities of PG&E in the south. The PG&E portion of the system is approximately 300 miles long, all in the state of California. Four compressor stations are located along the PG&E portion of the system. The PG&E portion is integrated with PG&E's other gas transmission facilities.

The Alberta-California Pipeline system was built in 1960-1961, with compression facilities added through 1971. An expansion and safety looping program was started in 1970. Looping is the practice of building a new pipeline between two points of an existing section of pipeline. While increasing the potential overall capacity of a pipeline, looping also allows one pipeline of a looped section to be shut down when necessary for maintenance without stopping the flow of natural gas through the pipeline system. In this case, 36-inch-diameter pipe was used to loop 26.4 miles of the PGT system and 17 miles of the PG&E system.

In 1975, the U. S. Department of the Interior certified the final EIS for the Alaska Natural Gas Transportation System (ANGTS) (U. S. Bureau of Land Management [BLM] 1976). In 1981, the prebuild phase of the western leg of the ANGTS expanded the Alberta-California Pipeline system by looping approximately 160 miles with 42-inch-diameter pipe, modifying piping at six compressor stations, and expanding a metering station near Stanfield, Oregon. The six existing looped sections are shown in Figure 1-1 and the map volume to this EIS.

The ANGTS Final EIS analyzed the impacts for a pipeline along the same route as PGT/PG&E's present proposal. Except for the 1981 prebuild phase looping, the rest of the ANGTS project was studied but never fully constructed. PGT/PG&E's proposed project would complete the looping of the Alberta-California Pipeline system and utilize its existing rights-of-way for most of the proposed facilities. PGT and PG&E were issued right-of-way grants in 1985 for the construction of the ANGTS project across federal lands and are currently requesting that these federal grants be amended.

Line 303. PG&E owns and operates approximately 43 miles of 36-inch-diameter pipe between Antioch, Contra Costa County, and Irvington, Alameda County, California. Line 303 was built in 1961 and currently transports Canadian gas south from the Alberta-California Pipeline system's Antioch Terminal to the Brentwood Compressor Station, located in eastern Contra Costa County. PGT/PG&E's proposed pipeline route would be parallel and adjacent to portions of the existing Line 303.

Stanpac No. 2 Pipeline. PG&E operates a 26-inch-diameter gas pipeline extending from Brentwood to the Panoche Metering Station in Fresno County. This

118.1-mile-long portion of pipeline was originally installed prior to 1930 to transport natural gas from the Kettleman Hills Gas Field to the San Francisco Bay area. Today, the pipeline is used primarily for north-to-south transmission of Canadian gas. Six-sevenths of the pipeline is owned by Standard Pacific Gas Line, Incorporated, and one-seventh is owned by Chevron Pipeline Company, subsidiaries of PG&E and Chevron USA, respectively. The recent CPUC Decision 88-10-28, issued October 14, 1988, authorizes a PG&E buyout of Chevron's ownership of the Stanpac No. 2 Pipeline. Following negotiations and purchase, the Stanpac No. 2 Pipeline would be owned entirely by PG&E. PGT/PG&E's proposed project would utilize some of the existing right-of-way of the Stanpac No. 2 Pipeline in its looping of the system.

Lines 300 A and B. PG&E owns and operates a 502-mile-long dual 34-inch-diameter pipeline from the California-Arizona border, near Needles, California, to the Kern River Metering Station. From the Kern River Metering Station, Lines 300 A and B extend through the San Joaquin Valley to the Panoche Metering Station. The pipeline continues from the Panoche Metering Station to the Milpitas Terminal, which is located in the San Francisco Bay area. The PGT/PG&E proposed project would connect to Lines 300 A and B at the Panoche Metering Station for transport of natural gas to the Kern River Metering Station.

Description of Proposed Facilities. The proposed PGT/PG&E project would transport annually an average of 903 MMcf/d of natural gas produced in the provinces of Alberta and British Columbia to the Pacific Northwest, intermountain region, and California. The proposed PGT/PG&E project would connect with the ANG facilities at Kingsgate, British Columbia. Approximately 48 miles of pipeline are proposed to be constructed by ANG, parallel to their existing pipeline, to accommodate the expected increased demand. ANG would provide gas from gas fields in British Columbia and Alberta. The environmental impacts of the ANG project are beyond the scope of this EIS.

PGT proposes to expand its facilities and service areas to provide additional firm transportation capacity to deliver Canadian gas to various utility concerns located in Idaho, Washington, and Oregon. These markets would receive access to approximately 148 MMcf/d (on an average annual basis) of Canadian gas. The PGT/PG&E project would deliver gas to four natural gas utilities in the Pacific Northwest. Washington Water Power Company, which serves Spokane, Washington, and northern Idaho, has contracted for 45 MMcf/d. Cascade Natural Gas Corporation, which serves 86 communities in Washington and Oregon, would receive 30 MMcf/d. IGI Resources, Inc., serving southern Idaho, would receive 33 MMcf/d. Northwest Natural Gas Company, which distributes gas within Oregon and Washington (including the Portland metropolitan area), would receive 40 MMcf/d.

PGT and PG&E also propose to provide firm transportation service for utilities and the oil and gas industry in California. Approximately 755 MMcf/d (on an average annual basis) of natural gas would be supplied by the PGT/PG&E project to end users in both northern and southern California. A total of 100 MMcf/d would be delivered to customers in northern California, with the remainder contracted for delivery to customers in southern California. In northern California, 100 MMcf/d would be delivered to PG&E, with customers throughout the Sacramento and San Joaquin Valleys and in the San Francisco Bay Area. Of the 655 MMcf/d contracted by southern California entities, approximately 30 MMcf/d would be delivered to municipalities, 300 MMcf/d would be delivered to two utilities (San Diego Gas and Electric Company and ~~SoCal~~ SoCal Edison), and the remainder would be delivered to nonutility shippers.

The proposed facilities include 845 miles (including compressor tie-ins) of new pipeline in 12 loops along the 1,044-mile existing pipeline, the 86.7-acre expansion of the existing Brentwood Compressor Station facilities, ~~the 4-acre expansion of~~ relocation of the fenceline at the existing Compressor Station No. 12, and the modification of all other compressor stations along the existing Alberta-California Pipeline system. The project requires approximately 8,389 acres of existing permanent right-of-way and approximately 671 acres of new permanent right-of-way, which is a total of 9,060 acres of permanent right-of-way. During construction, the project would directly affect up to 12,423 acres. This includes permanent right-of-way and temporary construction easements.

PGT proposes to complete the looping of all unlooped portions of its existing pipeline with 42-inch-diameter gas pipeline. At Malin, Oregon, the PGT line interconnects with that of PG&E where the looping with 42-inch-diameter gas pipeline would continue on PG&E's system to a terminus at the Brentwood Compressor Station near Antioch, California. South of the Brentwood Compressor Station, the PG&E system would be looped with 36-inch-diameter gas pipeline to a terminus at the Panoche Metering Station in Fresno County. The loops are summarized in Table 2-1 and their locations shown in Figure 1-1. The 12 proposed loops generally would be installed adjacent to and interconnected with existing gas pipelines. Seven of the loops, involving 430 miles of new pipeline, would be located on the PGT system. Five of the loops, involving 415 miles of new pipeline, would be located on the PG&E system.

PGT/PG&E proposes to modify 17 of the existing compressor stations along the pipeline route. The modifications at 12 of the stations would consist of installing additional metering and instrumentation; adding electrical and control equipment; and modifying compressor cases, piping, valves, and fittings to accommodate the additional gas flow. Additional compressor units would be required at Compressor Station No. 3 (one ~~25,000~~ 30,000-horsepower [hp] unit), Compressor Station No. 16 (one 14,365-hp unit) and the Brentwood Compressor Station (three 4,500-hp units). At Compressor Stations No. 5 and 7, existing 9,100-hp units would be replaced with ~~25,000~~ 30,000-hp units. The compressor station locations and modifications are summarized in Table 2-2.

Piping modifications would also be required at PGT's existing Malin Meter Station and at PG&E's existing Panoche and Kern River Metering Stations because of the proposed increase in gas volumes. Five existing pressure-limiting stations would be expanded to include the new loops.

Table 2-1

DESCRIPTION OF LOOPS FOR THE PGT/PG&E PROJECT

State	Loop	Pipe Diameter (inches)	Length of Pipe (miles)	Milepost Location
Idaho	1	42	20.9	0.0-20.9
	2	42	35.6	72.7-108.3
Washington	3	42	18.8	179.0-197.8
	4	42	30.3	225.3-255.6
Oregon	5	42	132.8	277.4-410.2
	6	42	95.6	410.2-505.8
	7	42	106.7	505.8-612.5 [1/]
California	8	42	82.3	612.5-694.8
	9	42	98.5	694.8-793.3
	10	42	36.1	810.3-846.4
	11	42	77.4	846.4-923.8
	12	36	120.2	923.8-1044.0

Note: Mileposts are based on the existing pipeline mileposts

[1/] MP 612.5 is the Oregon-California border

Table 2-2

COMPRESSOR STATION LOCATIONS AND MODIFICATIONS
FOR THE PGT/PG&E PROJECT

Compressor Station	Location	Milepost	Existing Horsepower (site-rated)	Proposed Horsepower
No. 3	Eastport, Idaho	2.5	12,479	35,523
No. 4	Bonner County, Idaho	46.7	20,519	0
No. 5	Athol, Idaho	87.6	21,399	* 26,511
No. 6	Spokane County, Washington	143.5	21,810	0
No. 7	Walla Walla County, Washington	212.6	22,296	* 24,945
No. 8	Wallula, Washington	255.6	27,582	0
No. 9	Ione, Oregon	319.5	24,683	0
No. 10	Kent, Oregon	368.3	23,493	0
No. 11	Madras, Oregon	425.1	17,813	0
No. 12	Bend, Oregon	472.8	25,349	0
No. 13	Chemult, Oregon	529.5	23,990	0
No. 14	Bonanza, Oregon	599.2	21,690	0
No. 14B	Tionesta, California	637.1	12,750	0
No. 15	Burney, California	697.8	23,050	0
No. 15B	Gerber, California	761.7	14,720	0
No. 16	Delevan, California	810.3	21,220	14,365
Brentwood	Brentwood, California	923.8	5,250	13,500

* One existing unit would be replaced wtih a larger unit at Compressor Stations No. 5 and 7; the proposed new hp is the incremental hp. The site ratings of the units to be replaced are 9,001 and 9,380 hp, respectively.

2.3.2 Project Location

Proposed Loops. The 12 proposed loops (Figure 1-1 and the Map Volume) generally would be installed adjacent to and interconnected with PGT's or PG&E's existing gas pipeline. Seven of the loops, involving 430 miles of new pipeline, would be located on the PGT system. Five of the loops, involving 415 miles of new pipeline, would be located on the PG&E system.

Loop 1 (Milepost 0.0-20.9). Loop 1 (20.9 miles) would be located within Boundary County, Idaho, and would cross portions of the Kaniksu National Forest (which is now within the Idaho Panhandle National Forest). The loop begins at the Canada-U. S. border near Eastport and ends near Mainline Valve 3-1 (Milepost [MP] 20.9), west of the settlement of Moyie Springs in Idaho. Loop 1 would be constructed within the existing right-of-way adjacent to the existing 36-inch-diameter pipeline.

From the International Boundary, Loop 1 would pass west of Eastport on a southerly course paralleling U. S. Highway (US) 95 for 3.5 miles. Compressor Station No. 3, Eastport, is located at MP 2.5.

The loop would generally parallel Moyie River Road and the Union Pacific Railroad track. Eight crossings of the Moyie River would be required. The potential need to modify the alignment of this loop in order to reduce the number of river crossings is discussed in Chapters 4 and 6 of this EIS. Loop 1 would pass west of Meadow Creek Campground at MP 13 and would connect with an existing loop near Mainline Valve 3-1. The existing loop, installed in 1970 and 1981, extends to the beginning of proposed Loop 2.

Loop 2 (MP 72.7-108.3). Loop 2 (35.6 miles) would be located in Bonner and Kootenai Counties, Idaho, and Spokane County, Washington. Loop 2 would be constructed within the existing right-of-way adjacent to the existing 36-inch-diameter pipeline.

From Mainline Valve 4-2 (MP 72.7), Loop 2 would proceed southwest parallel to, but approximately 0.5 mile east of, the Burlington Northern Railroad track, and cross land in the Kaniksu National Forest. The loop would pass west of Athol, Idaho, and enter Eightmile Prairie. Compressor Station No. 5, Athol, is located at MP 87.6.

Loop 2 would leave Eightmile Prairie and enter the Rathdrum Prairie at MP 90, passing east of Rathdrum, Idaho. It would continue southeast, parallel to and approximately 0.5 mile east of, State Route (SR) 53, crossing the Idaho-Washington state line at MP 106.8. Loop 2 would end at Mainline Valve 5-2 (MP 108.3), located in the Spokane River valley, and approximately 1 mile west of the Idaho-Washington border. At this mainline valve, Loop 2 would join a loop constructed in 1981, which extends to the beginning of proposed Loop 3.

Loop 3 (MP 179.0-197.8). Loop 3 (18.8 miles) would be located in Whitman County, Washington. Loop 3 would be constructed within existing right-of-way adjacent to the existing 36-inch-diameter pipeline.

From Mainline Valve 6-2 (MP 179), located on the north side of Union Flat Creek, Loop 3 would extend southwest. It would pass east of LaCrosse, Washington, at MP 183.5 and end near Mainline Valve 6.3 (MP 197.8) where it would join a loop constructed in 1981. This existing loop extends to the beginning of proposed Loop 4.

Loop 4 (MP 225.3-255.6). Loop 4 (30.3 miles) would be located in Walla Walla County, Washington. The loop would be constructed within existing right-of-way adjacent to the existing 36-inch-diameter pipeline. From Mainline Valve 7-1 (MP 225.3), Loop 4 would extend southwest along Eureka Flat for approximately 10 miles. The loop would descend onto the Walla Walla River floodplain and cross the Walla Walla River arm of Lake Wallula, a reservoir created by the McNary Dam on the Columbia River. Loop 4 would end at Compressor Station No. 8, Wallula, where it would connect with a loop constructed in 1981. This existing loop extends to the beginning of proposed Loop 5.

Loop 5 (MP 277.4-410.2). Loop 5 (132.8 miles) would cross six counties in eastern Oregon: Umatilla, Morrow, Gilliam, Sherman, Wasco, and Jefferson. The loop would be constructed in the existing right-of-way adjacent to the 36-inch-diameter pipeline, except for a 21.4-mile segment that would include a new crossing of the John Day Canyon. Here, a new route for the loop would be established to increase the reliability of the pipeline, as well as minimize environmental impact.

Loop 5 would begin near the Stanfield Metering Station (MP 277.4), pass north and west of Stanfield, Oregon, and proceed southwest for approximately 30 miles. Loop 5 would connect with an existing loop at MP 282.8, north of the Umatilla River. After crossing the Umatilla River, the existing 1.6-mile loop ends at MP 284.4, and Loop 5 would begin again, continuing southwest. At MP 318, the loop would pass north and west of Ione, Oregon, and cross Wouldow Creek. Compressor Station No. 9, Ione, is located at MP 319.5.

In the vicinity of the John Day Canyon, the route would deviate from the existing pipeline right-of-way. Both the new route and the existing route would cross sections of John Day River that are designated as a Wild and Scenic River but avoid a proposed Wilderness Study Area (WSA). The route would be incorporated into the ANGTS pipeline right-of-way on federal lands. The new route would depart from the existing right-of-way at MP 350.8 and travel 7.5 miles across the Columbia Plateau. The new route would then descend sharply into the John Day Canyon, cross the John Day River at MP 359, and immediately ascend back onto the Columbia Plateau. The route then descends sharply into Hannafin Canyon. The potential need to modify the alignment of the John Day Variation in order to avoid Hannafin Canyon is discussed in Chapters 4 and 6 of this EIS. The new route would return to the existing right-of-way about 1 mile north of Compressor Station No. 10, Kent (MP 368.3). The new route would total 21.4 miles.

Loop 5 would continue southwest from Compressor Station No. 10, Kent. At MP 372.2 and MP 380.6, Loop 5 would intersect US 97. From MP 397 to MP 404, Loop 5 would follow the narrow valleys of Trout and Hay Creeks. The loop would continue southward, roughly paralleling US 97, and enter the Blue Mountains province and the Crooked River National

Grasslands, which are administered by the Ochoco National Forest. The loop would end near Mainline Valve 10-3 (MP 410.2).

Loop 6 (MP 410.2-505.8). Loop 6 (95.6 miles) would be located in Jefferson, Crook, Deschutes, and Klamath Counties in eastern Oregon. The loop would be located within the existing right-of-way adjacent to the existing 36-inch-diameter pipeline.

From Mainline Valve 10-3 (MP 410.2), Loop 6 would continue 17 miles southwest across the Crooked River National Grassland, roughly parallel with Bonneville Power Administration's electric transmission line corridor. Compressor Station No. 11, Madras, is located at MP 425.1. The loop would pass east of the Redmond Municipal Airport (MP 439).

Continuing south, the loop would pass several miles east of Bend, Oregon. South of Bend, Loop 6 would enter the Deschutes National Forest. At MP 465, the loop would converge with US 97 and run roughly parallel with it for the remainder of its length. Lava River Cave ~~Park~~ lies approximately 0.125 mile west of Loop 6. In addition, this loop would be within the boundaries of the newly established Newberry National Volcanic Monument between MP 465.5 and 468.0, where it would be located within a designated utility corridor. The loop would pass several miles east of the Sunriver resort (MP 470). The loop would pass La Pine (MP 485) and Gilchrist, Oregon (MP 500), ending at MP 505.8 where it would cross US 97.

Loop 7 (MP 505.8-612.5). Loop 7 (106.7 miles) would cross Klamath County in southeastern Oregon. The loop would be located within the existing right-of-way adjacent to the existing 36-inch-diameter pipeline.

From MP 505.8, Loop 7 would travel southwest roughly parallel with US 97. The loop would cross the Deschutes and Winema National Forests. At MP 516.4, the loop would enter the Winema National Forest. Beginning at about MP 514, Loop 7 would parallel an existing electric transmission line corridor for the next 23 miles, turning south at MP 520. Compressor Station No. 13, Chemult, is at MP 529.5. The loop would continue south, parallel with US 97, and enter the Antelope Desert. At MP 552, the loop would turn southeast and cross the western slope of Soloman Butte. From MP 565, the loop would parallel Lone Pine Road to the Sprague River valley (MP 570).

At MP 570.7, Loop 7 would connect with an existing loop that crosses the Sprague River. The existing loop ends and Loop 7 would begin again at MP 581 in the Winema National Forest. Loop 7 would enter the Yonna Valley at MP 590 and would skirt the east side of the valley. Compressor Station No. 14, Bonanza, Oregon, is at MP 599.2. Loop 7 would extend eight miles to the Klamath Basin. The loop would end at the Oregon-California border (MP 612.5).

Loop 8 (MP 612.5-694.8). Loop 8 (82.3 miles) would be located in Modoc, Siskiyou, and Shasta Counties in northeastern California. The loop would begin at the Oregon-California border (MP 612.5) and end at Compressor Station No. 15, Burney, California (MP 694.8). The loop would be constructed within the existing right-of-way adjacent to the existing 36-inch-diameter pipeline.

Loop 8 would extend through the Klamath Basin to MP 623, parallel with SR 139, and enter the Modoc National Forest at MP 625. Loop 8 would reach the Tionesta Compressor Station at MP 637.1. Continuing across the Modoc National Forest, the loop would ~~run~~ turn to the southwest at MP 643. It would cross the western portion of the Long Bell ~~State Game Preserve at MP 649~~ Wildlife Preserve from MP 649 to MP 653.6. At MP 662.7, Loop 8 would pass adjacent to the Mayfield Ice Caves. The loop would then enter the Shasta National Forest at MP 681.1.

Loop 8 would enter the Fall River Valley at MP 677, cross the Pit River arm of Lake Britton at MP 687, and enter the Lassen National Forest. The loop would pass east of Johnson Park at the intersection of US 299 and SR 89, ending at the Burney Compressor Station (MP 694.8).

Loop 9 (MP 694.8-793.3). Loop 9 (98.5 miles) would be located in Shasta, Tehama, and Glenn Counties in northern California. The loop would be located within the existing right-of-way adjacent to the existing 36-inch-diameter pipeline.

From the Burney Compressor Station, Loop 9 would ~~extend through the Lassen National Forest,~~ pass~~ing~~ to the east of Burney. Between MP 703.4 to 704.1, PG&E's routes would follow the CPUC's certified Shasta County Cypress Forest Reroute West. At MP 727.4, the loop would cross SR 44, passing west of Shingletown, California. Loop 9 would continue southwest, passing west of Black Butte at MP 732. It would cross a deep ravine at Battle Creek (MP 734.8). A suspension structure carries the existing pipeline across Battle Creek.

At MP 743, the loop would parallel SR 36. The loop would enter the Sacramento Valley at MP 750. The loop would pass east of Red Bluff, California, crossing SR 99 at MP 753.5. Between MP 745 and MP 747, the loop would cross parcels of land managed by BLM.

Loop 9 would cross the Sacramento River at MP 755.2 and proceed to the Gerber Compressor Station (MP 761.7). From the Gerber Compressor Station, Loop 9 would cross Interstate 5 (I-5) at MP 761.9. At MP 772, it would turn south, paralleling I-5, but about 4 miles to the west of it. Loop 9 would tie into a loop constructed in 1970 at Mainline Valve 180.77 (MP 793.3). The existing loop travels 17 miles south to the Delevan Compressor Station (MP 810.3).

Loop 10 (MP 810.3-846.4). Loop 10 (36.1 miles) would be located in Colusa and Yolo Counties in northern California. The loop would be constructed within the existing right-of-way adjacent to the existing 36-inch-diameter pipeline.

Loop 10 would proceed south from Compressor Station No. 16, Delevan, along the west side of the Sacramento Valley. The loop would run roughly parallel with electric transmission lines operated by the Western Area Power Administration and PG&E. At MP 824, the loop would turn southwest, still following the edge of the Sacramento Valley and the transmission lines. The loop would end at Mainline Valve 233.9 (MP 846.4) about 23.5 miles northwest of Winters, California.

Loop 11 (MP 846.4-923.8). Loop 11 (77.4 miles) would be located in Yolo, Solano, Sacramento, and Contra Costa Counties, California. The loop would begin at Mainline Valve 233.9 (MP 846.4). It would end at the Brentwood Compressor Station (MP 923.8). The majority of the loop would be constructed in the existing right-of-way adjacent to the existing 36-inch-diameter pipeline.

From Mainline Valve 233.9 (MP 846.4), Loop 11 would travel southwest along the west side of the Sacramento Valley. It would turn south at MP 850. It would cross Cache Creek at MP 859 and turn southeast, passing west of Esparto, California, at MP 861. The loop would turn south at MP 869 and pass through Winters.

Loop 11 would cross Putah Creek and enter Solano County at MP 874. It would turn southeast, crossing I-505 at MP 877.7. At MP 881.2, the loop would cross I-80 east of Vacaville, California. The loop would travel south, passing 2.5 miles east of the Travis Air Force Base runway at MP 889.

Loop 11 would then pass along the western edge of The Nature Conservancy's Jepson Prairie Preserve. The existing right-of-way crosses two playa lakes outside the preserve before crossing a corner of the preserve (Figure 2-3). To avoid this sensitive biological area, one of three alternatives was chosen by PG&E, following a routing study. ~~A discussion of the other two alternate routes can be found in the CPUC EIR.~~ Alternative Route B, including the Contra Costa County Alkali Meadow and Vernal Pool Reroute, was certificated by the CPUC in its decision of December 27, 1990. A discussion of all three alternative routes is contained in the CPUC's FEIR.

~~The PG&E preferred route, Alternative C described in the PGT/PG&E report "Jepson Prairie Reserve Routing Study" (PGT/PG&E 1989a), would pass between two playa pools (330 feet apart), diverge southwesterly from the existing line near MP 892.2, and pass between the playa pools crossed by the existing right-of-way and a smaller vernal pool to the west (Figure 2-3). The route would then turn southeast and meet the existing right-of-way near MP 893.4. Alternative C would avoid a 1.2-mile section of the existing right-of-way. The total length of Alternative C, from MP 889.4 to MP 893.4 (which allows for equal comparison of all route alternatives) would be approximately 4.2 miles. Alternative C would cost approximately $154,000 more than paralleling the existing right-of-way. This estimate includes additional right-of-way, additional pipeline, and specialized construction techniques because of the adjacent playa pools. The preferred route would avoid The Nature Conservancy's Jepson Prairie Preserve property. The route would then proceed into the Montezuma Hills, north of the Sacramento River.~~

The existing right-of-way then cuts through the rapidly urbanizing Brentwood-Antioch area. To avoid this current and projected urbanization, four alternatives were studied by PG&E (Figure 2-4). The CPUC has certificated the use of Alternative Route 4, and Alternative Compressor Station Site C. ~~The proposed route, Alternative 1, would depart from the existing pipeline corridor at MP 903. It would cross the Sacramento River parallel to existing transmission lines. The route would go south across Sherman Island and cross the San Joaquin River to Jersey Island, paralleling the transmission line corridor. The route would cross Dutch~~

~~Slough, running west along the north side of Cypress Road before veering south, parallel to Sellers Avenue. One quarter mile north of Concord Avenue, the route would turn west, crossing Marsh Creek and then angling south to connect to the Brentwood Compressor Station (MP 923.8), which is proposed to be expanded. The total length of Alternative 1 from MP 903 to MP 932.5 would be 29.5 miles. PG&E also studied three compressor station sites, Compressor Station Sites A, B, and C, each as an alternative to expansion of the Brentwood Compressor Station (PG&E 1990a) (Figure 2-4). Alternative 1 could also use either Compressor Station Site B or C. For comparative purposes only, PG&E estimated that Alternative 1 (from MP 903 to MP 934.4) would cost approximately $237-239 million with either the Brentwood expansion site or Alternative Compressor Station Sites B or C.~~ For a discussion of other Brentwood alternative pipeline routes and alternative compressor station sites, see the CPUC EIR.

Loop 12 (MP 923.8-1044). Loop 12 (120.2 miles) would cross Contra Costa, Alameda, San Joaquin, Stanislaus, Merced, and Fresno Counties in central California. The loop would be located adjacent to the existing 26-inch-diameter Stanpac No. 2 Pipeline. In places, the Stanpac No. 2 Pipeline right-of-way is 15 or 30 feet wide; an additional right-of-way would be required to increase the width to 50 feet. The loop would deviate from the original Stanpac No. 2 Pipeline at some locations to reduce effects on established orchards.

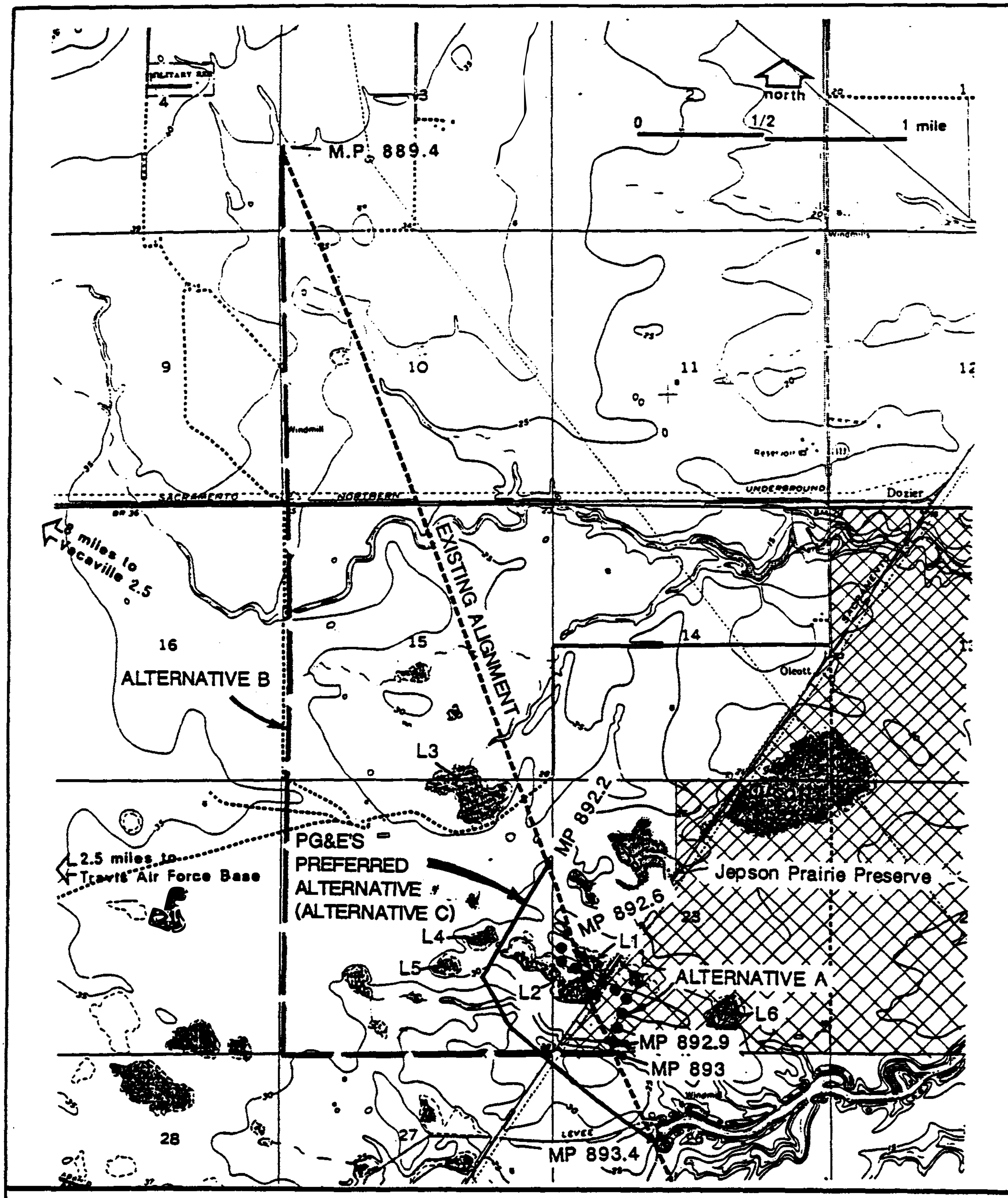
From the Brentwood Compressor Station, the loop would continue in a southeasterly direction and generally would follow the Stanpac No. 2 Pipeline for approximately 120 miles. The loop would cross the California Aqueduct near Clifton Court Forebay and enter Alameda County. It would then cross the Delta-Mendota Canal at MP 934.8. Several miles south, the loop would enter San Joaquin County and travel along the west side of the San Joaquin Valley roughly parallel with the Delta-Mendota Canal. The loop would pass west of the Tracy Municipal Airport.

The loop would continue along the west side of the San Joaquin Valley roughly parallel to and east of I-5. The California Aqueduct would be crossed several times. Loop 12 would end at the Panoche Metering Station (MP 1044.0) where it would meet PG&E's Lines 300 A and B. South of the Panoche Metering Station, Lines 300 A and B have sufficient capacity to deliver the additional volumes at the Kern River Metering Station without additional loops.

The total cost estimate for PGT's part of the expansion project, which covers Idaho, Washington, and Oregon, is approximately $635 million in 1988 dollars. The total cost estimate for the PG&E section of the expansion, which covers California, is approximately $545 million in 1988 dollars. The cost estimate for the entire project is approximately $1.18 billion in 1988 dollars. Costs are summarized in Table 2-3.

2.3.3 Requirements for Permanent Right-of-Way

Pipeline. PGT/PG&E's proposed right-of-way requirements vary greatly along its systems, as do the existing right-of-way widths. The loops would be installed on existing PGT/PG&E right-of-way for all but approximately 104 miles, or approximately 88 percent of the proposed route. Over 95 percent of the proposed pipeline would be within or adjacent to existing utility or transportation rights-of-way. In general, PGT and PG&E propose to install



LEGEND

- Existing Alignment
- Alternative A
- Alternative B
- Alternative C

Playa Pools

L# - Designated Playa Pools along the Alternative Alignments

CALIF

PGT/PG&E
NATURAL GAS PIPELINE PROJECT
Jepson Prairie Preserve Routing Study

FIGURE 2-3

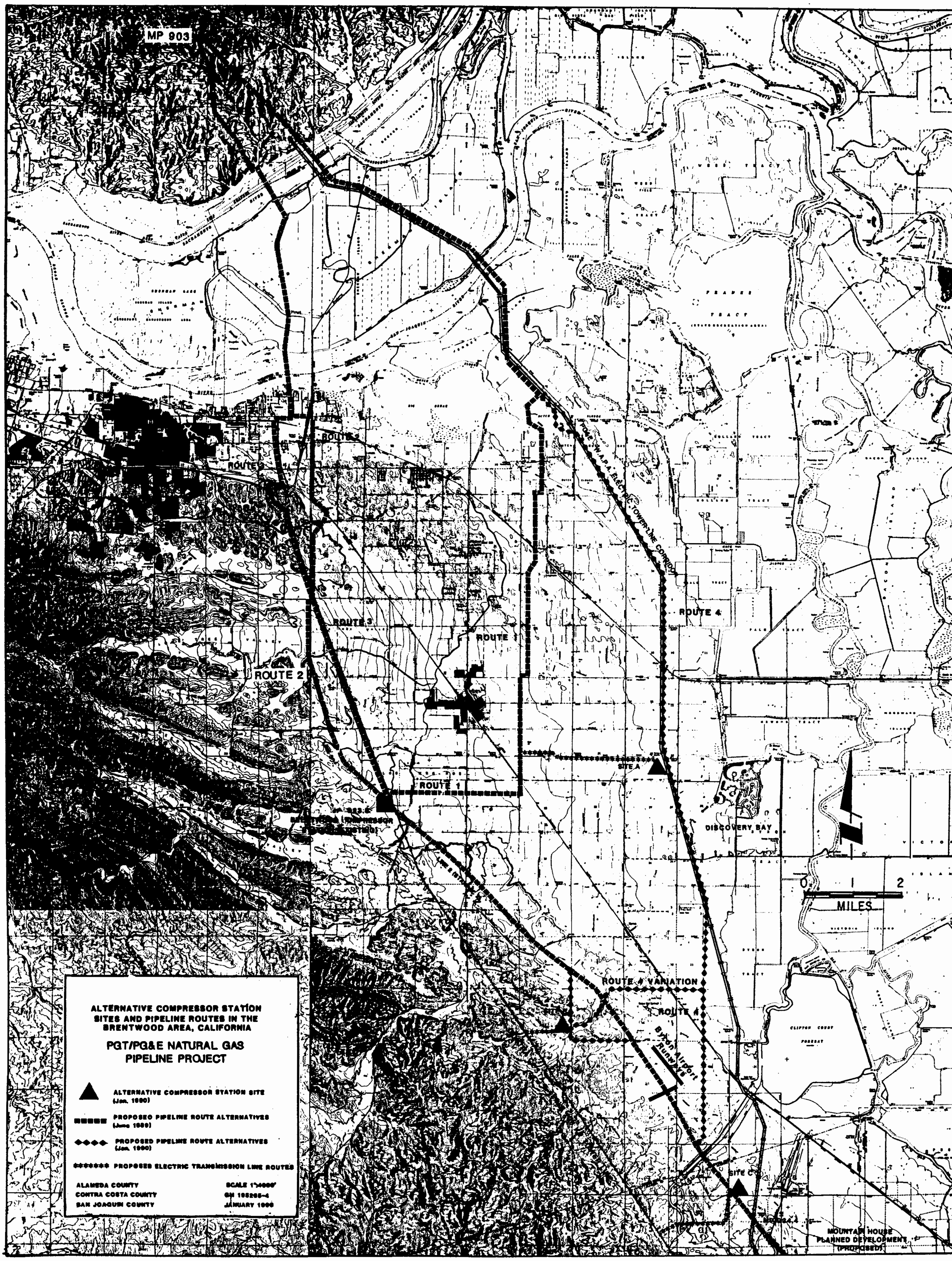


FIGURE 2-4. BRENTWOOD ALTERNATIVES

Table 2-3

PGT/PG&E PROJECT COST ESTIMATE SUMMARY
(in thousands of 1988 dollars)

Project Component	PGT	PG&E
Intangible plant	$ 1,020	$ 1,300
General management	7,319	7,710
Project management and engineering	36,222	23,488
Government inspection and permits	1,000	2,000
Land and land rights	2,581	13,969
Pipeline	386,805	357,549
Compressor stations	85,048	39,001
Metering stations	2,547	7,528
Management reserve	42,273	34,402
Allocated accrued costs	4,705	4,173
Finance charges and capitalized taxes	58,300	50,100
Other	0	3,621
TOTAL	$ 635,050	$ 544,841

the loops 20-30 feet from the existing pipeline on existing right-of-way with widths ranging from 50-100 feet. In the areas where the loops would deviate from the existing right-of-way, the width of the permanent right-of-way would also be between 50 and 100 feet. Appendix D-1 shows the existing and proposed right-of-way widths by MP.

On federal lands between the Canada-U. S. border and Malin, Oregon, PGT's existing right-of-way widths range between 53.5 and ~~83.5~~ 100 feet~~, except in the Winema National Forest where PGT has a 100 foot wide right-of-way~~. On BLM and FS lands in California, the existing right-of-way widths range between 81.75 and 100 feet, including 1985 easements granted on federal lands for the western leg facilities of the ANGTS. Figures 2-5 to 2-6 show typical PGT right-of-way configurations. Figure 2-7 shows the typical right-of-way configuration for private land and federal land along the John Day River Canyon route.

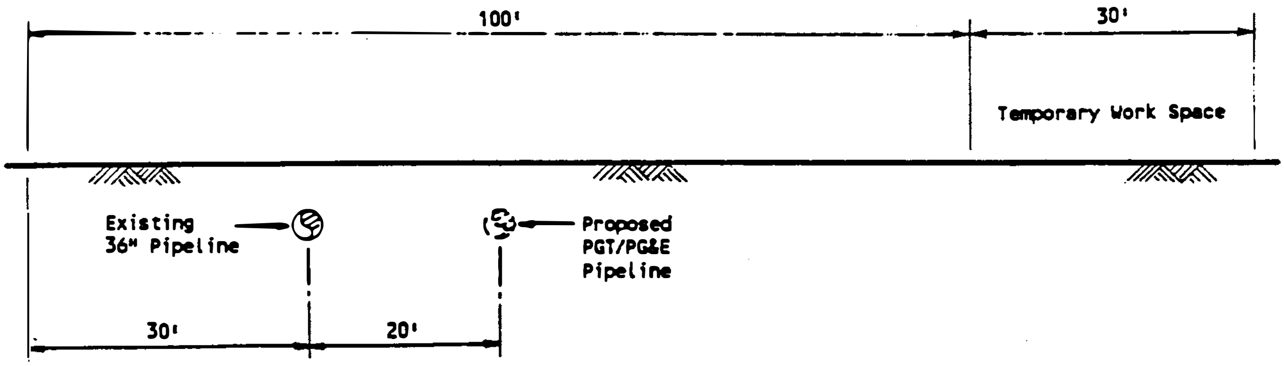
On private land, existing right-of-way widths range between 15 and 100 feet. Many of the existing easements contain a provision for the installation of a second pipeline. Where the existing right-of-way is 100 feet wide, no new permanent right-of-way would be required. Where additional permanent right-of-way would be necessary, PGT and PG&E propose to acquire between 20 and 35 feet to maintain a uniform 50-foot-wide permanent right-of-way.

Because the proposed loops would be constructed primarily on existing rights-of-way, few new access roads would be required. Existing private and public roads would provide the primary access to the right-of-way. Construction work areas and existing access roads may need improvements to ensure construction of the pipeline in a safe and efficient manner. Specific improvements are subject to negotiation with the affected property owner or land management agency. The right-of-way itself would be used for transportation access during construction. The small amount of additional access that is needed would be acquired prior to construction. PGT/PG&E has not determined where these new access roads would be located.

Where necessary on federal land, an additional 40-75 feet of temporary width (in accordance with the federal right-of-way grants) would be required to construct the loops. On some private lands, requirements for temporary working areas generally would include up to 40 feet of width, in addition to the existing permanent right-of-way. See Appendix D-1 for permanent and construction (permanent plus temporary) right-of-way needs and Figures 2-5 to 2-6 for specific temporary right-of-way needs.

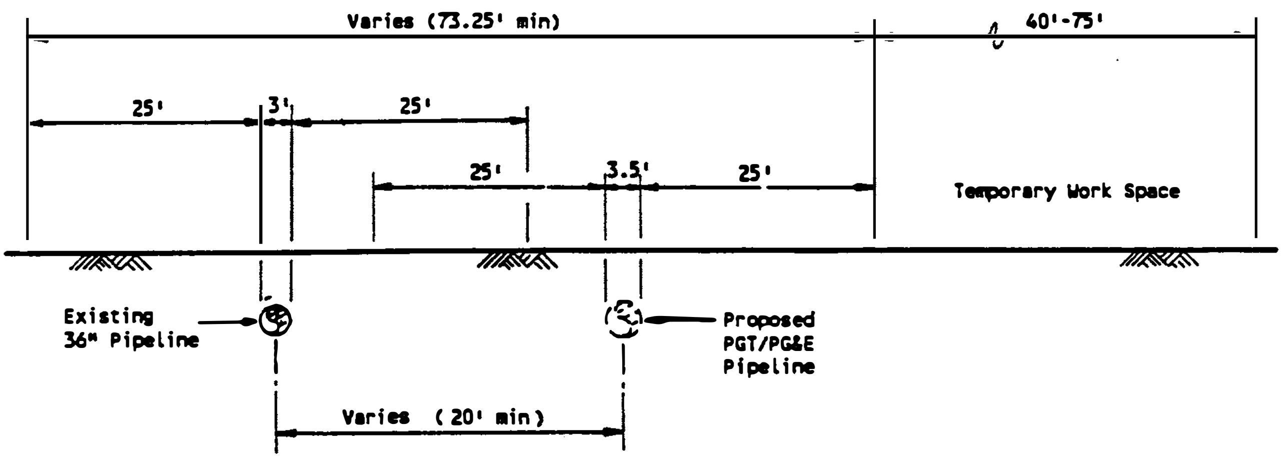
Working areas of up to 200 feet wide by 400 feet long may be needed on each side of major highway, railroad, and river crossings. After construction, temporary work areas would not be maintained and would be allowed to revert to their previous use. See Table 2-4 for the temporary work areas required at several of the major river crossings.

Above-ground Facilities. With the exception of Compressor Station No. 12 and the Brentwood Compressor Station, the proposed modifications would take place within the existing station perimeters (i.e., no additional land would be required). PGT's new compressor unit proposed for Compressor Station No. 3 would require construction of a new building and gas cooling equipment (Figure 2-8). Existing compressor buildings would be used for the compressor replacements at Compressor Station Nos. 5 and 7. PGT proposes to ~~acquire 4 acres~~



TYPICAL RIGHT-OF-WAY CONFIGURATION ON PRIVATE PROPERTY
INTERNATIONAL BOUNDARY TO CALIFORNIA-OREGON BORDER

FIGURE 2-5



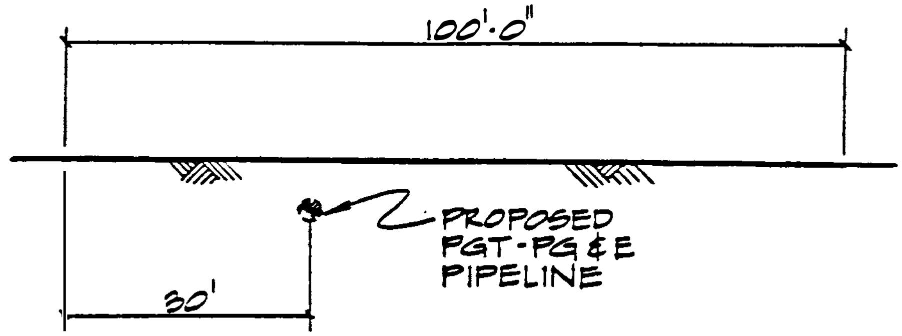
TYPICAL RIGHT-OF-WAY CONFIGURATION ON FEDERAL LAND
INTERNATIONAL BOUNDARY TO CALIFORNIA-OREGON BORDER

FIGURE 2-6

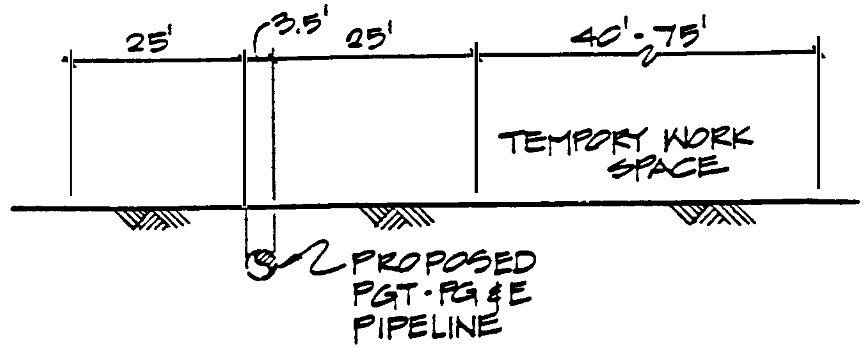
PGT/PG&E
NATURAL GAS PIPELINE
PROJECT

Typical Right-of-Way
International Boundary to
California-Oregon Border
Looking North

FIGURES 2-5 & 2-6



TYPICAL RIGHT-OF-WAY CONFIGURATION ON PRIVATE PROPERTY - JOHN DAY RIVER VARIATION (PROPOSED ROUTE)



TYPICAL RIGHT-OF-WAY CONFIGURATION ON FEDERAL LAND - JOHN DAY RIVER VARIATION (PROPOSED ROUTE)

PGT/PG&E
NATURAL GAS PIPELINE
PROJECT

Typical Right-of-Way
John Day River Route

Figure 2-7

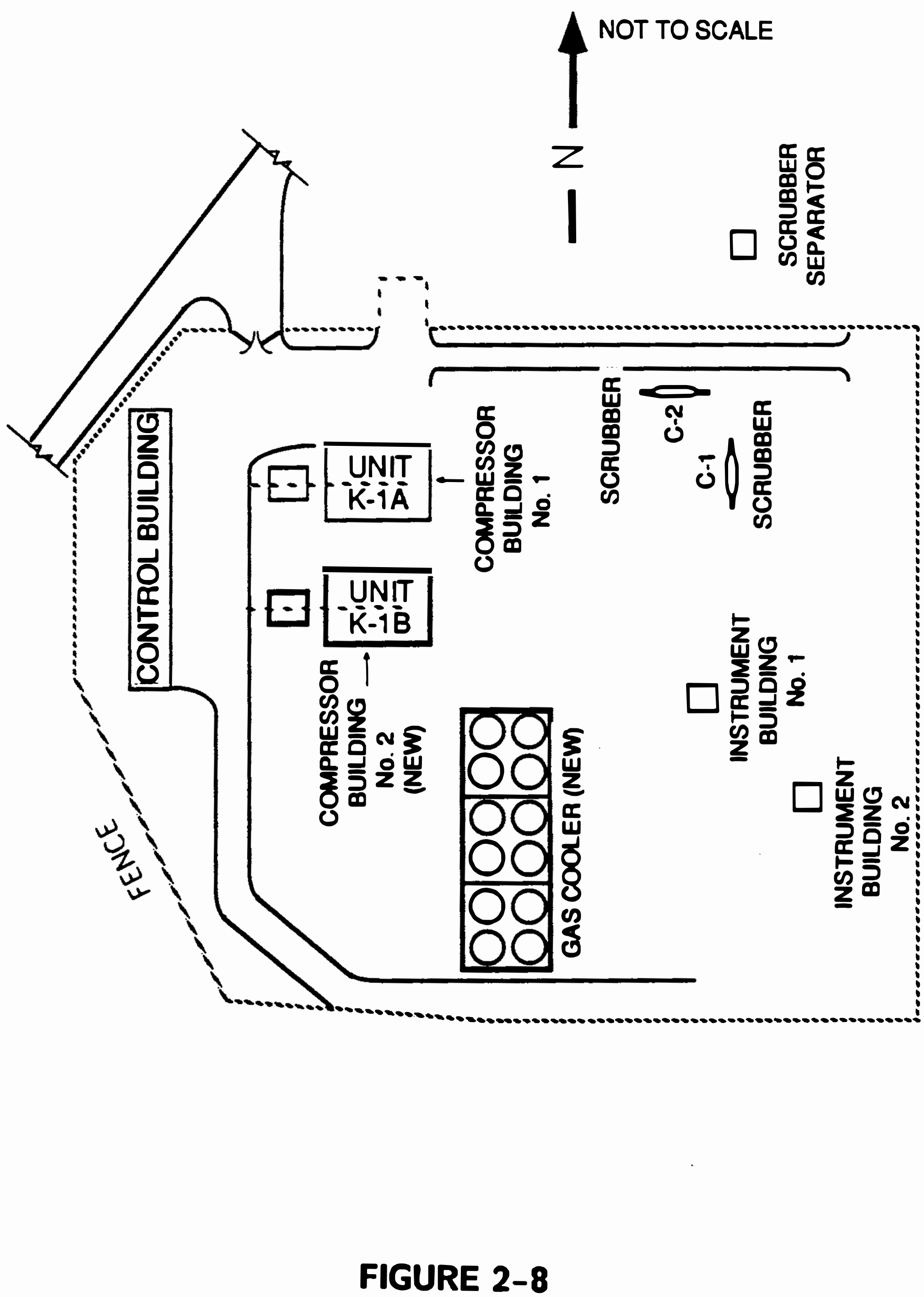


FIGURE 2-8
PGT COMPRESSOR STATION NO. 3 LAYOUT

Table 2-4

TEMPORARY WORK AREA REQUIREMENTS
FOR MAJOR RIVER CROSSINGS
OF THE PGT/PG&E PROJECT

State	River Crossing	Area Required (acres)
Idaho	Moyie River	8 [1/]
Washington	Walla Walla River	1
Oregon	John Day River	1
	Crooked River	1
	Williamson River	1
California	Fall River	1
	Pit River	1
	Sacramento River (north)	2
	Sacramento River (south)	2
	San Joaquin River	2
	Dutch Slough	2

[1/] Represents eight crossings of 1 acre each

~~adjacent to~~ relocate the fenceline at Compressor Station No. 12, and PG&E proposes to acquire 86.7 acres adjacent to the Brentwood Compressor Station. The Brentwood Compressor Station now occupies 13.3 acres. It would be expanded to 23 acres, and 77 acres of buffer would be acquired. The area would total 100 acres.

The expansion of the Panoche Metering Station would require an additional 0.8 acre. Although no additional acreage would be required at either the Malin or Kern River Metering Stations, the fenced boundaries may be expanded on property currently owned by PGT/PG&E. Each of the five pressure-limiting stations to be expanded (MPs 19.3, 212.6, 661.1, 727.8, and 846.4) would require approximately 0.3 acre per site.

The mainline valves for the proposed loops would be located adjacent to the valves on the existing pipeline, where possible. The valves would be in a fenced area approximately 70 feet long and 60 feet wide, centered over the pipeline. Table 2-5 lists the locations of these valves. Exclusive easements would be required at all mainline valve locations.

Pipe Storage Areas. A number of temporary pipe storage yards would be located near railheads. Pipeline contractors also would require temporary staging and storage areas for their heavy equipment and excavated materials, with the location and size dependent on construction plans. Table 2-6 lists storage sites and acreage involved. Few temporary access roads would be needed. PGT/PG&E has not determined where these temporary access roads would be located.

2.3.4 Project-Specific Construction Specifications and Procedures

Construction measures discussed in this section apply specifically to PGT/PG&E's proposed project. A general discussion of pipeline and support facility construction techniques common to all alternatives can be found above in the "General Construction, Operation, and Maintenance Procedures" section.

Pipe Specifications. Design pressures vary from 890 pounds per square inch gage (psig) to 1,040 psig along the existing pipeline. Based on DOT regulations and state requirements, the pipeline wall thickness would range between 0.343 inch and 0.589 inch. The pipeline diameter, length, and location are described in Table 2-1.

Between the Canada-U. S. border and Brentwood, the 12 loops would be crosstied with the existing pipeline at mainline valves and compressor stations. Seventeen new mainline valve sets with crossties to the existing pipeline would be installed. In addition, seven new mainline valves without crossties are planned. South of the Brentwood Compressor Station, seven new mainline valve sets would be installed with crossties to the Stanpac No. 2 Pipeline. In addition, 24-inch-diameter crosstie piping would be used at most mainline valves to interconnect the parallel pipelines.

Table 2-5

PROPOSED MAINLINE VALVE LOCATIONS
FOR THE PGT/PG&E PROJECT

State	Mainline Valve	Milepost
Idaho	5-1	97.6
Washington	7-2	241.9
Oregon	8-3	295.2
	8-4	308.8
	9-1	336.5
	9-2	350.7
	9-2.5	376.1
	10-1	385.2
	10-2	396.2
	10-3	410.2
	11-1	437.0
	11-2	450.8
	11-3	460.4
	12-1	486.5
	12-2	502.2
	12-3	516.5
	13-1	546.7
	13-2	562.1
	12-1.5	606.1
California	No name	628.8
	No name	643.4
	Indian Springs	661.1
	Dana	677.5
	No name	710.2

Table 2-5
(continued)
PROPOSED MAINLINE VALVE LOCATIONS
FOR THE PGT/PG&E PROJECT

State	Mainline Valve	Milepost
California (continued)	Shingletown	727.8
	Redding	741.9
	Sacramento River (north side)	755.1
	Sacramento River (south side)	755.4
	No name	776.9
	(Existing loop)	793.3
	Williams	827.9
	Buckeye Creek	846.4
	No name	859.0
	Pleasant Creek	870.8
	No name	882.0
	Sacramento River (north side)	905.9
	Cypress Road	915.4
	No name	933.8
	No name	966.3
	No name	977.1
	No name	989.0
	Los Banos Metering Station	1001.9
	Dos Palos Metering Station	1012.9
	Spreckels Sugar Metering Station	1032.7

Note: New mainline valves within existing compressor station boundaries are not included.

Table 2-6

STORAGE AREA LOCATIONS AND LAND REQUIREMENTS
FOR THE PGT/PG&E PROJECT

Location	Milepost	Quadrant Description	Acres
IDAHO			
Meadow Creek	13.7	SE¼ SE¼ Section 11, T63N, R2E	10
Athol	84.0	NW¼ SE¼ Section 9, T53N, R3W	10
Rathdrum	99.5	SE¼ NE¼ Section 10, T51N, R5W	15
WASHINGTON			
LaCrosse	184.3	NW¼ NW¼ Section 11, T15N, R39E	5
Wallula	254.0	SE¼ SW¼ Section 3, T7N, R31E	10
OREGON			
Stanfield	284.4	NW¼ SW¼ Section 25, T4N, R28E	20
Condon	344.5	NE¼ NW¼ Section 10, T4S, R21E	10
Madras	410.0	NE¼ SW¼ Section 35, T10S, R13E	15
Bend	456.0	SE¼ Section 9, T18S, R12E	15
Lenz	539.6	SE¼ SW¼ Section 30, T30S, R6E	25
Fuego (alternate)	548.0	E½ Section 12, T32S, R7E	25
Sprague River	578.0	NW¼ Section 13, T36S, R10E	20
CALIFORNIA			
Red Bluff	756.8	Within limits of Louisiana Pacific Lumber Mill	30
Harrington	841.5	SE¼ NW¼ + SW¼ NE¼ Section 9, T13N, R1W	15
Gustine	983.0	SW¼ SW¼ Section 15, T8S, R8E	30

Pipeline Construction Procedures. PGT/PG&E proposes to clear the entire permanent right-of-way and temporary construction area. All stumps would be grubbed from a continuous strip, 30 feet wide and centered on the new trench center line. All roots would be removed within the actual trench. Further, all stumps would be grubbed from areas of the construction right-of-way where right-of-way grading would be required. Outside of these areas to be graded and the 30-foot-wide trench strip, stumps would either be grubbed or cut off flush with the ground. Any stumps cut off would be left so that the construction right-of-way is suitable for rubber-tired vehicle traffic.

All grubbed stumps would be disposed of in a manner and method satisfactory to the landowner or government authorities having jurisdiction. Wherever stumps were grubbed and a hole was left in the ground, the hole would be backfilled and compacted to the original ground level.

Crossings of all limited-access federal and state highways and railroads in active use would be bored. Crossings of other thoroughfares would be open cut and thereby would avoid the use of casings.

Aerial crossings would be used at 10 locations that have existing above-grade crossings in place (Table 2-7). At the Pit River/Lake Britton crossing (MP 687), the existing above-grade crossing is now idle, and it is anticipated that the existing 36-inch-diameter pipeline crossing would be used.

In areas requiring blasting for trench excavation, the new pipeline would be spaced 30 feet from the existing pipeline. Locations where blasting may occur in the vicinity of residences are identified in Table 3D-4 (Land Use).

Hydrostatic testing of the installed pipeline would be conducted in sections of approximately 100 miles and is expected to occur during June-October 1992 and June-August 1993. A preliminary list of water sources and disposal sites is included and discussed in Chapter 3C, "Hydrology and Water Quality." Hydrostatic test water would be disposed of by discharging the water into either an existing waterway or a temporary pond for percolation and evaporation. No chemicals are proposed to be added to the test water. Methanol may be used for drying the pipeline. The resultant methanol-water mixture would be recovered and reused or recycled.

Pipeline construction at most locations would typically involve 4-8 weeks from initial land disturbance to final right-of-way recontouring and restoration. Construction would advance at an average rate of approximately 1 mile per day. At any specific location, the trench would generally be open for no more than one week. River crossings would generally take 2-6 days. Major river crossings would take longer.

Support Facility Construction Procedures. Preconstruction activities at the expanded compressor facility sites would include site selection, land acquisition, and topographic surveying. Construction of the Brentwood compressor facility would take approximately 12-18 months, exclusive of the time necessary for site preparation and the transport of workers and

Table 2-7

PROPOSED AERIAL CROSSINGS ALONG THE PGT/PG&E ROUTES

Milepost	Crossing
CALIFORNIA	
723.2	North Fork Bear Creek
723.6	Snow Creek
734.6	Battle Creek
756.0	Tehama-Colusa Creek
875.5	Vaughn Canal
6.0 BV-2 and BV-3	Mayberry Slough
15.4 BV-4	California Aqueduct
932.5	California Aqueduct
934.8	Delta-Mendota Canal
944.3	Delta-Mendota Canal
949.3	California Aqueduct
Notes: BV-2, BV-3, and BV-4 represent distinct MP systems developed for the Brentwood pipeline route Alternatives 2, 3, and 4, respectively. For Alternatives 2 and 3, the MP system starts at MP 903. For Alternative 4, the MP system starts at MP 913. No aerial crossings would be constructed in Idaho, Washington, or Oregon.	

equipment to and from the site. Construction at the other compressor stations is expected to take a total of 12 months with an estimated 5-6 months needed for work at each site.

After grading the site, foundations and pipe support piers would be installed, followed by the installation of equipment and piping, and erection of permanent buildings. After completion of service lines, pipe tie-ins, and testing, final construction operations would include painting, road surfacing, finish grading, and graveling of graded yard surfaces.

With the exception of Compressor Station No. 12 and the Brentwood Compressor Station, construction at compressor, metering, and pressure-limiting facilities would require a minimum amount of additional land and minimal clearing, grading, and other disturbances of vegetation and soil. Where necessary to protect property and the public, a permanent chain-link fence would either be erected or extended from existing fences to encompass the new facilities.

Construction Schedule and Workforce. Construction of PGT/PG&E's proposed project ~~is scheduled~~ was originally proposed to take place from April through October 1993 with the exception of the Moyie River crossings, which are scheduled to be constructed between July and December 1992. However, PGT has tentatively ~~indicated that it may~~ revised its proposed schedule and has indicated that it would construct in the spring, summer, and fall of 1992 and 1993. Compressor station work is scheduled to commence in late spring 1992 and be completed in November 1993. The pipeline work would be segregated into eight construction spreads, with employment for each spread averaging 545 workers. A pipeline construction spread consists of a section of pipeline built from start to finish by a specific work crew. Table 2-8 lists the location of each construction spread and the corresponding construction schedule.

Construction crews would be hired from local union halls depending on worker availability. The anticipated hiring breakdown would be as follows:

- Where sufficient labor is available, the following would be hired locally:
  - 100 percent of laborers and teamsters;
  - 50 percent of operating engineers; and
  - 25 percent of plumbers, pipe fitters, and welders.
- Seventy-five percent of the workers in trades covered by the plumbers-pipe fitters-welders union would be hired through the union office in Tulsa, Oklahoma, which has a nationwide contract to supply workers for long-distance projects.

2.3.5 Project-Specific Operation and Maintenance Procedures

Operation and maintenance measures discussed in this section apply specifically to PGT/PG&E's proposed project. A more general discussion of pipeline and support facility operation and maintenance procedures common to all alternatives can be found above in the "Construction, Operation, and Maintenance Procedures" section.

Table 2-8

CONSTRUCTION SPREAD LOCATIONS
AND CONSTRUCTION SCHEDULE
FOR THE PGT/PG&E PROJECT

Spread	Construction Period*
1A (M.P. 0 to 20.5)	APR to SEP 1992
1B (M.P. 73.0 to 108.0)	MAR to AUG 1992
1C (M.P. 179.3 to 197.5)	JUN to NOV 1992
1D (M.P. 225.6 to 255.6)	MAY to NOV 1992
2B (M.P. 277.6 to 350.7)	JAN to NOV 1993
2A (M.P. 350.7 to 437.0)	JAN to NOV 1992
3B (M.P. 437.0 to 502.2)	FEB to OCT 1993
3A (M.P. 502.2 to 612.5)	FEB to NOV 1992
4A (M.P. 612.5 to 694.8)	JAN to OCT 1992
4B (M.P. 694.8 to 793.2)	JAN to SEP 1993
5A (M.P. 810.2 to 923.8)	JAN to OCT 1992**
5B (M.P. 923.8 to 1043.6)	JAN to SEP 1993

* Based on requests from the U.S. Forest Service, PGT/PG&E is evaluating the feasibility of clearing merchantable timber from the right-of-way in the latter half of 1991, and may do so if authorized.

** PGT/PG&E is evaluating the feasibility of boring the lower Sacramento and San Joaquin River crossings, as well as Dutch Slough. Because selection of this construction method would require scheduling contingencies in case the bore cannot be accomplished, the bored crossings would be scheduled for the latter half of 1991.

Existing facilities and procedures are in place to operate and maintain the new facilities. No significant expansion of operations facilities or staff is anticipated to be necessary for the expansion project. Approximately 6-12 permanent jobs for PGT and 16 for PG&E are expected to be created along the pipeline.

PGT and PG&E have operating and maintenance plans that comply with the DOT regulations and applicable state regulatory requirements. To the extent necessary, these plans would be revised to incorporate the new project facilities.

The project is designed so that all facilities can, in conjunction with the existing pipeline, be monitored, controlled, and operated in a safe and reliable manner through a telemetry system linked to PGT and PG&E gas control centers. The system operation does not require 24-hour maintenance/operation personnel at the sites; however, under normal operating conditions, maintenance personnel generally inspect compressor and delivery sites daily during the work week. Other facility sites are checked on an established schedule.

Operating personnel live in communities along the system so that they can reach any area within a short period, in case of an emergency or malfunction. All equipment containing moving parts, such as the compressors, receive periodic maintenance on a scheduled, time-of-use basis. The pipeline right-of-way is surveyed on a set schedule for evidence of leaks, erosion damage, and right-of-way encroachment. The pipeline is routinely monitored for corrosion control.

Trees would be periodically removed along a 40-foot-wide strip above the pipeline. When these trees are 2-3 inches diameter at breast height (dbh) they would be mechanically cut, chipped into pieces less than 3 inches long, and scattered over the right-of-way. PGT/PG&E would allow natural revegetation to occur over the remainder (approximately 60 feet) of the right-of-way. This procedure, although in place for the existing pipeline, was never performed due to delays in the expected clearing and looping of the expansion project. PGT has found evidence of wind erosion in certain areas of sandy soil. On occasion, wind uncovers short segments of pipe. Revegetation of the disturbed area has proven to be the most successful approach to maintaining necessary pipe cover.

Herbicides would not be used for right-of-way maintenance. Regulatory agency-approved herbicides would be used to control vegetation in the fenced, aboveground facilities. These areas include unpaved portions of compressor stations, metering stations, and valve lots.

To facilitate repairs, equipment, tools, pretested pipe, and other repair materials for emergency use are stored at existing maintenance bases located along the pipeline. In addition, pretested pipe is currently stockpiled at two storage sites near critical locations that are not accessible to heavy trucks during adverse weather conditions. These two sites are located in Thirtymile Canyon (east of the John Day River) and Pine Canyon (west of the John Day River). Sections of pipe and other repair materials for the 12 loops would also be stored at existing locations.

2.3.6 Future Plans

Abandonment of Facilities. PGT and PG&E have no plans to abandon existing or proposed facilities. Should the pipeline be abandoned, the pipe would either be abandoned in place or removed and salvaged. Compressor stations and related facilities would also be dismantled and salvaged. Concrete and pavement would be broken up and disposed of in an approved disposal area or left in place. Pipe installed in rivers, creeks, and lakes would generally be abandoned in place, as well as at other locations where the landowner or land management agency would be agreeable to this arrangement. Pipe abandoned in place would be purged with an inert medium to displace any residual natural gas, in accordance with regulatory requirements. Should the pipeline be removed, the right-of-way would be rehabilitated, employing measures similar to those used during construction of the pipeline.

PGT and PG&E have no present plans to construct additional facilities related to the proposed project beyond those outlined above.

Relationship with Other Projects. PGT and PG&E have many ongoing projects that are necessary to maintain the safety and reliability of their respective systems, but these projects are not functionally related to the proposed project. Such projects may include pipeline replacement and compressor station modifications, as well as normal repairs. These repairs and maintenance tasks are independent of the PGT/PG&E project and would be completed regardless of the outcome of this certification process.

One such project is the replacement program for the Stanpac No. 2 Pipeline, which would replace approximately 50 miles of old pipe between 1989 and the mid-1990s. Loop 12 of the PGT/PG&E project would lie parallel and adjacent to the Stanpac No. 2 Pipeline, and would use portions of the Stanpac No. 2 Pipeline right-of-way.

2.4 ALTAMONT NATURAL GAS PIPELINE PROJECT

2.4.1 Project Characteristics

Altamont represents a consortium consisting of Tenneco-Altamont Corporation (40%), Amoco Altamont Company (25%), Petro-Canada Altamont Inc. (25%), and Entech Altamont, Inc. (10%)[1/]. The latter company represents Montana Power Company.

Altamont proposes to construct, own, and operate a 30-inch-diameter interstate natural gas pipeline transmission system with the design capacity to transport approximately 719 MMcf/d of natural gas. The pipeline would extend for 620 miles from the Canada-U. S. border near Port of Wild Horse, Montana, to the southwest corner of Wyoming near Opal (Figure 2-9). The system would link expanded Canadian transmission facilities owned by NOVA, with

1/ In early 1991, Petro-Canada left the Altamont Consortium. It's 25 percent share has not yet been reassigned.

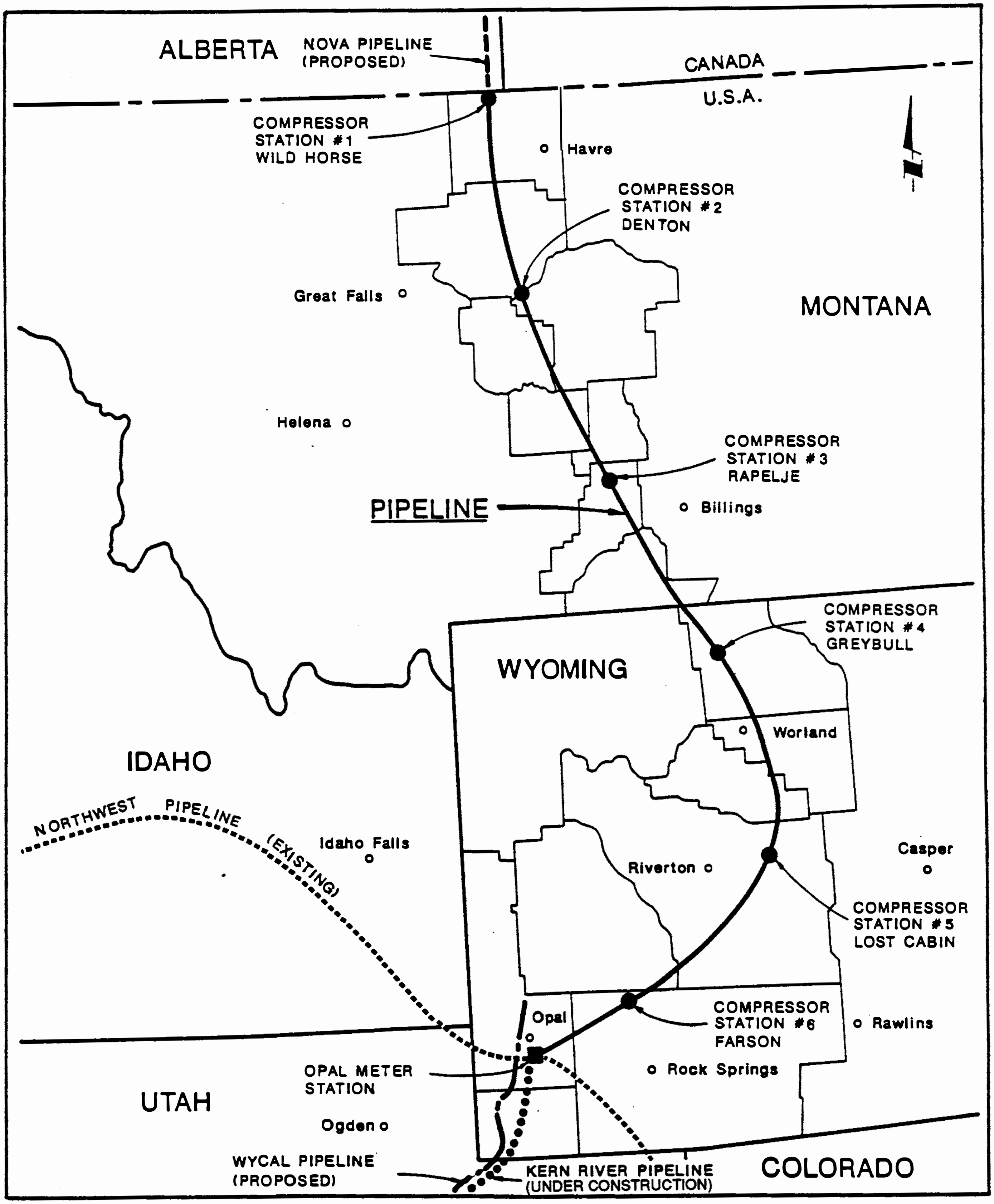


FIGURE 2-9. PROJECT LOCATION - ALTAMONT NATURAL GAS PIPELINE PROJECT

~~proposed~~ interstate facilities presently under construction between the Opal area and the Bakersfield area of Kern County in southern California. Gas would be delivered to LDCs, EOR operations, industrial gas users, and power generation facilities throughout southern California.

Both ~~the~~ Kern River and the Wyoming-California Pipeline Company (WyCal) have proposed interstate systems which begin at or near Opal. Although Altamont has entered into an agreement with Kern River for an interconnection at Opal and the necessary expansion of Kern River's system to accommodate the Altamont volumes, Altamont has indicated that use of either the Kern River or the WyCal projects would ultimately be determined by which system is constructed. ~~Both companies~~ Given that the Kern River System is presently under construction while the Wycal system appears to remain as a proposal, gas transported by Altamont would probably be delivered to Kern River for subsequent delivery to southern California. Nevertheless, both Kern River and WyCal have been certificated by the FERC to construct facilities and transport natural gas to southern California. The Kern River facilities (part of the Joint Kern River-Mojave Project) ~~would~~ will begin on Northwest Pipeline Corporation's (Northwest) system at the Opal Meter Station where Altamont's system would terminate. WyCal's system would begin immediately to the west of the proposed Altamont/Kern River interconnection. Altamont would require a short lateral constructed adjacent to Northwest's right-of-way to join with WyCal's certificated system.

Altamont could potentially be supplied by at least two existing sources of natural gas, including supplies imported from the western Canadian provinces of Alberta and British Columbia, or domestic gas produced in Montana or Wyoming. Because Altamont would act solely as a natural gas transporter, supply arrangements would be the responsibility of individual shippers in southern California. A major portion of Altamont's capacity is expected to be used to transport imported Canadian gas. However, the origin of the gas transported would ultimately be determined by shippers who would use the system and the location of producers from whom the shippers would purchase gas.

The proposed system would extend through 15 counties in two states, distributed as indicated in Table 2-9. Six compressor stations providing a total of 113,400 (ISO) hp would be constructed as part of Altamont's proposal. The initiating station near Port of Wild Horse would be equipped with four 12,600-hp turbine-driven centrifugal compressors, site rated at ~~44,333~~ 47,800 hp. One 12,600-hp unit would be sited at each of the other five compressor stations. The turbines would be driven by natural gas from the pipeline. Additional required facilities include a metering station (at the systems' terminus near Opal), a ~~microwave~~ communications system (either microwave- or satellite-based), and related facilities such as scraper (pig) launchers and receivers, cathodic protection test stations, and mainline sectioning valves. Altamont also plans to maintain three permanent field offices along the route, ~~including a central office in Billings, Montana~~ although the locations have yet to be determined. The project would directly affect approximately 7,570 acres during construction, ~~The project includes~~ including approximately 4,000 acres of permanent right-of-way. The route would parallel and generally abut existing utility and transportation corridors for approximately 35 percent (218 miles) of its length. The estimated cost of the Altamont system is $573.4 million in 1990 dollars (Table 2-10). Permit and approval requirements for the Altamont project are listed in Table 1-4.

Table 2-9

GEOGRAPHIC DISTRIBUTION OF ALTAMONT PROJECT FACILITIES

County	Length of Pipe (miles)	Compressor Station		
		Name (Number)	Horsepower (site-rated)	Milepost
MONTANA				
Hill	49	Wild Horse (No. 1)	47,800	0
Chouteau	63			
Fergus	31	Denton (No. 2)	11,900	121
Judith Basin	25			
Wheatland	38			
Golden Valley	8			
Stillwater	44	Rapelje (No. 3)	11,200	229
Carbon	47			
Subtotal	305		70,900	
WYOMING				
Big Horn	70	Greybull (No. 4)	11,000	347
Washakie	31			
Hot Springs	20			
Fremont	111	Lost Cabin (No. 5)	10,700	445
Sublette	3			
Sweetwater	55	Farson (No. 6)	10,100	549
Lincoln	25			
Subtotal	315		31,800	
TOTAL	**620**		**102,700**	

Table 2-10

COST ESTIMATE SUMMARY FOR THE ALTAMONT PROJECT
(First Quarter 1990 Dollars)

Item Number	Description	Cost (in thousands of dollars)
1.0	Land and land rights	$ 6,498
2.0	Pipeline	374,700
3.0	Compressor stations	88,411
4.0	Metering stations	1,334
5.0	SCADA system	5,774
6.0	O&M capital	1,440
7.0	Project management and engineering	17,800
8.0	Prepermit	18,026
9.0	Project contingency	23,970
10.0	AFUDC	32,960
11.0	Line pack	2,570
12.0	TOTAL COST	$ 573,483

2.4.2 Project Location

In the description below, the proposed pipeline has been divided into six segments that correspond to the pipeline segments between compressor and metering stations (Figure 2-9).

Segment 1 (MP 0-121). Segment 1 would begin at the proposed Wild Horse Compressor Station about one mile west of the international border town of Port of Wild Horse, Montana. At MP 7, the route would cross the Milk River about seven miles upstream (west) of Fresno Reservoir. The route would cross US 2 about two miles east of Gildford and 25 miles west of Havre near MP 30. The Larado gas field would be crossed between MP 35 and MP 50. The route would pass to the west of Lonesome Lake near MP 52 and would cross the Missouri River near MP 69, immediately north of Virgelle.

Segment 2 (MP 121-229). Segment 2 would begin at the proposed Denton Compressor Station, to be located about three miles northwest of Denton, Montana, on the south side of SR 81. Near MP 146, the route would cross US 87/SR 200 and the Judith River two miles northeast of Hobson. The route would then extend south, passing immediately east of the small town of Straw (MP 157) and immediately west of Garneill (MP 164). Near MP 169, the route would pass about one mile east of Judith Gap. The Musselshell River would be crossed immediately west of Shawmut at MP 195.

Segment 3 (MP 229-347). Segment 3 would begin at the proposed Rapelje Compressor Station some three miles south of Rapelje, Montana. This would place the station about six miles southwest and west of the Hailstone and Halfbreed National Wildlife Refuges (NWRs), respectively. The route would pass about 23 miles west of Billings, and cross the Yellowstone River just west of Park City near MP ~~157~~ 257. Immediately north of Edgar (MP 268), the route would cross the Clark's Fork of the Yellowstone River. The route would skirt the southwest corner of the Crow Indian Reservation at MP 288 and pass over a mile west of the Custer National Forest before crossing the Montana-Wyoming border at MP 305. The Shoshone River would be crossed at MP 320 where the route would pass immediately west of Lovell, Wyoming.

Segment 4 (MP 347-445). Segment 4 would begin at the proposed Greybull Compressor Station, to be located five miles west of Greybull, Wyoming, on the north side of US 14/16/20. The route would cross the Greybull River near MP 352 and pass over a mile west of Basin near MP 357. Nine miles north of Worland, the route would cross the Bighorn River near MP 374. The route would proceed south along the eastern edge of the valley, crossing US 16 about three miles east of Worland near MP 385. The east fork of Nowater Creek and Nowater Creek itself would be crossed near MP 392 and 399, respectively. Kirby Creek would be crossed within the Kirby Creek Oil Field near MP 409. The route would skirt to the east of the Bridger Mountains between MP 420 and 435 and cross Badwater Creek about eight miles west of Lysite near MP 440.

Segment 5 (MP 445-549). Segment 5 would begin at the proposed Lost Cabin Compressor Station, to be located about 12 miles west of Moneta, Wyoming, on the north side of US 20/26. The route would cross SR 136 about 17 miles east of Riverton near MP 464 and skirt the southeast corner of the Wind River Indian Reservation near MP 471. The Beaver Creek ~~and Sand Draw~~ Oil and Gas Field would be bisected near MP 480, some 22 miles east of Lander. The route would traverse Weiser Pass near MP 498 and cross Beaver Creek near MP 509, about five miles east of the southeast corner of the Shoshone National Forest. Near MP 515, the route would pass about five miles east of South Pass City. The ~~Continental Divide would be crossed about a mile southeast of South Pass near MP 529, as would a small portion of the South Pass National Historic Landmark (NHL) near MP 531. Once on the west side of the Divide,~~ Sweetwater River would be crossed near MP 527 and the Continental Divide near MP 529. The Divide would be crossed on the north side and immediately adjacent to SR 28 at the South Pass. This alignment would circumvent the South Pass National Historic Landmark (NHL), which lies on the southern side of SR 28 near its South Pass crossing. The route would continue towards the southwest, paralleling SR 28 to a point where the highway and the Oregon-Mormon Trail intersect near MP 537.7. Here, the route would cross the Trail and SR 28 simultaneously. Once on the south side of SR 28, the route would join an existing AT&T ROW which it would follow (on the south side of SR 28) to within three miles of Farson.

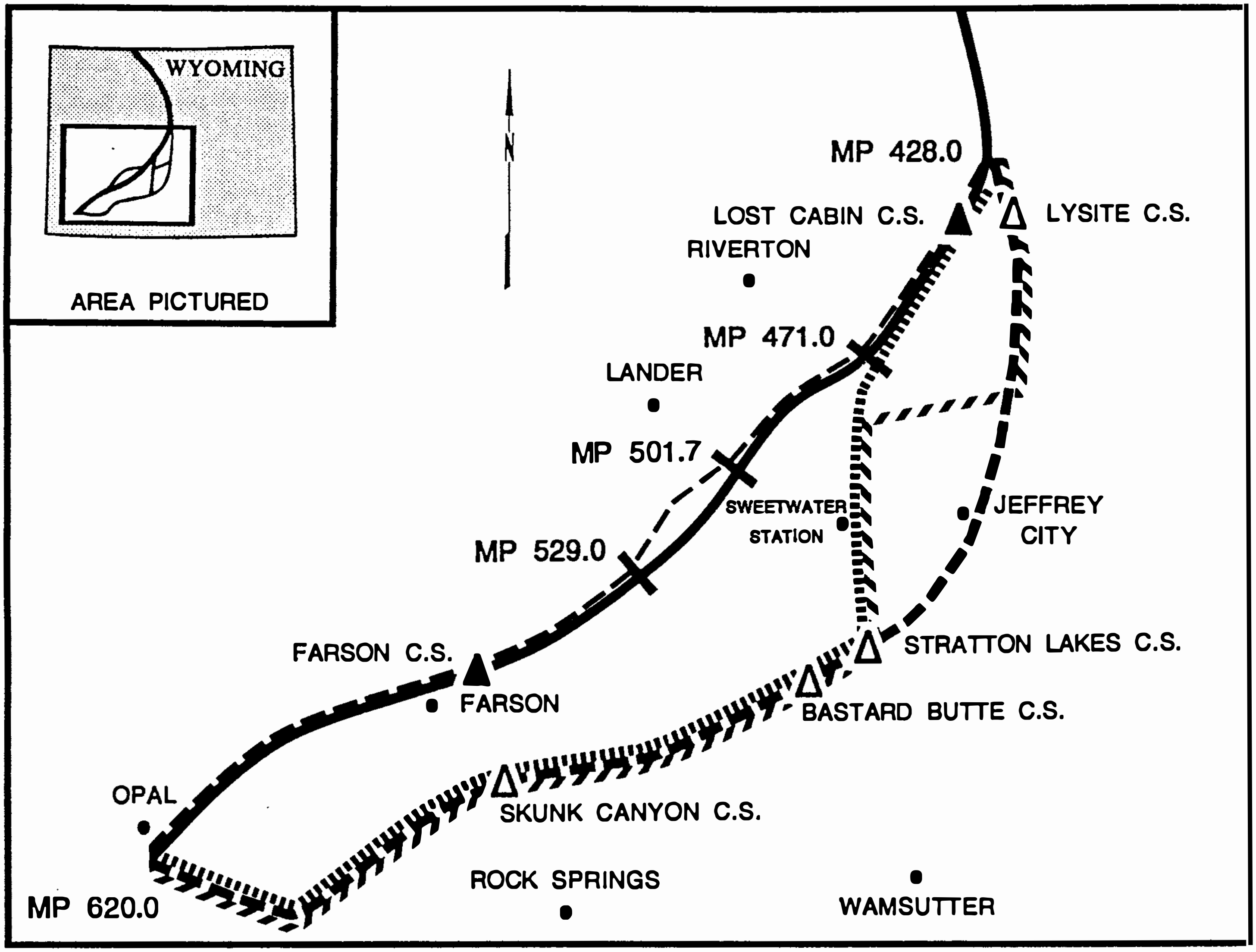
Between the Sweetwater River crossing (MP 526) and Farson (MP 562), the route would roughly parallel the historic Oregon-Mormon Trail, crossing it twice near MPs 536.5 and 561. The BLM and others have identified routing variations that would either avoid the South Pass area or maximize the use of existing utility corridors. A description of these alternate routes can be found below in "South Pass Route Variations."

Segment 6 (MP 549-620). Segment 6 would begin at the proposed location of the Farson Compressor Station, approximately 13 miles northeast of Farson, Wyoming, on the south side of SR 28. The route would cross US 187 about one mile north of Farson near MP 562, and the Green River adjacent to several existing pipelines immediately upstream of the Seedskadee NWR near MP 593. This crossing would be approximately four miles downstream (southeast) of Fontenelle Reservoir. The route would cross the Hams Fork River about two miles east of Opal near MP 613 before terminating at the proposed Opal Meter Station (MP 620) where the Kern River and Northwest systems interconnect.

2.4.3 South Pass Route Variations

During the public scoping meeting held in Riverton, Wyoming on September 18, 1989, the BLM representative announced that alternative routes which the Lander and Rock Springs District Offices had proposed to circumvent the South Pass area would be included in the EIS. The three alternatives were subsequently refined and are presented below as the Jeffrey City, Alkali Butte, and Northern Utilities Variations.

Public comment received after the scoping period ended identified a fourth alternative to the proposed route which would traverse the immediate South Pass vicinity to the north and west of the proposed route. This alternative is presented below as the Route 28 Variation. Figure 2-10 illustrates the South Pass Route Variations. Table 2-11 compares the capital costs associated with adoption of the individual South Pass Route Variations against those associated with construction along the proposed route.



LEGEND

- Proposed Route
- Jeffrey City Variation
- Alkali Butte Variation
- Northern Utilities Variation
- Route No. 28 Variation
- Proposed Compressor Station
- Alternative Compressor Station Sites

0 Miles 50 100

NOTES

(a) All variations begin at MP 428 and terminate at MP 620. MP's where the variations depart from and return to the proposed route (if different than MP 428 and MP 620, respectively) are noted.

(b) Only the Northern Utilities Variation would require construction of a compressor station at Stratton Lakes.

(c) Both the Jeffrey City and the Alkali Butte Variations would require construction of a compressor station at Bastard Butte.

FIGURE 2-10. ALTAMONT PROJECT'S SOUTH PASS ROUTE VARIATIONS

Table 2-11

COST ESTIMATE SUMMARY AND COMPARISON
ALTAMONT PROPOSED ROUTE VS. THE SOUTH PASS ROUTE VARIATIONS[a]
(First Quarter 1990 $)

Item Number	Description	Cost (In Thousands of Dollars)				
		Proposed Route (620 Miles)	Jeffrey City (659 Miles)	Alkali Butte (654 Miles)	Northern Utilities (671 Miles)	Route 28 (621 Miles)
1.0	Land and Land Rights	$ 6,498	$ 6,839	$ 6,796	$ 6,924	$ 6,524
2.0	Pipeline	374,700	394,312	393,240	401,736	381,092
3.0	Compressor Stations	88,411	98,022	98,022	98,022	88,411
1.0	Metering Stations	1,334	1,334	1,334	1,334	1,334
5.0	SCADA System	5,774	6,128	6,076	6,229	5,774
6.0	O&M Capital	1,440	1,925	1,925	1,925	1,440
7.0	Project Management and Engineering	17,800	18,829	18,790	19,087	18,018
8.0	Prepermit	18,026	19,057	19,057	19,057	18,026
9.0	Project Contingency	23,970	26,465	26,373	27,070	24,291
10.0	AFUDC	32,960	35,342	35,254	35,917	33,402
11.0	Line Pack	2,570	2,762	2,733	2,815	2,572
12.0	Total Costs	$ 573,483	$ 611,015	$ 609,600	$ 620,115	$ 581,134
13.0	Capital Cost Increase		$ 37,532	$ 36,117	$ 46,633	$ 7,651

[a] Table compares capital costs associated with the proposed route (MP 0-620) against the capital costs incurred if one of the South Pass Route Variations were adopted. The total project length for each route or variation is included. Net capital costs increase over the proposed route for each variation is included as Item Number 13.

Jeffrey City Variation. The Jeffrey City Variation is approximately 231 miles long, compared to 192 miles along the portion of the proposed route which it would replace. Use of this variation is estimated to increase project costs by ~~$36.4~~ $37.5 million in ~~1989~~ 1990 dollars (Table 2-11).

The variation diverges from the proposed route at MP 428, immediately east of Copper Mountain in northern Fremont County to follow several existing pipeline rights-of-way and the Bridger Creek Road toward Lysite. The route would pass immediately west of Lysite and continue south, roughly paralleling the Moneta Lysite Road to Moneta and the Love Ranch Road to its intersection with SR 136 some 40 miles east of Riverton and 16 miles west of Gas Hills. The variation would continue south, ascending the Beaver Divide immediately west of the Jeffrey City to Gas Hills haul road, then roughly paralleling the haul road to Jeffrey City where the variation would cross the Sweetwater River and the Oregon-Mormon Trail. Passing immediately east of Jeffrey City, the variation would continue south along an existing county road through Crooks Gap before bending southwest to join the existing Frontier/Bairoil pipeline corridor and entering Sweetwater County. The variation would follow this ROW across northern Sweetwater County along a west-southwest alignment, passing south of Steamboat Mountain and crossing the Continental Divide immediately north of the Table Mountain twins in the Leucite Hills. Continuing along the existing right-of-way, the route would cross US 191 (about 18 miles north of Rock Springs), the Green River (about four miles downstream of the Seedskadee NWR), and SR 372 (about 11 miles northeast of the SR 372/US 30 intersection) before crossing Blacks Fork and passing about one mile south of Granger. Two miles southwest of Granger, the route would again cross the Oregon-Mormon Trail. About one mile further west, the variation would intersect with Northwest's existing pipeline right-of-way which would be followed into Lincoln County to Altamont's proposed termination point at the Opal Meter Station.

The Jeffrey City Variation would require Compressor Stations 5 and 6 to be relocated ~~and construction of an additional (seventh) compressor station~~. Because the variation would significantly increase the length of the proposed route, it would also require construction of an additional (seventh) compressor station in order to maintain the proposed delivery volumes and pipeline pressure at the Opal interconnection with Kern River. Compressor Station No. 5 (Lost Cabin) would be relocated to JC MP 440.5 near Lysite in Fremont County while Compressor Station No. 6 (Farson) would be relocated to JC MP 539 near Bastard Butte, south of Cyclone Rim in northern Sweetwater County.[2] An additional 12,000-hp Compressor Station No. 7 would be required at JC MP 608 near the convergence of the Skunk Canyon tributary and Alkali Creek, some 11 miles east-northeast of the Green River crossing in Sweetwater County.

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[2] MPs along the South Pass Variations are determined by starting at MP 428 on the proposed route (the location where all four variations begin), and counting forward. When necessary, variation MPs are preceded by the designations "JC" for Jeffrey City, "AB" for Alkali Butte, "NU" for Northern Utilities, and "RT" for Route 28.

Alkali Butte Variation. The Alkali Butte Variation is approximately 226 miles long. While it would follow the proposed route from MP 428 (the location where all four South Pass Variations begin) to the southeast corner of the Wind River Indian Reservation near Alkali Butte at MP 471, its use would add almost 34 miles to the final alignment between Alkali Butte and Opal. Use of the Alkali Butte Variation is estimated to increase project costs by ~~$35~~ $36.1 million in ~~1989~~ 1990 dollars (Table 2-11).

The variation diverges from the proposed route at MP 471 to follow an existing utility corridor south, passing about one mile west of Sand Draw and climbing the Beaver Divide some two to three miles southwest of where Sand Draw Road makes its ascent. Once atop the Divide, the variation would roughly follow Sand Draw Road south to a crossing of the Sweetwater River and Bison Basin Road to Bison Basin in southern Fremont County. Immediately south of the Sweetwater River, the variation would cross the Oregon-Mormon Trail and the Emigrant Trail split-off. The route then continues along a southern alignment, crossing into Sweetwater County immediately east of Flattop Buttes and intersecting with the Jeffrey City Variation at Stratton Lakes (JC MP 529.6) along the existing Frontier/Bairoil pipeline right-of-way. For its remaining 130 miles, the Alkali Butte Variation would follow the route of the Jeffrey City Variation previously described across northern Sweetwater County and into Lincoln County to the proposed Opal Meter Station.

The Alkali Butte Variation would require Compressor Station 6 to be relocated and construction of an additional (seventh) compressor station for the same reason as discussed above on the Jeffrey City Variation. Compressor Station No. 6 (Farson) would be relocated to JC MP 539 at Bastard Butte, south of Cyclone Rim in northern Sweetwater County (about 9 miles southwest of where the Alkali Butte and Jeffrey City Variations join at Stratton Lakes). An additional 12,000-hp Compressor Station No. 7 would be required at JC MP 608 at Skunk Canyon in Sweetwater County.

Northern Utilities Variation. The Northern Utilities Variation is approximately 243 miles long, compared to 192 miles along the portion of the proposed route which it would replace. Use of this variation is estimated to increase project costs by ~~$45.2~~ $46.6 million in ~~1989~~ 1990 dollars (Table 2-11).

The variation diverges from the proposed route at MP 428. From here it would follow the route of the Jeffrey City Variation previously described for almost 43 miles past Lysite and Moneta to an intersection with SR 136. At the highway, the Northern Utilities Variation would turn westward, joining the existing Northern Utilities pipeline right-of-way which it would follow for almost 31 miles to an intersection with the Alkali Butte Variation about three miles southwest of Sand ~~Hills~~ Draw [3]. For its remaining 169 miles, the Northern Utilities Variation would follow the route of the Alkali Butte Variation south across Fremont County and the Jeffrey City Variation from northern Sweetwater County into Lincoln County to the proposed Opal Meter Station.

3/ In comments on the Draft EIS, the Wyoming Public Service Commission indicated that this right-of-way is now owned by Northern Gas Company.

The Northern Utilities Variation would require Compressor Stations 5 and 6 to be relocated and construction of an additional (seventh) compressor station for the same reason as discussed above on the Jeffrey City Variation. Compressor Station No. 5 (Lost Cabin) would be relocated to JC MP 440.5 at Lysite in Fremont County while Compressor Station No. 6 (Farson) would be relocated to JC MP 529.6 at Stratton Lakes in northern Sweetwater County (where the Alkali Butte and Jeffrey City routes intersect). An additional 12,000-hp Compressor Station No. 7 would be required at JC MP 608 at Skunk Canyon in Sweetwater County.

Route 28 Variation. While the Route 28 Variation is about 192.5 miles long, all but 27.8 miles follows the proposed route. This unique 27.8 miles would add about 0.5 miles to the proposed alignment. Use of this variation is estimated to increase project costs by ~~almost $8~~ $7.65 million in ~~1989~~ 1990 dollars, primarily because so much more of the route would require grading and blasting to prepare the pipeline trench (Table 2-11).

The unique 27.8-mile-long portion of the Route 28 Variation would involve only Fremont County, Wyoming. The variation diverges from the proposed route at the southern end of Cottonwood Divide near MP 501.7 where the proposed route intersects an existing Northern Mountain Gas right-of-way. Here, the variation turns west, proceeding to a point just south of SR 28. At this location, the variation would turn to the southwest, skirting (but not crossing) the Red Canyon National Natural Landmark and the Red Canyon Area of Critical Environmental Concern (ACEC). (The Northern Mountain Gas ROW appears to cross both of these areas.) Once across Beaver Creek, the alignment would enter the South Pass ACEC, passing about 0.8 miles northwest of the town of Miners Delight and just inside the southwest corner of the Shoshone National Forest. About 1.3 miles north of Atlantic City, the variation would turn due west, traveling about 1.1 miles to cross the Pacific Power & Light Company (PPL) powerline right-of-way. The variation would then head south-southwest between the PPL and SR 28 rights-of-way, crossing another corner of the Shoshone National Forest and passing about 1.5 miles northwest of South Pass City at its closest point. The variation would exit the South Pass ACEC, and rejoin the proposed route ~~at~~ near MP 529 ~~(immediately west of the Continental Divide where the proposed route joins an existing AT&T buried cable right-of-way)~~ (on the west side of SR 28). From this point, the Route 28 Variation would follow the proposed route to its termination near Opal at MP 620.

Adoption of the Route 28 Variation would not require any change in the locations proposed for Compressor Station Nos. 5 and 6. Altamont's proposed horsepower requirements would also be unaffected.

2.4.4 Right-of-Way Requirements

Permanent Right-of-Way. Altamont proposes to acquire up to a 52.5-foot-wide permanent easement for the pipeline (50 feet plus the diameter of the pipe), subject to the landowner's specifications. Compressor Station No. 1 would require a 9-acre site, and Compressor Stations No. 2-6 would each require 8.3-acre sites (Figures 2-11 and 2-12). The Opal Metering Station would require a 1.7-acre site (Figure 2-13). Exclusive easements within the right-of-way (approximately ~~50~~ 30 feet long and ~~50~~ 30 feet wide) would be required to allow security fencing for mainline valves. Easements would be acquired from private landowners or

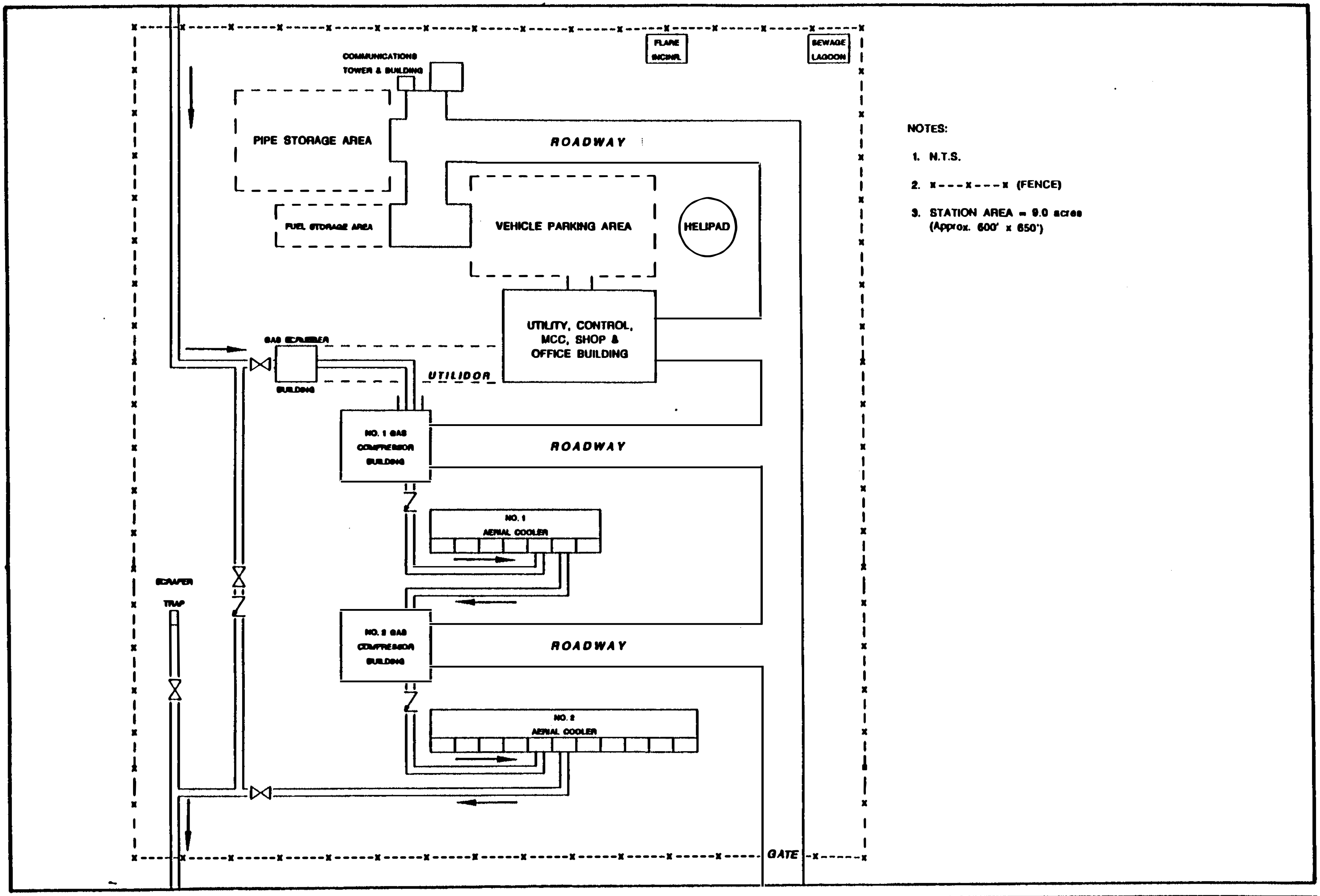

FIGURE 2-11. PROPOSED PLOT PLAN COMPRESSOR STATION NO. 1 (Wild Horse, Montana)

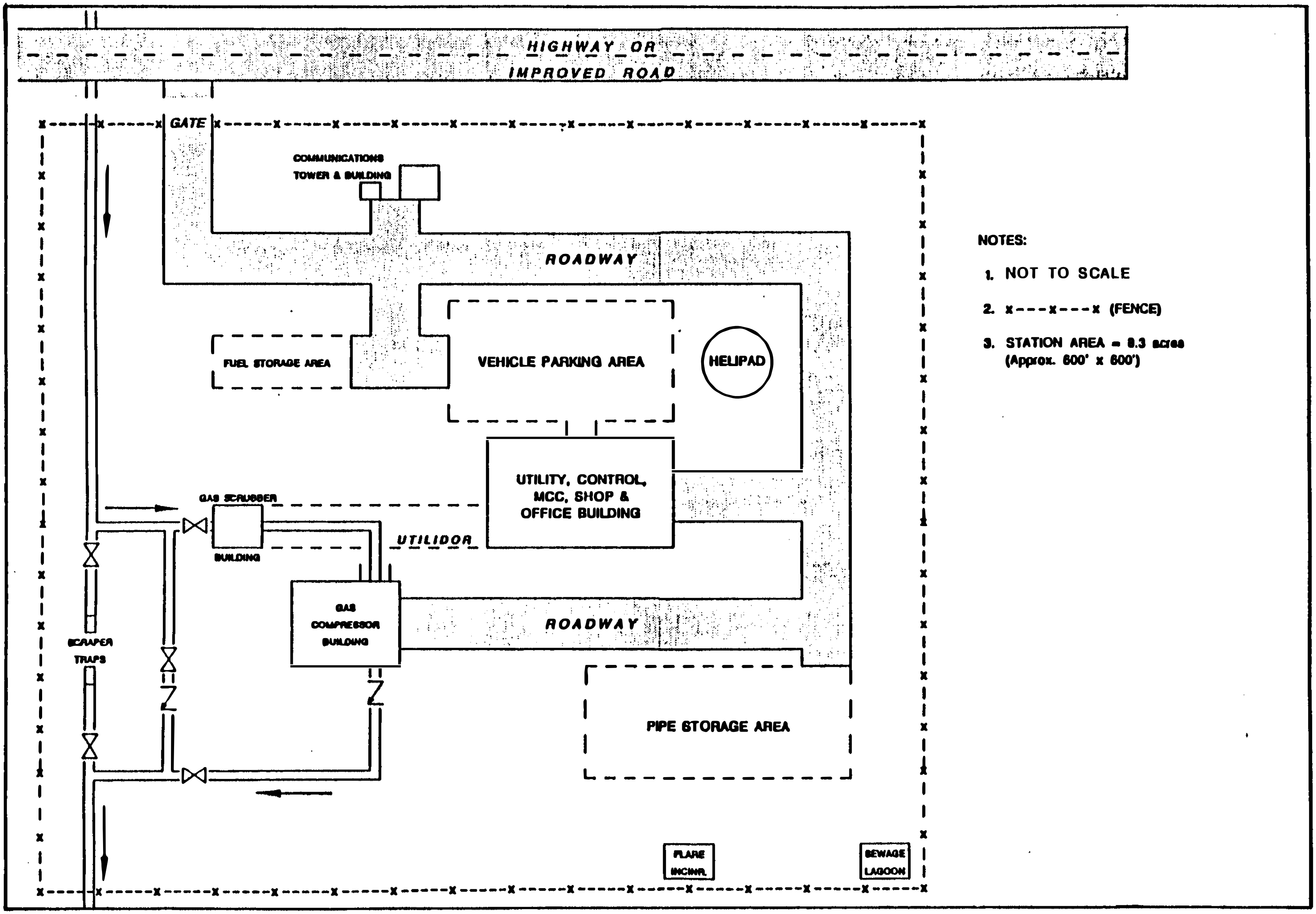

FIGURE 2-12. PROPOSED PLOT PLAN COMPRESSOR STATIONS NO. 2-6

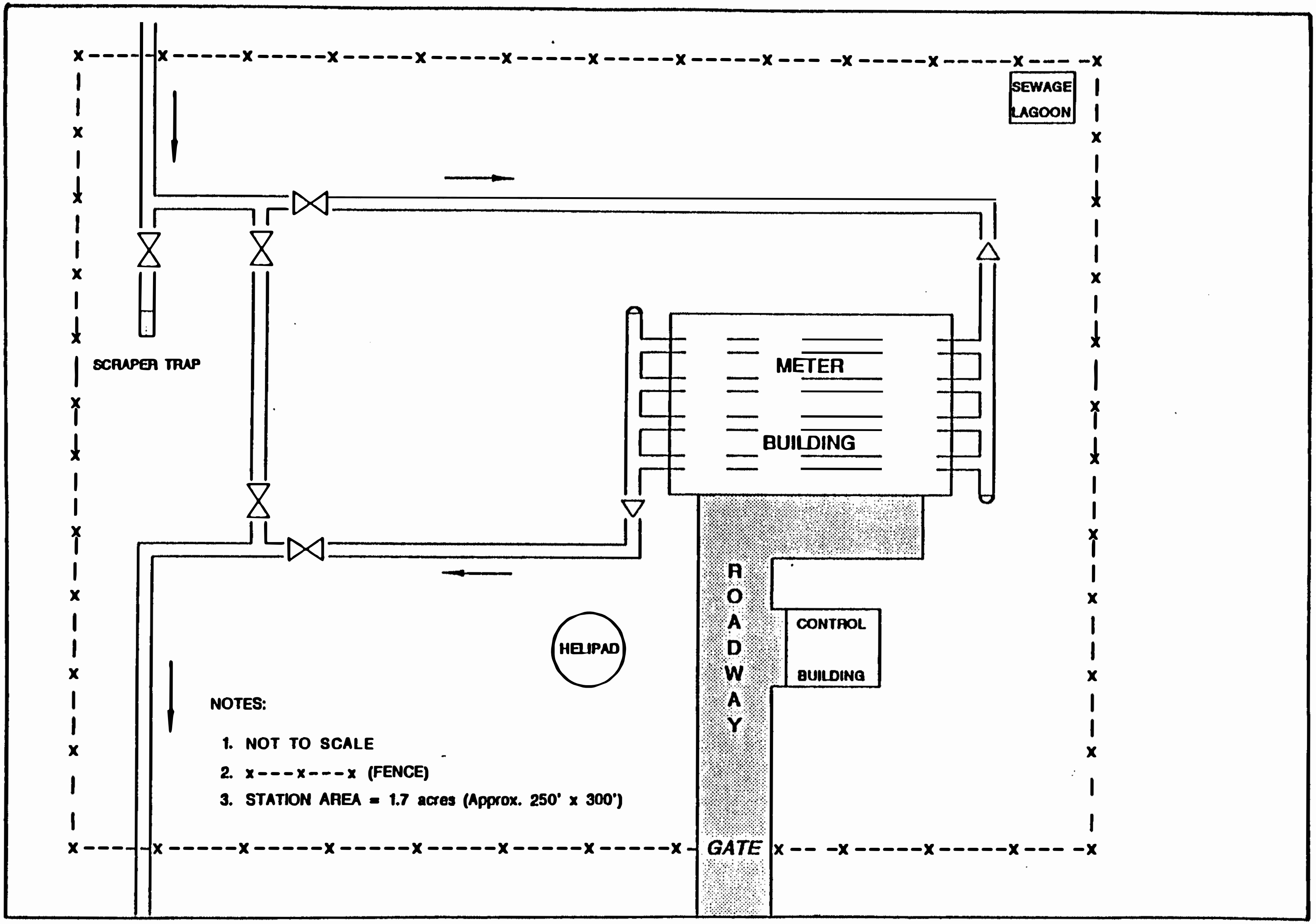

FIGURE 2-13. PROPOSED PLOT PLAN OPAL METERING STATION (Opal, Wyoming)

state land management agencies and right-of-way grants would be obtained from federal land management agencies. The proposed locations of mainline valves are presented in Table 2-12. The maximum spacing between mainline valves would be 20 miles. If Altamont adopts a microwave communication system, this would also require additional permanent right-of-way. ~~although~~ Facility locations for a microwave-based system have not yet been determined.

Temporary Construction Areas. In addition to the permanent rights-of-way, Altamont would obtain an additional 47.5 feet of temporary right-of-way during construction. Larger working areas, up to 200 feet wide by 100 feet long, in addition to the basic 100-foot-wide right-of-way, may be needed on one side of state and federal highway, railroad, and major river crossings. Major river crossings would require a work area approximately 100 feet longer than the width of the crossing. The number and location of pipe storage areas and rail sidings have not yet been determined.

Access to the work area for construction crews and delivery of materials would be by way of existing public and private roadways and the proposed pipeline right-of-way. Construction of temporary roads to facilitate access would not be required. With the exception of Compressor Station No. 1, all aboveground facilities would be sited adjacent to existing surfaced or dirt roads and would require no new permanent access roads. Access to Compressor Station No. 1 would require construction of approximately 0.75 mile of new permanent road.

2.4.5 Project-Specific Construction Specifications and Procedures

Construction measures discussed in this section apply specifically to the Altamont project. A general discussion of pipeline and support facility construction techniques common to all alternatives can be found above under "General Construction, Operation, and Maintenance Procedures."

Pipe Specifications. Pipe wall thickness would vary with class locations between 0.429 and 0.625 inch. The pipeline system would be designed for a maximum operating pressure of 1,440 psig and would be installed entirely underground.

Pipeline Construction Procedures. Altamont proposes to clear the entire permanent right-of-way and temporary construction area of trees, large rocks, brush, and logs. To minimize wind erosion and facilitate restoration, the roots of existing vegetation would be retained in place as much as possible with the use of brush beaters or similar equipment. In cultivated and improved areas, topsoil would be stripped over the trench and under spoil storage areas or as directed by the landowner. Low shrubs, smaller woody debris, and herbaceous plants would be salvaged with topsoil, then reapplied during rehabilitation to create organic matter and a source of plant material. The work would be performed in accordance with the permits issued by FERC and land-administering agencies, or the agreements drawn up with each landowner or administering agency.

Table 2-12

ALTAMONT PROJECT PROPOSED MAINLINE VALVE LOCATIONS

Valve Number	Milepost	Spacing (miles)	Location
1	0.0	20.0	Compressor Station No. 1 (Wild Horse)
2	20.0	19.4	North side of road
3	39.4	18.1	North side of road
4	57.5	15.6	North side of road
5	73.1	15.2	North side of road
6	88.3	15.8	South side of road
7	104.1	16.9	North side of road
8	121.0	19.2	Compressor Station No. 2 (Denton)
9	140.2	19.0	North side of road
10	159.2	16.5	South side of road
11	175.7	19.5	South side of road
12	195.2	14.9	North side of Highway 12
13	210.1	18.9	South side of road
14	229.0	19.4	Compressor Station No. 3 (Rapelje)
15	248.4	19.7	West side of road
16	268.1	19.9	South side of road
17	288.0	11.2	North side of road
18	299.2	14.2	South side of road
19	313.4	17.8	North side of road
20	331.2	15.4	North side of Trail
21	346.6	17.1	Compressor Station No. 4 (Greybull)

Table 2-12 (continued)

ALTAMONT PROJECT PROPOSED MAINLINE VALVE LOCATIONS

Valve Number	Milepost	Spacing (miles)	Location
22	363.7		North side of road
		16.3	
23	380.0		South side of road
		15.1	
24	395.1		North side of road
		12.1	
25	407.2		North side of Black Mountain Road
		19.2	
26	426.4		North side of Trail
		19.0	
27	445.4		Compressor Station No. 5 (Lost Cabin)
		19.1	
28	464.5		North side of Ohio Road
		19.8	
29	484.3		East side of road
		11.2	
30	495.5		North side of road
		20.0	
31	515.5		East side of road (buried valve)
		18.7	
32	534.2		South side of road
		14.8	
33	549.0		Compressor Station No. 6 (Farson)
		20.0	
34	569.0		East side of road
		19.2	
35	588.2		North side of road
		19.0	
36	607.2		North side of road
		12.8	
37	620.0		Opal Meter Station

On excessively steep slopes that would otherwise require an extensive cut, grading would be reduced by using detour access roads for vehicle traffic around the slope. Where sidehills are unavoidable, two-toning may be required to reduce the amount of grading necessary. Steep, erodible slopes would not be cleared until trenching and pipe installation were scheduled. A temporary, uncleared buffer zone, extending back from the crest of the hill, would be retained.

State and federal highways, developed roads, and railroad rights-of-way would be crossed primarily by boring. Where ground conditions prevent boring, and where permitted by authorities having jurisdiction, highways or roads would be open-cut in stages to maintain traffic flow. Most undeveloped roads would be open cut.

As a general rule, Altamont proposes to use the open trench technique to bury the pipeline at all stream and river crossings. The trench would be opened in the streambed using tracked backhoes or, in deeper water, a backhoe supported by a submerged sled. Flow would be maintained at all water crossings during construction. Spoil removed from the trench would be stockpiled out of the water or on the downstream side of the trench at larger rivers. Irrigation canals would generally be crossed by boring. If boring is technically infeasible, the canal would be open cut during the dry season with the bed and banks compacted and restored to preconstruction conditions.

Construction equipment would not be refueled, and chemicals, fuels, or lubricating oils would not be stored within 250 feet of a streambank or wetland. Special methods may be used to install the pipe in wetlands. Construction would generally be timed to coincide with the dry period when water tables are low. Trenching may proceed across wetlands with the aid of swamp mats and low-bearing pressure equipment. Construction of temporary access roads with geotextiles and fill is currently not expected. Hard plugs would be retained to prevent migration of water along the ditch, and ditch breakers would be installed as required to prevent permanent draining of wetlands. The requirement for pipe weighting would be evaluated on a site-specific basis and, if required, would be implemented using saddle weights, bolt-on weights, or continuous concrete coating. The pipe either would be carried in or pulled into the trench and the trench backfilled as soon as possible in a manner that would not permanently obstruct water flow. Original drainage patterns would be restored.

Hydrostatic testing of the installed pipeline would be conducted in sections. The length of each section would depend on local topography. The length of each proposed hydrostatic test section, the associated water volumes required, and the proposed water sources are discussed in Chapter 3C, "Hydrology and Water Quality." At present, it is not anticipated that any chemicals would be added to the test water. A methanol wash, however, may be used to dry the pipe interior following dewatering operations. If used, any methanol would be recovered and reused, if possible, for further drying runs or disposed of in an approved manner at suitable disposal sites in compliance with those authorities having jurisdiction.

Pipeline construction at most locations would typically involve 4-8 weeks between initial land disturbance and final right-of-way recontouring and restoration. Construction would advance at an average rate of approximately 1.25-1.5 miles per day. At any specific location, the trench would generally be open for no more than 1 week. River crossings would generally take from 1 to 2 days. If blasting is required, river crossings would take longer.

Support Facility Construction Procedures. The Altamont project would involve the construction of six compressor stations, as well as associated facilities, including a metering station, pig launchers and receivers, mainline sectionalizing valves, and communication equipment. Preconstruction activities at the new compressor station sites would include site selection, land acquisition, and topographic surveying. Construction of the compressor and metering stations would take approximately 9-12 months, excluding the time necessary for site preparation.

Construction Schedule and Work Force. Construction of Altamont's proposed project is scheduled to take place from June through October 1993 to ensure an in-service date of December 1993. Compressor station construction would begin in early 1993. The pipeline work would be segregated into six construction spreads, with employment for each spread ranging from approximately 460 to 475 persons. Table 2-13 lists the location of each spread, its length, the average production expected per day, total work days, and personnel required. Pipeline contractors would rely on existing local accommodations to house construction personnel. Construction camps are not proposed for use.

2.4.6 Project-Specific Operation and Maintenance Procedures

Operation and maintenance measures discussed in this section apply specifically to the Altamont project. A more general discussion of the pipeline and support facility operation and maintenance procedures common to all alternatives can be found above under "General Construction, Operation, and Maintenance Procedures."

The project would be designed so that all facilities could be monitored, controlled, and operated in a safe and reliable manner through a telemetry system linked to ~~the~~ an Altamont gas control center. ~~proposed for Billings, Montana.~~ A location for the proposed control center has yet to be selected. Maintenance and operation personnel functions would be coordinated from district offices in communities along the system so that any area could be reached within a short period in case of an emergency or malfunction. ~~Possible~~ Although no final site selections have been made at this time, possible district office locations include Lewistown, Billings, and Riverton. Regular patrol of the right-of-way would be conducted by aerial overflights. The pipeline would also be inspected at existing ground access points. No permanent trail along the right-of-way would be required for operational and maintenance purposes.

Where right-of-way maintenance is necessary, Altamont would not perform routine mechanical vegetation maintenance ~~(e.g., mowing or using brush beaters) to maintain rights-of-way~~ prior to August 1 of any year. As a practical matter, there are very few locations along the proposed route where right-of-way vegetation control is expected to be necessary. Herbicides would not be broadcast-sprayed on the right-of-way to control woody plants. In the event that noxious weeds should invade the right-of-way or other areas disturbed by pipeline activities, herbicide spot-spraying with hand-held sprayers would be implemented to control

Table 2-13

ALTAMONT PROJECT CONSTRUCTION SPREAD SUMMARY

Pipeline Spread Number (milepost)	Construction Spread Location	Length (miles)	Spread Production (ft/day)	Average Work Days	Down Days	Spread Size [1] (persons)
1 (0-125)	Wild Horse, Alberta, to Denton, Montana	125	8,640	77	5	433
2 (125-225)	Denton, Montana, to Rapelje, Montana	100	7,200	74	5	426
3 (225-305)	Rapelje, Montana, to Wyoming border	80	5,760	74	5	424
4 (305-420)	Montana border to Lost Cabin, Wyoming	115	7,200	85	5	431
5 (420-510)	Lost Cabin, Wyoming, to Atlantic City, Wyoming	90	5,760	83	5	426
6 (510-620)	Atlantic City, Wyoming, to Opal, Wyoming	110	7,200	81	5	431
TOTAL		620				2,571

[1] Spread size shown includes pipeline contractors' personnel only. Approximately 35-40 additional Altamont personnel would be required on each spread for project management, field engineering, construction and environmental inspection, land services, surveys, and radiographic inspection.

infestations as required by noxious weed control laws in both Montana and Wyoming. Additional noxious weed control measures would be implemented as specified by the county weed control boards. On federal lands, the land managing agency would require prior approval of all vegetation control measures.

~~Herbicides would not be used~~ Vegetation within the fenced areas at compressor and metering stations may be controlled either through the use of herbicides or by mechanical means. Mechanical methods of vegetation control would be employed ~~at compressor and metering stations and~~ around safety signs and valve locations within the right-of-way. Tree and shrub growth over a 20-foot strip centered on the pipeline would be controlled by mechanical means.

2.4.7 Future Plans

The pipeline and associated facilities would be designed for a minimum 30-year operating life, although it is expected that the system could operate much longer. Altamont has no plans to abandon the proposed facilities. Should the pipeline be abandoned, however, the pipe would either be left in place or removed and salvaged. Compressor stations and related facilities would also be dismantled and salvaged. Concrete structures and other pavement would be broken up and removed to an approved disposal area or left in place. Pipe installed in rivers, creeks, and lakes would generally be abandoned in place, as well as at other locations where the landowner or land management agency would be agreeable to this arrangement. In accordance with regulatory requirements, pipe abandoned in place would be purged with an inert medium to displace any residual natural gas. Should the pipeline be removed, the right-of-way would be rehabilitated by employing measures similar to those used during construction of the pipeline. Altamont would require approval from FERC prior to implementing any abandonment. Altamont has no plans for the construction of additional facilities beyond those presently proposed.

2.4.8 Kern River and WyCal Facility Requirements

Two interstate pipeline systems have been issued Certificates of Public Convenience and Necessity by FERC for construction between the Opal and Bakersfield areas: the Joint Mojave-Kern River Project and the WyCal Project. Kern River's portion of the Joint Mojave-Kern River project ~~would~~ will have the capacity to transport up to 700 MMcf/d from Opal. WyCal proposes to construct a system with the capacity to transport up to 400 MMcf/d (WyCal I) or up to 600 MMcf/d (WyCal II) from the southwest Wyoming/northeast Utah area. Kern River ~~proposes to begin~~ began construction in ~~late 1990~~ January 1991 and anticipate completion in late 1991 or early 1992. Mojave anticipates construction starting in June 1991. WyCal's construction schedule appears to be on hold pending further study of the gas market.

Altamont has entered into an agreement with Kern River for an interconnection at Opal and the necessary expansion of Kern River's system to transport incremental volumes of natural gas delivered by the Altamont pipeline system downstream of the Opal Metering Station. Information provided to Altamont by Kern River indicates that Kern River would require additional compression facilities to transport the Altamont gas. These facilities would include

Table 2-14

ADDITIONAL KERN RIVER FACILITY REQUIREMENTS FOR THE ALTAMONT PROJECT

State County	Milepost [1]	Section, Range and Township	Kern River Certificated		Additional Compression Facilities	
			Station No.	hp [2]	Station No.	hp [3]
WYOMING						
Lincoln	0	Section 23, T20N, R114W	1	17,100	1	0
UTAH						
Morgan	25	Section 6, T2N, R4E			2	20,000
Utah	115	Section 7, T10S, R1W			3	30,000
Millard	251	Section 34-35, T22S, R6W	3	9,200	4	10,000
Iron	342	Section 31-32, T34S, R14W			5	30,000
NEVADA						
Clark	9	Section 33-34, T14S, R66E			6	20,000
Clark	96	Section 36, T24S, R58E	5	9,400	7	20,000
CALIFORNIA						
San Bernardino	28	Section 23, T9N, R1E			8	10,000

[1] All mileposts are approximate. Mileposts correspond to Kern River's proposed route as shown in Volume IV of the EOR FEIR/FEIS except for the following: Station Nos. 2 and 3 are located along the Wasatch Variation, while Station Nos. 6 and 7 are located along the North Las Vegas Variation (see respective variation maps in the EOR FEIR/FEIS). Station No. 8 is located at the Daggett Interconnection Point of the Joint Mojave-Kern River project (see MP 28, Mojave Alternative B route in Volume IV of the EOR FEIR/FEIS). Locations for Station Nos. 2, 3, 5, 6, and 8 are preliminary.
[2] Site-rated horsepower as certificated for the joint Mojave-Kern River project.
[3] Estimated site-rated horsepower requirements, based on preliminary information.

incremental hp additions at two of the three certificated compressor stations and the installation of five new compressor stations along the pipeline. This would allow Kern River to achieve a 1,200-MMcf/d level of design throughput capability. Table 2-14 identifies these facilities, including the pipe distance from MP 0.0 on the Kern River system (i.e., MP 620 on the Altamont system). Because all of the additional stations would be located within Kern River's one mile-wide corridor studied during the preparation of the EOR FEIR/FEIS and the Mojave-Kern River-WyCal Environmental Assessment (EA), environmental resource area discussions of Kern River's downstream facilities in Chapters 3 and 4 are limited and focus on the new station sites. Kern River has not filed an application for the required facilities with the FERC.

Information is not available to determine what expansion of WyCal's system would be necessary to accommodate 700 MMcf/d of natural gas from Altamont, however, it is expected to be at least similar to the incremental facilities required on the Kern River system.

2.5 SYSTEM ALTERNATIVES

2.5.1 Screening Criteria

The PGT/PG&E and Altamont projects propose to each provide a long-term, firm supply of 700-755 MMcf/d of natural gas from Canada to LDCs, power generation facilities, electric facilities, industrial gas users, and EOR operations throughout California. As stated in Chapter 1, both projects are being evaluated at the same time in this EIS. No conclusion should be drawn that because the two projects are being studied together, the projects are competitive with each other. The Commission, in its Preliminary Determinations of Non-Environmental Issues of January 17 and 22, 1991 respectively for the Altamont and PGT projects, specifically noted that 1) Altamont had not established that Altamont and PGT will serve the same market and, 2) that PGT has explicitly stated that it does not propose to serve the EOR market which is to be served by Kern River and Altamont. Market forces will ultimately determine whether one, both, or none of these projects are ultimately built. The same issue of competitiveness applies to the various system alternatives identified below. All, some, or none of the various proposals and system alternatives may ultimately be built. The purpose of this EIS (and the various EIS's, EIR's, and EA's preceding this particular EIS which have already analyzed these various system alternatives) is to present the description of those various projects and their respective environmental impacts. Adding or "piggy-backing" one project's impacts with those of another may or may not be appropriate and, at this time, is speculative at best. Those individuals and agencies who wish to add, compare, and/or "piggy-back" impacts associated with some or all of the various proposals and alternatives are invited to do so. This EIS, however, will not present such an analysis. It will present the basic facts about these system alternatives and refers the reader to existing documents where impacts associated with other proposals can be found. Summary impact tables from the original FEIS/Supplement are reproduced in Appendix A of this EIS to allow the reader to compare the environmental impacts associated with these project/alternatives.

Ten system alternatives were considered that could potentially provide most or all of the proposed natural gas services to California (Table 2-15). The initial list of alternatives was based on applications submitted to FERC and CPUC, previous studies, and public scoping meetings conducted for this EIS. The screening looked at a broad range of system alternatives and was based on the following initial criteria:

- Alternative systems must provide most or all of the proposed long-term 700-755 MMcf/d of natural gas to California.
- Interstate pipeline alternatives must have filed an application for a Certificate of Public Convenience and Necessity with FERC and said application must be one that has not been dismissed or determined to be incomplete by FERC.
- Alternatives must not involve proceedings which are considered inactive or effectively in abeyance.

Table 2-15

POTENTIAL SYSTEM ALTERNATIVES TO THE PGT/PG&E AND ALTAMONT PIPELINE PROJECTS

Mojave Pipeline Project
Kern River Pipeline Project
Joint Mojave-Kern River Pipeline Project
WyCal I Pipeline Project
WyCal II Pipeline Project
El Dorado Interstate Transmission Company Project
Southcoast Transmission Corporation Project
MexUs Interstate Pipeline Project
APEX Pipeline Project
Integrated Intrastate System Alternative

System alternatives that were found to meet these criteria include:

- o the Mojave Pipeline Project [4]
- o the Kern River Pipeline Project
- o the Joint Mojave-Kern River Pipeline Project
- o the WyCal I and II Projects [5]

These system alternatives are discussed in Section 2.5.3. The status of each project's certification before FERC is identified below.

Alternatives that were eliminated from detailed study in this EIS are described and the reasons for their elimination are explained below in "Alternatives Considered but Eliminated from Detailed Analysis."

2.5.2 Status of Certification and Environmental Compliance of the System Alternatives

Table 2-16 summarizes the status of FERC certification of the potential system alternatives to the PGT/PG&E and Altamont projects. The Mojave, WyCal I and II, and Joint Mojave-Kern River projects have been certified under the OC process by FERC. CSLC has not granted right-of-way permits for these projects.

The environmental impacts of the Mojave and Kern River projects were analyzed in a joint FEIR/FEIS prepared by CSLC and FERC. The environmental impacts of the WyCal I project were analyzed in a supplemental FEIR/FEIS prepared by CSLC and FERC. FERC prepared an EA to address the environmental impacts of the Joint Kern River-Mojave and WyCal II projects. CSLC also prepared an environmental amendment to the joint FEIR/FEIS and supplemental FEIR/FEIS that evaluates the California portions of the Joint Kern River-Mojave project. On ~~December 5, 1990~~ February 18, 1991, the CSLC ~~circulated~~ issued its Final Amendment to the ~~Draft EIR for comment~~ FEIR; it does not address the WyCal projects. On March 6, 1991, the CSLC certified the FEIR, as amended, and authorized both Kern River and Mojave to cross state lands.

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[4] Mojave Pipeline Company (Docket No. CP89-1-000). FERC OC issued May 8, 1989. There is also a Mojave application (Docket No. CP85-437-000) filed in 1985 under the FERC's traditional Section 7(c) regulation. It has never been certificated. From an environmental standpoint, there are no significant differences between the two dockets.

[5] There was also a Wycal III filed before the FERC and the CSLC. However, the project sponsors are no longer pursuing this alternative. On December 3, 1990, Wycal notified the CSLC that it was suspending all activities on its proposed pipeline project(s) pending further study of the markets involved, and formally withdrew its applications before the CSLC, including WyCal I and II.

Table 2-16

STATUS OF FERC CERTIFICATION OF POTENTIAL SYSTEM ALTERNATIVES

Alternative	Docket Number	Dated Filed	Type of Filing: Traditional Section 7(c) Certificate	Type of Filing: Optional Certificate	FERC Certificated	Amount of Gas Proposed for Transport to Southern California (MMcf/d)
Mojave	CP85-437-000	April 15, 1985	X		No	600
	CP89-1-000	October 3, 1988		X	Yes (5/8/89)	600
Kern River	CP85-552-002	May 31, 1985	X		No	700
WyCal I	CP87-479-001	August 4, 1987		X	Yes (1/13/89)	650
WyCal II	CP90-41-000	October 10, 1989		X	Yes (1/24/90)	500
Joint Mojave-Kern River						
Mojave portion	CP89-1-002	September 1, 1989		X	Yes (1/24/90)	400
Kern River Portion	CP89-2048-000	September 1, 1989		X	Yes (1/24/90)	700
Transwestern [a]	CP86-212-001 [c]	November 22, 1985	X [c]		No	--
El Paso [b]	CP86-197-003 [c]	November 8, 1985	X [c]		No	--

[a] Upstream facilities for the Mojave or Joint Mojave-Kern River project
[b] Upstream facilities for the Mojave, WyCal I, or Joint Mojave-Kern River project
[c] Both applications have since been withdrawn and superseded by Optional Certificate applications which further expand both pipeline systems, including these volumes of gas under the old applications.

Summary descriptions of the Mojave, Kern River, Joint Mojave-Kern River, and WyCal system alternatives are given below. Figure 2-14 illustrates the relationship of the system alternatives to the proposed projects. Table 2-17 summarizes the facility requirements of each alternative pipeline system. More detailed descriptions can be found in the EOR FEIR/FEIS (CSLC and FERC 1987a,b,c,d,e), in the WyCal Supplement (CSLC and FERC 1988a, b), ~~and~~ in the Mojave-Kern River-WyCal EA (FERC 1990), and the Mojave-Kern River EIR Final Amendment (CSLC 1991). These documents are readily available, and incorporated by reference. Copies of the environmental studies are available for review at FERC; CPUC; CSLC; BLM field offices in Wyoming, Utah, Nevada, California, Arizona, New Mexico, and Texas; and in many local libraries in these states. As stated previously in Chapter 1 of this EIS, the affected environment and environmental impact sections of those documents are not being reproduced or summarized in this EIS. However, each of the project descriptions in those documents are summarized here and, as stated previously, summary impact tables are reproduced in Appendix A of this EIS.

2.5.3 Mojave Pipeline Project

Project Characteristics. On May 8, 1989, FERC issued a Certificate of Public Convenience and Necessity under its OC procedures to the Mojave Pipeline Company (Mojave) in Docket No. CP89-1-000. Under this certificate, Mojave was authorized to construct a pipeline system that would extend from western Mojave County, Arizona, to Kern County, California (Figure 2-14 and Table 2-17). The project would include the following components: up to 387 miles of 24-, 26-, 30-, and 36-inch-diameter pipeline; a new compressor station at Topock, Arizona, with up to 22,500 installed hp; a dual-inlet metering station at Topock to measure deliveries of gas to Mojave; approximately 16 metering stations at various locations to measure deliveries of gas by Mojave; and appurtenant facilities. The Mojave system would connect with the existing El Paso pipeline at Topock, Arizona, and the existing Transwestern pipeline in the vicinity of Needles, California. Mojave's facilities are designed for a maximum capacity throughput of 600 MMcf/d and are estimated to cost up to $308 million in 1988 dollars.

The Mojave system would receive gas from both the El Paso and Transwestern systems. The staff believes that the facilities proposed in 1985 by El Paso and Transwestern, and analyzed as part of the Mojave System in the EOR FEIS, would be adequate to supply Mojave with its certificated capacity (see the El Paso and Transwestern Expansion Project descriptions below).

Since El Paso and Transwestern filed their original applications in 1985, the two companies have apparently reevaluated their ability to provide gas to Mojave (in El Paso's case, several times). Transwestern filed a new application in Docket No. CP90-2294-000, and concurrently withdrew its original application on September 25, 1990. Its new filing requests authorization to construct 199 miles of pipeline loop, 105 miles of lateral pipeline, and additional compression and metering facilities. Although the looping proposed in the new filing was part of Transwestern's 1985 filing, the new application indicates that the facilities are being constructed to provide gas to PG&E, not to Mojave. Transwestern may, in fact, deliver gas to Mojave when and if it is built, but it is unknown whether additional facilities would be required.

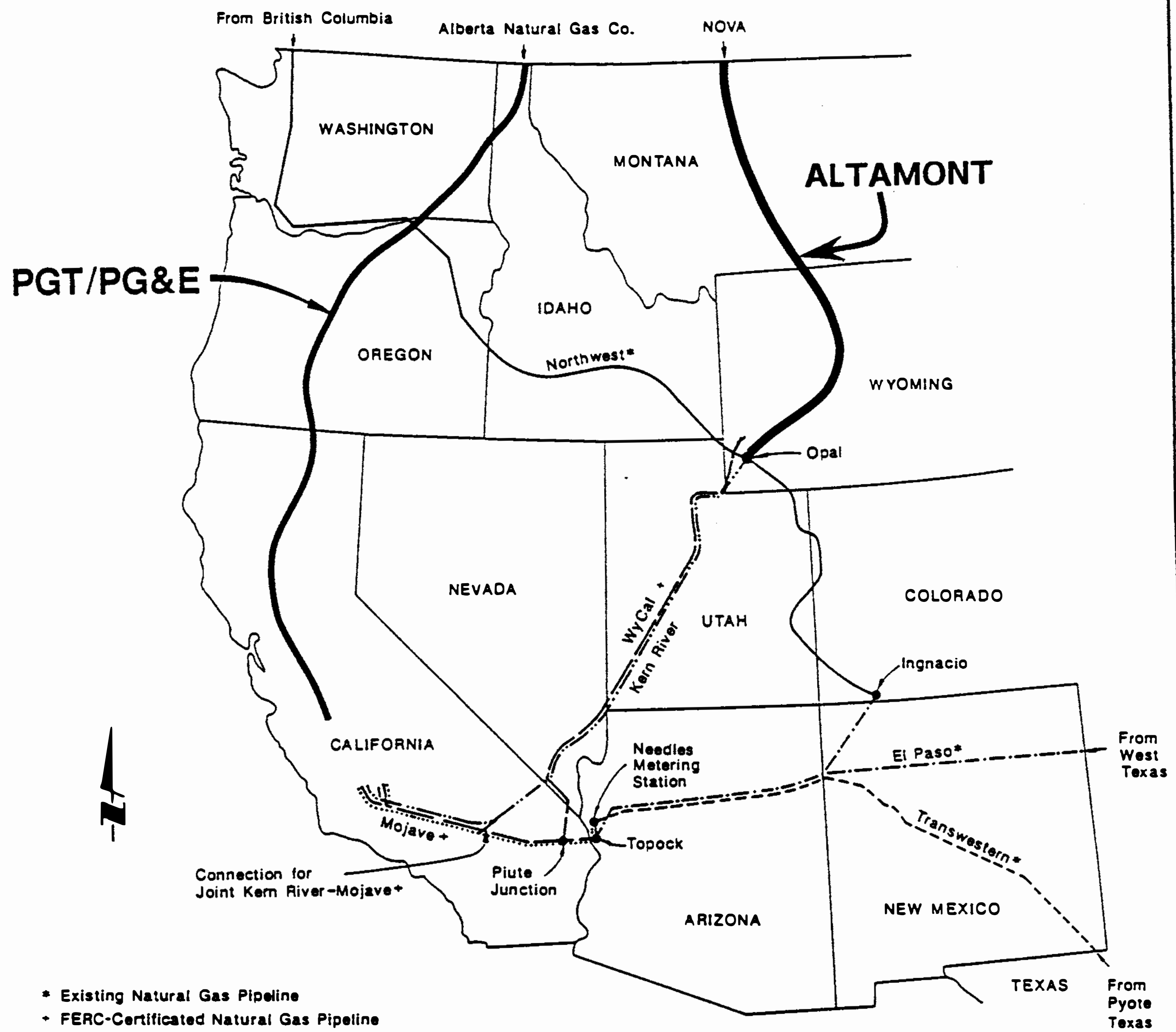

FIGURE 2-14. INTERSTATE NATURAL GAS PIPELINE PROJECT ALTERNATIVES

Table 2-17

NEW FACILITIES CONSTRUCTION REQUIRED FOR IMPLEMENTATION OF THE SYSTEM ALTERNATIVES

Alternative	Length of Pipe (miles)	Number of Compressor Stations
MOJAVE [a]		
Mojave	386.5	1
Transwestern	356.4	0
El Paso	14.8	0
Total	757.7	1
KERN RIVER [b]	873.0	3
JOINT MOJAVE-KERN RIVER [a,b]		
Mojave	159.3	1
Transwestern	356.4[c]	0
El Paso	14.8	0
Kern River	676.2	3
Joint Facilities	225.5	0
Total	1,431.8[c]	4
WYCAL I [a,b]		
El Paso	14.8	0
WyCal	1,062.0	4
Total	1,076.8	4
WYCAL II [a,b]	902.0	6

a With Alternative B between Pisgah and Boron, California (recommended in EOR FEIR/FEIS)
b With Wasatch and North Las Vegas Variations
c Since Mojave only proposes to transport 400 MMcf/d under the Joint Mojave-Kern River project (instead of 600 MMcf/d for the Mojave stand-alone project), the Transwestern facilities may be unnecessary

In El Paso's case, it filed two applications (Docket Nos. CP89-1909-000 and CP90-2214-000) in which the facilities and services were similar to those proposed in El Paso's original filing. On September 17, 1990, El Paso withdrew its original filing and Docket No. CP89-1909-000, and concurrently filed a new application in Docket No. CP90-2214-000. The new application requests authorization to construct substantially more facilities to transport the identical 400 MMcf/d to Mojave. The reasons why additional upstream facilities are necessary are unclear. In the interim, we will continue to present the Mojave System as including the upstream facilities studied in the EOR FEIS, recognizing that the extent of the upstream facilities requirements on these systems will ultimately be determined by shippers who use the Mojave system. The environmental analyses of the new El Paso and Transwestern filings are currently underway and will be separate from this EIS.

Right-of-Way Requirements. The construction and operational rights-of-way would be 100 and 50 feet, respectively. The Mojave system could affect up to 4,645 acres of federal, state, private, and Native American lands during construction; and up to 2,322 acres during operation in Mojave County, Arizona, and San Bernardino and Kern Counties, California. The Mojave system would follow existing utility and transportation corridors for approximately 60 percent of its length. An estimated 17 microwave communication sites would need to be constructed.

Construction Schedule and Work Force. The Mojave project pipeline would be constructed simultaneously by separate construction crews. The entire system would be constructed within approximately 10 months, with construction along any one location along the route to be completed within 6-10 weeks from initial land disturbance to the end of restoration. The length of open trench would vary between 5 and 10 miles; however, the trench would only be open a few days at any given locality, depending on weather conditions, construction location, and environmental restrictions. Approximately 50-170 vehicles would be in operation along the construction right-of-way, depending on the stage of construction.

The maximum number of construction workers associated directly with pipeline construction is estimated by Mojave at 1,700. Spread crew sizes would vary from 200 to 375, depending on the stage of construction. The spread crews would require about 55-65 percent skilled workers (nonlocal) and 35-45 percent unskilled workers (local). Mojave estimates that an operating and maintenance staff of 80-123 additional permanent employees would be required to operate and maintain the proposed pipeline system.

Future Plans. No plans beyond the useful life of the proposed Mojave pipeline have been proposed.

2.5.4 Kern River Pipeline Project

Project Characteristics. In 1985, Kern River proposed to construct a pipeline system from near Opal, Wyoming, across Utah, Nevada, and southern California to Kern County, California (Figure 2-12 and Table 2-17). The proposed project would consist of approximately 873 miles of 30- and 36-inch-diameter pipeline; three new compressor stations in Wyoming, Utah, and Nevada totaling 35,500 site-rated hp; and appurtenant facilities. Two major route variations were recommended in the EOR FEIR/FEIS. The Wasatch Variation in north-central Utah would avoid rugged mountain terrain and the Uinta National Forest by passing west of Salt Lake City. The North Las Vegas Variation in southern Nevada would avoid several sensitive areas by passing north and west of Las Vegas. Kern River's facilities were proposed in Docket No. CP85-552-000, but a Certificate of Public Convenience and Necessity has not been issued by FERC. Kern River's facilities were estimated to cost $714 million in 1986 dollars.

The Kern River project would carry 700 MMcf/d of natural gas. Gas to support the system would come from two existing sources: the Overthrust Belt Gas Fields in southwest Wyoming and northeast Utah, and western Canadian gas fields. The EOR FEIR/FEIS assumed that each source would provide approximately one-half of the pipeline's capacity. Canadian gas would be delivered via Northwest's existing system at a proposed Opal interconnection. To deliver gas to Kern River, Northwest would construct a mainline tap and metering station at the proposed interconnection near Opal at an estimated cost of $1.3 million in 1986 dollars. These facilities were proposed in Docket No. CP85-625-001, but have not been certificated by FERC. The Northwest system itself would require no additional facilities to transport the Canadian gas.

Right-of-Way Requirements. Based on construction and operational rights-of-way of 100 and 50 feet, respectively, the Kern River project would directly affect a total of 7,600 acres of land during construction and 5,100 acres during operation. The route would follow existing utility and transportation corridors for approximately 54 percent (450 miles) of its length. Additional land would be required during construction at watercourse, railroad, road, and highway crossings. Additional space would also be required for metering stations, communications facilities, maintenance bases, and pipe storage and staging areas as necessary. These requirements would range from about 0.5 acre for a new communications site to 4 acres for a major river crossing. The extent and number of maintenance and staging areas have not yet been determined by Kern River. The proposed compressor station sites would require about 20-50 acres each. An estimated 27 microwave communication sites would need to be constructed.

Construction Schedule and Work Force. Kern River proposes to use nine construction spreads for construction of the mainline, laterals, and compressor stations. Each spread would employ approximately 400 persons. It is anticipated that 40 percent of the work force would be locally hired.

The entire system would be constructed within a 10- to 12-month period, with construction along any one location along the route to be completed within 6-8 weeks from initial land disturbance to the end of restoration. Approximately 2-4 miles of ditch would remain open at any one place, depending on weather conditions, terrain, and soil conditions. However, the trench would only be open for 4-5 days at any given locality. Approximately 100-110 vehicles would be operated simultaneously at any given spread location.

Future Plans. Although Kern River has not proposed any future expansion or modification of its original project, the system throughput capacity could be increased to 1,000 MMcf/d by adding 55,000 hp, installed at three additional compressor stations along its mainline. If necessary, these additional stations would be located between proposed Compressor Stations

Nos. 1, 3, and 5, and the system bifurcation point in Kern County, California. Any subsequently required facilities would be compatible with those of the current proposal. The estimated life of the proposed pipeline is 30-40 years.

2.5.5 Joint Mojave-Kern River Pipeline Project

Project Characteristics. In September 1989, Kern River and Mojave proposed to construct and operate a new interstate pipeline system made up of components of both of the systems that they had individually proposed (Figure 2-14 and Table 2-17). The Joint Mojave-Kern River project was issued a Certificate of Public Convenience and Necessity by FERC under its OC procedures on January 24, 1990, (Docket Nos. CP89-2048-000 and CP89-1-002). The project would include construction by Kern River of approximately 676 miles of 36-inch-diameter pipeline between a proposed interconnection with Northwest near Opal, Wyoming, and a location near Daggett in San Bernardino County, California; three new compressor stations in Wyoming, Utah, and Nevada totaling 35,700 site-rated hp; metering stations near Opal and Daggett; and appurtenant facilities. Kern River's portion of the system would include the recommended Wasatch and North Las Vegas Variations. This portion of the joint system would be capable of supplying up to 700 MMcf/d at the Daggett interconnection.

Mojave's portion of the joint project would include construction of up to approximately 159 miles of 24- and 30-inch-diameter pipeline along Mojave's certificated route from western Arizona to Daggett, the certificated Topock Compressor Station (with installed hp reduced to 14,080), metering stations at Topock and Daggett, and appurtenant facilities. This portion of the joint project would have a design capacity of 400 MMcf/d. Between Daggett and the Bakersfield area, approximately 225.5 miles of 30-, 36-, and 42-inch-diameter pipeline and appurtenant facilities would be constructed by Mojave but owned jointly with Kern River. These "common facilities" between Daggett and the Bakersfield area would be sited almost entirely on Mojave's certificated right-of-way or on right-of-way previously proposed by Kern River in 1985.

The joint project would require construction of some 23 metering stations near Bakersfield, including one where up to 300 MMcf/d would be delivered to SoCal. Overall, the joint system would increase capacity to the Bakersfield area by 1,100 MMcf/d. The estimated cost of the Joint Mojave-Kern River project pipeline is approximately $1,068 million in 1989 dollars. The gas supply systems to the Joint Mojave-Kern River project would be the same as those described above for the Kern River and Mojave projects as independent systems, with the exception that the Transwestern facilities may not be necessary (see footnote in Table 2-16).

Right-of-Way Requirements. Right-of-way requirements would be the same as those described above for the Mojave project and for the portion of the Kern River project that would be included in this joint project.

Construction Schedule and Work Force. See the individual Mojave and Kern River project descriptions for information on construction schedule and work force.

Future Plans. See discussion of future plans under the Mojave and Kern River projects.

2.5.6 WyCal Projects[6]

Project Characteristics - WyCal I. The originally proposed WyCal pipeline (WyCal I) would include construction and operation of a new interstate natural gas pipeline system that would extend between Lincoln County in southwest Wyoming and the southern San Joaquin Valley near Bakersfield, California (Figure 2-12 and Table 2-14). On January 13, 1989, WyCal I was issued a certificate under FERC's OC procedures (Docket No. CP87-479-001). Except for the northernmost 55 miles, the route would essentially be a combination of the route proposed by Kern River from southwest Wyoming to the Las Vegas area (including the Wasatch and North Las Vegas Variations), a Kern River alternative between Las Vegas and western San Bernardino County (East Las Vegas System Alternative), and Mojave's certificated route between western Arizona and the Bakersfield area. The WyCal I system would consist of approximately 1,062 miles of 16-, 20-, 24-, 26-, 30-, and 36-inch-diameter pipeline; four new compressor stations in Wyoming, Utah, Nevada, and Arizona totaling 53,000 hp; metering stations to measure deliveries of gas to WyCal in southwest Wyoming and in northeast Utah, and from Northwest, Transwestern, and El Paso; metering stations at various locations in the Bakersfield area to measure redeliveries of gas by WyCal; and appurtenant facilities.

WyCal I interconnects with Northwest in southwest Wyoming and with El Paso and Transwestern in western Arizona. These systems would provide potential access to major Canadian gas reserves, as well as gas supplies in the major producing areas of the U. S. midcontinent, onshore and offshore Texas and Louisiana, and the Permian Basin areas of Texas and New Mexico. Overthrust Belt gas from Wyoming and Utah would also be accessible through the WyCal I pipeline. The WyCal I facilities are estimated to cost approximately $700 million in 1987 dollars.

The WyCal I system was designed to supply 650 MMcf/d of natural gas to Kern County. The northern leg would be capable of transporting up to 400 MMcf/d of Canadian and/or Overthrust Belt gas. Beyond an interconnection with Northwest, no additional support facilities have been identified for the northern leg. WyCal I's Topock Supply Lateral would be capable of receiving gas supplies from both the El Paso and Transwestern systems. WyCal I proposes to accept about 50 MMcf/d from Transwestern and about 200 MMcf/d from El Paso. Like the Mojave project, the extent of upstream facilities requirements on the El Paso and Transwestern systems would ultimately be determined by shippers who use WyCal I. Because upstream support facilities have not yet been identified, the comparative analysis assumes that upstream facilities would be limited to those proposed by El Paso in 1985 (i.e., 14.8 miles of looping). As previously stated, this looping would enable El Paso to deliver up to 400 MMcf/d at Topock. No additional facilities would be required on the Transwestern system.

Right-of-Way Requirements - WyCal I. Based on construction and operation rights-of-way of 100 and 50 feet, respectively, the WyCal I system would directly affect 12,840 acres of land during construction and 6,420 acres during operation. Additional land would be

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[6] See footnote 5 on page 2-67 concerning the status of the various WyCal projects.

required during construction at watercourse, railroad, major road, and highway crossings. Additional land would also be required for an unknown number of metering stations, communication facilities, maintenance bases, and pipe storage and staging areas, as necessary. These land requirements would be about 0.5 acre for communications facilities, 10 acres each for the compressor stations, approximately 12 acres each for an unidentified number of pipe storage and staging areas, and usually less than 5 acres each for major river and road crossings. An estimated 24 microwave communication sites would need to be constructed.

Construction Schedule and Work Force - WyCal I. WyCal proposes to use up to 12 spreads to complete construction, which would allow for concurrent construction at several locations. Assuming that 400 persons would be employed on each spread, a work force of 4,800 persons would be necessary. Additional details on the construction work force and schedule have been presented in the WyCal Supplement.

Project Characteristics - WyCal II. On January 24, 1990, FERC issued WyCal another Certificate of Public Convenience and Necessity under its OC procedures in Docket No. CP90-41-000. This second certificate authorizes WyCal to construct and operate a new interstate pipeline system similar to the one certified in 1989 (Table 2-16). Except for several minor route realignments, the WyCal II route is identical to the WyCal I route from its beginning in southwest Wyoming to southern Nevada, and from the Barstow area to its terminus near Bakersfield, California. Between southern Nevada and the Barstow area, WyCal II would follow the route originally proposed by Kern River in 1985. The WyCal II system would involve construction of approximately 902 miles of 20-, 24-, and 30-inch-diameter pipeline; six new compressor stations (three of which were certificated as part of WyCal I) totaling 90,100 hp; metering stations at various locations in Wyoming, Utah, Nevada, and California; and appurtenant facilities. Major differences between WyCal I and II include the following:

- WyCal II would not include interconnections with Transwestern or El Paso in western Arizona;
- WyCal II would have an increased capacity of 600 MMcf/d north of Las Vegas, enabling delivery of up to 100 MMcf/d of natural gas to the Las Vegas area; and
- WyCal II would have the capacity to deliver up to 500 MMcf/d to southern California, including up to 220 MMcf/d of natural gas to SoCal near Newberry Springs in San Bernardino County, California.

The estimated cost of WyCal II is approximately $687 million in 1989 dollars.

2.5.7 El Paso Expansion Project

Project Characteristics. To support either the Mojave, Joint Mojave-Kern River, or WyCal I project, El Paso would loop up to 14.8 miles of its existing pipeline system in Apache and Navajo Counties, Arizona. This would provide an additional 400 MMcf/d of capacity. This expansion would directly affect up to 180 acres during construction and approximately 107 acres during operation. These facilities were proposed in Docket No. CP86-197-000, but this application has since been withdrawn and superceded by applications which further expand El Paso's system, and include the volumes associated with Docket No. CP86-197-000.

2.5.8 Transwestern Expansion Project

Project Characteristics. To support either the Mojave or the Joint Mojave-Kern River project, Transwestern would loop up to 356.4 miles of its existing pipeline system between Pyote, Texas, and its Needles metering station in Arizona. Transwestern proposes to loop 356.4 miles of the existing pipeline in 11 segments with 30-inch-diameter pipe. An increase of 320 MMcf/d capacity would be achieved by this design. No new compressor stations or increased compression would be required to implement the proposed expansion. The expansion would directly affect 4,315 acres during construction and 2,160 acres during operation. These facilities were proposed in Docket No. CP86-212-001, but this application has since been withdrawn and superceded by an application which further expands the Transwestern system, and includes the volumes associated with Docket No. CP86-212-001.

Construction Schedule and Workforce. Transwestern intends to construct the looping projects using four spreads. Work would be completed in approximately 270 days, and spreads would employ from 230-375 persons.

2.6 NO-ACTION ALTERNATIVE

The FERC can take three basic actions on an application for a Certificate of Public Convenience and Necessity. It can grant the certificate, grant the certificate with conditions, or deny the certificate. ~~Under t~~ The No-Action Alternative assures that the FERC would not grant a Certificate of Public Convenience and Necessity for a proposed project. In this instance where two discrete applications are involved, the FERC could deny authorization of either one or both projects under the No-Action Alternative.

If the FERC denied authorization to PGT, then its portion of the PGT/PG&E project would not be constructed. It is assumed that the lack of upstream facilities would have the effect of avoiding construction of the PG&E portion of the project as well. As a result, FERC denial of PGT's authorization would not only avoid the construction and operational impacts associated with PGT's portion of the project, but also those associated with PG&E's portion.

In the case of Altamont, FERC denial of the requested authorization would prohibit construction of Altamont's proposed project. ~~It would also preclude the need for Kern River~~ Should Kern River in the future propose to expand its system capacity to accommodate gas volumes over the 700 MMcf/d for which it is currently certificated, denial here would effect this expansion. Construction and operational impacts associated with both of these actions would therefore not occur.

If neither of the proposed projects ~~were~~ was constructed, the projected need for energy services in the markets that each of the projects propose to serve would have to be met by other means or go unmet. This would result in one of the following two scenarios: either alternative projects would be implemented to meet part or all of the projected need, or no action would be taken to meet the projected need. If additional supplies of natural gas were not made available, existing energy sources and/or conservation efforts would continue to be used. Natural gas would not be available to supplement these sources or for fuel switching. The impacts associated with construction and operation of one or both of the proposed projects would not occur. The benefits ~~to air quality that could result from using natural gas instead of other fuels, such as oil, would not be realized~~ of increased gas use in attaining air quality standards for California in the future could be effected if other fuels, such as oil, were used instead of gas.

The potential would also exist for energy demand to exceed available supply, thus driving up energy prices and exerting an indirect limiting effect on growth. This could result in either positive or negative impacts on resources, depending on how policy makers and end users deal with a curtailment in future natural gas availability. Indirect impacts on biological resources may be positive in that future land disturbance would be curtailed. If, on the other hand, alternative projects were implemented, each would result in its own set of specific impacts which would be greater than those associated with the current proposals. It would be purely speculative and therefore beyond the scope of this EIS to attempt to predict what actions may be taken by policy makers or end users in response to the No-Action Alternative. The assessment of impacts associated with these scenarios would also be speculative.

2.7 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Five system alternatives were rejected from detailed study because no application for certification was filed with FERC or the application for certification before FERC or CSLC was dismissed, or the proposal was considered inactive because the applicant failed to pursue its application. These include:

- the El Dorado Interstate Transmission Company (El Dorado) proposal,
- the Southcoast Transmission Corporation (Southcoast) proposal,
- the MexUS Interstate Pipeline (MexUS) proposal,
- the Alternative Pipeline Expansion (APEX) proposal, and
- the Integrated Intrastate System Alternative.

Several route variations or alternatives were rejected from detailed study because they were determined to be infeasible for economic or technical reasons, or they lacked environmental advantage over other alignments. These include ~~three~~ five PGT/PG&E project variations and ~~three~~ five Altamont project variations:

- the Moyie River Valley Camp Nine Alternative (PGT)
- the Hannafin Canyon Alternative (PGT)
- the John Day River Canyon Existing Alignment (PGT),
- the Jepson Prairie Preserve Existing Alignment (PGT/PG&E),
- the San Joaquin West Variation (PG&E),

- o the West Route Variation (Altamont),
- o the Middle Route Variation ~~and~~ (Altamont),
- o the East Route Variation (Altamont),
- o the Abandoned Railroad Variation (Altamont), and
- o the Opal Bench/Hams Fork River Variation (Altamont).

The following sections discuss each of the system and route alternatives that were eliminated from detailed study and summarizes the reasons for elimination.

2.7.1 System Alternatives

El Dorado Interstate Transmission Company Proposal. On November 24, 1986, El Dorado filed an application with FERC (Docket No. CP86-205-001) seeking authorization to construct a 381-mile-long pipeline into Kern County, California, from Mohave County, Arizona. The pipeline would have a capacity of 520 MMcf/d. On October 27, 1986, El Dorado's application was dismissed by FERC's presiding administrative law judge, because El Dorado failed to pursue its application. The dismissal was affirmed by FERC on October 20, 1987. On June 30, 1987, CSLC denied El Dorado's application.

Southcoast Transmission Corporation Proposal. On October 21, 1988, Southcoast Transmission Company (Southcoast) filed an application with FERC (Docket No. CP89-60-000), pursuant to section 7(c) of the Natural Gas Act and Subpart E of Part 157 of FERC's regulations, for an OC. The applicant sought authorization for construction and operation of a 1,300-mile-long pipeline system to transport natural gas to California from western Canada, the Rocky Mountain area, and the southwestern United States.

Southcoast's pipeline would transport natural gas from the following points to California:

- o an interconnection with the NOVA metering station at Carway, Alberta, Canada;
- o an interconnection at Hyram and Payson, Utah, near Salt Lake City with Questar Pipeline Company; and
- o interconnections at the California-Arizona border with Transwestern and El Paso.

The proposed system would have a capacity of 1,500 MMcf/d and is estimated to cost approximately $1,264 million.

On December 12, 1988, Southcoast was notified by FERC of deficiencies in its application; most of the exhibits required by FERC's regulations were omitted from the filing. Southcoast was requested to supply the additional information. After subsequent correspondence, Southcoast responded with a supplemental filing on May 16, 1989. Southcoast's supplemental filing modified the proposal, acknowledged deficiencies in the application, and stated that further information would be forthcoming. As of November 3, 1989, Southcoast's filing remained deficient. On November 3, 1989, FERC dismissed the application.

MexUS Interstate Pipeline Proposal. MexUS filed an application with FERC on August 3, 1988 (Docket No. CP88-656-000), seeking authorization to construct and operate a 1,655-mile-long pipeline system extending from southern Texas through Mexico to markets in southern California. Capacity of the proposed system would be 1.13 MMcf/d. Because MexUS has not filed a complete application or specified a time frame within which it would file, the processing of the application has been suspended.

APEX Pipeline Proposal. Three Canadian gas producers have proposed to construct an alternate pipeline expansion on the same route as the proposed PGT/PG&E natural gas pipeline project. The APEX proposal would have a reported capacity of 600 MMcf/d. Prospective owners and shippers were initially identified as Shell Canada, Ltd.; Suncor, Inc.; and Alberta Energy Company, Ltd. No regulatory applications have been filed with FERC or CPUC; therefore, this is not a viable alternative to the proposed PGT/PG&E project.

Integrated Intrastate System Alternative. The FERC staff first developed this alternative as part of the analysis of system alternatives presented in the EOR FEIR/FEIS. Up to 690 MMcf/d could be transported to the California-Arizona border using existing capacity and authorized deliveries from El Paso and Transwestern through 1995. Spare capacity on both the PG&E and SoCal systems would be used to deliver at least 600 MMcf/d of natural gas from the California-Arizona border to markets in southern California. To ensure that the two intrastate systems had the flexibility to operate in an integrated fashion to receive gas from either El Paso or Transwestern at either existing delivery point, the staff recommended construction of a connector pipeline similar to the Mojave Transfer Line. This 16.5-mile-long pipeline was the only new facilities required by this alternative.

On August 18, 1989, in a response to a FERC staff data request, PG&E stated that the available capacity of the combined utility systems is now projected to decrease to the point where additional gas supplies are needed and as a consequence of this, the integrated intrastate option is no longer a feasible alternative. The FERC staff no longer considers this an alternative system.

2.7.2 PGT/PG&E Project Route Variations

Moyie River Valley Camp Nine Alternative. In the Draft EIS, we identified two areas along PGT's proposed route where environmental impacts were potentially significant. We concluded that significant impacts at these locations may not be mitigable to less-than-significant levels, and recommended that PGT evaluate the use of alternative route alignments at these locations. The first location where our Draft EIS concluded that the use of an alternative route may be desirable due to significant residual environmental impacts was the Moyie River Valley in Idaho (Loop 1). PGT's route would cross the Moyie River at eight locations, all of which would occur within a continuous fourteen mile long area. These numerous crossings increase the likelihood that significant individual and cumulative impacts would occur on water quality and coldwater fish populations. In addition, construction along PGT's proposed route through the Moyie River Valley would also result in adverse, although not necessarily significant, impacts on sensitive wildlife species, wetland areas, visual resources, cultural resources, and recreational uses.

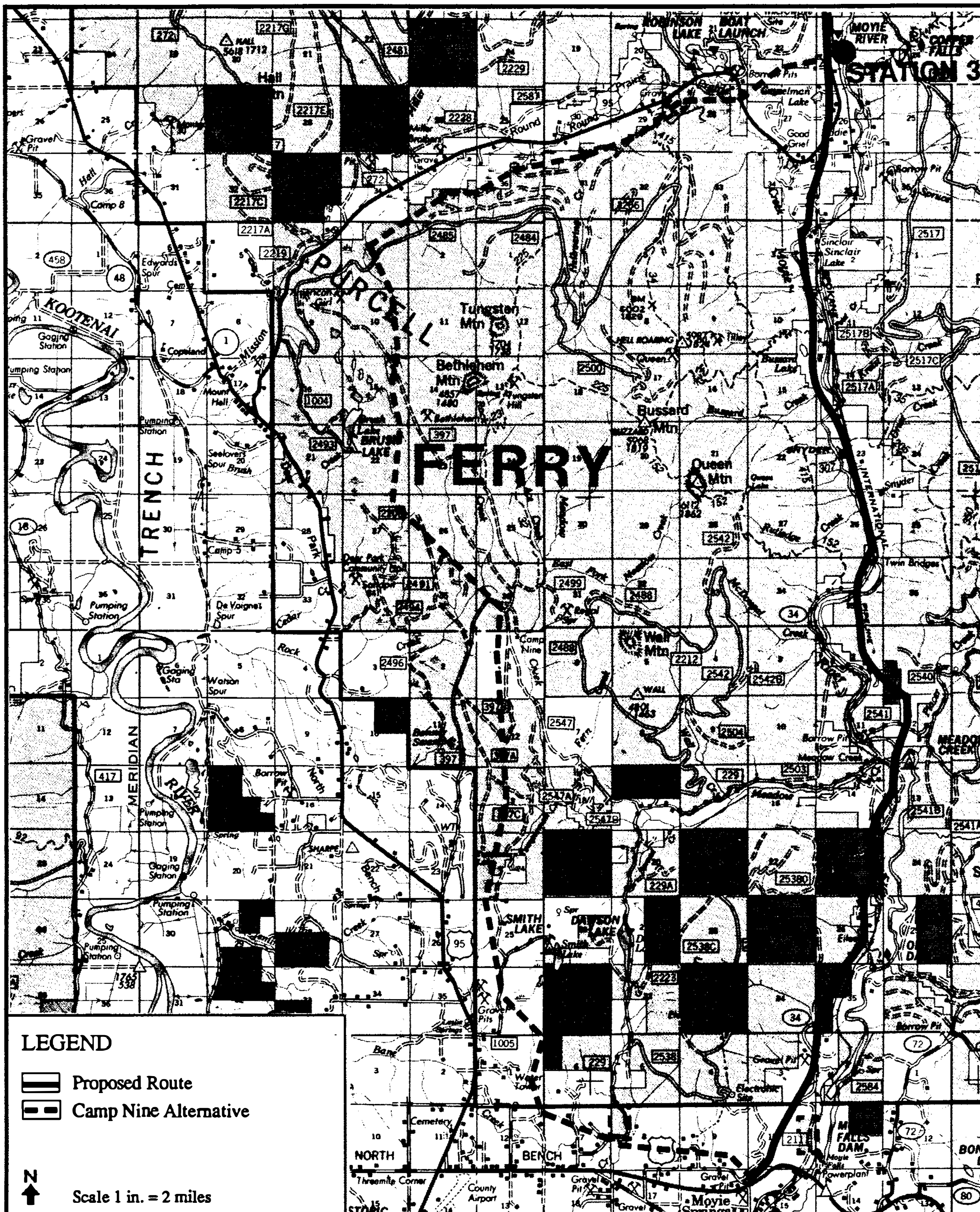
In order to minimize these impacts, in our Draft EIS we developed (in conjunction with PGT and the FS) a preliminary alternative route that would eliminate six crossings of the Moyie River. This alternative route, known as the Camp Nine Alternative, would deviate from PGT's route on the downstream side of Compressor Station No. 3, and would rejoin PGT's proposed route on the north side of US 2. The approximate route of the Camp Nine Alternative is presented in Figure 2-15.

In the Draft EIS we acknowledged that we did not have sufficient information to conclusively establish that the Camp Nine Alternative was environmentally superior to PGT's proposed route. Therefore, we recommended that PGT conduct a detailed environmental, engineering, and economic analysis for this alternative route, and submit this information to the staff for inclusion and analysis in our Final EIS. In addition, we specifically requested comments on the feasibility and environmental impacts associated with construction of this alternative routes from the appropriate Federal land management agencies, state natural resource management agencies, and all interested individuals. Finally, our Draft EIS also recommended that PGT provide us with a detailed, site-specific construction, mitigation, and restoration plan for its proposed route at location for inclusion and analysis in our Final EIS. Our analysis of this information is presented below.

A summary of PGT's Environmental, Engineering, and Economic Analysis of the Camp Nine Alternative is contained in Table 2-18. The Camp Nine Alternative is approximately 24.8 miles long, and is approximately 6.8 miles longer than PGT's proposed route through the Moyie River Valley. The entire length of this Alternative would require new right-of-way, which would result in a five-fold increase in the amount of forest vegetation cleared during construction. In addition, this Alternative would cross eight more streams than the segment of PGT's proposed route that it would replace. Several of these additional streams provide critical spawning habitat for sensitive coldwater fish species. Construction along the Camp Nine Alternative route also would disturb areas of traditional use and importance to the Kootenai Tribe, and could result in additional significant cultural resource impacts. Finally, the incremental cost of constructing along this Alternative route is nearly $9 million.

PGT provided the staff with a detailed, site-specific construction, mitigation, and restoration plan for its proposed crossings of the Moyie River. This plan, entitled "Moyie River Pipeline Crossings: Construction, Mitigation, and Restoration Plan", is attached as Appendix F-1 of the Final EIS. PGT's proposed Moyie River Plan contains detailed information concerning the environmental characteristics of each proposed Moyie River crossing. In addition, PGT's Moyie River Plan also contains specific construction, mitigation, and restoration procedures for its proposed Moyie River crossings, many of which were developed after extensive coordination and consultation with the Commission staff, FS, and appropriate Idaho water quality and fishery management agencies.

Numerous comment letters were received by the staff concerning the potential use of the Camp Nine Alternative. These letters were written by the FS, several Idaho natural resource management agencies, and numerous concerned citizens. With the exception of one private individual, all of these commentors were opposed to the use of the Camp Nine Alternative. The major point of opposition raised by these commentors was that the Camp Nine Alternative would



PGT PROJECT CAMP NINE ALTERNATIVE

FIGURE 2-15

create a new right-of-way through a previously undisturbed area, which would likely result in a greater amount of significant impact than would construction utilizing PGT's proposed route.

Many of these comment letters also referenced PGT's Moyie River Plan, and voiced support for the procedures it contained. Of particular interest to most of these commentors was Appendix B of the Moyie River Plan, which contains a Fishery Enhancement Conceptual Plan. The Commission staff believes, as do most of the commentors on this subject (including the FS and appropriate Idaho agencies), that implementation of PGT's fishery enhancement conceptual plan would result in significant environmental benefits to the water quality and fish populations of the Moyie River.

As discussed above and indicated in Table 2-18, construction of the PGT Project using the Camp Nine Alternative would result in additional environmental impacts as compared to construction along PGT's proposed route. The staff believes that some of these impacts may be potentially long-term and significant in nature. In contrast, the Commission staff's analysis of environmental impacts associated with construction along PGT's proposed route indicates that while these impacts may also be significant, they are primarily of a short-term and temporary nature. In addition, implementation of PGT's proposed Moyie River Plan would provide long-term significant environmental benefits to the water quality and fish populations of the Moyie River.

In conclusion, construction along the Camp Nine Alternative would result in potentially long-term significant impacts along a new right-of-way, as opposed to the short-term significant impacts and long-term significant benefits that would result from construction along PGT's existing, previously disturbed right-of-way. The Commission staff believes that in order for it to recommend the use of an alternative route in a project which involves the looping of an existing pipeline, that alternative must offer a clear and substantial reduction of environmental impacts when compared to the applicant's proposed route. As discussed above, the Camp Nine Alternative not only fails to reduce environmental impacts, but may actually increase both the extent and magnitude of these impacts. Therefore, the Commission staff concludes that construction along PGT's proposed route, with the implementation of PGT's proposed Moyie River Plan and the staff's recommended mitigation measures, is the environmentally preferable alternative.

Hannafin Canyon Alternative. In the Draft EIS, we identified two areas along PGT's proposed route where environmental impacts were potentially significant. We concluded that significant impacts at these locations may not be mitigable to less-than-significant levels, and recommended that PGT evaluate the use of alternative route alignments at these locations. The first location was the Moyie River Valley in Idaho (Loop 1).

The second location where our Draft EIS concluded that the use of an alternate route may be justified occurs where the John Day Canyon Variation would cross extremely steep and rough terrain in the vicinity of Hannafin Canyon (JDV MP 17.6). Construction across the steep slopes of Hannafin Canyon raises concern for the potential of significant adverse environmental impact to occur, primarily due to the probability for landslide activity and slope instability to threaten the integrity of the pipeline. In addition, construction across these extremely steep slopes

Table 2-18

ENVIRONMENTAL, ENGINEERING, AND ECONOMIC ANAYSIS OF THE CAMP NINE ALTERNATIVE

ANALYSIS FACTOR	CAMP NINE ALTERNATIVE	PROPOSED ROUTE
Pipeline Length	24.8 miles	18 miles
New Right-of-Way	24.8 miles	0 miles
New Access Roads	2 miles	None
Sidehill Construction	9.5 miles	6 miles
Potential Blasting Areas	3.5 miles	3.5 miles
Potential Slope Instability	Moderate	Moderate
Erosion Potential	Moderate/High	Moderate
Wetland/Riparian Vegetation	2.24 acres	4.1 acres
Removal of Trees	3.4 Mbf	0.77 Mbf
Perennial Stream Crossings	16	8
Sensitive Fish Habitat	Yes	No
Potential Cultural Resource Sites	15	10
Visual Resource Impact Level	Moderate/High	Moderate/High
Public Lands Crossed	16.5 miles	6.4 miles
Private Lands Crossed	8.3 miles	14.1 miles
Estimated Construction Cost	$26,120,000	$17,320,000

increases the probability that adverse residual visual impacts and restoration difficulties will occur.

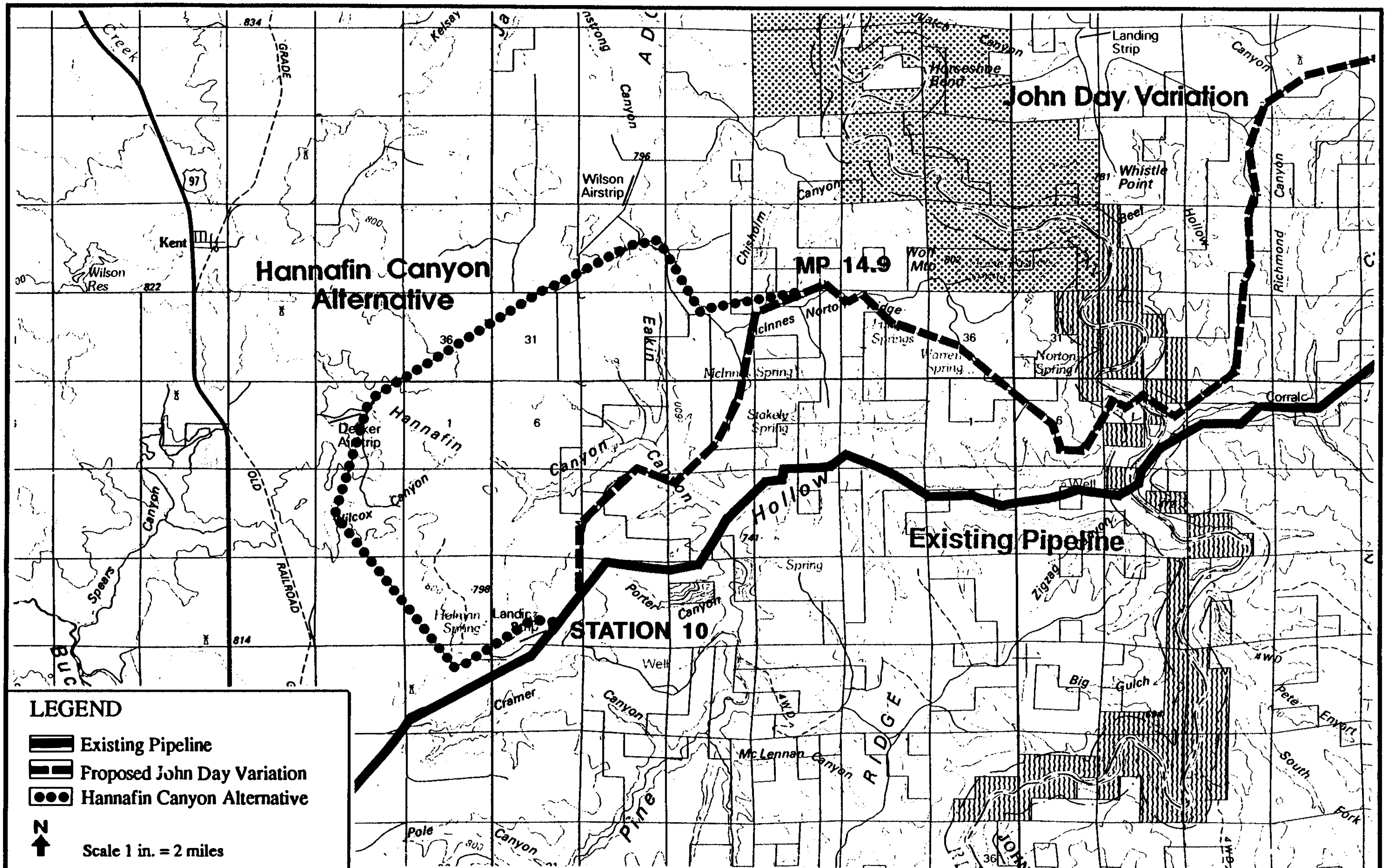
In order to eliminate these potentially significant impacts, our Draft EIS developed an alternative route that would be located on level terrain and would avoid the steep slopes present in Hannafin Canyon. This alternative route would deviate from the John Day Variation at MP 15.6, where the pipeline is located on relatively level ground on McInnes Norton Ridge, and would rejoin PGT's existing right-of-way on the upstream side of Compressor Station No. 10. Figure 2-16 illustrates the approximate route of the Hannafin Canyon Alternative.

In the Draft EIS we acknowledged that we did not have sufficient information to conclusively establish that the Hannafin Canyon Alternative was environmentally superior to PGT's proposed route. Therefore, we recommended that PGT conduct a detailed environmental, engineering, and economic analysis for this alternative routes, and submit this information to the staff for inclusion and analysis in our Final EIS. In addition, we specifically requested comments on the feasibility and environmental impacts associated with construction of this alternative route from the appropriate federal land management agencies, state natural resource management agencies, and all interested individuals. Finally, our Draft EIS also recommended that PGT provide us with a detailed, site-specific construction, mitigation, and restoration plan for its proposed route at this location for inclusion and analysis in our Final EIS. Our analysis of this information for each location is presented below.

A summary of PGT's Environmental, Engineering, and Economic Analysis of the Hannafin Canyon Alternative is contained in Table 2-19. The Hannafin Canyon Alternative is approximately 4.6 mile longer than PGT's proposed John Day Variation route, and would result in the incremental disturbance of approximately 55.8 acres of land. Construction along the Hannafin Canyon Alternative route also would result in over a five-fold increase in the amount of agricultural land disturbed during construction. The incremental cost associated with constructing along this Alternative route is nearly $6.4 million.

PGT provided the staff with a construction, mitigation, and restoration plan for its proposed John Day Variation. This plan, entitled "Construction and Restoration Plan: John Day Variation", is included as Attachment B to PGT's comments on our Draft EIS (see FEIS, Comments/Responses Volume). The John Day Variation Plan, as well as PGT's comments on the Draft EIS, stress that PGT's field evaluation of the John Day Variation route indicates that landslide and slope-stability related problems associated with its crossing of Hannafin Canyon are not significant. The staff believes that PGT's evaluation of potential landslide and slope-stability problems is correct, and that its construction and restoration procedures would ensure that these impacts are less-than-significant. However, the staff also believes that while the John Day Variation Plan conceptually addresses restoration, revegetation, and visual impacts that are potentially significant, the Plan does not address these issues in a sufficiently detailed and site-specific manner.

Only a few comment letters were received concerning the potential use of the Hannafin Canyon Alternative. Several of these letters were written by the private individuals who own the land that would be crossed by both the Hannafin Canyon Alternative route and the segment



PGT PROJECT HANNAFIN CANYON ALTERNATIVE

FIGURE 2-16

Table 2-19

ENVIRONMENTAL, ENGINEERING, AND ECONOMIC ANAYSIS OF THE HANNAFIN CANYON ALTERNATIVE

ANALYSIS FACTOR	HANNAFIN CANYON ALTERNATIVE	PROPOSED ROUTE
Pipeline Length	10 miles	5.4 miles
New Right-of-Way	10 miles	4.7 miles
New Access Roads	None	None
Sidehill Construction	None	None
Potential Blasting Areas	3000 feet	6000 feet
Potential Slope Instability	Moderate	Moderate
Erosion Potential	Moderate	Moderate
Ephemeral Stream Crossings	3	1
Potential Cultural Resource Sites	4	9
Visual Resource Impact Level	Low	Low/Moderate
Active Agricultural Land Disturbed by Construction	85 acres	15 acres
Estimated Construction Cost	$14,600,000	$8,200,000

of the John Day Variation that it would replace. All of these commentors were opposed to the use of the Hannafin Canyon Alternative, and favored the use of the John Day Variation. In addition, several commentors requested that the Commission staff re-analyze the use of PGT's existing right-of-way through the John Day Canyon area (see discussion following this section).

The major point of opposition raised by these commentors was that construction along the Hannafin Canyon Alternative would significantly increase disturbance to agricultural land. The staff agrees with the commentors' position that construction along the Hannafin Canyon Alternative would substantially increase the amount of impact on agricultural land. Based on the information presented by the commentors and PGT, as well as its own independent analysis, the staff believes that these impacts may be long-term in nature.

The staff believes that construction along the Hannafin Canyon Alternative would result in similar levels of impact to most environmental resources as compared to PGT's proposed route, and would substantially increase the extent and magnitude of impact on agricultural land. In addition, we note that the private landowners who would be affected by both the proposed route and the Hannafin Canyon Alternative favor the use of PGT's proposed route. As discussed above, the staff has concluded that landslide and slope-stability impacts associated with construction across Hannafin Canyon can be mitigated to less-than-significant levels. In addition, although we believe that PGT's John Day Variation Plan does not contain a sufficient level of detail and site-specificity, the generic procedures established in that Plan convince us that revegetation, restoration, and visual impacts in this area are mitigable. The staff also notes that PGT's John Day Variation was developed, after intensive consultation with the BLM and the State of Oregon, as a means to minimize environmental impacts associated with traversing the John Day Canyon area.

As previously indicated, the Commission staff believes that in order for it to recommend the use of an alternative route in a project that involves the looping of an existing pipeline, that alternative must offer a clear and substantial reduction of environmental impacts when compared to the applicant's proposed route. In light of the information presented above, the staff cannot conclude that construction of the Hannafin Canyon Alternative would result in a clear and substantial reduction of environmental impacts. Therefore, the Commission staff concludes that construction along PGT's proposed route, with the implementation of the staff's recommended mitigation measures, is the environmentally preferable alternative.

John Day River Canyon Existing Alignment. With this variation, the proposed pipeline would not deviate from the existing pipeline at MP 350.8 but would be constructed adjacent to the existing pipeline within the John Day River canyon. This alternative was rejected in the final EIS on the ANGTS because it would have greater environmental impacts than the proposed route, due to the fact that the existing route is located within the floodplain of Thirtymile Creek. In its application and environmental report for the proposed project, PGT indicated that past flooding had threatened the security of the existing pipeline, and therefore the proposed pipeline should not be built in the same area.

However, in comments that the FERC staff received on the Draft EIS, we were requested to reanalyze the use of the existing pipeline alignment in the John Day Canyon area.

PGT's existing 36-inch-diameter pipeline was constructed through Thirtymile Canyon and Pine Hollow in 1961. During the winter of 1964-65, extreme winter storms in the Pacific Northwest resulted in dramatic flooding in Pine Hollow, with water levels up to six feet deep from wall to wall of the canyon. This flooding exposed a 295-foot-long section of the existing pipeline in Thirtymile Canyon, and eight sections of the existing pipeline ranging in length from 100 feet to nearly 1000 feet long in Pine Hollow.

Although the pipeline remained operational during this time span, it took PGT nearly an entire summer and one-half million dollars to put the pipeline "back to bed." During this remedial work, extensive sections of the pipeline were concrete-coated in an attempt to preclude future floatation problems. Despite these efforts, however, additional flooding in January of 1966 resulted in the exposure of six sections of pipeline in Pine Hollow, including three sections which had been previously concrete-coated.

In light of these problems, PGT began to investigate alternative routes through the John Day Canyon area in 1967. The result of this effort was the development, after extensive consultation with the BLM, Oregon Game Commission, and Oregon Department of Environmental Quality, of the John Day Alternative.

The staff has independently reviewed the information provided by PGT concerning the problems it has encountered with its existing pipeline alignment through Thirtymile Canyon and Pine Hollow, and has made two visits to the area to ascertain actual site conditions. PGT's existing alignment is located on the floor of both Pine Hollow and Thirtymile Canyon, which has resulted in the crossing of approximately 4.5 miles of wetland and riparian habitat. The wetland and riparian vegetation in this area serve as important winter range for mule deer, and this area is also extensively used by California bighorn sheep (see Chapter 4B). In addition, Long Hollow Creek, which flows through Pine Hollow, is important spawning and rearing habitat for steelhead trout.

In light of the information presented above, the FERC staff has concluded that construction of PGT's proposed pipeline through the John Day Canyon area following its existing alignment is not feasible from either an engineering or an environmental perspective. Therefore, the FERC staff has eliminated PGT's existing alignment from further consideration in this EIS.

Jepson Prairie Preserve Existing Alignment. The existing pipeline (MP 892.3-893.0) crosses two playa lakes for approximately 700 feet outside The Nature Conservancy's Jepson Prairie Preserve in Solano County, California, and then crosses a corner of the preserve. The Jepson Prairie Preserve was established by The Nature Conservancy in 1981 to preserve and protect the area's natural habitat, specifically vernal pools, and provide a site for research of the existing ecosystems. The preserve was designated as a National Natural Landmark in 1988. In the environmental report for the proposed project and the "Jepson Prairie Reserve Routing Study", PG&E concluded that playa lakes/vernal pools can be avoided through careful routing of the pipeline. The existing alignment alternative has therefore been eliminated from detailed analysis because alternative feasible routes exist that avoid potential adverse impacts on the playa lakes/vernal pools.

San Joaquin West Variation. The San Joaquin West Variation would deviate from the proposed route at MP 936, about 7 miles northwest of Tracy, California. It would extend along sloping foothills west of the San Joaquin Valley floor, and return to the existing pipeline alignment at MP 976. This 40-mile variation would parallel the proposed route, but would be separated between 0.25 and 2 miles to the west from the proposed route by I-5. Predominant land use is nonirrigated rangeland.

This variation would require more area for new right-of-way both for the pipeline and the crosstie lines that would be necessary between the variation and the existing Stanpac No. 2 Pipeline. Because of the long crossties that would be required, maintenance of the system would be more difficult and costly. This variation would have less impact on agricultural operations than would the proposed pipeline, but would result in greater potential for soil erosion and impacts on San Joaquin kit fox habitat. The San Joaquin West Variation was determined to be significantly inferior to the proposed route primarily because of the difficulties in operating a looped system with a 40-mile stretch of paired, but nonadjacent, pipelines and its potential environmental impacts. For all of the above reasons, this variation has been eliminated by CPUC staff from further consideration.

2.7.3 Altamont Project Route Variations

The following routes were analyzed by Altamont during the project planning stage, and conclusions about their viability were reported in the environmental exhibit to Altamont's FERC application. The FERC staff agrees that these variations should be eliminated from further consideration.

West Route Variation. The West Route Variation would extend for 625 miles from Carway, Montana, to Opal, Wyoming. It would cross western Montana, southeastern Idaho, and southwestern Wyoming and traverse several forested mountain ranges and broad agricultural valleys. This variation was rejected for the following reasons:

- The route would cross prime recreation land in the upper Missouri River valley, the upper Madison River valley, the Raynold's Pass area on the Continental Divide, the Targhee National Forest and Henry's Lake area of Idaho, and the west Yellowstone area.
- At its closest point, the route would pass 10 miles west of Yellowstone National Park, well within the Greater Yellowstone ~~Ecozone~~ Ecosystem, which is recognized by environmental agencies and interest groups as an environmentally sensitive area.
- The route would cross 11 Class I ("blue ribbon") trout streams of national importance, including the Missouri, Jefferson, Madison, Henry's Fork, and Snake Rivers.
- The route would traverse semimountainous terrain throughout its length, as well as lava fields in Idaho.

- o The route would cross a Native American reservation in northern Montana and populated areas around irrigated farmlands in adjacent river valleys in Montana and Idaho.

Middle Route Variation. The Middle Route Variation would also extend from Carway to Opal. This variation would be 695 miles long and extend from Carway in a southeast direction, avoiding mountainous terrain and joining the proposed route near Judith Gap, Montana. It would then follow the proposed route to Opal. This variation was rejected because it would be 75 miles longer than the proposed route, cost approximately $75 million more, and, in addition, cross a Native American reservation in northern Montana.

East Route Variation. The East Route Variation would extend for 625 miles from either Spring Lakes or Monchy, Montana, approximately 65 miles or 115 miles, respectively, east of Wild Horse, Montana, the start of the proposed route. The variation would join the proposed route west of Billings, Montana. The East Route Variation would cross the Missouri River in a designated utility corridor within the Charles M. Russell NWR. It would cross more rugged terrain in the foothills of the Little Rocky Mountains and more badlands in the Missouri River valley than the proposed route. Although the East Route Variation would be viable from an engineering and environmental perspective, it was not economically viable because it would require major pipeline expansion to transport the gas to the Montana border crossing from the Canadian province of Saskatchewan.

Abandoned Railroad Variation. According to the BLM, the Abandoned Railroad Variation is about 0.7 miles longer than the portion of the proposed route that it would replace. The variation would deviate from the proposed route immediately east of its Sweetwater River crossing near MP 525 and follow the abandoned grade along an alignment which roughly parallels the proposed route to a point near MP 550 where the variation and the proposed route would merge. Like the proposed route, this variation would cross the Oregon-Mormon Trail at a previously disturbed location. However, the variation would not avoid crossing the South Pass NHL. Approximately 3.75 miles of the abandoned railroad traverses through the middle of the NHL. The BLM feels that this route would provide it some opportunity to restore and reclaim a substantial segment of an existing disturbance, including that part of the railroad traversing through the NHL.

The railroad was constructed in the late 1960's between Rock Springs, Wyoming and an iron ore mine in the South Pass area north of SR 28. Both the mine and the railroad were subsequently abandoned. The rails and the ballast have been removed from the railroad grade.

The Abandoned Railroad Variation would not require any significant change in the locations proposed for Compressor Stations 5 and 6, nor in their horsepower requirements. The cost implications of adopting this variation were not provided by BLM.

This variation was eliminated from further consideration because it traverses the center of the South Pass NHL. (In fact, it crosses more of the NHL than Altamont's originally-filed route.) We also reject the idea that crossing of the Oregon-Mormon Trail at the existing railroad grade would be superior to the presently-proposed crossing at SR 28.

Opal Bench/Hams Fork River Variation. This BLM variation would increase the length of the proposed route by approximately 2.5 miles. The variation would deviate from the proposed route near MP 596 on the south side of SR 372. The variation route passes around the west end of Opal Bench, crosses SR 240, and joins an existing pipeline corridor which it would then parallel south across the Hams Fork River to the Opal Meter Station (MP 620 on the proposed route).

This variation would avoid a new crossing of the Hams Form River, placing the pipeline instead about 2.5 miles west in an existing corridor crossing. The variation would also avoid a crossing of the Opal Bench. According to the BLM, the Opal Bench is an area of extreme erosion hazard, and poor soils not conductive to successful revegetation.

The reroute would follow an existing corridor for 10 miles and cross the Hams Fork River where other pipelines have crossed. Although the cost implications of adopting this variation were not provided by BLM, the BLM feels that some of the additional costs associated with increased length would be offset by savings in reduced construction time due to relatively flat topography and lower potential for cultural resource clearances/excavations.

Our review of the final 25 miles of the proposed Altamont route did not identify any resource conflicts which would be unresponsive to conventional mitigation strategies or which warranted adoption of a route variation which would increase the length of the pipeline by 2.5 miles. The Variation was therefore eliminated from further consideration.

Chapter 3A. Affected Environment: Geology

PGT PROJECT

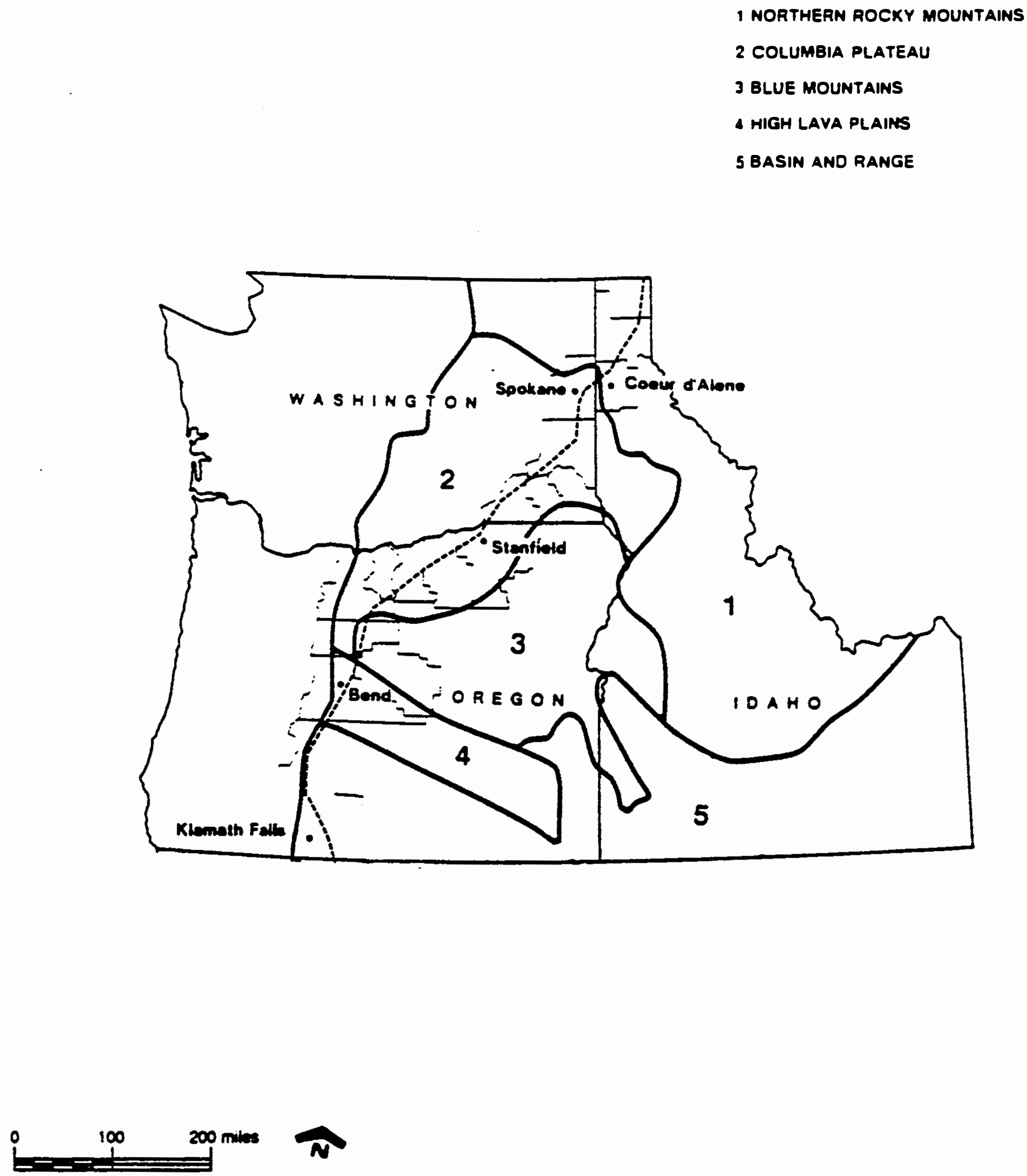
Idaho

Topography, Geology, and Geomorphology. The pipeline route in Idaho would traverse the Northern Rocky Mountains Physiographic Province (Figure 3A-1). The route would cross complex, irregularly shaped mountain chains and a wide diversity of rock types and geologic structures from the Canada-U.S. border in the vicinity of Eastport (MP 0) south to the Idaho-Washington border (MP 107). These lands are characterized by river valleys, structural lowlands, prairieland, and hills and ridges. This portion of the pipeline would generally follow valleys and lowlands, alternately intersecting Holocene floodplain deposits and glacial outwash terraces and till. Steeper terrain is found near the Canada-U.S. border. The slopes along the loops are generally less than 10 percent. Slopes of 25 and 50 percent are found at MP 11 in the Moyie River canyon.

Seismicity. The pipeline route would follow the Purcell Trench, a fault-bounded depression, through most of northern Idaho. The Hope Fault, a northwest-trending fault at least 100 miles long, intersects a previously looped pipeline segment in the vicinity of Pend Oreille Lake (MP 45). The Hope Fault offsets older faults bounding the Purcell Trench. Subsidiary faults radiate northwest from this fault juncture.

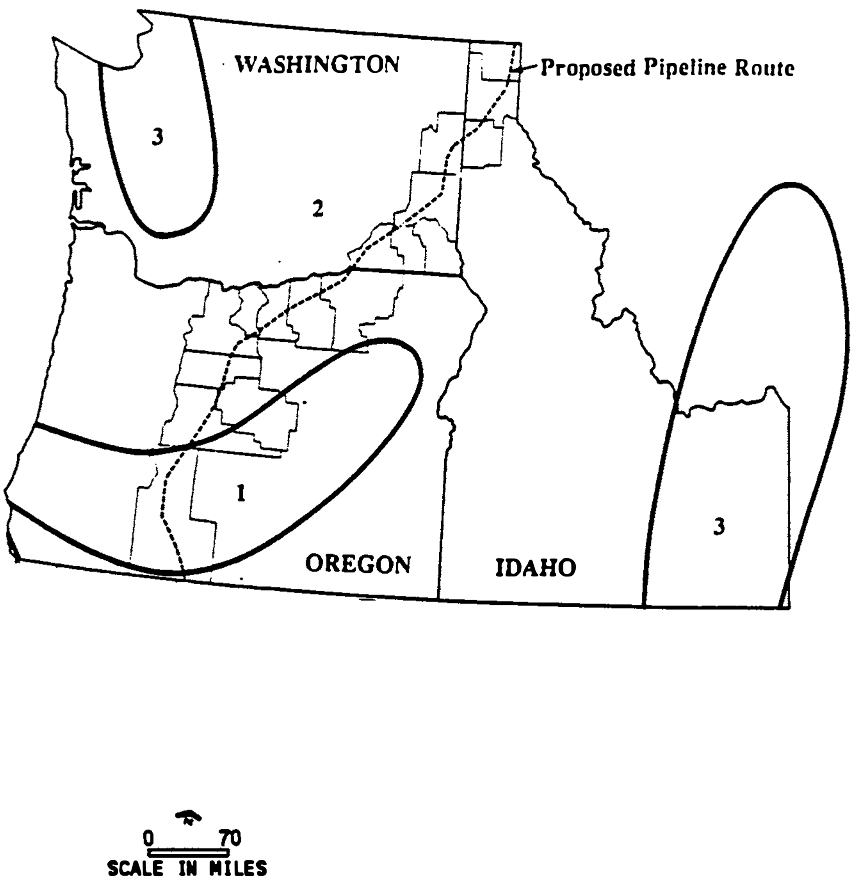
A similar relationship exists between the Purcell Trench and the complex Osburn Fault Zone in the vicinity of Coeur d'Alene (approximately 10 miles east of the pipeline route), south of the juncture of the Hope Fault and the Purcell Trench. The Osburn Fault Zone has a northwest trend and includes a series of faults known to extend 100 miles southeast. All these faults are believed to be inactive. There is no historic evidence of active surface faults within five miles of the proposed route in Idaho.

The portion of Idaho that would be traversed by the proposed pipeline lies in Seismic Risk Zone 2 (Figure 3A-2). Seismic risk zones are based on the known distribution of damaging earthquakes and the Modified Mercalli intensities associated with these earthquakes, evidence of strain release, and consideration of major geologic structures and provinces believed to be associated with earthquake activity. While active surface faults do not occur within five miles of the pipeline route (Table 3A-1), active subsurface faults do occur in the vicinity (Gillerman, 1990). Only two earthquakes of any consequence have been recorded in the region. The stronger shock occurred in 1942 near Granite, 0.8 mile west of the proposed pipeline route at MP 79.5. The other shock occurred near Rathdrum in 1918. Rathdrum is less than one mile



Source: Modified from Hammond, Edwin H., 1965, Physical Subdivisions, in the U.S. Geological Survey, The National Atlas of the United States of America, 1970, pg. 61

FIGURE 3A-1. PHYSIOGRAPHIC PROVINCES CROSSED BY THE PGT PROJECT



EXPLANATION

SEISMIC RISK ZONES (After Algermissen, 1969)

ZONE 0 - No damage (not indicated on this map)

ZONE 1 - Minor damage; distant earthquakes may cause damage to structures with fundamental periods greater than 1.0 seconds; corresponds to intensities V and VI of the M.M.* Scale.

ZONE 2 - Moderate damage; corresponds to intensity VII of the M.M.* Scale.

ZONE 3 - Major damage; corresponds to intensity VIII and higher of the M.M.* Scale.

This map based on the known distribution of damaging earthquakes and the M.M.* intensities associated with these earthquakes; evidence of strain release; and consideration of major geologic structures and provinces believed to be associated with earthquake activity. The probable frequency of occurrence of damaging earthquakes in each zone was not considered in assigning rating to the various zones.

* Modified Mercalli Intensity Scale of 1931

FIGURE 3A-2. SEISMIC RISK ZONE MAP FOR THE PGT PROJECT

Table 3A-1

QUATERNARY SURFACE FAULTS WITHIN FIVE MILES OF THE PGT ROUTE

Fault	Pipeline Location within 5 Miles of the Fault (milepost)	Fault Crossing (milepost)	Remarks
Wallula Gap	256.1	*	Offsets Pleistocene rocks
Green Mountain	457.5	–	
Unnamed	459.5	459.6	
Unnamed	460	460.3	
Northwest Rift Zone of Newberry Volcano	458-467	465.6	Recent faulting associated with young (2,000-year-old) volcanic flows has occurred
Unnamed	499-504	–	
Unnamed	498.0-502.5	–	
Walker Rim System	499.0-526.5	518.8	Offsets Pleistocene volcanic rocks
Unnamed	529.5-530.5	–	
Unnamed	553.5-563.0	557	
Unnamed	556-565	561.4	
Unnamed	556.0-561.5	–	
Unnamed	564.5-569.0	–	
Unnamed	565.5-572.0	–	
Unnamed	565.5-569.0	–	
Unnamed system	567-612	596.2, 605.5, and 608.2	

Notes: – = The pipeline would not cross a fault at this location.

* = Existing pipeline crosses fault 0.5 mile south of the end of Loop 4.

west of the proposed pipeline route at MP 97. The magnitudes of these events are not known. No major faults known to be capable of causing strong ground shaking are near the pipeline route in Idaho (Table 3A-2). Therefore, areas susceptible to liquefaction would not be crossed by the pipeline route in Idaho. However, Loop 2 in its entirety (MPs 72.7 - 108.3) would cross potentially liquefiable sediments.

Volcanic Activity. Little potential for volcanic activity exists in the pipeline portion of the northern Rocky Mountains province because the most recent volcanic rocks date from the Precambrian Era (590 million years old). A geologic time scale is provided in Table 3A-3.

Slope Stability. Although slopes greater than 10 percent are found intermittently, large-scale slope stability problems are not believed to exist in this province because of the generally level topography. An exception is the Moyie River canyon, which has slopes that exceed 25 percent. However, most of the route would traverse the bottom of the canyon along the river.

Mineral Resources. Table 3A-4 lists the known mineral resources within one mile of the pipeline alignment. Several excavations (e.g., gravel pits, mine prospects) exist near the right-of-way.

Unique Geologic Features. Unique geologic features are not particularly notable in the province. Many of these features are related to visual resources and are discussed in Chapter 3L, "Visual Resources."

Table 3A-2

KNOWN FAULTS THAT HAVE CAUSED STRONG GROUND SHAKING IN THE PGT PROJECT AREA

General Location	Historic Events [a]
Umatilla, Oregon	M6 (estimated) March 6, 1893
Milton-Freewater, Oregon	M5.75 July 15, 1936

[a] Richter scale magnitude (M) and date, if known, are given for known historic events. An estimated magnitude is given for a maximum credible earthquake (MCE) event. Precise determinations of specific earthquake parameters are not attempted nor implied by these estimated values.

Table 3A-3. Relative Time Scale, Geologic Time

Era	Period	Epoch	Years Ago
Cenozoic	Quaternary	Holocene	10,000
		Pleistocene	2 million
	Tertiary	Pliocene	10 million
		Miocene	25 million
		Oligocene	40 million
		Eocene	55 million
		Paleocene	65 million
Mesozoic	Cretaceous		140 million
	Jurassic		190 million
	Triassic		230 million
Paleozoic	Permian		280 million
	Pennsylvanian		310 million
	Mississipian		345 million
	Devonian		405 million
	Silurian		425 million
	Ordovician		500 million
	Cambrian		570 million
Precambrian	Proterozoic		2.5 billion
	Archeozoic		5 billion

Source: Flexner 1987.

Table 3A-4

KNOWN MINERAL RESOURCES WITHIN ONE MILE OF THE PGT ROUTE

Location (milepost)	Distance from Right-of-Way (miles)	Activity
IDAHO		
1.0	0.25	Comet Placer mine
2.5	0.10	Unspecified quarry
13.3	0.75	Silver Spoon prospect mine
	0.70	Unspecified quarry
15.5	0.25	Unspecified quarry
17.0	0.50	Skin Creek Occurrence prospect mine
	0.25	Eileen Mining Company prospect mine
20.0	1.00	Unspecified quarry
20.9	0.10	Unspecfied quarry
74.0	0.50	Sand quarry
74.6	0.50	Sand quarry
80.4	0.75	Sand quarry
84.0	1.00	Gravel quarry
88.5	0.20	Gravel quarry
89.2	0.75	Gravel quarry
104.3	0.75	Gravel quarry
	0.75	Unspecified quarry
106.7	0.75	Gravel quarry
107.0-107.5	0.75	Gravel quarries
WASHINGTON		
183.4	0.80	Gravel quarry
184.0	1.00	Gravel quarry
186.4	0.30	Gravel quarry
187.0	0.80	Gravel quarry

Table 3A-4
(continued)
KNOWN MINERAL RESOURCES WITHIN ONE MILE OF THE PGT ROUTE

Location (milepost)	Distance from Right-of-Way (miles)	Activity
OREGON		
296.4	0.05	Gravel quarry
317.0	0.30	Unspecified quarry
336.8	0.20	Unspecified quarry
344.0	0.10	Unspecified quarry
347.6	1.00	Unspecified quarry
350.6	0.10	Gravel quarry
369.0	0.50	Unspecified quarry
372.6	0.75	Unspecified quarry
385.9	0.50	Unspecified quarry
388.4	0.50	Unspecified quarry
395.5	1.00	Unspecified quarry
414.6	0.10	Unspecified quarry
432.1	1.00	Gravel quarry
433.2	0.50	Gravel quarry
456.0-457.0	0.25	Unspecified quarry
458.0	1.00	Cinder/ash quarry
464.0	0.75	Cinder/ash quarry
468.6	0.25	Cinder/ash quarry
469.3	0.25	Cinder/ash quarry
475.5	0.75	Gravel quarry
478.0-478.3	1.00	Gravel quarry
481.4	0.10	Gravel quarry
497.5	1.00	Gravel quarry
499.3	0.50	Cinder/ash quarry
512.0	0.25	Pumice quarry
513.0	0.25	Pumice quarry
515.7	0.25	Pumice quarry
550.4	0.75	Cinder/ash quarry

Washington

Topography, Geology, and Geomorphology. From the Idaho-Washington border south to the Washington-Oregon border, the pipeline route would cross the Columbia Plateau Physiographic Province, a mountainous region that is actually a broad, shallow basin (Figure 3A-1). Locally, the bedrock is folded into long, west-to-northwest ridges and valleys. The surface of the Columbia Plateau province is predominantly level with moderate local relief. From MP 179 to MP 197, the plateau surface is gently rolling with some incised major tributaries. The terrain from MP 225 to MP 256 changes to a nearly level surface on Eureka Flat.

Seismicity. The proposed pipeline route would be located entirely in Seismic Risk Zone 2 (Figure 3A-2). The Columbia Plateau province is considered an area of moderate seismic risk. ~~Twelve~~ Approximately 20 historic earthquakes (through ~~1970~~ 1983) have been felt within about 100 miles of the proposed route. Less than one-half with Modified Mercalli intensities between V and VII appear to have been generated locally: the rest ~~were~~ appear to have been distant earthquakes centered in western Washington or Montana Algermissen, 1983; Stickney, et al., 1987; Zollweg and Jacobsen, 1986; Stover, et al., 1986).

Except at the Wallula Gap Fault, there is no evidence of Holocene-aged activity at any surface fault within five miles of the proposed route across the Columbia Plateau province (Table 3A-1). The existing pipeline crosses the Wallula Gap Fault at MP 256.1 just south of the end of proposed Loop 4. The Wallula Gap Fault forms part of the Olympic-Wallowa Lineament, a major structural lineament in the Pacific Northwest.

Two moderate earthquakes occurred in northern Oregon that affected the project area in Washington (Table 3A-2). The closest earthquake to the project route occurred on March 6, 1893, at Umatilla. On July 15, 1936, an earthquake with a magnitude of 5.75 on the Richter scale was centered near the town of Milton-Freewater. These earthquakes are discussed in more detail below in the "Oregon" section.

Liquefaction. A moderately high potential for liquefaction exists where the proposed pipeline alignment would cross Pleistocene-Period lake sediments near the mouth of the Walla Walla River. These sediments are fine grained and saturated during winter or during periods of high rainfall or flooding, and may liquefy during a major earthquake.

Volcanic Activity. The potential for renewed volcanic activity in the Columbia Plateau province is remote. The youngest volcanic rocks are of Miocene age (more than 5 million years old).

Slope Stability. ~~Considering the entire alignment~~ The Columbia Plateau Province section appears to have ~~the most significant~~ some potential for slope stability problems. Small slides and slumps ~~can be expected~~ are possible (but not likely) on ~~steep~~ hummocky hills of loess (a homogeneous, nonstratified, unconsolidated deposit consisting predominantly of wind-deposited silt) in this province. New road cuts in loess tend to slough and ravel. Steep hillsides along major valleys are also susceptible to sliding. In general, the greatest potential for slope stability problems exists along canyon walls where steep slopes have developed in weak, underlying rocks (e.g., MP 231.0).

Tributary rivers and streams of the Columbia River occupy narrow canyons that usually have steep walls. The process of active downcutting by the stream and oversteepening and undercutting of canyon walls may result in grossly unstable slopes, especially where weak volcanic rocks composed of ash and granular materials are present. However, these areas would not be affected by pipeline construction activities because they are located in areas that have already been looped.

Mineral Resources. Only a few geologic resources, such as quarries and gravel pits, are known to exist along the route (Table 3A-4).

Unique Geologic Features. Geologic resources of special interest are limited to sand dunes of the loessial deposits.

Oregon

Topography, Geology, and Geomorphology. From the Washington-Oregon border south to the Oregon-California border, the route would cross the Columbia Plateau, Blue Mountains, High Lava Plains, and Basin and Range Physiographic Provinces (Figure 3A-1).

The Columbia Plateau province was described previously. Southwest through the plateau from MP 277 to MP 396, the topography is low and rolling and slopes northwest toward a landscape of incised canyons. Deeply incised canyons are prevalent along the route in the vicinity of the John Day River.

The Blue Mountains province, MP 396-433, is characterized by fairly steep to hilly terrain for the northern section, and gently rolling to fairly flat topography toward the province's southern border. Landforms created by ~~Pliocene and~~ Miocene to Pleistocene-Age volcanic activity are found in the vicinity of the right-of-way. Landsliding is common where heavy basalt flows overlie tilted, altered tuffaceous rocks of early and middle Tertiary age. North of Madras, near the Antelope Creek crossing, the land surface has more local relief. For 30 miles, south of Antelope Creek to Gray Butte, the elevation increases from 2,000 to 3,000 feet. The route would then traverse the fairly flat alluvial valley of the Crooked River.

The High Lava Plains province, formed of late Cenozoic volcanic rocks, generally has less relief than areas to the north and south but lies at a fairly high elevation, typically 3,000-5,000 feet. The physiography owes its form and general character to building up processes of volcanic extrusion. The Northwest rift zone of Newberry Volcano is marked by several young lava flows and numerous cinder cones, including Lava Butte. Newberry Volcano is one of the few isolated high mountains in the province. Near Lava Butte, the right-of-way would cross the southeastern flow of two lava flows, called the Gas Line Flows, which are 5,800 years old according to carbon-14 dating. ~~Some eruptions at the southeast end of the zone are younger than 1,970 years, with considerably less modified surfaces than the Gas Line Flows.~~ Carbon-14 dates along the entire Northwest Rift Zone range from 5,800 to 6,200 years, but other field evidence supports a narrower time span at about 6,100 years. Further south, from MP 460 to MP 485, the proposed route would cross older flows on the western flank of Newberry Volcano. These older flows, many of which end with steep faces, are forest covered, slightly modified by erosion, and mantled by ash and loess. Near Paulina Creek, the right-of-way would descend from the Quaternary basalt flows and enter a broad plain that extends for several miles beyond La Pine.

The portion of the Basin and Range province that would be traversed by the proposed route is underlain by upper Cenozoic volcanic and sedimentary rocks that are offset by northerly trending large faults with considerable movement. The topography of this province varies from forested terrain of moderate and low relief in the north, to low ridges and valleys. The forested terrain is one of high ridges separated by either steep, high escarpments or gentle slopes from adjacent valleys. Elevations in the region range from 4,000 to over 8,000 feet. The route would be mostly below 5,000 feet and would run primarily along the flat valley bottoms.

Seismicity. The proposed pipeline route in the Columbia Plateau province would be in Seismic Risk Zone 2, except for a small part that would be in Seismic Risk Zone 1 (Figure 3A-2). The Columbia Plateau is considered an area of moderate seismic risk. ~~Twelve~~ Approximately ten historic earthquakes (through ~~1970~~ 1983) have been felt within about 100 miles of the proposed route. ~~Less than~~ About one-half appear to have been generated locally; the rest ~~were~~ appear to have been distant earthquakes centered in western Washington or Montana or in central Idaho. The portions of the Blue Mountains and High Lava Plains provinces that would be traversed by the pipeline route are in Seismic Risk Zone 1. The Basin and Range province lies in Seismic Risk Zone 1 in its northern part and in Seismic Risk Zone 2 toward the Oregon-California border (Algermissen, 1983; Stickney, et al., 1987; Zollweg and Jackson, 1986; Stover, et al., 1986).

No evidence exists of Holocene-aged activity at any surface fault within five miles of the proposed route in Oregon, except at the Northwest Rift Zone and Walker Rim System (Table 3A-1). However, the earthquake at Umatilla and the earthquake and associated ground cracking near the town of Milton-Freewater, discussed below, suggest that northeastern Oregon should be considered an area of potential future seismicity and possible ground failure. Numerous faults that displace Quaternary rocks occur near the proposed route in the High Lava Plains province (Table 3A-1). Faults also intersect the proposed route in a three-mile segment south of Soloman Butte (MPs 558-561), two miles southwest of the Williamson River, and near Switchback Hill (MP 581.5).

Two moderate earthquakes have occurred in northern Oregon near the proposed route (Table 3A-2). The closest occurred on March 6, 1893, at Umatilla, about 10 miles northwest of the proposed route. On July 15, 1936, an earthquake of 5.75 on the Richter scale occurred centered near the town of Milton-Freewater, about 20 miles southeast of the proposed route. This earthquake was felt over about 100,000 square miles. During this earthquake, ground cracking was extensive in the general vicinity of the town. Some cracks were 200 feet long and the largest was 3 feet wide and 8 feet deep. Water discharged from many of the cracks. This general area is near the eastward projection of the Wallula Gap Fault. ~~The appearance of the cracks suggests they are ruptures from ground shaking rather than surface fault ruptures.~~

Moderate levels of ground shaking should be expected over most of the southern two-thirds of the Basin and Range province. This determination is based on the large number of Quaternary faults in the region. Local ~~attenuation~~ amplification of ground shaking may occur in areas of unconsolidated materials.

A moderate potential for liquefaction exists in some of the unconsolidated alluvial and lake deposits south of Bonanza (MP 610). About five miles of lakebeds would be crossed by the proposed route in the Tule Lake basin at the Oregon-California border. Some of these areas may have a high water table and may be affected if cohesionless soils lie below them.

Volcanic Activity. Because of the youthful age of the volcanic terrain of the High Lava Plains province, the potential for volcanic eruptions should be considered a potential geologic hazard with associated risk for the proposed pipeline. The proposed pipeline route in this region is underlain by Quaternary volcanic rocks. Eruptions along the Northwest rift zone of Newberry Volcano occurred between ~~1,970~~ 5,800 and ~~5,800~~ 6,200 years ago, according to Carbon-14 dating. Volcanic activity of similarly recent age has also occurred in the caldera atop Newberry Volcano. Some obsidian flows and pumice and ash deposits in the area are ~~1,270-5,000~~ 1,300 to 6,800 years old.

Slope Stability. ~~Considering the alignment as a whole, the Columbia Plateau province section appears to have the most significant potential for slope stability problems. Small slides and slumps can be expected on steep loess hills. New road cuts in loess tend to slough and ravel. Steep hillsides along major valleys are also susceptible to sliding. In general, the greatest potential for slope stability problems exists along canyon walls where steep slopes have developed in areas of weak, underlying sandstone.~~ Except for the deeply incised areas in the vicinity of the John Day Variation, no slope stability-related problems would be expected to be encountered in Oregon.

Mineral Resources. Mineral resources in the state are limited to sand, gravel, and cinder deposits and stone. Table 3A-4 lists the known quarries, gravel pits, or other mining operations in the pipeline vicinity.

Unique Geologic Features. Geologic resources of special interest include sand dunes of the loessial deposits and volcanic bluffs along the John Day River. The young lava flows of the High Lava Plains province are also of interest, especially those associated with the Newberry Volcano. Near Cava Butte, the route would pass through the newly created Newberry National Volcanic Monument. Lava tubes, such as those at Lava River Caves Park, are unique. Devil's Garden, an area of interesting volcanic terrain, lies within one mile of the proposed pipeline near MP 582.

ALTAMONT PROJECT

Montana

Topography, Geology, and Geomorphology. In Montana, the Altamont route would be located in both the glaciated and the unglaciated portions of the Great Plains Physiographic Province. From the Canadian border, the route would pass south across the Judith River Basin and drainages of the Missouri, Musselshell, and Yellowstone Rivers, avoiding all mountain ranges. Bedrock geology is entirely sedimentary, consisting primarily of Cretaceous shale and mudstone.

From the Canada-U. S. border in the vicinity of Wild Horse (MP 0) south to Flat Creek near Geraldine (MP 96.6), the route would traverse the nearly level Missouri Plateau. Bedrock is sedimentary (mostly Cretaceous shale) that is largely concealed by flat to hummocky glacial till and local patches of outwash gravels and lake sand, silt, and clay. Preglacial and postglacial streams and rivers have incised wide, shallow valleys into the plain.

South of the glaciated plains, bedrock is weak, erodible shale and siltstone of the Cretaceous Period. A few thick sandstone units are exposed. The route generally would traverse broad, gravel-mantled, late Tertiary stream terraces, which incise the bedrock. Active and inactive landslides occur in dark gray Colorado shale beds of the Cretaceous Period in the Arrow Creek Breaks between MP 112.9 and MP 115.

The route would descend gradually southward via gravel-mantled benches and low hills underlain by Cretaceous Period shale units and cross the Musselshell River (MP 195.5) in a broad alluvial valley. South of the Musselshell River, between MP 199.5 and MP 199.8, the route would cross steeply inclined Cretaceous sandstone beds exposed along the Shawmut Anticline (a broad, asymmetric, bedrock fold).

South of the Yellowstone River crossing (MP 257.4), the route would climb steep, gullied bluffs exposing sandstone and shale beds of the Cretaceous Period. Further south, the route would pass through dissected terrain and local badlands developed in shale and sandstone bedrock of the Jurassic and Triassic Periods. Near the Clarks Fork crossing (MP 268), the route would enter the Middle Rocky Mountain Physiographic Province. South of MP 283, the route would follow a broad bench with several deep ravines and local shallow bedrock, including bright red sandstone and shale of the Triassic Period Chugwater Formation. South to the Wyoming border at MP 305, the route would follow a broad bench paralleling the western toe of the Pryor Mountains.

Seismicity. Geologic hazards related to earthquakes include ground shaking, surface displacement, and liquefaction. The proposed pipeline route would avoid most historical earthquake epicenters. According to seismicity maps produced by the U.S. Geological Survey (USGS) (through 1981), seven small earthquakes occurred within a 50-mile-wide corridor along the route. The highest recorded intensity for an earthquake was III on the Modified Mercalli scale (Table 3A-5). The route would not cross or approach any faults active during the Quaternary Period (last 2 million years). No areas are prone to liquefaction.

Volcanic Activity. No volcanic activity during the Quaternary Period has occurred along or near the route in Montana.

Slope Stability. Table 3A-6 describes landslides of the Quaternary Period, as identified by geological reconnaissance, aerial photograph interpretation, and literature review. Because of the dry climate and lack of steep, undercut slopes in incompetent rock (rock that, because it lacks strength or cohesiveness, is unable to support its own or the weight above it without breaking), such as shale and mudstone, few landslides occur on or near the proposed route. Most slides are small or inactive.

Mineral Resources. None of the coal within 0.5 mile of the route is feasible to mine. Most coal beds that would be crossed are deeply buried, low grade, or thin and discontinuous. Discontinuous coal beds of undetermined thickness and extent in the Judith River and Eagle Sandstone Formations are found between MP 60 and MP 97. These subbituminous coal beds are largely covered by glacial deposits and considered noneconomic to mine. Coal was mined in the late 1800s near Coal Banks Landing north of the Missouri River crossing (MP 69), although the works have since been abandoned.

The Great Falls-Lewistown Coal Field (MP 130-166) is located in Montana's Judith Basin. The coal is thin, averaging less than 14 inches where it would be crossed by the route. The route would pass about eight miles east of the Buffalo Creek mining district and eight miles west of the Rock Creek mining district, which have bituminous coal beds 2.5 to 4 feet thick in the upper Morrison Formation. The coal was extracted from underground mines, although no mining has occurred since about 1965. In the Columbus area west of MP 242-253, coal was recovered from several small underground mines in the 1920s. The coal was mined from thin beds in the Judith River Formation, with production of less than 10 tons per day. The coal is bituminous, has much ash and many shale interbeds, and is generally 11 to 23 inches thick. The coal beds become thinner southward toward the Yellowstone River. South of the Yellowstone River, the Bridger Field is located several miles west of the route. Oil and gas fields that would be crossed or are adjacent to the Altamont route are listed in Table 3A-7.

No active mines exist within 0.5 mile of the Altamont project pipeline route. Limestone is mined several miles east of the route near Warren, Montana, just north of the Wyoming border.

Wyoming

Topography, Geology, and Geomorphology. The route would traverse the Bighorn Basin, Copper Mountain area, Wind River Basin, South Pass area, and Green River Basin. The terrain is relatively gentle except for a few ravines; escarpments; badlands; and steep, high sections in the Copper Mountain and South Pass areas. Bedrock geology is mostly sedimentary, including extensive stretches of shale and mudstone of the Cretaceous and Tertiary Periods.

Table 3A-5

MODIFIED MERCALLI INTENSITY SCALE

Rating	Description
I	Not felt; marginal and long-period effects of large earthquakes
II	Felt by persons at rest, on upper floors, or favorably placed
III	Felt indoors; hanging objects swing; vibration like passing of light trucks; duration estimated; may not be recognized as an earthquake
IV	Hanging objects swing; vibration like passing of heavy trucks, or sensation of a jolt like a heavy ball striking the walls; standing motor cars rock; windows, dishes, doors rattle; glasses clink; crockery clashes; in the upper range of IV, wooden walls and frames creak
V	Felt outdoors; direction can be estimated; sleepers wakened; liquids disturbed, some spilled; small unstable objects displaced or upset; doors swing, close, open; shutters, pictures move; pendulum clocks stop, start, change rate
VI	Felt by all; many frightened and run outdoors; persons walk unsteadily; windows, dishes, glassware broken; knickknacks, books, etc., off shelves; pictures off walls; furniture moved or overturned; weak plaster and masonry D[a] cracked; small bells ring (church, school); trees, bushes shaken (visibly, or heard to rustle)
VII	Difficult to stand; noticed by drivers of motor cars; hanging objects quiver; furniture broken; damage to masonry D[a], including cracks; weak chimneys broken at roof line; fall of plaster, loose bricks, stones, tiles, cornices (also unbraced parapets and architectural ornaments); some cracks in masonry C[b]; waves on ponds; water turbid with mud; small slides and caving in along sand or gravel banks; large bells ring; concrete irrigation ditches damaged
VIII	Steering or motor cars affected; damage to masonry C[b]; partial collapse; some damage to masonry B[c]; none to masonry A[d]; fall of stucco and some masonry walls; twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks; frame houses moved on foundations if not bolted down; loose panel walls thrown out; decayed piling broken off; branches broken from trees; changes in flow or temperature of springs and wells; cracks in wet ground and on steep slopes
IX	General panic; masonry D[a] destroyed; masonry C[b] heavily damaged, sometimes with complete collapse; masonry B[c] seriously damaged (general damage to foundations); frame structures, if not bolted, shifted off foundations; frames cracked; serious damage to reservoirs; underground pipes broken; conspicuous cracks in ground; in alluviated areas, sand and mud ejected, earthquake fountains, sand craters
X	Most masonry and frame structures destroyed with their foundations; some well-built wooden structures and bridges destroyed; serious damage to dams, dikes, embankments; large landslides; water thrown on banks of canals, rivers, lakes, etc.; sand and mud shifted horizontally on beaches and flat land; rails bent slightly
XI	Rails bent greatly; underground pipelines completely out of service
XII	Damage nearly total; large rock masses displaced; lines of sight and level distorted; objects thrown into the air

[a] Masonry D is weak material, such as adobe; poor mortar; low standards of workmanship; weak horizontally.
[b] Masonry C is ordinary workmanship and mortar; no extreme weaknesses such as failing to tie in at corners, but neither reinforced nor designed against horizontal forces.
[c] Masonry B is good workmanship and mortar; reinforced, but not designed in detail to resist lateral forces.
[d] Masonry A is good workmanship, mortar, and design; reinforced, especially laterally, and bound together by using steel, concrete, etc.; designed to resist lateral forces.

Table 3A-6

SLOPE INSTABILITY ALONG THE ALTAMONT ROUTE

Milepost	Location	Description
MONTANA		
74.6-74.8	South side of the Sag	Hummocks suggest old, completely stabilized and vegetated slumps in Cretaceous shale and mudstone on lower half of bluffs; slumps are probably Late Pleistocene in age; upper third of slope is underlain by glacial till; care is needed to avoid reactivating slumps, but no major shift in right-of-way is indicated; small, surficial earth flows a few inches thick on steep shale slopes, on grassy slopes overlying shallow black Colorado (Cretaceous age) shale
112.9-115.0	Arrow Creek	Active and inactive slumps and complex slump-earth flows in dark gray marine shale of Colorado Group (Early Cretaceous age); shallow to deep; based on aerial photograph interpretation, slopes mostly have continuous ground vegetation, but there is little rounding of head scarps and other ground breaks, suggesting some movement within the past 100 to several thousand years; a few areas are active with fresh ground breaks which suggest very shallow slumps, mainly from MP 114.2-115.0; adjacent gulches along the Arrow Creek badlands have similar unstable ground
133.7-134.9	Sage Creek	South approach slope has old, stabilized slumps in incompetent Cretaceous shale
WYOMING		
416.2-416.4	West Kirby Creek	Inactive slump on valley sideslope east of bench and right-of-way
417.0-417.1	West Kirby Creek	Small inactive slump on right-of-way where creek has undercut stream terrace
417.8-418.1	West Kirby Creek	Active and inactive slump-earth flow complex in Mowry Shale (Early Cretaceous age) on steep slope where right-of-way exits southeast from the valley to reach a high pediment bench; based on aerial photograph interpretation and site views, the slope is well vegetated but has local fresh ground breaks, and there is little rounding of head scarps and hummocky terrain, suggesting ongoing movement over the past 100 to several thousand years
495.6-496.3	Twin Creek	Largely inactive, complex slump-earth flow on steep slope where right-of-way climbs westward from valley to high pediment bench; field observations of the slide's toe show no signs of movement and aerial photographs of the entire slide confirm this; parts of the slide are forested with no tilting of trees, and the head scarp and hummocky terrain of the main slide mass is subdued by erosion; such features are typical of Late Pleistocene slides; aerial photographs also suggest that the slide's upper southwestern corner may be active, with open, fresh ground cracks, approximately between MP 496.0 and 496.3
503.3-508.2	Cottonwood Divide	Inactive slumps near route on slopes flanking Cottonwood Divide bench

Paleozoic-Era limestone and shale beds and Precambrian-Era metamorphic rocks occur in the South Pass area of Wyoming.

From the state border southeast to the Bighorn River (MP 374.2), the route would cross benches and gently rolling hills underlain by shale, siltstone, and minor sandstone of the Cretaceous and Jurassic Periods. These sedimentary beds mostly dip to the west into the Bighorn Basin. Except for the Shoshone (MP 319.5) and Greybull Rivers (MP 352.2), streams are small and incised, many with steep side-slopes. There are a few badlands and sandstone outcrops. South of Lovell, between MP 325 and MP 340, the route would follow a shale valley between parallel sandstone hogbacks. At the Greybull River crossing, the river flows west against a high vertical bank exposing shale and siltstone capped by alluvial gravels. South of Worland (MP 388), the route would traverse rolling to level ground underlain by shale and sandstone formations, which dip gently northward. There are numerous gullies, ravines, and local badlands from MP 389 to MP 391 and from MP 391.9 to MP 403.0.

South of MP 415, the route would skirt the eastern flank of Copper Mountain on a gently inclined bench, first paralleling, then crossing the valley of West Kirby Creek to reach an upland bench and pass (elevation 6,434 feet, MP 422.5) on mostly steep, bedrock-controlled slopes. There are extensive inactive and active shale landslides where the route would exit West Kirby Creek (MP 417.8-418.1). Colorado Group shale and sandstone beds of the Lower Cretaceous Period in this area dip north, off the mountain block uplift. On the uplands are broad ridges, underlain by Tertiary-Period mudstones of the Eocene Epoch that are very soft when wet.

The Wind River Basin contains Eocene-, Paleocene-, and Upper Cretaceous-Period drab to colored mudstone, siltstone, and sandstone. Beds generally dip gently to the northeast with local folding and faulting. Once clear of Copper Mountain at MP 432, the route would enter the Wyoming Basin Physiographic Province, turning southwest across gentle, dry, locally gullied slopes to pass east of Alkali Butte (MP 470). Between Alkali Butte and the southeastern edge of the Wind River Range (MP 493) are irregular escarpments and local badlands, separated by benches and small, flat-bottomed basins. Red, pink, and yellow siltstone and mudstone beds are widely exposed.

Between MP 480 and MP 516, the route would cross the southern flank of the Wind River Range, following valleys and benches to avoid nearly all steep slopes. Shales and sandstones of the Cretaceous Period would be crossed (MP 480-500), and progressively older formations would be crossed south of this point. There is a large landslide (MP 496) where the route would exit from Twin Creek valley and ascend Cottonwood Divide (a high, gently sloping bench). Black, nearly vertically dipping metamorphosed sandstone and amphibolite of the Precambrian Era would be crossed from about MP 511.2 to ~~about~~ MP ~~517~~ 520 or further. These rocks are highly fractured and locally mineralized.

South of MP 517, the route would traverse undulating and rolling land. Near Pine Creek (MP 522.1) and Fish Creek (MP 525.6), Miocene-Epoch sandstone and mudstone overlie Precambrian-Era granite and metamorphic rocks. The route would pass four miles south of South Pass City (MP 518), gently climbing to cross the Continental Divide at an elevation of

7,526-feet (MP 528.5). The route would traverse mudstone, siltstone, and minor sandstone from MP 528.5 to MP 532.0.

From MP 528.5 to MP 562.0 at Farson, the terrain is level to gently undulating and bedrock controlled. Eocene-Epoch bedrock formations in the Green River basin include marlstone and sandstone with oilshale and soft limestone; and the Bridger Formation, which consists of gray, pink, and green tuffaceous mudstone and sandstone beds, with local white limestone beds. The Bridger Formation typically weathers into badlands. Near Farson, the route would cross the Big Sandy River (MP 561.5) and continue southwest across gently undulating terrain; small escarpments; and minor, unnamed drainage courses tributary to the Green River. A final segment of the route between MP 606 and 612 would cross the Opal Bench, an area of steep, broken topography.

Seismicity. The proposed route would avoid major seismic areas. It would be located more than 100 miles from the Yellowstone seismic region and several miles east of the Intermountain Seismic Belt, a zone of major earthquakes and regional extension. The Opal Metering Station site lies at the eastern edge of the belt.

No earthquake epicenters have been recorded within a 50-mile-wide corridor centered on the proposed route as far south as Worland. According to the seismicity map of Wyoming (Case, 1986), eight earthquakes occurred within a 50-mile-wide corridor along the pipeline route near Copper Mountain area. Two of these earthquakes were recorded at intensity V on the Modified Mercalli scale. Thirteen epicenters were identified along the remaining segment of the route within a 50-mile-wide corridor. One seismic event was recorded at intensity V and two events at intensity IV (see Table 3A-5).

The Cedar Ridge/Dry Fork fault system, along with the Stagner Creek fault system, separates the Wind River basin from Copper Mountain. The route would cross one segment of the Cedar Ridge/Dry Fork system at or near MP 432.4, just south of the Copper Mountain area. Quaternary movement has been noted on some segments of this system (Case, 1988). A site reconnaissance at the Altamont crossing of this fault shows no evidence of Quaternary movement. The Stagner Creek fault system may have recurrence intervals of surface displacement of about 8,000-20,000 years. This system is on the south side of the Owl Creek and Bridger Mountains, and has field evidence of seismic activity during the Late Pleistocene Epoch. The system trends eastward but does not connect with the Cedar Ridge/Dry Fork fault system and is not crossed by the proposed route.

The Continental Fault runs along the southwest side of the Wind River Range and would be crossed by the proposed route at MP 532.1. This fault could have been active during the Quaternary Period, but has not been examined in detail. Site reconnaissance at the Altamont crossing shows no evidence of activity during the Holocene Epoch.

A north-south trending area of recent microseismicity exists about 10 miles west of the site of the Opal Metering Station (Arabasz, Smith, and Richins, 1979). The linear trend suggests motion along a potentially active subsurface fault or faults, with a maximum magnitude of 6.5 on the Richter scale. The proximity of this microseismicity zone and the Rock Creek Fault increases the risk of strong ground motion at the Opal Metering Station site at MP 620.

About 25 miles west of the Opal Metering Station is the 24-mile-long, seismically active Rock Creek fault system, which has a maximum credible earthquake of magnitude 7 on the Richter scale and lies within the Intermountain Seismic Belt. Taking into account the proximity of both the Rock Creek Fault and the zone of microseismicity, the Opal Metering Station is near the edge of the Intermountain Seismic Belt and could experience significant earth shaking.

Several areas with a high water table and presence of sandy soils are prone to liquefaction, including Badwater Creek (MP 440.0-440.7), Poison Creek (MP 447.1-447.3), and the Big Sandy/Little Sandy valley (MP 557.1-564.0). At Badwater Creek, possible liquefaction potential exists along the floodplain, which contains abundant sandy deposits interbedded with overbank silt and channel gravels. The presence of nonsandy materials, however, reduces the likelihood of liquefaction at this location. At Poison Creek, the floodplain is sandy and has liquefaction potential, although the creek is intermittent and frequently dry, as is Badwater Creek. The only extensive area prone to liquefaction consists of floodplains and low terraces with sandy deposits in the vicinity of Big Sandy River and Little Sandy Creek, both of which are perennial streams. The Continental Fault is the only nearby major fault; however, it is not active.

Volcanic Activity. No volcanic activity during the Quaternary age has occurred along or near the route in Wyoming.

Slope Stability. See the discussion above under "Montana."

Mineral Resources. The Altamont route would cross several miles of potentially minable coal. The Big Horn Basin field (MP 345-407) contains low-sulfur, mostly subbituminous coal. However, the nearest active mining of strippable coal is located at Grass Creek, about 40 miles west of the route. The Wind River Basin (MP 437-486) and the Green River Basin (MP 532-612) also contain coal beds. However, none of the beds in these basins are presently being mined. Extensive underground oil shale deposits in the Green River Basin area would also be crossed, although these deposits are presently uneconomical to mine. In addition, the proposed route would cross or be adjacent to several oil and gas fields (see Table 3A-7).

The Altamont route would also cross or be adjacent to several metallic and non-metallic mineral claims, prospects and mines in Wyoming. The Copper Mountain uranium district was active until the late 1970's but production ceased due to depressed uranium prices. In the South Pass area, the alluvial floodplains of the nearby creeks were dredged for gold between 1933 and 1941. Although placer mining occurred sporadically in this area until 1951, there are presently signs of renewed mineral extraction activities due to rising gold prices. The route would cross the Twin Creek paleoplacer, due north of South Pass (MP 504), which is presently undergoing active gold prospecting. Farther south along the route, the Rock Creek placer (MP 514) is presently being mined for gold. The Willow Creek placer (MP 516) is undergoing active prospecting, and a mine may soon be opened in the area.

Table 3A-7

OIL AND GAS FIELDS THAT WOULD BE CROSSED BY OR ADJACENT TO THE ALTAMONT ROUTE

Approximate Milepost	Location	Field
MONTANA		
35.0-50.0	West of Havre	Laredo Gas Field
239.0-243.0	Lake Basin	Lake Basin Gas Field
WYOMING		
330.0-331.0	South of Lovell	Alkali Anticline Oil Field
379.0-382.2	Northeast of Worland	Rattlesnake Oil Field (also produces gas)
386.0-387.5	Southeast of Worland	Slick Creek Oil Field (also produces gas)
404.2	Southeast of Worland	Murphy Dome Oil Field
405.7-407.2	Southeast of Worland	Lake Creek Oil Field
408.1-409.8	East of Thermopolis	Kirby Creek Oil Field
435.0-439.0	East of Copper Mountain	Madden/Long Butte Gas Field
456.0	Muskrat Creek	Unidentified oil or gas field
472.3-472.9	Wind River Basin	Alkali Butte Oil Field
479.0-481.5	Wind River Basin	Beaver Creek Oil and Gas Field
486.6 487.3 489.3	Wind River Basin	Oil wells within 0.5 mile of route
586.0-590.3	Green River Basin	Lincoln Road Gas Field
595.0	South of Green River	Shute Creek Gas Field

The route would cross the South Pass Greenstone Belt (MP 529) which is presently undergoing active exploration by several companies and near-future mineral extracting operations are anticipated. This mineralization belt produces gold, silver, iron, copper, tungsten, gemstones, asbestos, and feldspar; and may also produce nickel, chromium, and tin. The route would also cross a recently discovered regional geochemical gold anomaly surrounding Farson (MP 562). Although this area is not being actively mined, activities in the area are in the research stage. The route would cross very close to the Crows Nest gold and tungsten lode and placer (MP 511) which contains many active claims and small sluice-type mining operations. The route may also cross a recently discovered and incompletely mapped belt of manganese mineralization near Parting of the Ways (MPs 528-534). This area may contain several active claims. The route would also pass in the vicinity of several inactive bentonite claims in the Big Horn Basin.

SOUTH PASS ROUTE VARIATIONS

All four variations would be located in the Wyoming Basin Physiographic Province. There are no volcanoes within at least 100 miles from the variations. Oil and gas fields that would be crossed or adjacent to the South Pass Variations are listed in Table 3A-8.

Jeffrey City Variation

Topography, Geology, and Geomorphology. This variation would begin on the southeastern flank of Copper Mountain and travel southward into the Wind River Basin, crossing the Beaver Divide (JC MP 484) and the Sweetwater Plateau/Granite Mountains/Crooks Gap area (JC MP 507). It would then head southwestward through the Great Divide Basin, the Rock Springs Uplift, and the Green River Basin. The terrain is mostly low relief with local topographic highs. The variation is primarily underlain by Cretaceous to Quaternary sedimentary deposits and local Precambrian granitic rocks. Portions of the variation cross steep escarpments, sand dunes, and about 42 miles of rough badland terrain.

Seismicity. The variation would cross five fault systems: the Cedar Ridge/Dry Fork fault system in the foothills of Copper Mountain (JC MP 433); the North Granite Mountains Fault at the Beaver Divide (JC MP 484); the South Granite Mountains Fault north of Green Mountain (JC MP 503); the Flattop Fault, north of Cyclone Rim (JC MP 523); and an unnamed fault approximately 4 miles southwest of the Flattop Fault (JC MP 527). Comments received on the Draft EIS suggest that the South Granite Mountains Fault was active during the Quaternary Period. All other faults are considered inactive, having shown no evidence of Quaternary activity. ~~However~~ The Cedar Ridge/Dry Fork, the South Granite Mountain, and the Flattop Faults merit further study because fault activity has been noted near the route crossings. Although the sedimentary conditions in the vicinity of the Bridger, Badwater, and Poison Creek crossings are conducive to potential liquefaction, the probability of seismic or liquefaction damage along this variation is considered small. The estimated Modified Mercalli magnitude

Table 3A-8

OIL AND GAS FIELDS THAT WOULD BE CROSSED BY OR ADJACENT TO THE SOUTH PASS VARIATIONS

Approximate Milepost	Location	Field
JEFFREY CITY VARIATION		
JC MP 437-441	North of Lysite	Madden/Long Butte Gas Field
JC MP 503-504	South of Jeffrey City	Kirk Oil Field (0.75 mile west of route)
JC MP 504-506	South of Jeffrey City	Crooks Gas Oil and Gas Field (0.75 mile west of route)
JC MP 515-517	Great Divide Basin	East Antelope Gas Field (1.5 miles southeast of route)
JC MP 582	West of Continental Divide	Nitchie Gulch Gas Field
JC MP 644-645	7 miles west of Granger	Bruff Sour Gas Field
ALKALI BUTTE VARIATION		
MP 435-438	Central Wind River Basin	Madden/Long Butte Gas Field
MP 456	Central Wind River Basin	Unnamed oil and gas field
AB MP 472-473	10 miles north of Sand Draw	Alkali Butte Oil Field
AB MP 482-484	East of McTurk Ridge	Big Sand Draw Oil and Gas Field
AB MP 515	Buffalo Basin	Bison Basin Oil Field
JC MP 582	West of Continental Divide	Nitchie Gulch Gas Field
JC MP 644-645	7 miles west of Granger	Bruff Sour Gas Field
NORTHERN UTILITIES VARIATION		
JC MP 437-441	North of Lysite	Madden/Long Butte Gas Field
NU MP 498	Town of Sand Draw	Big Sand Draw Oil and Gas Field
AB MP 515	Buffalo Basin	Bison Basin Oil Field
JC MP 582	West of Continental Divide	Nitchie Gulch Gas Field
JC MP 644-645	7 miles west of Granger	Bruff Sour Gas Field
ROUTE 28 VARIATION		
See Table 3A-7, proposed route, MPs 428-620		

of any possible seismic event would probably not exceed ~~6.5~~ 6.75, and ~~would~~ probably ~~not~~ could recur within ~~50,000~~ 2,000 to 13,000 years.

Slope Stability. There is no landslide potential along this variation. However the variation would cross several sand dune and sand flat areas totaling approximately 40 miles, of which approximately 6 miles are active or partially active (JC MP 571-7).

Mineral Resources. The variation would cross uranium mineralization prospect pits at Fraser Draw (JC MP 467) and access roads to uranium open pit mines east of the Beaver Divide area. The route would cross zeolite mineralization along the Beaver Divide. The variation would not cross any active coal mining areas, but would cross a 19-mile-wide stretch of a subbituminous coal field in the Rock Springs Uplift (JC MP 573-592). The variation would also cross trona deposits (a source of sodium compounds) near the Green River (JC MP 619).

Alkali Butte Variation

Topography, Geology, and Geomorphology. This variation would begin in the southeastern flank of Copper Mountain and follow the proposed route through the Wind River Basin to a point near the southeast corner of the Wind River Indian Reservation. Here, the variation would leave the proposed route to cross the central Wind River Basin, an escarpment of the McTurk Ridge, and another part of the Wind River Basin. The route would then cross the Beaver Divide, the Sweetwater Plateau, the Buffalo Basin and the Cyclone Rim before intersecting the Jeffrey City route at the relocated Compressor Station No. 6 near Stratton Lakes. Between this point and the Opal Meter Station, the variation would follow the Jeffrey City route through the Great Divide Basin, the Rock Springs Uplift and the Green River Basin. The terrain is mostly low relief with local topographic highs. The variation is underlain by Cretaceous to Tertiary sedimentary deposits and would cross a total of approximately 46 miles of badland areas. The variation also crosses short, steep escarpments, sand dunes, and one landslide area.

Seismicity. The variation route would cross six fault systems: The Cedar Ridge/Dry Fork fault system in the foothills of the Copper Mountain (MP 432.4); the South Granite Mountains Fault at Crooks Mountain (AB MP 505); two unnamed faults, located due south of the South Granite Mountains Fault (AB MP 510 and 514); the Flattop Fault near the Cyclone Rim (AB MP 520); and an unnamed fault approximately 3 miles south of the Flattop Fault (AB MP 523). ~~These~~ Comments received on the Draft EIS suggest that the South Granite Mountains Fault was active during the Quaternary Period. All other faults are considered inactive, having shown no evidence of Quaternary activity. However, the Cedar Ridge/Dry Fork, the South Granite Mountains and the Flattop Faults merit further study because fault activity has been noted near the route crossings. Although the sedimentary conditions in the vicinity of the Badwater and Poison Creek crossings are conducive to potential liquefaction, the probability of seismic or liquefaction damage is considered to be small. The estimated Modified Mercalli magnitude of any possible seismic event would probably not exceed ~~6.5~~ 6.75, and ~~would~~ probably ~~not~~ could recur within ~~50,000~~ 2,000 to 13,000 years.

Slope Stability. The variation would cross one large landslide area at Beaver Rim (AB MP 489). This landslide area appears to be stable, but would require further geological investigation during final project design. The variation would also cross several sand dune and sand flat areas, totaling approximately 20 miles, of which approximately 6 miles are active or partially active (JC MP 571-7).

Mineral Resources. The variation would cross about 1 mile of coal prospects north of Kirby Draw (AB MP 472). It would also cross uranium mineland in the Buffalo Basin (AB MP 516) and areas of uranium mineralization below Beaver Rim and along Cyclone Rim. The variation would then cross a 19-mile-wide subbituminous coal field in the Rock Springs Uplift (JC MP 573-592), and a 24-mile stretch of trona mineralization near the Green River (JC MP 619).

Northern Utilities Variation

Topography, Geology, and Geomorphology. This variation would begin in the southeastern flank of Copper Mountain, and follow the Jeffrey City route through the central Wind River Basin. The variation's east-west traverse (between the Jeffrey City and Alkali Butte routes) would remain within the southern portion of the Wind River Basin. Between its intersection with the Alkali Butte route and the relocated Compressor Station No. 6 at Stratton Lakes, the variation would follow the Alkali Butte route across an escarpment of the McTurk Ridge, another portion of the Wind River Basin, the Beaver Divide, the Sweetwater Plateau, the Buffalo Basin, and the Cyclone Rim. Between the Stratton Lakes area and the Opal Meter Station, the variation would follow the Jeffrey City route through the Great Divide Basin, the Rock Springs Uplift, and the Green River Basin. The variation is underlain by Cretaceous to Tertiary sedimentary deposits and would cross a total of approximately 63.9 miles of badland areas. The variation also crosses short, steep escarpments, sand dunes, and one landslide area.

Seismicity. The variation route would cross six fault systems: The Cedar Ridge/Dry Fork fault system in the foothills of Copper Mountain (JC MP 433); the South Granite Mountains Fault at Crooks Mountain (AB MP 505); two unnamed faults located due south of the South Granite Mountains Fault (AB MP 510 and 514); the Flattop Fault near the Cyclone Rim (AB MP 520); and an unnamed fault approximately three miles south of the Flattop Fault (AB MP 523). ~~These~~ Comments received on the Draft EIS suggest that the South Granite Mountains Fault was active during the Quaternary Period. All other faults are considered inactive, having shown no evidence of Quaternary activity. However, the Cedar Ridge/Dry Fork, the South Granite Mountains and the Flattop Faults merit further study because fault activity has been noted near the variation crossings. Although the sedimentary conditions in the vicinity of the Bridger, Badwater, and Poison Creek crossings are conducive to potential liquefaction, the probability of seismic or liquefaction damage is considered to be small. The estimated Modified Mercalli magnitude of any possible seismic event would probably not exceed ~~6.5~~ 6.75, and ~~would~~ probably ~~not~~ could recur within ~~50,000~~ 2,000 to 13,000 years.

Slope Stability. The variation route would cross one large landslide area at Beaver Rim (AB MP 489). This landslide area appears to be stable, but would require further geological investigation during final project design. The variation would also cross several sand dune and sand flat areas, totaling approximately 28 miles, of which approximately 6 miles are active or partially active (JC MP 571-7).

Mineral Resources. The variation route would cross uranium mineralization prospect pits at Fraser Draw (JC MP 467); and access roads to uranium open pit mines east of the Beaver Divide area. It would also cross uranium mineland in the Buffalo Basin (AB MP 516) and areas of uranium mineralization below Beaver Rim and along Cyclone Rim. The variation would then cross a 19-mile-wide subbituminous coal field in the Rock Springs Uplift (JC MP 573-592) and a 24-mile stretch of trona mineralization near the Green River (JC MP 619).

Route 28 Variation

Topography, Geology, and Geomorphology. This variation would cross about 26 miles of rough, steep terrain, as well as approximately 17 miles of badland terrain, and three landslide areas. The variation would begin in the southeastern flank of Copper Mountain and follow the proposed route through the Wind River Basin to the southwestern end of the Cottonwood Divide (MP 501.7). Here, the variation would turn southwestward, passing to the south of Red Canyon Rim (RT MP 506). The variation would continue on a southwestward course, parallel to and within 0.5 mile of SR 28, crossing the hilly terrain of Limestone and Roundtop Mountains and the southeast corner of the Shoshone National Forest. The variation would continue southwestward within 0.25 mile of SR 28 on less hilly terrain, crossing the Continental Divide, and merge with the proposed route at RT MP 529. From here, the proposed route would be followed to its termination near Opal.

The terrain crossed by the variation is mostly low relief with locally moderate to high relief in the Limestone and Roundtop Mountain areas. The northern part of the route is underlain by Tertiary and Cretaceous age deposits. The central portion of the route is primarily underlain by Tertiary sedimentary deposits and local Precambrian granitic intrusions, as well as the South Pass Greenstone Belt, a complex of metamorphosed sedimentary and igneous rocks of Precambrian age. The southern part of the route is underlain by Cretaceous age deposits and metamorphosed igneous and sedimentary rocks of Precambrian age. Unconsolidated Quaternary deposits are also found at stream crossings.

Seismicity. The variation would cross four fault systems: the Cedar Ridge/Dry Fork fault system in the foothills of Copper Mountain (MP 432.4); the Roundtop Fault, near the southeastern boundary of the Shoshone National Forest (RT MP 515 and RT MP 516); the Anderson Ridge Fault approximately 1.5 miles due northwest of South Pass City (RT MP 520); and the Continental Fault, just south of the South Pass (MP 532). The Cedar Ridge/Dry Fork and the Continental Faults are considered inactive, having shown no evidence of Quaternary activity. The Flattop and the Anderson Ridge Faults merit further study because definitive information regarding them is lacking. However, the Wyoming Geological Survey (WGS) has indicated that preliminary investigations point to the possibility that the Roundtop Fault may be active, having shown several movements within the geologic past. Likewise, the Anderson Ridge Fault is suspected to be active. Several seismic events occurred in the region during this century. The most notable event was the 1984 earthquake that was epicentered about three miles northwest of Atlantic City, had a Modified Mercalli magnitude of VI, and registered 5.0 on the

Richter scale. However, the Modified Mercalli magnitude of any possible future event in the region would probably not exceed 6.5, and would probably not recur within less than 50,000 years. One seven-mile area between MPs 557 and 564 has been identified as having potentially liquefiable sediments.

Slope Stability. The variation would cross two areas that are potentially unstable. One is located near Twin Creek at MP 495.6-496.3. The other, identified by the WGS as an active rockslide and debris laden earthflow complex, is located in the Limestone Mountain highlands less than 0.25 mile due south of the route at RT MP 508.

Mineral Resources. The variation would cross about one mile of coal prospects north of Kirby Draw (MP 474). The variation would pass within 0.5 mile of several mineral prospects and active and inactive mines in the South Pass Greenstone Belt. The route would pass approximately 0.5 mile of the Tornado Mine (RT MP 512), an inactive copper, gold and silver mine, which, due to thin veins, may support a small mining operation. The route would pass about 1,000 feet northwest of several incompletely explored gold prospect pits and adits south of the southeastern boundary of the Shoshone National Forest (RT MP 513). The route would pass about 1,000 feet south of the Rose Mine (RT MP 514), an inactive gold mine. Several active prospect pits and inactive mines are located in the vicinity of the Rose Mine, including the 1914, Garfield, Diana and Caribou Mines. These mines are presently undergoing active exploration because they contain the best gold mineralization in the South Pass district, with gold concentrations averaging 1.5 ppm. The route would also pass about 0.5 mile southeast of active prospect pits (RT MP 517), about two miles south of South Pass City. Although these prospects have, so far, discovered only minor gold veins, they are of geologic interest because the gold is associated with a banded iron formation. Similar banded iron associations have produced major gold deposits in Canada and South Africa.

KERN RIVER DOWNSTREAM FACILITIES

Compressor Station 2 would be located in the seismically-active Middle Rocky Mountains Physiographic Province. The site lies immediately northeast of East Canyon Reservoir and has moderate relief. Although this segment of the pipeline route is generally noted for poor slope stability, the formation which underlies the site itself is thought to support stable slopes in this area. No active or potentially active faults are within 10 miles of the site.

Compressor Stations 3, 5, and 6 would be located in the Basin and Range Physiographic Province. This province is considered seismically active, having experienced moderate to high seismic events in the past. No active or potentially active faults are within 10 miles of any of the station sites.

The site for Station 3 is in the Goshen Valley, south-southwest of Utah Lake. This site is relatively flat and is likely underlain by sediments which could be subject to liquefaction during a seismic event. Sand and gravel extraction operations are common in the vicinity of this site.

The site for Station 5 is in the southern end of the Escalante Desert at the base of the Antelope Range. The site for Station 6 is in a desert valley between the Muddy Mountains and the Arrow Range. While the area surrounding the site for Station 6 is generally noted for flash flooding, both sites are relatively flat and have no unique geologic features.

Compressor Station 8 would be located in the Sonoran Desert section of the Basin and Range Physiographic Province at the southwestern edge of the Mojave Valley. This province is subject to moderate seismic activity. The site itself is flat and lacks any unique geologic features. While there are two quaternary faults within 10 miles, no active or potentially active faults actually cross the site.

Chapter 3B. Affected Environment: Soils

PGT PROJECT

Idaho

In Idaho, the proposed pipeline route would cross Quaternary glacial and glaciofluvial sediments within the Northern Rocky Mountains Physiographic Province. This material ranges in composition from boulder moraines to fine silt and is usually very deep and mantled with volcanic ash and loess. The rehabilitation potential of most of the soils is ~~moderate~~ fair to ~~low~~ poor. The route in Idaho would ~~not~~ cross ~~any~~ 13.1 miles of prime farmland, as designated by the U.S. Soil Conservation Service (SCS) (Table 3B-1) (Weisel, 1991).

Washington

In Washington, the proposed pipeline route would traverse predominantly loess soils, with some volcanic ash, of the Columbia Plateau Physiographic Province. Some of these soils are underlain by basalt or compact, calcareous, alternating layers of silt and sand. Most of the loess retains its original dune-like landforms, resulting in rolling topography from MP 179 to MP 197. The rehabilitation potential of the soils is ~~moderate~~ fair to ~~low~~ poor. The route would cross 33.4 miles of prime farmland in Washington (Table 3B-1).

Oregon

The proposed pipeline in Oregon would cross a portion of the Columbia Plateau province with soils that are similar to those described previously. Riverwash soils are found in the stream channels of the John Day River and its tributaries. These soils are predominantly sands and gravels, with some silt and cobbles. The rehabilitation potential of the soils is ~~moderate~~ fair to ~~low~~ poor in the Columbia Plateau province.

The soils of the Blue Mountains Physiographic Province are silty with sand and gravel, shallow to moderately deep, and usually underlain by volcanic tuff or a calcareous hardpan. The rehabilitation potential in the Blue Mountains province is ~~high~~ good to ~~moderate~~ fair.

The soils of the High Lava Plains Physiographic Province are predominantly silty sands, derived from eolian silts, ash, and cinder sediments, and are moderately shallow to deep to bedrock. The soil rehabilitation potential is ~~high~~ good to ~~moderate~~ fair.

Table 3B-1

PRIME FARMLAND THAT WOULD BE CROSSED BY THE PGT ROUTE

State	Milepost	Length (miles)	Dominant Soil Series
IDAHO	19.9-20.9	1.0	Rubson
	94.7-99.0	4.3	Kootenai
	99.0-101.8	2.8	Avonville
	101.8-106.8	5.0	Garrison
SUBTOTAL		13.1	
WASHINGTON	179.0-179.8	0.8	Palouse
	179.8-185.0	5.2	Walla Walla
	185.0-186.0	1.0	Anders
	186.0-197.8	11.8	Walla Walla
	225.3-237.1	11.8	Ritzville
	244.1-246.4	2.3	Ellisforde
	254.1-254.6	0.5	Esquatzel
SUBTOTAL		33.4	
OREGON	292.0-299.4	7.4	Ritzville
	299.4-306.5	7.1	Warden
	306.5-330.3	23.8	Ritzville
	330.3-337.4	7.1	Mikkalo
	340.0-350.0	10.0	Condon
	365.4-391.6	26.2	Condon
	588.2-595.7	7.5	Fordney
	609.4-612.5	3.1	Fordney
SUBTOTAL		92.2	
TOTAL		138.7	

Note: "Prime farmland" is farmland specifically designated as prime by the SCS.

The soils of the Basin and Range Physiographic Province are predominantly silt with sand and gravel and were formed from either volcanic ash or lava rock. These soils can be shallow, moderately deep, or deep. The rehabilitation potential for Basin and Range province soils is generally ~~high~~ good to ~~moderate~~ fair. The route would cross 92.2 miles of prime farmland in Oregon (Table 3B-1).

ALTAMONT PROJECT

Montana

County soil surveys ~~of prime agricultural land~~ are in various stages of completion. Identification of prime farmlands, according to SCS designation, is completed. Important farmlands are likely at locations where the route would cross river valleys, but these lands qualify as prime farmlands only if they are irrigated. The route would cross approximately eight miles of SCS-designated potentially prime farmland as identified in Table 3B-2. Montana soils are grouped into three regions. Region 1 consists of soils formed in glacial till parent material, Region 2 is comprised primarily of badlands, and Region 3 consists of soils formed in a variety of sedimentary bedrock materials (claystones, siltstones, and sandstones).

Region 1 (MP 0.0-96.6) consists of deep, relatively gently sloped, well-drained, fine loamy- to clayey-textured soils. Most of this area is used for dryland farming and has a fair to good rehabilitation rating. Topsoil depths generally range from 6 to 12 inches. Restrictive features include high ECs and SARs. Other constraints that normally occur near stream crossings include slope, high water table, and flooding.

Region 2 is comparatively short (MP 96.6-115.0) and consists of badland uplands and slopes, and alluvial lowlands. The badlands consist of steep slopes, rock outcrops, and shallow soil. Soil textures are predominantly clay. Restrictive features include slope, shallow soil, and rock outcrops. Topsoil depths are usually less than two inches. The rehabilitation potential of these badlands is poor. The alluvial lowlands consist of deep, nearly level, silty clay loam to sandy loam soils. Restrictive features include a high water table and minor areas of high EC. Topsoil depths range from 9 to 12 inches. The rehabilitation potential of these lowlands is fair to good.

Region 3 (MP 115-305) consists of shallow to deep, undulating to steep, well-drained, clay loams, silt loams, loams, sandy loams, and loamy sands. Restrictive features include steep slopes and shallow soils in the uplands, and high ECs, high SARs, high water tables, and flooding in the lowlands. Topsoil depths range from 4 to 12 inches. The rehabilitation potential for most of this region is fair to good.

Table 3B-2

POTENTIALLY PRIME FARMLAND THAT WOULD BE CROSSED BY THE ALTAMONT ROUTE

County	Milepost	Length (miles)	Soil Map Unit
MONTANA			
Hill	None	--	--
Chouteau	68.6-68.9	0.3	Yamac, Havre
Fergus	None	--	--
Judith Basin	None	--	--
Wheatland	195.2-195.4 195.5-196.0	0.2 0.5	Havre Havre, Glendive
Golden Valley	None	--	--
Stillwater	255.1-257.1	2.0	Attenwan, Glendive, Yamac
Carbon	264.2-264.8 265.1-266.4 266.5-266.8 267.1-268.7 268.8-269.3 269.9-270.0 270.3-270.4 279.4-279.9	0.6 1.3 0.3 1.6 0.5 0.1 0.1 0.5	Heldt Fort Collins, Vona Toluca Fort Collins, Heldt Toluca Toluca Toluca Martinsdale
TOTAL		8.0	

Notes: "Prime farmland" is farmland specifically designated as prime by SCS.
-- = not applicable

Wyoming

No prime farmland has been designated along the proposed route in Wyoming. Wyoming soils are grouped into five regions composed of two major soil groups. The first major soil group includes soils of intermountain basins and foothills. The second major soil group includes soils of mountains and mountain valleys.

Regions 1 (MP 305-415) and 3 (MP 435-500) are dominated by soils in the first major soil group. The soils are generally shallow to deep, well-drained, undulating to steep, clay loams, loams, and sandy loams in the uplands; and more gently sloped clay loams, silty loams, and sandy loams along alluvial lowlands. Restrictive features include steep slopes, shallow soil, and bedrock in the uplands; and high ECs, high SARs, flooding, and high water tables along rivers and streams. Topsoil depths range from ~~2 to 6~~ 0 to 12 inches. The rehabilitation potential is poor to fair in the uplands and fair to good in the lowlands.

Regions 2 (MP 415-435) and 4 (MP 500-515) are dominated by soils in the second major soil group. The soils are generally moderately deep to deep, undulating to steep, well-drained, sandy clay loams, loams, sandy loams, and loamy sands. Restrictive features include shallow soil and steep slopes. Topsoil depths range from 4 0 to 6 inches. The rehabilitation potential for the majority of the region is poor to fair.

Region 5 (MP 515-620) contains landforms similar to those in the first soil group. The soils are predominantly shallow to deep, well-drained, undulating to steep, sandy clay loams, loams, sandy loams, loamy sands, and sands. Restrictive features include shallow soil; unconsolidated parent material; steep slopes; and minor areas of high ECs, high SARs, flooding, and high water tables. Topsoil depths range from ~~2 to 5~~ 0 to 6 inches except on the occasional lowland site where it is deeper (8-12 inches). The rehabilitation potential is poor to fair for the majority of the area and good for some of the lowland soils.

SOUTH PASS ROUTE VARIATIONS

The South Pass Variation routes are located on upland foothills soils derived from residuum and on transported soils derived from alluvial and aeolian deposits. These soils occur in the intermountain basins and foothills region of Fremont, Sweetwater, and Lincoln Counties, in south-central Wyoming, where the soils are poorly developed. Although county soil surveys have not been ~~completed for~~ published for most of the areas crossed by the four variations, no prime farmland would appear to be involved. The annual precipitation rate of less than 10 inches contributes to the region's arid to semi-arid climate.

Upland Foothills Soils are mostly shallow (depth to bedrock of less than 20 inches) to moderately deep (20-40 inches). They are primarily well-drained clay loams, loams, and sandy loams. The slopes of these soils range from 0 to 30 percent in hilly and undulating areas, and 0 to 75 percent in badland and other dissected terrain. The topsoil depths range from 0 to 6 inches ~~which cause~~ and the rehabilitation potentials of these soils ~~to be~~ are poor to fair.

Alluvial Soils are soils whose precursors were deposited by streams or running water. These soils are deep (depth to bedrock greater than 40 inches) and are poorly- to well-drained. The textures of these soils range from heavy clays to clay loams, silt loams, sandy loams, and loamy sands. The slopes are normally gentle in streamlaid deposits, but can range from 15 to 60 percent along stream cuts. The topsoil depths of these soils range from 0 to 12 inches and the rehabilitation potentials range from poor to good.

Aeolian Soils are primarily sand dunes, which are extremely sandy, barren areas that are susceptible to movement by wind and water. The soils are excessively well-drained and moderately deep. The slopes vary from 0 to 30 percent, depending upon dune height. The topsoil thicknesses range from 0 to 4 inches and the rehabilitation potentials are mostly poor, but occasionally fair.

KERN RIVER DOWNSTREAM FACILITIES

Compressor Station 2 would be located in an area of generally deep to very deep soils, having moderate to high water erosion potential but low wind erosion potential. These soils are typically well drained. Rehabilitation potential at the site is expected to be poor to fair due to the clayey texture of the underlying soils and the presence of cobbles.

Compressor Station 3 would be located in an area of very deep soils, having low water and low to moderate wind erosion potentials. Rehabilitation potential ranges from poor to good, depending on the occurrence of cobbles and gravel. Soils at this site are expected to be well drained, loamy, and very cobbly.

Compressor Station 5 would be located in an area of very deep, well drained soils. Erosion potentials at the site are classified as low for water and moderate for wind. The site's rehabilitation potential is expected to range from poor to good, limited primarily by the occurrence of salinity or alkalinity.

Compressor Station 6 would be located in an area of shallow to very deep soils, having low to moderate water erosion potential and low to high wind erosion potential. Drainage characteristics range from poor to excessive, depending on the particular soil series encountered. Soil texture is expected to be dominated by sand fractions, with lesser amounts of loam, clay, and gravel. Rehabilitation potential at the site ranges from poor to fair, being limited by soil depth, sandy texture, and the occurrence of salinity, alkalinity, or gravel.

Compressor Station 8 would be located in an area of generally deep, sandy soils, having low to medium water erosion potential and high wind erosion potential. These soils are characterized as somewhat excessively drained with a sand or loamy sand texture. As a result, rehabilitation potential at the site is expected to be poor.

Chapter 3C. Affected Environment: Hydrology and Water Quality

PGT PROJECT: REGIONAL HYDROLOGIC CHARACTERISTICS

The following discussions of hydrology, water quality, and water uses relate only to the major rivers that would be traversed by the proposed pipeline. The Kootenai, Pend Oreille, Spokane, Palouse, Snake, Umatilla, and Sprague Rivers are not discussed because these rivers have been previously looped and would not require new pipeline construction. Other streams (especially small perennials) are discussed in Chapter 4C, "Environmental Consequences: Hydrology and Water Quality."

Surface water and groundwater characteristics and specific rivers are discussed by state. Appendix C-1 lists water quality and fisheries characteristics of all perennial watercourses that would be crossed by ~~the~~ PGT's proposed ~~PGT/PG&E project~~ pipeline route.

Precipitation along the proposed pipeline route varies widely with season, elevation, and location. Annual precipitation is heaviest in the northern portion of Idaho. Precipitation along the pipeline route decreases through much of Oregon and Washington because it would be located east of the Cascade Range. Figures 3C-1 shows the average annual precipitation, respectively, at various stations along the proposed pipeline route.

Idaho

Surface Water. The proposed pipeline would cross the International Boundary at Eastport, Idaho, and would follow the Moyie River valley for roughly 20 miles. It would then follow Paradise Valley between the Selkirk and Cabinet Mountains in the Kaniksu National Forest, enter the Pend Oreille River basin, and continue into the Spokane River drainage system in Washington. Rivers in this region generally originate in the mountains and highlands and flow west to the Columbia Plateau province. Maximum flows usually occur in May or June after snowmelt. Minimum flows generally occur in late summer or early fall.

There would be 16 watercourse crossings in Idaho. Eight of these crossings would be across the Moyie River. Twelve of these watercourses are perennial.

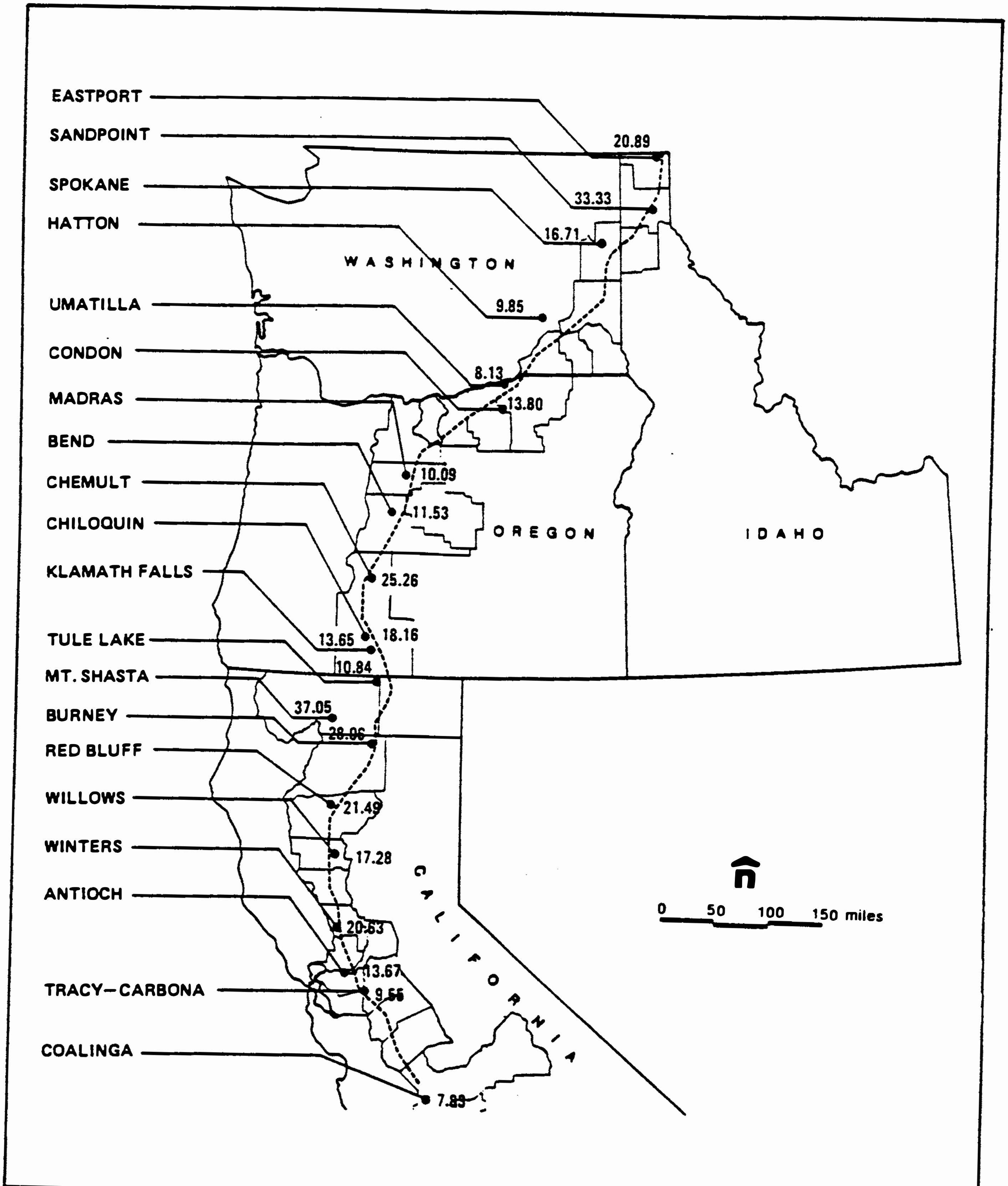


FIGURE 3C-1. PGT PROJECT AVERAGE ANNUAL PRECIPITATION (inches)

Moyie River. The Moyie River is the only major river that would be crossed by the proposed pipeline loop in Idaho. This river originates in Canada and flows south into northeast Idaho in a steep, narrow valley through the Cabinet Mountains. Maximum flows generally occur during spring runoff periods in April-June, with peaks up to 8,930 cubic feet per second (cfs) occurring in May. Average flow in the Moyie River is approximately 570 cfs.

The Moyie River is designated by the state at the proposed pipeline crossing as special resource waters. This designation is given to waters that are part of the National Wild and Scenic River System; are of unique ecological significance, outstanding recreational quality, or high water quality that exceeds the criteria for both primary contact recreation and coldwater biota; or require intensive protection to maintain an existing beneficial use. Moyie River water is of high quality, although some water quality degradation, such as channel sedimentation and turbidity associated with timber harvesting, road maintenance, and railroad maintenance activities, has occurred. The designated beneficial uses of the Moyie River are domestic water supply, agricultural water supply, coldwater biota, salmonid spawning, primary contact recreation, secondary contact recreation, and special resource water. Two municipal water users are located eight miles downstream from the nearest proposed crossing.

Groundwater. Along the proposed pipeline route in the Northern Rocky Mountain province, from Eastport, Idaho, to the vicinity of Spokane, Washington, groundwater occurs as unconfined water in alluvial layers and Quaternary glacial deposit, and as water underlying basement-complex crystalline rocks of igneous and metamorphic origins. In general, wells from the alluvial and glacial aquifers yield large volumes of water, and wells in basement-complex aquifers yield much lower volumes.

The alluvial layers built by the existing perennial streams are generally less than 100 feet thick and are moderately permeable. However, the Spokane-Rathdrum aquifer is a product of glacial-aged streams and is up to 800 feet thick and highly permeable. It is the principal source of domestic and industrial water for Spokane. The aquifer covers about 350 square miles and would be crossed by the proposed pipeline. The Spokane-Rathdrum aquifer tends to respond to flow stages of overlying streams and other surface water bodies with considerable time lag. Recharge also occurs through infiltration.

Groundwater quality in Idaho is sufficient to meet population and economic demands. The Spokane-Rathdrum aquifer is suitable for domestic, municipal, commercial, agricultural, and industrial uses but is susceptible to surface water contamination.

Potentially sensitive groundwater systems that would be crossed by the pipeline in Idaho include the Moyie River valley, Cocolalla Valley, and Rathdrum Prairie. Table 3C-1 includes a brief description and the locations of potentially sensitive groundwater systems that would be crossed by the proposed pipeline.

Table 3C-1

LOCATION OF POTENTIALLY SENSITIVE GROUNDWATERS
ALONG THE PGT ROUTE

Location	Milepost	Area	Description
Idaho	0.0-20.9	Moyie River valley	Highly permeable alluvium; shallow water table; portions are near populated areas
	72.7-77.5	Cocolalla Valley	Highly permeable alluvium; shallow water table; portions are near populated areas
Idaho-Washington	77.5-108.3	Rathdrum Prairie	Highly permeable glacial material; high use (mostly irrigation)
Oregon	277.4-282.8	Fourmile Gap to Stanfield	Highly permeable glacial material; high use (mostly irrigation)
	284.4-306.2	Echo Meadow to Butter Creek	Highly permeable; high use (mostly irrigation)
	318.5-319.9	Ione	Moderately to highly permeable alluvium; locally shallow water table; near population center
	459.0-485.5	Bend-Sunriver-LaPine area	Locally high permeability; locally shallow water table; locally high use
	491.0-495.0	Sunriver suburb	Locally high permeability; locally shallow water table; near population center
	502.5-504.7	Crescent Valley	Locally high permeability; locally shallow water table; near population center
	519.5-530.5	Chemult to Diamond Lake	Locally permeable alluvium; locally shallow water table; portions are near population centers
	530.5-553.6	Klamath Marsh to Kirk	Locally permeable alluvium; locally shallow water table; near marsh; portion is near population center
	553.6-570.7	Sprague Valley	Locally permeable alluvium; locally shallow water table; used for irrigation
	581.0-601.0	Swan Valley Yonna Valley	Locally permeable alluvium; locally shallow water table; used for irrigation
	608.4-612.5	Malin to Copic Bay	Locally permeable alluvium; locally shallow water table; used for irrigation

Washington

Surface Water. As the proposed pipeline entered Washington, the alignment would cross the Spokane, Snake, and Walla Walla River basins, which are all part of the Columbia River basin system. The rivers within this system originate in the mountains, with maximum runoff from snowmelt occurring in May and June in the Spokane and Snake River basins and a month or more earlier in the Walla Walla River basin. Minimum flows generally occur in late summer or early fall.

The proposed pipeline would cross nine watercourses in Washington. Of these watercourses, five are perennial and four are ephemeral or intermittent.

Walla Walla River. The pipeline route would cross the mainstream of the Walla Walla River near Lake Wallula on the Columbia River approximately 12 miles downstream from Touchet, Washington. This river flows north from Oregon to Washington and then west into Lake Wallula. The mainstream Walla Walla River drains semiarid regions of Oregon and Washington but receives most of its flows from north and south fork tributaries that drain deep basaltic canyons to the east. Floodflows occur generally between November and July, with peak flows of up to 20,300 cfs occurring in February. Yearly average flow is approximately 587 cfs.

The Walla Walla River is designated as Class B by the State of Washington at the pipeline crossing. Waters of this class meet or exceed the requirements for most beneficial uses. These uses include industrial and agricultural water supply, stock watering, fisheries, wildlife habitat, secondary contact recreation, and navigation. Agricultural runoff return flows and small municipal sewage treatment facilities discharges are the major causes of water quality degradation. Factors limiting Walla Walla River water quality are fecal coliform bacteria, elevated nutrient levels, and turbidity caused by agricultural operations. Elevated water temperatures also occur and are aggravated by the lack of bank vegetation along this river.

Groundwater. From Spokane, Washington, southwest to the vicinity of Bend, Oregon, the proposed pipeline would cross the Walla Walla section of the Columbia Plateau province. In this region, unconfined groundwater occurs in the alluvial valley deposits of the perennial streams and on upland tracts from thinner discontinuous surficial deposits. Confined groundwater also occurs in thicker surficial upland deposits and in the basalt of the Columbia River group, which underlies extensive areas.

In the shallow surficial deposits, the potential groundwater yields are generally small to moderate and are sufficient for watering stock and individual farms. The lower surficial deposits and the basement basalt sustain numerous large withdrawals for domestic supplies and irrigation. Most of the important lower surficial water-bearing formations are located near the Columbia River. Potentially sensitive groundwater systems that would be crossed by the proposed pipeline in Washington are listed in Table 3C-1.

Oregon

Surface Water. From the Walla Walla River crossing, the proposed pipeline route would extend southwest across the John Day and Crooked River basins of Oregon. The Umatilla and John Day Rivers drain to the north into the Columbia River. The Crooked River drains to the west into the Deschutes River, which flows north into the Columbia River.

From the Deschutes River basin, the proposed route would traverse a divide south into the Klamath River basin. Here the pipeline alignment would cross the Williamson and Sprague Rivers, which flow west into the Upper Klamath Lake and are principal headwater tributaries of the Klamath River. Streams within this basin exhibit maximum flows in winter and early spring and are often sustained year round by large springs. From the Klamath River basin, the pipeline route would continue south into the Lost River basin near the Oregon-California border.

The proposed pipeline would require 118 watercrossings in Oregon. Of these watercourses, 16 are perennial and 102 are ephemeral.

John Day River. The proposed route would descend into the canyon of the John Day River southwest of Condon and cross the river near the mouth of Thirtymile Creek. The John Day River flows west through central Oregon then north to join the Columbia River two miles upstream of the John Day Dam. In general, flood season begins in November, peaks in April, and decreases in July. Average flow is approximately 2,100 cfs.

The John Day River downstream from Service Creek is included in and protected by the Oregon Scenic Waterways System. The existing PGT pipeline right-of-way is, and the proposed new route would be, located within the protected area. In addition, both the proposed and existing routes are located along a stretch of the river which has a federal Wild and Scenic designation.

Water quality in the John Day River is generally good, with the major problems consisting of high sediment loads and turbidity during spring runoff and elevated water temperatures in late summer. High water temperatures are caused by low stream flows and minimal streambank vegetation. Oregon does not have a system for classifying surface waters at this time. However, the state is in the process of assessing water quality data to identify "water quality limited" streams in the state. The John Day River has been designated as "suspected water quality limited" at the proposed pipeline crossing. Water quality limited segments are surface waters that do not meet water standards and do not support all beneficial uses. The recognized beneficial uses of the river include domestic, municipal, and residential water supply; livestock watering; irrigation; mining; power development; pollution abatement; and wildlife and fish habitat.

Crooked River. The proposed pipeline route would cross the Crooked River 15 miles downstream of Prineville near Terrebonne. The Crooked River is regulated by the Prineville and Ochoco Reservoirs. Springs augment summer flows in the river. Floodflows generally occur from November throughout May. Peak flooding usually occurs in April. Average flow is approximately 1,600 cfs.

The Crooked River is classified as suspected water quality limited at the pipeline crossing. Existing water quality degradation caused by human activities does not impair beneficial uses of the river. The designated beneficial uses of the Crooked River include domestic, municipal, and industrial water supply; livestock watering; irrigation; power development; mining; recreation; and wildlife and fish habitat. A high demand for water use results in low flows, increased water temperatures, and degraded water quality during summer. Some beneficial uses during this period may be threatened in the future.

Williamson River. The proposed pipeline loop would cross the Williamson River one mile northwest of Kirk, Oregon, just downstream of the Klamath Marsh. Although flows of this river are not regulated by any major reservoir, the marsh tends to act as a storage buffer. High-flow periods occur from November through June, with peaks from February through April. Average flow is approximately 213 cfs.

The Williamson River has no surface water classification at this time. High turbidity during winter exceeds acceptable levels for fish and other aquatic life. The river frequently has high nitrogen and phosphate levels. At specific locations, coliform bacteria levels in the lower Williamson River exceed safe limits for public health and water contact for recreational purposes. Beneficial uses include domestic, municipal and industrial water supply, and irrigation.

Lost River. The proposed pipeline route alignment would cross the Lost River three miles downstream from Bonanza, Oregon. The Lost River originates at Clear Lake in Modoc County, California, flows north-northwest into Oregon, then flows south-southeast back into California and into the Tule Lake sump. Irrigated agriculture is the predominant land use along most of the river. Agricultural activities have increased mineral concentrations in the lower Lost River and constitute major water quality impairments. Water quality parameters, such as acid/base ratio, specific conductance, iron, temperature, and turbidity, exceed allowable Oregon limits.

The Lost River is classified as suspected water quality limited at the proposed pipeline crossing. Beneficial uses of the river include agricultural supply, groundwater recharge, freshwater replenishment of lakes and streams, primary and secondary contact water recreation, warm and cold freshwater habitat, wildlife habitat, rare and endangered species habitat, and fish spawning areas.

Groundwater. From the Washington-Oregon border to near Bend, Oregon, the groundwater system is part of the Walla Walla section of the Columbia Plateau province. This groundwater system is described above under "Washington."

In Oregon, large withdrawals are made from shallow surficial deposits in Morrow and Umatilla Counties. Shallow groundwaters provide a large portion of irrigation water to these counties. Pumping in these areas has, however, resulted in major water level declines. Increased nitrate concentrations are creating water quality problems in these aquifers.

From the vicinity of Bend, Oregon, and south to the Oregon-California border, the groundwater systems are part of the western fringe of the Harney section of the Columbia Plateau province, the High Lava Plains province, and the Basin and Range province.

In much of the High Lava Plains province, the depth to the water table is several hundred feet below ground surface. Occurrence of shallow perched water or shallow local flow systems may be common. In the High Lava Plains province along the Gateway-to-Bend stretch in Loop 6, most of the principal aquifers consist of interlayered volcanic and sedimentary rock. The region has gone through several cycles of canyon cutting by the Deschutes River system, followed by canyon filling by lava erupted from fissures and vents. Aquifers were drained or filled during this process. Most of the aquifers are pumped extensively for irrigation. Wells penetrating the regional water table in the Bend-Redmond area obtain their water chiefly from volcanic and sedimentary aquifers, although many tap the lava tubes.

In many of the basins located in the Basin and Range province, volcanic and sedimentary aquifers several hundred feet thick are overlain by similar but younger, thinner basin-fill and alluvial aquifers. Permeable, unconsolidated, and consolidated beds in either unit of the basins are capable of yielding more than 250 gallons per minute (gpm) of groundwater to wells. Both aquifers are heavily pumped in many of the basins.

Separate basins that the right-of-way would cross include the La Pine-Gilchrist area; Klamath Marsh; and the Sprague River, Yonna, and Langell Valleys of southern Oregon. The basin-fill and, to a lesser extent, alluvial aquifers in these areas are the principal water supplies for irrigation and domestic use.

The main source of most of the groundwater in these basins is precipitation that falls within the basin and infiltrates the ground, largely in the surrounding mountains. It is commonly discharged through springs along the mountain slopes and lowlands or by evapotranspiration in lowland areas.

Groundwater in the basin areas is generally low in total dissolved solids (TDS); soft to moderately hard; and of excellent quality for drinking, irrigation, and most industrial uses. High silica concentrations may be a problem in water for some industrial uses. Elevated concentrations of nitrates encountered in a few wells are probably attributable to land use practices. Groundwater in the Klamath Lake area is generally high in sodium and nitrate content.

Table 3C-1 includes the location and a brief description of potentially sensitive groundwater systems that would be crossed by the proposed pipeline in Oregon.

ALTAMONT PROJECT: REGIONAL HYDROLOGIC CHARACTERISTICS

This section includes a brief overview of the regional hydrologic characteristics, followed by a description of surface water and groundwater resources for each state. Appendix C-2 lists water quality and fisheries characteristics of all perennial watercourses that would be crossed by the Altamont project route. Within each state, primary rivers that would be affected by the project are highlighted and described. Stream crossing totals were compiled from named drainages on USGS topographic maps. Shallow groundwater resources is the primary area of interest with respect to pipeline impacts on groundwater, because of the relatively shallow trench depth required for the pipeline. As such, specific areas are emphasized where groundwater is known to be, or has historically been, close to the land surface.

Precipitation along the proposed pipeline route varies widely with season, elevation, and location. Annual precipitation is heaviest in Montana and decreases in Wyoming as the route enters the Bighorn basin region. Figure 3C-2 shows the average annual precipitation at various stations along the pipeline route, which ranges from about 6 inches per year to almost 15 inches per year.

Montana

Surface Water. A total of 93 streams, including 35 perennial rivers and streams, 40 intermittent streams, and 18 ephemeral streams, would be crossed in Montana.

Perennial streams in Montana support such beneficial uses as irrigation, wildlife and livestock watering, domestic water supply, and recreation, although water quantities are often inadequate. During years of low precipitation and runoff, irrigation diversions severely dewater some streams and rivers. Streams in eastern Montana are naturally more turbid and of poorer quality than those in western Montana because they drain agricultural and badland areas that contribute sediment and total dissolved solids (TDS) runoff. Water quality is poorer where heavy grazing has removed streamside vegetation and the resulting sediment has entered streams. Return flows from irrigated agriculture carry nutrients, pesticides, and sediment from fields into surface waters. No municipal water intakes are located within three miles downstream of a proposed crossing.

Milk River. The Milk River, a major tributary of the Missouri River, would be crossed by the pipeline route at MP 8.3. Peak flows usually occur in May, June, and July, with lower flows occurring between August and February. In 1984, mean monthly flows peaked at 600 cubic feet per second (cfs) in June and July. The lowest mean monthly flows in 1984 and 1988 were 13 cfs and 5 cfs, respectively, and occurred in October.

Water quality degradation in the Milk River results from municipal and industrial discharges, runoff from mismanaged and erodible soils, and agricultural wastewaters. The waters of the Milk River are classified by the ~~state~~ Montana Department of Health and Environmental Sciences (DHES) as type B-3, which indicates that they are suitable for

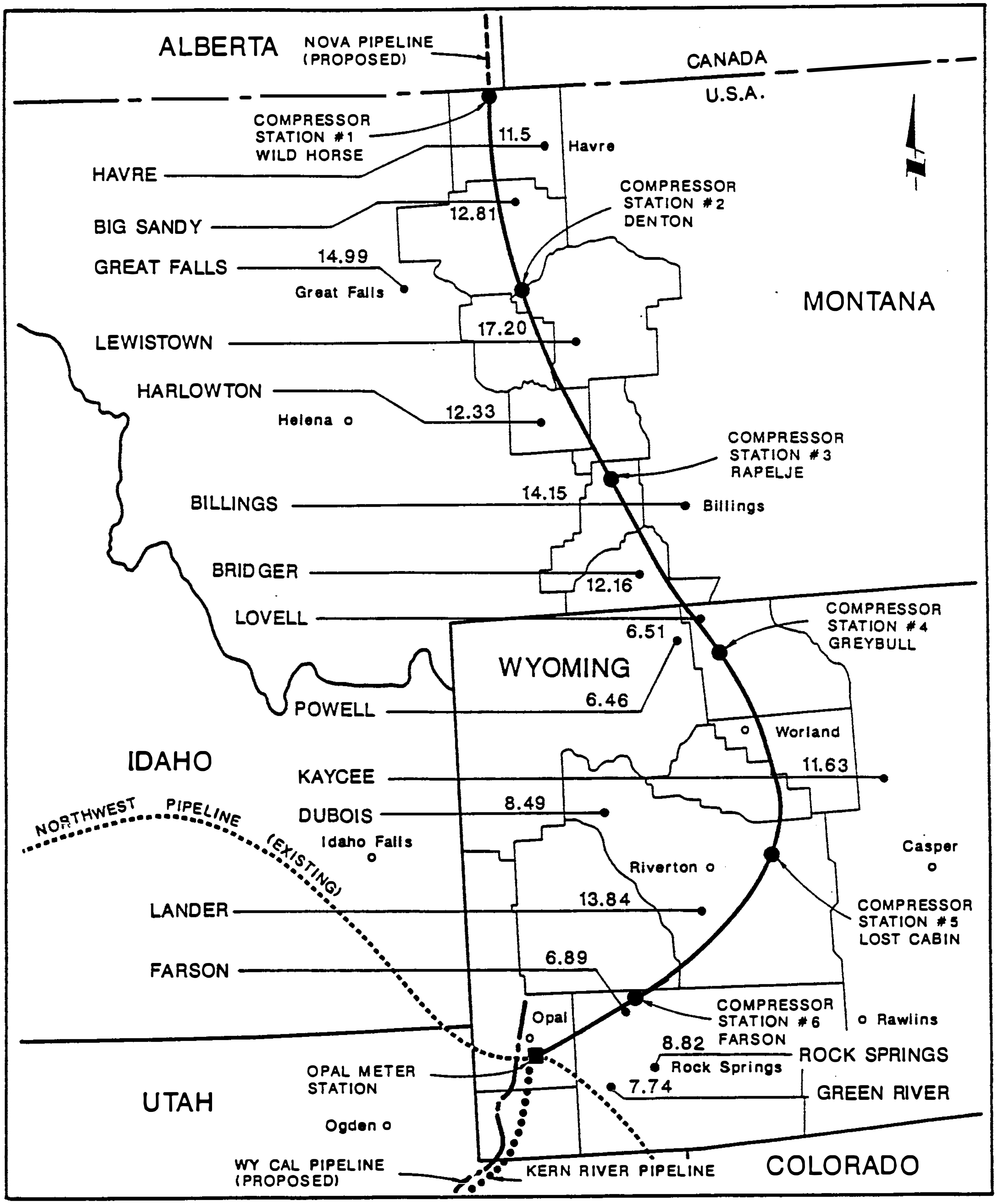


FIGURE 3C-2. ALTAMONT PROJECT AVERAGE ANNUAL PRECIPITATION (inches)

recreation, production of nonsalmonid fishes and associated biota, drinking (after conventional treatment), and agricultural and industrial uses.

Missouri River. The pipeline route would cross a recreational section of the Upper Missouri National Wild and Scenic River (UMNWSR), near Virgelle, Montana. Peak flows usually occur in May, June, and July, with lower, relatively steady flows occurring between August and February. Mean monthly flows range from about 6,000 cfs between August and February to nearly 20,000 cfs in June.

The Missouri River channel at the proposed crossing location is thought to be composed primarily of sands, silts, and pea size to 1.5-inch-diameter gravels. Core logs collected downstream at the Winifred Bridge indicate alluvial thicknesses of at least 100 feet. According to the Montana Department of Highways (MDH), at least 15 feet of scour is possible.

Water quality degradation in the Missouri River results primarily from high sediment loads resulting from irrigation returns, poor soil conservation practices, overgrazing, and natural erosion. The waters of the Missouri River are classified by the ~~state~~ DHES as type B-3, which indicates that they are suitable for recreation, production of nonsalmonid fishes and associated biota, drinking (after conventional treatment), and agricultural and industrial uses.

Judith River. The Judith River, a major tributary of the Missouri River, would be crossed by the pipeline route at MP 145.1. Peak flows usually occur in May and June, with the lowest flows occurring between November and March. Average monthly flows in the Judith River near Utica, Montana, range from 3 cfs in January, February, and March to nearly 300 cfs in June.

Water quality in the Judith River is generally good, but high levels of nitrate and suspended silt occur near the pipeline crossing as a result of poor logging and agricultural practices, and building of subdivisions. The waters of the Judith River are classified by the ~~state~~ DHES as type B-1, which indicates that they are suitable for recreation, production of salmonid fishes and associated biota, drinking (after conventional treatment), and agricultural and industrial uses.

Musselshell River. The Musselshell River also is a major tributary of the Missouri River. At Harlowtown, Montana, peak flows in the Musselshell River usually occur in May, June, and July, with the lowest flows occurring between August and February. Mean monthly flows range from 60 cfs in January to over 500 cfs in June.

Water quality degradation in the Musselshell River results primarily from logging and agricultural practices, and natural erosion. The waters of the Musselshell River are classified by the ~~state~~ DHES as type C-3, which indicates that they are suitable for recreation and production of salmonid fishes and associated biota, but marginal for drinking, agricultural, and industrial purposes.

Yellowstone River. The pipeline route would cross the Yellowstone River at MP 257.4. The highest flows in the Yellowstone River usually occur in May, June, and July, with the lowest flows occurring between August and February. At Billings, Montana, mean monthly flows in 1984 ranged from approximately 3,200 cfs in December to 23,700 cfs in June. In 1988, the range was 1,900 cfs in January to 15,400 cfs in June.

The Yellowstone River channel at the proposed crossing location is thought to be highly unstable and erosive. A pipeline crossing constructed in 1983 near Laurel caused erosion and subsequent downstream deposition, which redirected flow into a formerly minor channel, threatening several homes. Bridge core data collected at Laurel and Columbus show up to 13 feet of alluvial materials atop shale bedrock. Bridge engineers with the MDH consider all 13 feet to be within the potential scour zone.

Water quality in the Yellowstone River near the crossing is generally good, but diminishes downstream because of increases in TDS, suspended sediment, and sulfate. The waters of the Yellowstone River are classified by the ~~state~~ DHES as type B-1, which indicates that they are suitable for recreation, production of salmonid fishes and associated biota, drinking (after conventional treatment), and agricultural and industrial uses.

Clarks Fork of the Yellowstone River. The pipeline would cross the Clarks Fork of the Yellowstone River at MP 268.1. Peak flows usually occur in May, June, and July, with the lowest flows occurring between August and February. In 1984, mean monthly flows near Silesia, Montana, ranged from approximately 400 cfs from December through April to approximately 3,600 cfs in June.

Water quality in the Clarks Fork of the Yellowstone River is generally poor to fair with relatively high dissolved solid concentrations and conductivity, and large sediment loads originating from natural erosion and irrigation. The waters of the Clarks Fork of the Yellowstone River are classified by the ~~state~~ DHES as type B-2, which indicates that they are suitable for recreation, marginal production of salmonid fishes and associated biota, drinking (after conventional treatment), and agricultural and industrial uses.

Groundwater. Groundwater quality and quantity in the Great Plains region of Montana varies considerably, depending on geology, topography, and precipitation patterns. Where available, good-quality groundwater is used for domestic, municipal, industrial, irrigation, and livestock water supplies.

Groundwater in the vicinity of the pipeline occurs in both consolidated bedrock aquifers and unconsolidated deposits. Quaternary unconsolidated deposits include glacial deposits, alluvium, colluvium, and terrace gravels. Typical depths to groundwater range from 20 to 60 feet, and TDS are generally less than 2,200 milligrams per liter (mg/l).

Glacial deposits occur north of Flat Creek (MP 96.6). They are generally less than 50 feet thick, but can be thicker than 100 feet in some areas. Yields and water quality vary considerably in glacial deposits. Alluvial and terrace deposits are usually less than 30 feet thick along most drainages, but can reach thicknesses of 200 feet along some of the major rivers. Colluvial deposits are rarely thicker than 15 feet. The alluvial aquifer is the most heavily utilized in the Great Plains of Montana, primarily because of accessibility at shallow depths, typically high yields, and proximity to farmland. TDS ranges from 300 mg/l to 2,500 mg/l. Yields and water quality vary considerably in glacial deposits.

Bedrock aquifers in the vicinity of the pipeline route in Montana include the Judith River Formation, the Eagle Formation, the Kootenai Formation, and the Madison Group. Depths to groundwater range from 100 feet to 3,000 feet, and TDS concentrations are usually less than 2,300 mg/l.

Wyoming

Surface Water. From its crossing at the Montana-Wyoming border to its termination at Opal, the Altamont pipeline route would cross 92 water bodies, including 25 perennial rivers or creeks, 55 intermittent creeks or irrigation ditches, and 12 ephemeral creeks.

Perennial streams in Wyoming support a variety of uses, including irrigation, wildlife and livestock watering, domestic water supply, and recreation. The only municipal water supply intake located near a proposed crossing is on the Shoshone River approximately 1.3 miles upstream of Lovell and approximately one mile upstream of the pipeline crossing. Watersheds along the Wyoming portion of the route consist primarily of rangelands and occasional badlands. High rates of evapotranspiration and sublimation lead to water shortages in many areas. Surface water quality is generally good in headwater streams but deteriorates downstream. Salinity and sediment concentrations increase as a result of natural geologic erosion and point and nonpoint sources of pollution. Salinity restricts water use for agricultural, municipal, industrial, and recreational purposes.

Shoshone River. The pipeline route would cross the Shoshone River within the Bighorn Basin at MP 319.5. Near Lovell, flows are usually highest in May, June, and July and lowest between August and April. In 1984, mean monthly flows ranged from 1,400 cfs in December to 4,600 cfs in June. In 1988, a relatively dry year, the range of flows was 200-600 cfs, with the highest flow occurring in May.

Water quality problems in the Shoshone River include suspended sediment, salinity, and pesticides contamination. The main sediment sources are natural erosion and irrigation. High salinities originate from natural sources, oil field discharges, and irrigation return flows. The waters of the Shoshone River are classified by the ~~state~~ Wyoming Department of Environmental quality (DEQ) as type II, which indicates that they presently support or are capable of supporting game fish.

Greybull River. The Greybull River, a tributary to the Bighorn River, would be crossed by the pipeline route at MP 352.2. Like the Shoshone, the highest flows occur in May, June, and July, with the lowest flows occurring between August and April. Peak mean monthly flows in 1984 and 1988 were 900 cfs and 800 cfs, respectively.

A major water quality problem in the Greybull River is salinity, which originates from natural sources, oil field discharges, and irrigation return flows. The waters of the Greybull

River are classified by the ~~state~~ DEQ as type II, which indicates that they presently support or are capable of supporting game fish.

Bighorn River. The pipeline route would cross the Bighorn River at MP 374.2. In 1984, mean monthly flows in the Bighorn River at Basin, Wyoming, ranged from 1,400 cfs in December to 4,600 cfs in June. In 1988, the range was from 400 cfs in July and August to 2,700 cfs in May.

Water quality problems in the Bighorn River include suspended sediment, salinity, and pesticide contamination. High sediment loads and salinity originate primarily from natural sources and irrigation return flows. The waters of the Bighorn River are classified by the ~~state~~ DEQ as type II, which indicates that they presently support or are capable of supporting game fish.

Sweetwater River. The pipeline route would cross the Sweetwater River at MP 526.8. The seasonal flow pattern is generally characterized by low winter flows and peak flows in May, June, and July. In 1984, mean monthly flows in the Sweetwater River near Sweetwater Station, Wyoming, ranged from 35 cfs in February to 714 cfs in May. In 1988, mean monthly flows ranged from 5 cfs in August to 254 cfs in April.

Water quality in the Sweetwater River is generally good, although suspended sediment can reach high levels during spring and summer runoff. The Sweetwater River has a type III ~~state~~ Wyoming Game and Fish Department (GFD) fishery classification, and a DEQ class II classification which indicates that it has important trout waters.

Green River. The pipeline route would cross the Green River below Fontenelle Reservoir at MP 593.5. The seasonal flow pattern is generally characterized by low winter flows and peak flows in May, June, and July. In 1984, mean monthly flows below Fontenelle Reservoir ranged from about 700 cfs between December and March to 5,500 in June. In 1988, mean monthly flows ranged from 400 cfs in January and February to 2,500 cfs in June.

Water quality problems in the Green River include suspended sediment, salinity, and phosphorus. However, under normal operating conditions the Fontenelle Reservoir effectively eliminates these water quality problems. ~~High sediment loads originate from natural sources and poor range conditions due to overgrazing, while high salinities are primarily the result of irrigation return flows.~~ The waters of the Green River are classified by the ~~state~~ DEQ as type II, which indicates that they presently support or are capable of supporting game fish.

Groundwater. Occurrence of groundwater in Wyoming is controlled by climate, geology, and topography. Recharge to shallow groundwater occurs via seepage, infiltration and percolation from runoff, precipitation, and streamflow. Water quality ranges from poor to excellent. Groundwater is derived from unconsolidated floodplain and terrace deposits and bedrock formations. The unconsolidated deposits vary considerably in permeability, depending on grain size and sorting. The fine-grained deposits yield only small quantities of water (2-8 gpm) at depths of 10-100 feet. This water is generally of marginal quality for human consumption but suitable for livestock and wildlife use. The coarse-grained deposits typically yield about 15-70 gpm, and the water is generally suitable for most uses.

Bedrock aquifers in the vicinity of the pipeline route in Wyoming include the Willwood, Fort Union, Lance, Mesaverde, Tensleep, Madison, Wasatch, and Green River Formations. The Willwood, Fort Union, Lance, and Mesaverde Formations are Tertiary and Upper Cretaceous formations that consist of interbedded shale, mudstone, sandstone, and conglomerated lenses. Discontinuous sandstone beds are the primary water-producing zones. Water from these units is commonly used for livestock and wildlife watering and is generally suitable for human use. The Tensleep and Madison Formations are Paleozoic formations that consist of massive dolomite and limestone sequences. Permeability in these units is high and water yields range from 200 gpm to over 1,000 gpm. Water quality is generally good and is satisfactory for human consumption, irrigation, livestock, wildlife, and industrial use. The sandstone and conglomerate lenses of the Wasatch Formation yield small to moderate amounts of water that commonly contain 500-1,000 mg/l of TDS. The Green River Formation yields fair to poor water quality at considerable depths.

SOUTH PASS ROUTE VARIATIONS: REGIONAL HYDROLOGIC CHARACTERISTICS

Jeffrey City Variation

The Jeffrey City Variation would cross four perennial streams a total of six times. Waterbodies crossed by this variation include the Sweetwater River, Green River, Crooks Creek (two crossings), and Blacks Fork (two crossings).

Alkali Butte Variation

Construction along the Alkali Butte Variation would result in five crossings of four perennial waterbodies. Perennial waterbodies crossed by this variation include the Sweetwater River, East Alkali Creek, Green River, and Blacks Fork (two crossings).

Northern Utilities Variation

The Northern Utilities Variation would cross four perennial streams a total of five times. Waterbodies crossed by this variation include the Sweetwater River, East Alkali Creek, Green River, and Blacks Fork (two crossings).

Route 28 Variation

This variation would cross a total of ~~10~~ 17 perennial streams. Perennial waterbodies crossed at different locations than the proposed route include Twin Creek, Beaver Creek, Cole Gulch, Rock Creek, Big Hermit Gulch, Willow Creek, Dead Ox Creek, Pine Creek, Fish Creek, and the Sweetwater River.

KERN RIVER DOWNSTREAM FACILITIES: REGIONAL HYDROLOGIC CHARACTERISTICS

There are no perennial streams on the proposed sites of Compressor Stations 2, 3, 5 or 8. There are, however, intermittent drainages on the southern portion of station sites 2 and 3, as well as the extreme eastern portion of site 5. The western portion of the site for Compressor Station 6 is crossed by an unnamed tributary to the Muddy River, a stream that is classified as intermittent to perennial, depending on rainfall conditions. Because streamflows in the area of Compressor Station 6 are typically the result of high intensity thunderstorms, waters are generally turbid with sediment. Alkalinity is also generally high due to the desert environment.

Chapter 3D. Affected Environment: Land Use

This chapter examines a series of factors involving the use and ownership of land and describes federal, state, and county land uses; governmental plans and policies; and land ownership along the pipeline projects routes.

Land uses are separated into four categories: nonvegetated, agricultural, forested, and other vegetation. The nonvegetated category includes urban uses, water, barren ground, and rock. The agricultural category consists of rangeland, pasture, dry cropland, and irrigated cropland. The forested category includes commercial and noncommercial sites. Other types of vegetation include riparian areas and brushlands. See Chapter 3A, "Geology," for locations of known mineral extraction operations.

Governmental plans and policy designations and descriptions of land use categories sometimes differ among jurisdictions; however, these categories generally permit the same types of uses. For purposes of this analysis, designated land uses are categorized as nonurban uses, rural uses, and urban uses. Nonurban uses consist of general agriculture, agricultural preservation/prime agricultural land, and forestry/forest preservation. Rural uses consist of low-density residential areas that allow limited agricultural uses. Urban uses consist of residential, commercial, and industrial uses.

Land ownership is identified as federal, state, or private. The federal lands include those administered by FS, BLM, or BOR. Recreation areas are included within the applicable federal, state, or private lands.

PGT PROJECT

Agriculture and forestland are the dominant land uses along the PGT/PG&E proposed project route. ~~(Table 3D-1)~~ Agriculture occurs on approximately 50 percent and forestland occurs on approximately 40 percent of the pipeline route. Urban uses occur on approximately two percent of the route. Because PGT proposes to locate the pipeline loops within its existing right-of-way, except for the John Day Canyon Variation, an exact land use designation of the permanent right-of-way would be "utility corridor". Table 3D-1 identifies, by miles of pipe, the existing land use that surrounds the pipeline right-of-way in order to provide a reasonable description of the area. The primary affect on these existing land uses would be limited to the temporary right-of-way and additional workspace areas. See Chapter 4B for the estimated acreage of vegetation types that would be cleared during construction. Table 3D-2 lists those residences that would be located within 50 feet of the proposed PGT right-of-way. The remainder of the route consists of rivers and streams, riparian vegetation, transportation routes, and other miscellaneous uses. No landfills would be crossed by the proposed pipeline.

Table 3D-1

EXISTING LAND USE ALONG THE PGT ROUTE
(in miles)

Existing Land Use	Idaho	Washington	Oregon
Urban	2.7	0.0	4.4
Water	0.2	0.0	1.0
Barren ground/rock	0.0	0.2	25.3
Agriculture: grazing	3.5	2.1	74.8
Agriculture: crop production	12.7	47.4	81.2
Forested: commercial	35.6	0.0	113.5
Forested: noncommercial	0.1	0.0	24.5
Other vegetation	0.3	0.7	11.1
TOTAL	55.0	50.5	335.9

Note: Inconsistencies between tables are because of rounding.

Table 3D-2

LOCATIONS OF RESIDENCES IN THE VICINITY OF THE PGT ROUTE

State	Milepost	Receptor	Distance from Edge of Permanent Right-of-Way (feet)
Idaho	0.5	House	45 west
	0.5	House	45 west
	0.6	House	47 west
	3.1	Trailer	30 west
	10.0 a/	Log house	18 east
	18.5 a/	Log house	25 west
	75.0 a/	Log house	50 west
	80.2 a/	House	30 west
	80.2 a/	Trailer home	50 west
	83.2 a/	Mobile home	45 west
	94.1 a/	Double-wide trailer	40 east
	94.9 a/	House	50 east
	95.0 a/	Trailer and foundation	20 east
	97.2 a/	House	14 west
	103.1	Trailer home	24 east
Oregon	282.4	Mobile home	6 west
	282.4	Mobile home	47 west
	288.5	House	48 west
	288.5	Trailer	50 west
	451.3 a/	House	20 east
	451.4 a/	House	4 east
	451.6 a/	Trailer	25 west
	454.5 a/	Log cabin	43 west
	493.4	House	50 west
	493.5	Trailer	47 east
	493.5	Trailer	7 east
	493.7	Trailer	40 west
	493.8	Trailer	15 west
	493.8	Trailer	5 west
	494.1	Trailer	45 west
	592.2	Trailer	30 east
	592.5	House	10 west
	592.5	Trailer	10 west
	593.9	House	46 west

a/ Potential blasting locations along the PGT route

According to the land use plans of local agencies, nearly all of the land along the route is designated for nonurban uses (Table 3D-3). This includes land designated for agriculture and forestry. As illustrated in Table 3D-4, most of the land along the proposed route is in private ownership. Nonprivate owners are the FS, BLM, and the respective states, counties, and cities.

The proposed pipeline route would require the acquisition of approximately 20 miles of new right-of-way in the John Day Canyon area of Oregon. The acreage area requirements for the new right-of-way would vary according to the construction configuration for each location (Appendix D-1). Temporary right-of-way for work space along the pipeline would also vary according to the construction configuration for each location (Appendix D-1).

Blasting would be necessary along portions of the proposed route where bedrock lies above grade or within approximately five feet of ground surface. As shown in Table 3D-2, these conditions are expected to occur in 14 locations where residences lie within 50 feet of the proposed right-of-way.

Idaho

The first 55 miles of the proposed route, Loops 1 and 2, would be located in Idaho. The land crossed by the PGT route is approximately 65 percent ~~is~~ forestland and 29 percent agriculture. Six percent of the route is classified as urban uses, rivers, and brushland. Fifteen residences are located within 50 feet of the edge of the proposed permanent right-of-way.

Local planning agencies have designated the proposed route in Idaho primarily for agricultural and rural land uses. Approximately 44 percent is designated as agriculture and 39 percent is designated rural. The remainder of the land is assigned to urban uses.~~Existing land use, and~~ ~~l~~Land use designated by planning agencies in Idaho ~~are~~ is summarized by county in ~~Appendices~~ Appendix D-2~~. and D-3.~~

Boundary County. A majority of the affected area within Boundary County is designated in the county's general plan as agriculture. Thirteen miles are assigned for prime agriculture, while the remaining five miles are for general mixed-use agriculture. Three miles have been designated for residential use. Five houses and one trailer are within 50 feet of the edge of the pipeline right-of-way. The route would cross the Panhandle National Forest but would be west of the ~~Meadowcreek~~ Meadow Creek Campground in the Forest at MP 13.6.

Bonner County. Bonner County's comprehensive plan is being revised and is expected to be completed in two years. A shoreline management plan will be included in the revised comprehensive plan. Use of the shorelines of Cocolalla Creek (a creek that would be crossed by the proposed pipeline) will then be further regulated; the creek is currently identified by FWS as a critical drainage. The area is zoned partially as agriculture with a 10-acre minimum lot size and partially as rural residential with a 5-acre minimum lot size. The present agricultural uses are tied to small-scale, hobby-type farming. Little cropland is cultivated; a majority of land is used as pastureland for cattle, horses, and sheep. The route would cross a small portion of the Kaniksu National Forest, which is now within the Panhandle National Forest. Two houses and

Table 3D-3

DESIGNATED LAND USE ALONG THE
PGT ROUTE (in miles)

Designated Land Use	Idaho	Washington	Oregon
General agriculture	11.6	30.0	141.0
Agriculture preservation/ prime agricultural land	13.0	19.0	78.0
Forestry/forest preservation	0.0	0.0	110.0
Rural	21.6	2.0	4.0
Urban	9.3	0.0	2.7
TOTAL	55.5	51.0	335.7
Note: Inconsistencies between tables are because of rounding			

Table 3D-4

LAND OWNERSHIP ALONG THE PGT ROUTE (in m les)

Land Ownership	Idaho	Washington	Oregon
FS	6.6	0.0	75.3
BLM	0.0	0.0	33.4
COE	0.0	0.2	0.0
State	1.4	0.3	0.0
County franchise	0.0	0.0	1.3
City franchise	0.0	0.0	1.5
Private	46.8	49.8	222.4
TOTAL	54.8	50.3	333.9
Note: Inconsistencies between tables are because of rounding			

one trailer home are within 50 feet of the proposed permanent pipeline right-of-way (Morgan personal communication).

Kootenai County. The Kootenai County general plan designates a majority of the land adjacent to the pipeline route as rural. This designation allows single family homes on a minimum lot size of 5 acres and agricultural use with a minimum lot size of 10 acres. Nearly all of the agricultural land is designated as general agriculture, with less than one mile as prime agricultural land. Limited public services are provided to rural and agricultural areas. The remainder of the route is designated as either residential or industrial. Residential use is a combination of urban and suburban land uses with small lot sizes and full public services. The industrial designation allows general industrial and manufacturing uses. Three trailer homes, two houses, and the IMS Plant Building No. 1 are within 50 feet of the edge of the proposed permanent right-of-way.

Washington

The dominant land use along these 51 miles of the proposed route (Loops 3 and 4) is agriculture, which occurs along approximately 98 percent of the route. The most common agricultural use is dry cropland, which is found along 43 miles of the proposed route. No houses are located within 50 feet of the edge of the proposed permanent right-of-way.

Most of the land along the proposed route in Washington is designated for agricultural land use. Approximately 59 percent is classified as general agriculture and 37 percent is classified as agricultural preserve/prime agricultural land. Two miles of the route are classified for rural uses. ~~Existing land use and l~~Land use designated by planning agencies in Washington ~~are~~ is summarized by county in ~~Appendices~~ Appendix D-2. ~~and D-3.~~

Spokane County. The comprehensive plan designation for the pipeline expansion area is semirural. This designation is intended to limit development to maintain the country-type setting of the area. Lot sizes are to be between 2 and 10 acres, public services to this area are limited, and few types of land uses occur within this zone. Agricultural parcels in the applicable portion of the county are generally small scale, ranging from 2 to 10 acres (Jaffery, personal communication). Although no permanent structures are proposed to be located on the project route, an application to rezone for resource extraction for a sand and gravel operation has been filed for land at MP 107.3-108.0 (Furgen, personal communication).

Whitman County. The zoning designation of the area that would be affected in Whitman County is agricultural district. This designation is intended to preserve productive farmland and the family farm. No minimum lot size requirement has been established, although a minimum allowable frontage width of 60 feet is specified.

Several stream crossings would be required within this portion of the project. The Whitman County Shoreline Master Plan is relevant to this project because the route would cross Union Flat Creek. This creek lies in the western portion of the county and is designated as having a shoreline of state significance. The county will require a shoreline permit for the crossing of Union Flat Creek (Peterson, personal communication).

Walla Walla County. The primary land use that would be affected by the pipeline expansion in Walla Walla County is large-scale agriculture. A majority of the farms that would be affected are on 1,000 or more acres of land (Beard, personal communication). The zoning and comprehensive plan designations of the affected area are primarily general agriculture. These areas are not designated for urban uses and are not prime agricultural land but are suitable for various agricultural enterprises. The minimum lot size is 10 acres. A small portion close to the Oregon border is unclassified.

The shoreline management plan for the county is relevant to this project because the route would cross the Walla Walla River. The shoreline is designated as rural. The proposed construction would require a shoreline permit. The pipeline route would cross the Wallula Habitat Management Unit adjacent to the Walla Walla River. This area is under COE jurisdiction and is managed and used for recreation activities, such as camping and hunting.

Oregon

The proposed route would cover approximately 335 miles in Oregon and includes Loops 5, 6, and 7. In addition, PGT proposes to ~~acquire~~ expand by four acres ~~adjacent to~~ its existing Compressor Station No. 12, located in Deschutes National Forest. This would be done in order to provide adequate space for PGT to tie-in the proposed line with the existing compressor station facilities. The FS has indicated the existing station permit area extends beyond the present station fenceline. Expansion of the compressor station area without increasing the permit area would be preferred by the FS.

Along the route, 46 percent of the total is devoted to agriculture and 40 percent to forestland. Rangeland and dry cropland are the most common agricultural uses. The remainder consists of urban use, rock, riparian vegetation, brushland vegetation, and marshland. A total of 19 residences are located within 50 feet of the edge of the proposed permanent right-of-way.

About 99 percent of the land that would be crossed by the proposed route in Oregon is assigned to nonurban use classifications. Approximately 65 percent is designated for agricultural use, with nearly two-thirds of the agricultural land in general agriculture and the remainder in agricultural preservation/prime agricultural land. An additional 33 percent of the route is designated for forestry and forest preservation. ~~Existing land use and~~ ~~d~~Designated land use in Oregon ~~are~~ is summarized by county in Appendi~~ces~~x D-2. ~~and D-3.~~

Umatilla County. The majority of the land in Umatilla County is designated as exclusive farm use (EFU) with a minimum lot size of 160 acres. The EFU zone is intended to preserve and maintain agricultural lands for farm use, particularly range and grazing uses, consistent with existing and future needs for agricultural products, forests, and open spaces. In Umatilla County, the pipeline would cross mostly rangeland. Several irrigation ditches within the Stanfield Irrigation District would be crossed by the proposed project (Randolph, personal communication). An area near Stanfield is designated EFU but with a 40-acre minimum lot size. Zoning designations within Stanfield are community commercial, general residential, transportation industrial, and permanent open space. The proposed pipeline route would pass through residential properties in Stanfield, including a mobile home development. Two mobile homes, a trailer, and a house are within 50 feet of edge of the proposed permanent right-of-way.

The county will require a discretionary review of the project, which is similar to a conditional use permit. A combined permit will be required for the crossing of Butter Creek by the Oregon Division of State Lands and COE (Randolph, personal communication).

Morrow County. The entire route in Morrow County is designated EFU, except for the portion of the proposed route near the City of Ione and Compressor Station No. 9. The designations within Ione are residential and farm residential. The pipeline would cross some Nature Conservancy property near Juniper Canyon. The Oregon-Pioneer Trail would be crossed near MP 298.

Gilliam County. The zoning of the area that would be affected by the pipeline in Gilliam County is EFU with the intention of maximizing the preservation and protection of commercial farmland. The route would cross the John Day River at MP 358 in a segment designated as a federal Wild and Scenic River and an Oregon Scenic Waterway. This river and its surrounding area have many recreational uses, including rafting, hunting, and ORV use.

Sherman County. Land that would be affected by the pipeline expansion in Sherman County is designated for agricultural uses. The majority is designated as rangeland, and a portion is designated as cropland. The rangeland portion is not suitable for crop production.

Wasco County. The zoning of the area that would be affected by the pipeline in Wasco County is EFU with the intention of preserving and maintaining agricultural land for farm use.

Jefferson County. The zoning designation for the entire stretch of proposed pipeline in Jefferson County is rangeland, which is nonirrigated land used for low-density grazing, dryland agriculture, and forestry. The route would cross 19.2 miles of the Crooked River National Grasslands in the Ochoco National Forest.

Crook County. A small segment of the pipeline would cross Crook County. The area is designated EFU, which allows a minimum lot size of 160 acres and is intended for farm use and forestry. This area is used for agriculture and forestry. The route would cross 3.1 miles of BLM land.

Deschutes County. A majority of the portion of Deschutes County that would be affected by the pipeline is administered by BLM and FS (the Deschutes National Forest). Approximately two miles of the route would be within the boundary of the ~~proposed~~ Newberry National Volcanic Monument, a regional destination sight-seeing area. The route would cross 18.7 miles of the Deschutes National Forest and 20.7 miles of BLM land. The general plan for Deschutes County designates major portions of the affected area as EFU and forest use. Small segments are designated rural, urban transition, and scenic corridor. Some urban land would be affected, primarily in the areas near Bend and La Pine. Three houses and a trailer are within

50 feet of the edge of the proposed permanent right-of-way. The current land use adjacent to the proposed compressor station expansion is forest production.

Klamath County. Zoning designations for the area that would be affected include EFU - grazing, cropland/grazing, forestry/range (generally for range and grazing, forest use, and limited cropland), EFU - cropland (prime agricultural land), forestry (intended to protect areas for timber production and harvesting and related uses), rural (rural residential uses, typically small family farms larger than one acre), light industrial (manufacturing, storage, sorting, and wholesaling distribution close to one another but not affecting the character of the adjacent uses), and rural service center. Eight trailers and three houses are within 50 feet of edge of the proposed permanent right-of-way. The route would pass through 11.9 miles of the Deschutes National Forest and 23.5 miles of the Winema National Forest.

ALTAMONT PROJECT

Agriculture, including rangeland, is the dominant land use occurring on approximately 97 percent of the proposed route. The remainder of the route consists of rivers and streams, transportation routes, and other miscellaneous uses. Dispersed recreational activities, such as hunting, fishing, and camping, are most likely to occur along BLM and BOR lands. No buildings are located within 50 feet of the proposed pipeline right-of-way. Land uses are summarized by state and county in Table 3D-5.

Of the counties that would be crossed by the pipeline route, only one has a zoning ordinance; however, four of the counties along the route have a permit process regulating pipeline transmission activity and location, and a large portion of the pipeline is subject to federal land management plans. A 40-foot-wide strip of land that would be crossed at the Canada-U.S. border is administered by the International Boundary Commission.

Land ownership along the route is divided among federal, state, and private ownership. Private ownership accounts for 57 percent of the route. Public landowners include BLM, which accounts for 29 percent; BOR, which accounts for 4 percent; and the states, which account for 10 percent. See Table 3D-6 for land ownership summaries by state and county.

Montana

A total of 305 miles of the proposed route for segments 1, 2, and 3 would be located in Montana. Approximately 95 percent of the Montana route is in agricultural use including rangeland. A total of 84 percent of the land that would be crossed by the route is privately owned. State-administered lands comprise 13 percent of the route. Federal land along the route consists of 3 percent of BLM land and 1 percent of BOR land. The proposed route would be adjacent to existing transportation and utility corridors for over 73 miles (24 percent) in Montana.

Table 3D-5

LAND USE ALONG THE RIGHTS-OF-WAY FOR THE ALTAMONT ROUTE

County	Rangeland			Dryland Cultivated			Irrigated Cropland			Water-Related Areas[a]			Length Adjacent to Existing ROW (miles)[b]
	Miles	Perm. ROW (acres)	Const. ROW (acres)	Miles	Perm. ROW (acres)	Const. ROW (acres)	Miles	Perm. ROW (acres)	Const. ROW (acres)	Miles	Perm. ROW (acres)	Const. ROW (acres)	
MONTANA													
Hill	2.8	17.8	33.9	45.5	289.5	551.5	0.0	0.0	0.0	0.2	1.3	2.4	4.1
Chouteau	8.1	51.5	98.2	49.2	313.1	596.4	0.8	5.1	9.7	5.6	35.6	67.9	4.0
Fergus	4.8	30.5	58.2	18.1	115.2	219.4	0.0	0.0	0.0	5.1	32.5	61.8	5.8
Judith Basin	3.3	21.0	40.0	22.6	143.8	273.9	1.3	8.3	15.8	1.0	6.4	12.1	2.6
Wheatland	20.8	132.4	252.1	14.6	92.9	177.0	1.9	12.1	23.0	0.2	1.3	2.4	32.7
Golden Valley	8.5	54.1	103.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	1.2	0.7
Stillwater	17.4	110.7	210.9	21.5	136.8	260.6	1.9	12.1	23.0	2.0	12.7	24.2	0.0
Carbon	38.1	242.5	461.8	0.0	0.0	0.0	9.1	57.9	110.3	0.5	3.2	6.1	23.5
TOTAL	103.8	660.5	1,258.1	171.5	1,091.3	2,078.8	15.0	95.5	181.8	14.7	93.6	178.1	73.4
WYOMING													
Big Horn	61.7	392.6	747.9	0.0	0.0	0.0	5.6	35.6	67.9	0.8	5.12	9.7	68.1
Washakie	23.4	148.9	283.6	0.0	0.0	0.0	8.2	52.2	99.4	0.4	2.5	4.8	27.5
Hot Springs	18.1	115.2	219.4	0.0	0.0	0.0	0.0	0.0	0.0	1.8	11.4	21.8	8.3
Fremont	110.3	701.9	1,337.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2	14.0	26.7	19.8
Sublette	3.0	19.1	36.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0
Sweetwater	47.3	301.0	573.3	0.0	0.0	0.0	5.5	35.0	66.7	1.5	9.5	18.2	16.7
Lincoln	25.1	159.7	304.2	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.6	1.2	1.1
TOTAL	288.9	1,838.4	3,501.8	0.0	0.0	0.0	19.3	122.8	234.0	6.8	43.1	82.4	144.5

Notes: Acres of right-of-way affected by the project are based on Altamont using a 100-foot-wide construction right-of-way and permanently maintaining a 52.5-foot-wide right-of-way. Road and railroad crossings are included in the above land uses.

Perm ROW = permanent right-of-way Const. ROW = Construction right-of-way

[a] Includes water bodies, riparian zones, and wetlands

[b] Pipeline miles adjoining existing rights-of-way for railroads, highways, improved roads, and pipelines.

Table 3D-6

LAND OWNERSHIP ALONG THE ALTAMONT ROUTE

County or Variation	Ownership (in miles)				Total
	BLM	BOR	State	Private	
MONTANA					
Hill	0.0	1.0	11.0	36.5	48.5
Chouteau	1.0	2.0	12.0	48.7	63.7
Fergus	2.0	0.0	3.0	23.0	28.0
Judith Basin	0.0	0.0	1.0	27.2	28.2
Wheatland	0.0	0.0	6.0	31.5	37.5
Golden Valley	0.0	0.0	0.0	8.6	8.6
Stillwater	0.0	0.0	4.0	38.8	42.8
Carbon	5.0	0.0	2.0	40.7	47.7
MONTANA SUBTOTAL	8.0	3.0	39.0	255.0	305.0
WYOMING					
Big Horn	33.0	8.0	4.0	23.1	68.1
Washakie	17.0	1.0	0.0	14.0	32.0
Hot Springs	2.0	0.0	4.0	13.9	19.9
Fremont	68.5	0.0	10.5	33.5	112.5
Sublette	1.5	0.0	1.5	0.0	3.0
Sweetwater	36.3	11.0	0.0	7.0	54.3
Lincoln	16.0	1.0	1.0	7.2	25.2
WYOMING SUBTOTAL	174.3	21.0	21.0	98.7	315.0
TOTAL	182.3	24.0	60.0	353.7	620.0
SOUTH PASS ROUTE VARIATIONS					
Jeffrey City	145.2	4.6	13.5	68.0	231.3
Alkali Butte	155.7	4.6	10.6	54.6	225.5
Northern Utilites	161.4	4.6	13.0	63.5	242.5
Route 28 [a/]	146.1	6.2	11.1	29.1	192.5

a/ This variation also crosses 1.9 miles of FS land.

Water-related recreation activities such as angling, boating, and swimming are an important factor in Montana's appeal to tourism. Table 3D-7 provides recreation baseline information on angler use and activity on the major river/stream crossings in Montana.

None of the Montana counties crossed by the pipeline have a zoning ordinance, although Chouteau County requires a development permit for pipeline transmission and location activities.

Hill County. The predominant land use that would be crossed by the proposed route in the county is dryland wheat farming (94 percent), with some grazing (6 percent) and water-related activities (less than 1 percent). The Laredo Gas Field would be crossed by the proposed route. Land ownership is divided between BOR (2 percent), state (23 percent), and private holdings (75 percent). The Wildhorse Compressor Station would be located on private land; the surrounding land use is rangeland.

Chouteau County. The pipeline route would cross dryland cultivation (77 percent), rangeland (13 percent), water-related areas (9 percent), and irrigated agricultural land (1 percent). The proposed route would cross the Missouri River (MP 69) in an area used for water-related recreation activities. This section of the river is designated as National Wild and Scenic, with this segment at the crossing classified as Recreational.

Although no zoning exists for the county, the pipeline route must comply with the county's development permit system. Land ownership includes private land (75 percent), state land (19 percent), BOR land (4 percent), and BLM land (2 percent).

Fergus County. The route would cross 65 percent dryland cultivation, 18 percent water-related uses, and 17 percent rangeland. The pipeline would cross private land (72 percent), state land (18 percent), and BLM land (10 percent). The Denton Compressor Station would be located on private land; the surrounding land use is dryland cultivation.

Judith Basin County. The route would cross 80 percent dryland cultivation, 12 percent rangeland, 5 percent irrigated farmland, and 3 percent water-related uses. The route would cross private land (94 percent) and state land (6 percent).

Wheatland County. A total of 55 percent of the pipeline route would cross rangeland, 39 percent would cross dryland cultivation, 5 percent would cross irrigated farmland, and less than 1 percent would cross water-related areas. The route would cross the Musselshell River, a publicly owned water-related recreational area. Land ownership includes private land (84 percent) and state land (16 percent).

Golden Valley County. All but 0.1 mile of the 8.6 miles of the proposed route in Golden Valley County would cross rangeland; the remaining portion crosses water-related areas. Land along the entire route is privately owned.

Table 3D-7

WATER-RELATED ACTIVITIES ON MAJOR RIVERS/STREAMS CROSSED BY THE ALTAMONT ROUTE IN MONTANA

River/Stream	Months/Year Boatable	Use Estimate	Number of Developed Sites	Water Character	Angler Use Days[a]	Primary Activity	Secondary Activity
Milk River[1]	1	low	0	flat	137[d]	shore fishing	canoeing, tent camping
Missouri River[2]	6	moderate	6[b]	flat	5,225[e]	motor boating, boat fishing, motor trolling, viewing	canoeing, shore fishing, tent camping, car camping, picnicking
Yellowstone River[3]	9	heavy	3	minor rapids	9,429	motor boating, canoeing, rafting, boat fishing, shore fishing, car camping, driving viewing, picnicking	kayaking, tubing, swimming, motor trolling
Rock Creek[4]	0	heavy	4	not boated	5,644	shore fishing, driving, viewing, picnicking	tubing, swimming, car camping
Clark's Fork[5]	8	moderate/low	3	minor rapids	2,032	boat fishing, shore fishing	motor boating, tubing, canoeing rafting, swimming, driving, viewing
Bluewater Creek[6]	0	low	1[c]	not boated	743	shore fishing	driving, viewing, picnicking

[1] Canada to Fresno Dam
[2] Marias to Chouteau/Blaine County Line
[3] Clark's Fork to Stillwater - angler use
Rosebud to Clark's Fork - recreation use
[4] West Fork to mouth
[5] Bridger to mouth
[6] Headwaters to mouth

[a] Average of 4 years - 1983-86
[b] Coal Banks Landing recreation area 1 mile above proposed crossing
[c] Bluewater Springs trout hatchery - upstream, but timing may be important
[d] 1982-83 only
[e] Phillips-Fergus-Blaine-Choteau Counties

Additional Angler Use Day Information:

Judith River - 2,819 (headwaters to Plum Creek
Ross Fork - 180
Musselshell - 5,194 (headwaters to Lavina)

Sources: Montana Statewide Angling Pressure Survey
Montana Rivers Information System

Stillwater County. The proposed route would cross 50 percent dryland cultivation, 41 percent rangeland, 5 percent water-related areas, and 4 percent irrigated farmland. Scattered suburban residential tracts would be crossed west of Park City. An irrigation and recreation reservoir site is proposed for the southern part of the county along the route (MP 250-255). Ninety-one percent of the route would cross private land and 9 percent state land. The Rapelje Compressor Station would be located on private land; the surrounding land use is dryland cultivation. The pipeline would cross the Yellowstone River which is used for water-related recreational activities.

Carbon County. The pipeline route would cross 80 percent rangeland, 19 percent irrigated farmland, and 1 percent water-related areas. The route would follow an existing pipeline through the county for 22.9 miles. Eighty-five percent of the route would cross private land, 4 percent state land, and 11 percent scattered parcels of BLM land. The pipeline would cross the Clarks Fork of the Yellowstone River which receives a moderate level of water-related recreational use.

Wyoming

A total of 315 miles of the proposed route for segments 3, 4, 5, and 6 would be located in Wyoming. Approximately 98 percent is in agricultural use (includes rangeland), and 2 percent of the route is classified water-related areas. No prime farmland would be crossed by the project route. The route would cross 69 percent publicly owned land, 55 percent BLM land, and 7 percent BOR land. State-administered lands would make up 7 percent of the route. The remaining 31 percent would cross private land. The proposed route would be adjacent to existing utility and transportation corridors for over 144 miles (46 percent) in Wyoming.

Of the seven Wyoming pipeline counties, only Sweetwater County has a zoning ordinance; however, three counties (Hot Springs, Sublette, and Lincoln) require a development permit for the location of a natural gas transmission line.

Big Horn County. Ninety-one percent of the route would cross rangeland, 8 percent would cross irrigated farmland, and 1 percent would cross water-related areas. Forty-eight percent of the route would cross BLM land, 34 percent would cross private land, 12 percent would cross BOR land, and 6 percent would cross state land. The route would pass within 500 feet east of the Lovell-Cowley-Byron Airport (MP 314.4), and would cross the jurisdiction of BLM's Cody Resource Management Plan, which delineates right-of-way avoidance areas north of the Shoshone River at historic Sidon Canal; at the Shoshone River, a special recreation management area (SRMA); and along US 310, a raptor nesting and grouse lekking (courtship display) area. The Graybull Compressor Station would be located on BLM land; the surrounding land use is rangeland.

Washakie County. The pipeline route would consist of 73 percent rangeland, 26 percent irrigated farmland, and 1 percent water-related areas. The pipeline route would parallel existing pipelines for 23.7 miles through the county. The route would cross the Bighorn River in a BLM-designated SRMA. The route would be located on 53 percent BLM land, 44 percent private land, and 3 percent BOR land.

Hot Springs County. The route would follow existing pipelines for 7.4 miles in Hot Springs County. Ninety-one percent of the route is in rangeland use, while the remainder is in water-related areas. Seventy percent of the pipeline route would cross privately owned land, 20 percent would cross state land, and 10 percent would cross BLM land.

Fremont County. Ninety-eight percent of the route in the county would cross rangeland; the remaining portion would cross water-related areas. The route would cross the Fuller Airstrip (MP 429.1) on the Fuller Ranch and would cross the Beaver Creek ~~and Sand Draw~~ Oil and Gas Fields. The route passes just outside the southeast corner of the Wind River Indian Reservation near MP 470. Between MPs ~~508~~ 502 and 540, the route would cross the South Pass area that is rich in historical, archeological, wildlife, and recreational values. ~~The first crossing of the Oregon-Mormon Trail would occur near MP 536.5.~~

The Oregon-Mormon trail, which is listed on the NRHP, would be crossed two times by the proposed route in Fremont County. The first of the crossings would occur at the Lander Cut-off near MP 521.2 where the trail is in a mostly graveled condition. A second crossing of this historic trail would occur near MP 537.7 at the intersection point of the trail and SR 28. See Chapter 3M for a list of other historic trails that would be crossed by the project.

The pipeline would cross the Sweetwater River, near MP 527, which is classified as an important trout water by the State of Wyoming and receives a moderate amount of fishing pressure. The South Pass area also receives moderate use by hunters, hikers, and ORV users. The BLM has designated much of the Lander Resource Area a semi-primitive motorized class under its Recreational Opportunity Spectrum (ROS). This classification results from a physical setting that is mostly devoid of modern human-made features. The BLM uses the ROS classes to facilitate the consideration, determination, and implementation of its recreational management role. BLM management actions are geared toward maintaining the existing natural setting.

The pipeline route would fall within BLM's Rawlins Management District and the Rock Springs Management District. The route would cross 61 percent BLM land, 30 percent private land, and 9 percent state land. The Lost Cabin Compressor Station would be located on BLM land; the surrounding land use is rangeland.

Sublette County. All of the pipeline route in the county would cross rangeland, and falls within BLM's Rock Springs Management District. Half of the route would cross BLM land and half would cross state land.

Sweetwater County. Eighty-seven percent of the pipeline route in the county would cross rangeland, 10 percent would cross irrigated farmland, and 3 percent would cross water-related areas. North of Farson, the route would cross the Oregon-Mormon Trail near MP 560.5. This crossing would occur in a privately-owned hay field which has totally obscured the Trail. The route would cross the Green River 0.8 mile northwest of the Seedskadee NWR, near several existing pipelines.

The zoning ordinance for the county has designated the land along the pipeline route for agricultural use, which allows for utility corridors. Sixty-seven percent of the route would cross

BLM land, 20 percent would cross BOR land, and 13 percent would cross private land. The Farson Compressor Station would be located on BLM land; the surrounding land use is rangeland.

Lincoln County. The pipeline would enter the county near oil and gas wells, and cross mostly rangeland for its 25.2-mile length. The pipeline would terminate at Opal. Sixty-three percent of the route would cross BLM land, 29 percent would cross private land, 8 percent would cross BOR land, and 8 percent would cross state land. The meter station would be located on BLM land; the surrounding land use is rangeland.

SOUTH PASS ROUTE VARIATIONS

With the exception of the Route 28 Variation, all of the variations cross Fremont, Sweetwater, and Lincoln Counties in Wyoming. The Route 28 Variation is located entirely in Fremont County. No residences are within 50 feet of any of the routes. A location permit is required for oil and gas facilities in Lincoln County. The area is classified in the Sweetwater County zoning ordinance as agricultural but allows utility corridors.

The predominant land use designation throughout the areas crossed by the Jeffrey City, Alkali Butte, and Northern Utilities Variations is rangeland which is utilized primarily for livestock grazing and oil and gas development. The relocated and new compressor stations associated with these variations would be located on BLM lands and in open areas adjacent to existing roads. There is only dispersed recreational use of these areas such as hunting, hiking, and ORV operation. All three variations would cross the Green and Sweetwater Rivers at locations that receive moderate recreational use.

Land uses along the Route 28 Variation differs greatly from that crossed by the other three variations. This Variation would involve relatively substantial forest tracts and numerous well vegetated riparian zones. The area receives intensive recreational use for fishing, hiking, and sightseeing. The Route 28 Variation crosses the headwaters of the Sweetwater River at nearly the same point as the proposed route, a location considered moderately important for recreational fishing.

Jeffrey City Variation

The Jeffrey City Variation is approximately 231 miles in length. Land ownership along the route is 63 percent BLM, 29 percent private, 6 percent state, and 2 percent BOR. About ~~75~~ 98 percent of the route is ~~located adjacent~~ parallel to existing ROWs. This variation would cross the Oregon-Mormon Trail just north of Jeffrey City and again near the town of Granger.

Alkali Butte Variation

The Alkali Butte Variation is approximately 225 miles in length. Land ownership along the route is 69 percent BLM, 24 percent private, 5 percent state, and 2 percent BOR. Existing ROWs ~~are located adjacent to~~ parallel about ~~70~~ 73 percent of this route. The route would cross the Oregon-Mormon Trail just south of Sweetwater Station, a settlement on the banks of the Sweetwater River. It would ~~also~~ cross the Oregon-Mormon ~~Emigrant~~ Trail again near the town of Granger.

This route would cross the BLM-designated Beaver Rim ACEC, an area established for the monitoring of sensitive plant communities and the protection of raptor nests. Fremont County maintains a scenic turnout near the area where the route crosses the ACEC.

Northern Utilities Variation

The Northern Utilities Variation is approximately 242 miles in length. Land ownership consists of 67 percent BLM, 26 percent private, 5 percent state, and 2 percent BOR. This variation would ~~be located adjacent to~~ parallel existing ROWs about ~~85~~ 89 percent of the route. This route would cross the same areas of public interest as those crossed by the Alkali Butte Variation.

Route 28 Variation

This variation is 192.5 miles in length. Land ownership along the route is 76 percent BLM, 15 percent private, 6 percent state, and 3 percent BOR. Existing ROWs ~~are located adjacent to~~ parallel about ~~55~~ 38 percent of the route. The route would cross two portions of the Shoshone National Forest, the BLM-designated South Pass ACEC, and the Oregon-Mormon Trail twice.

KERN RIVER DOWNSTREAM FACILITIES

Table 2-12 identified the counties and the preliminary locations of the required downstream facilities on Kern River's system. Compressor Station 2 would be sited on private property in a relatively rugged mountainous area where land use is primarily grazing. Land use at the site of Compressor Station 3 is dominated by agriculture and grazing. The site is on private property approximately 1.5 miles west of the small town of Elberta, Utah. Compressor Stations 5 and 6 would be located on and adjacent to the Intermountain Power Project right-of-way on land devoted to rangeland grazing. The site of Compressor Station 5 is privately owned, while Station 6 is on BLM land. Station 6 would lie within one mile east of the small village of Moapa, Nevada. Compressor Station 8 would be sited on and adjacent to the BLM-designated Utility Corridor G approximately one mile southeast of the town of Daggett, California. This site is owned by BLM and/or the State of California and is currently open range. Although the area around Station 8 is potentially developable, its proximity to existing utility rights-of-way and the interstate highway is expected to discourage residential use.

None of the additional compressor stations would be located on land designated for recreation, nor on any proposed or designated BLM Wilderness Study Area, Area of Critical Environmental Concern, or FS RARE II Area. There are no residential structures located on any of the station sites. Additional information regarding the land use plans and policies of the counties where the required downstream facilities would be located is presented in the EOR

FEIR/FEIS, Sections 3.1.9, 3.3.1.9, and 3.3.4.9 of Volume II (for Stations 2, 3, 5, and 6) and Sections 3.1.9 and 3.2.2.9 of Volume I (for Station 8).

Chapter 3E. Affected Environment: Vegetation and Wildlife

In this chapter, general vegetation types and associated wildlife that occur along the different pipeline routes are discussed. Closer attention is given to plant and wildlife species and communities that have special protective status or are of special concern to states and regulatory agencies. To facilitate the use of this chapter by agencies and residents of the various states that would be traversed by the pipeline, the distributions of these resources have been identified by state.

SPECIAL-STATUS PLANT SPECIES

Special-status plant species include:

- o species that are currently listed, proposed for listing, or candidates under review for listing as threatened or endangered under the ESA;
- o species listed as endangered by the State of Oregon;
- o species listed as sensitive by FS; and
- o species listed as sensitive by BLM.

Plant species that are listed by state heritage programs or native plant societies but do not have official state recognition were not considered special-status species in this report.

SPECIAL-STATUS WILDLIFE SPECIES

Special-status wildlife species include:

- o species that are currently listed, proposed for listing, or candidates under review for listing as threatened or endangered under the ESA;
- o species that are state-listed in Oregon or Washington;
- o species listed as sensitive by FS;
- o species listed as sensitive by BLM; and
- o species considered special-status or rare in Montana (Flath, 1984), Wyoming (Wyoming Game and Fish Department, 1977), and Idaho.

WETLANDS AND RIPARIAN HABITAT

Wetlands

Wetlands perform a number of important functions, including water quality improvement, flood and stormwater control, erosion control, recreation, and fish and wildlife habitat. Wetlands help maintain good water quality through the removal and retention of nutrients, the processing of organic and chemical wastes, and the reduction of sediment load. In their natural undisturbed condition, wetlands act as a temporary storage area for storm flood waters, protecting downstream areas from flood damage. The abundant vegetation associated with wetlands acts as the primary erosion deterrent; root systems bind sediments and reduce wave action and current velocity.

Both consumptive and nonconsumptive activities are associated with wetlands. Hunting and fishing are common sports which take place in and around wetlands. Nonconsumptive activities in wetlands include hiking, canoeing, bird watching, and photography. Inland wetlands provide breeding, migratory, and winter habitats for a number of birds, mammals, and fish. Many of the rare animal and plant species encountered along the proposed route are associated with wetlands.

The COE and the EPA define wetlands as:

> Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. (COE, 33 CFR 328.3 and EPA, 40 CFR 230.3).

The SCS and the FWS have similar definitions. The FWS definition include vegetated and nonvegetated areas. All four agencies' definitions of wetlands are conceptually the same and include three basic parameters for identifying wetlands; hydrology, vegetation, and soils (Federal Manual for Identifying and Delineating Jurisdictional Wetlands, 1989).

Wetlands crossed by the PGT route were identified through the use of FWS National Wetland Inventory (NWI) maps and the review of aerial photographs. A summary of wetlands crossed by the PGT route is given is Table 3E-1. This method tends to underestimate the amount of jurisdictional wetlands present because small, isolated wetlands frequently do not appear on NWI maps, and these small wetlands could not be precisely identified given the poor quality and small scale of PGT's aerial photographs. The analysis for the Altamont route used vegetation and topographic indicators on aerial photographs to identify potential jurisdictional wetlands and other waters of the United States. This method tends to overestimate the extent of jurisdictional wetlands by using only the vegetation parameter due to the fact that riparian and wetland vegetation are difficult to distinguish from each other on aerial photogarphs, especially

Table 3E-1
SUMMARY OF WETLAND AND RIPARIAN AREAS CROSSED BY THE PGT ROUTE

State	Classification[1/]	Number	Total Crossing Width (feet)
Idaho	PFO1	3	200
	PFO4	1	200
	PSS1/FO1	1	1,000
	PSS1	6	1,750
	PEM1	3	2,000
	PSS1/EM1	1	300
SUBTOTAL		15	5,450
Washington	PFO1	1	50
	PEM1	6	550
	PSS/EM	1	100
	PSS	2	300
SUBTOTAL		10	1,000
Oregon	PEM1	12	1,825
	PSS1	1	25
	PSS2/FO2	2	100
	PFO/EM	1	50
	PSS	6	1,000
	PEM	16	4,100
	PAB	1	125
SUBTOTAL		39	7,225
GRAND TOTAL		64	13,675

[1/] Classification system:

PFO1 = Palustrine forested broad-leaved deciduous
PFO4 = Palustrine forested needle-leaved evergreen
PSS1 = Palustrine scrub/shrub broad-leaved deciduous
PEM1 = Palustrine emergent persistent
PEM = Palustrine emergent
PSS = Palustrine scrub/shrub
PAB = Palustrine aquatic bed
PFO/EM = Palustrine forested and emergent mix
PSS1/EM1 = Palustrine scrub/shrub broad-leaved deciduous and persistent emergent mix
PSS1/FO1 = Palustrine broad-leaved deciduous scrub/shrub and forested mix
PSS/EM = Palustrine scrub/shrub and emergent mix
PSS2/FO2 = Palustrine narrow-leaved deciduous scrub/shrub and forested mix

in the region of the U.S. where the Altamont Project is located. Therefore, wetland information for PGT and Altamont are not directly comparable. A summary of wetlands crossed by the Altamont route is given in Table 3E-2.

Riparian Habitat

Riparian forest habitat frequently provides excellent habitat for a wide variety of wildlife species, and has been greatly reduced from its original extent in the United States (Mitsch and Gosselink 1986). Riparian habitats sometimes meet COE criteria as jurisdictional wetlands if flooding occurs frequently and for a long enough time during the growing season. Riparian areas are also included in Tables 3E-1 and 3E-2.

PGT PROJECT

Vegetation

For analysis in this report, the natural vegetation along the PGT project route was subdivided into ~~nine~~ seven broadly defined vegetation types (Daubenmire, 1952; Franklin and Dyrness, 1973; Barbour and Major, 1988; Barbour and Billings, 1988). ~~Five~~ Four forest and woodland vegetation types occur along the route: mixed conifer forest, ponderosa pine forest, lodgepole pine forest, and juniper woodland~~, and oak woodland~~. ~~Two~~ One grassland vegetation types occur along the route: Palouse grassland~~ and Central Valley grassland~~. Sagebrush-steppe is the only shrub vegetation type that occurs along the route. Wetlands and riparian vegetation occur within each of these vegetation types and are discussed separately.

Wildlife

Wildlife species that commonly occur in vegetation types that would be crossed by the proposed PGT natural gas pipeline route were identified using reports that described the biological resources along the pipeline (BLM, 1976; PG&E, 1988b; PGT, 1988b; Stebbins and Smith, 1987; Transmission Agency of Northern California, 1988), relevant literature describing the distribution of wildlife and their habitats (Ingles, 1965; Burt and Grossenheider, 1976; Thomas, 1979; Larrison, 1981; Grenfell and Laudenslayer, 1983; Nussbaum, Brodie, and Storm, 1983; Stebbins, 1985; Maser, Thomas, and Anderson, 1986; Mayer and Laudenslayer, 1988; and Jameson and Peeters, 1988;), and discussions with biologists who were familiar with species that occurred along the pipeline route.

Vegetation Types and Associated Wildlife

Mixed Conifer Forest. Mixed conifer forest occurs along the pipeline route in northern Idaho, northeastern Washington, north-central Oregon, and south-central Oregon. Mixed conifer forest is typically dominated by grand fir and Douglas fir. Trees commonly associated with the dominant species include ponderosa pine, lodgepole pine, subalpine fir, and western larch. The understory shrub layer commonly supports common snowberry, spinyleaf spirea, Wood's rose, mallow ninebark, creambush oceanspray, Oregon boxwood, and big huckleberry. On volcanic

Table 3E-2

SUMMARY OF WETLAND AND RIPARIAN AREAS
CROSSED BY THE ALTAMONT ROUTE

State	Classification [1]	Number	Total Crossing Width (feet)
Montana	PSS	6	1,225
	PEM	44	74,700
	PFO	7	3,500
	PEM/SS	4	3,200
	PSS/EM	4	3,050
	PFL	1	500
	POW/EM	1	150
SUBTOTAL		67	86,325
Wyoming	PFO	4	2,650
	PSS	29	8,500
	PEM	9	5,050
	PEM/FO	1	250
	PFO/SS	5	2,550
	PSS/FO	1	3,000
	PSS/EM	2	350
	PEM/SS	2	2,800
SUBTOTAL		53	25,150
GRAND TOTAL		120	111,475

[1] Classification system:

PSS = Palustrine scrub/shrub
PEM = Palustrine emergent
PFO = Palustrine forested
PEM/SS = Palustrine emergent and scrub/shrub mix
PSS/EM = Palustrine scrub/shrub and emergent mix
PFL = Palustrine flat
POW/EM = Palustrine open water and emergent mix
PEM/FO = Palustrine emergent and forested mix
PFO/SS = Palustrine forested and scrub/shrub mix
PSS/FO = Palustrine scrub/shrub and forested mix

soils of the Ochoco and Blue Mountains, the shrub layer is typically absent and the understory is dominated by pinegrass.

The pipeline route would cross approximately 36 miles of mixed conifer forest vegetation. Most of the operational right-of-way has been kept cleared of trees. Cleared right-of-way supports grassland and ruderal vegetation. On portions of the pipeline route the right-of-way has not been kept cleared, and dense stands of young trees are present.

The diversity of tree species and successional stages in mixed conifer forests results in a high diversity of wildlife species. Most amphibians occur adjacent to wetland and riparian areas; common species include the spotted frog, Pacific treefrog, and western toad. Reptiles include the northern alligator lizard, rubber boa, and western terrestrial garter snake.

Numerous species of birds nest throughout the mixed conifer forest. The dark-eyed junco, blue grouse, and hermit thrush nest on the ground; species that nest in shrubs include the American robin and MacGillivray's warbler. Common species that nest in the forest canopy include Hammond's flycatcher, evening grosbeak, western tanager, and Steller's jay. Species that nest in tree cavities include the mountain chickadee, red-breasted nuthatch, mountain bluebird, and hairy woodpecker.

Small mammals inhabiting the forest floor include the dusky shrew, coast mole, golden-mantled ground squirrel, deer mouse, and dusky-footed woodrat. The northern flying squirrel and Douglas' squirrel nest and forage in the forest canopy. Mammalian predators include the long-tailed weasel, coyote, black bear, and mountain lion. The mixed conifer forest provides important summer range for black-tailed deer, mule deer, and elk.

Ponderosa Pine Forest. Ponderosa pine forest occurs along the pipeline route in northern Idaho, eastern Washington, central Oregon, and southern Oregon.

Ponderosa pine forest is dominated by ponderosa pine, typically in open, parklike stands. Ponderosa pine forest occurs on a variety of soils. In eastern Washington and northern Idaho, the forest understory is dominated by common snowberry and mallow ninebark where soils are deep and fine grained, and by bitterbrush, Idaho fescue, bluebunch wheatgrass, and needle-and-thread grass where soils are shallow and coarse grained. On pumice soils in Oregon, the forest understory commonly supports bitterbrush, Idaho fescue, green manzanita, and snowbrush ceanothus.

Ponderosa pine forest occurs in regions with short growing seasons constrained by summer drought and winter cold. Precipitation usually ranges between 14 and 30 inches per year with most of it falling in winter. Ponderosa pine forest occurs at elevations between 1,900 and 3,900 feet in Washington, between 2,900 and 4,900 feet in northeastern Oregon, between 4,500 and 6,500 feet in south-central Oregon. Periodic fire is an important ecological factor in maintaining the ponderosa pine forest vegetation.

At upper elevations, ponderosa pine forest typically grades into mixed conifer forest. At low elevations, ponderosa pine forest grades into sagebrush-steppe or Palouse grassland.

Many of the wildlife species that occur in the mixed conifer forest also occur in the ponderosa pine forest. However, the diversity of tree and shrub species is lower in the ponderosa pine forest and the habitat is often drier; therefore, the diversity of wildlife in ponderosa pine forests is generally lower, compared to mixed conifer forests. Amphibians and reptiles that occur in ponderosa pine forests are similar to those commonly found in mixed conifer forests.

The dark-eyed junco, hermit thrush, and mountain quail nest on the ground in ponderosa pine forests. The olive-sided flycatcher, purple finch, and band-tailed pigeon nest in the tree canopy. Cavity-nesting birds include the pygmy nuthatch, white-breasted nuthatch, and white-headed woodpecker.

The dusky shrew, coast mole, yellow pine chipmunk, golden-mantled ground squirrel, and deer mouse are small mammals that forage on the ground in the ponderosa pine forest. Mule deer and elk may use the ponderosa pine forest as winter range, summer range, or migration corridors. Mammalian predators include the long-tailed weasel, pine marten, coyote, and black bear.

Lodgepole Pine Forest. Lodgepole pine forest occurs along the pipeline route as widely distributed patches in northern Idaho, Washington, and Oregon. Lodgepole pine forest typically consists of pure or nearly pure stands of lodgepole pine. Bitterbrush, wax currant, and Idaho fescue are common understory associates in lodgepole pine forests. Lodgepole pine has a wide physiological tolerance and is often found on poorly drained wet sites or excessively drained dry sites that other trees do not tolerate. Lodgepole pine is also a good "pioneer species," releasing large numbers of seeds, especially after fires, to establish in open areas. Along the pipeline route, lodgepole pine forest occurs as patches within mixed conifer forest and ponderosa pine forest.

Habitat diversity in the lodgepole pine forest is lower than in the mixed conifer and ponderosa pine forests because there is less structural diversity and fewer species of trees; therefore, fewer species of wildlife occur in the lodgepole pine forest. Common amphibians and reptiles that inhabit lodgepole pine forests include the Pacific treefrog and western terrestrial garter snake, respectively.

Spruce grouse and dark-eyed juncos nest on the ground in the lodgepole pine forest. The American robin nests in shrubs, while Clark's nutcracker, Cassin's finch, and pine siskin nest in the canopy of lodgepole pine forests. Cavity-nesting species include the mountain chickadee, mountain bluebird, and northern three-toed woodpecker.

Small mammals that occur in lodgepole pine forests include the northern pocket gopher, lodgepole chipmunk, deer mouse, and snowshoe hare. Western jumping mice, Belding's ground squirrel, and Columbian ground squirrel occur in the moist meadows adjacent to lodgepole forests. These forests provide cover during summer for mule deer and elk. Mammalian predators include black bear, coyote, and mountain lion.

Sagebrush-Steppe. Sagebrush-steppe occurs along the pipeline route in south-central Washington, north-central Oregon, south-central Oregon, and northern California. Sagebrush-steppe supports shrub and grass vegetation dominated by big sagebrush. Common associated shrubs include bitterbrush and tall green rabbitbrush in northern regions and low sagebrush in southern Oregon and northern California. The understory supports grasses common to the Palouse grassland, including bluebunch wheatgrass, Idaho fescue, needle-and-thread grass, and Sandberg's bluegrass. Sagebrush-steppe occurs in regions of hot summers and cold winters with annual precipitation between 8 and 15 inches, falling mostly as snow in winter. At its eastern edge, sagebrush-steppe grades into Palouse grassland in eastern Washington and northern Oregon. Along its western edge and in southern Oregon, sagebrush-steppe grades into ponderosa pine forest and juniper woodland.

The sagebrush-steppe vegetation provides important wildlife habitat for numerous species. Many of these species have developed special adaptations to occupy the dry conditions typical of this vegetation type. Amphibians occurring in the sagebrush-steppe include the western toad and Great Basin spadefoot toad. The western fence lizard, sagebrush lizard, short-horned lizard, western rattlesnake, and gopher snake are common reptiles. Bird species that nest on the ground include sage grouse, common nighthawk, common poorwill, and western meadowlark. Species that nest in shrubs include sage sparrow, Brewer's sparrow, green-tailed towhee, and sage thrasher. The canyon wren, rock wren, and Say's phoebe nest in the small rock outcrops that are scattered throughout the shrub-steppe.

Small mammals include the sagebrush vole, canyon mouse, Ord's kangaroo rat, Great Basin pocket mouse, bushy-tailed woodrat, pygmy rabbit, and black-tailed jackrabbit. Sagebrush-steppe vegetation provides year-round habitat for pronghorn antelope and winter range for mule deer. Mammalian predators include the American badger, gray fox, bobcat, and coyote.

Juniper Woodland. Juniper woodland occurs along the pipeline in central Oregon. This vegetation type supports an overstory of well-spaced western junipers and an understory of sagebrush-steppe vegetation. Juniper woodland occurs in regions of hot summers and cold winters with annual precipitation ranging between 8 and 30 inches, falling mostly as snow in winter. Juniper woodland is the driest tree-dominated vegetation type, occurring where moisture conditions are intermediate between ponderosa pine forest and sagebrush-steppe. Summer temperatures are slightly cooler in juniper woodland than in sagebrush-steppe regions. Juniper woodland abuts ponderosa pine forest and grades into sagebrush-steppe in central Oregon.

Amphibians that inhabit the juniper woodland include the western toad, Great Basin spadefoot toad, and long-toed salamander. The western fence lizard, western rattlesnake, and gopher snake are common reptiles.

The common nighthawk and Townsend's solitaire are birds that nest on the ground in the juniper woodland. Species that nest in shrubs include the gray flycatcher and bushtit. Pinyon jays, black-throated gray warblers, and mourning doves nest in the foliage of juniper trees, while American kestrels, western bluebirds, and northern flickers nest in tree cavities.

Small mammals include the pinyon mouse, Great Basin pocket mouse, bushy-tailed woodrat, and black-tailed jackrabbit. Juniper woodlands provide cover for pronghorn antelope and mule deer. Mammalian predators include gray fox, coyote, and bobcat.

Palouse Grassland. Palouse grassland occurs along the pipeline route in eastern Washington and north-central Oregon. Palouse grassland is a steppe (dry climate grassland) vegetation type. In its original condition, the Palouse grassland was dominated by perennial grasses: bluebunch wheatgrass and Idaho fescue. Sandberg's bluegrass and common snowberry were common associates, along with a large number of perennial herb species. Heavy grazing pressure caused the replacement of native bunchgrasses by such grazing-tolerant, invasive grasses as cheatgrass brome and Kentucky bluegrass. Most of the Palouse grassland vegetation has been replaced by agricultural crops.

Palouse grassland occurs under moister conditions than sagebrush-steppe. Fire was an important ecological factor in maintaining Palouse grassland. Palouse grassland grades into sagebrush-steppe along its western edge and into ponderosa pine and mixed conifer forest along its eastern and northern edges.

Amphibians inhabiting the Palouse grassland include tiger salamander, long-toed salamander, and Great Basin spadefoot toad. The western skink, western fence lizard, terrestrial garter snake, gopher snake, and western rattlesnake are reptiles commonly found in the Palouse grassland.

Birds that commonly occur in the Palouse grassland include the horned lark, western meadowlark, ring-necked pheasant, vesper sparrow, and California quail. Small mammals include the deer mouse, northern pocket mouse, bushy-tailed woodrat, Washington ground squirrel, and black-tailed jackrabbit. Predatory mammals include the badger and coyote.

Agricultural and Developed Land. Most of what was once Palouse grassland is now in agricultural use. Row crops, irrigated pasture, and orchards occur on the rich soils and level terrain of Washington, and Oregon grassland regions. Land developed for residential, commercial, and industrial uses is increasing along the pipeline route. Most of this land is converted agricultural land.

Agricultural fields and developed land provide limited habitat for wildlife. Most use occurs as feeding along the edge between wildland habitat and agricultural fields. Raptors may utilize these areas as hunting grounds.

Wetland and Riparian Habitats

Wetland and riparian habitats occur within the various vegetation types listed above, and were identified through the review of FWS NWI maps and aerial photography. Specific locations of these habitats are listed in Appendix E-2. Subclasses of wetland and riparian habitat found along the route are described below.

Wet Meadows. Sites with perennial or nearly perennial high soil moisture support wet meadow vegetation. Wet meadows dominated by rushes and sedges occur within all of the vegetation types. Saltgrass and alkali cordgrass-dominated meadows occur in the Palouse grassland and sagebrush-steppe.

Wet meadows, ephemerally wet swales, and herbaceous riparian wetlands may provide habitat for most amphibians, waterfowl, and shorebirds.

Ephemerally Wet Swales. Ephemerally wet swales occur in oak woodland and grassland. These seasonal wetlands support grasses and forbs able to survive saturated soil conditions in addition to a prolonged dry season. Common species include ryegrass, Mediterranean barley, and curly dock.

Freshwater Marsh. Freshwater marsh occurs along the pipeline route in several places and cattails and tules are the dominant species. Freshwater marsh occurs on sites with standing water through much or all of the year and perennial soil saturation.

Herbaceous Riparian. Herbaceous riparian occurs at river, stream, and canal crossings along the entire pipeline route. Herbaceous riparian includes emergent and streamside herbaceous vegetation. Smartweeds, rushes, sedges, spikerushes, wormwood, and willow-herbs are common streamside species.

Riparian Scrub. Riparian scrub occurs at river, stream, and canal crossings. Riparian scrub vegetation is characterized by dense thickets of shrubs and brambles. Dominant species include sandbar willow, arroyo willow, California blackberry, and Himalaya berry.

Riparian scrub provides habitat for lesser goldfinches, house finches, western flycatchers, deer mice, brush rabbits, and gray foxes.

Riparian Forest. Riparian forest occurs along the pipeline route at river and stream crossings. Riparian forest is dominated by Fremont cottonwood, valley oak, and Gooding's willow. Associated trees include red willow, California box-elder, and Oregon ash.

Riparian forests provide habitat for numerous species of wildlife, including yellow warbler, belted kingfisher, wood duck, Cooper's hawk, long-eared owl, beaver, striped skunk, raccoon, and several species of bats.

Idaho

In Idaho, the pipeline route would cross mixed conifer forest, ponderosa pine forest, and lodgepole pine forest.

Special-Status Plant Species. Special-status plant species with the potential to occur along the pipeline route are shown in Appendix E-1.

Wetlands and Riparian Habitat. Wetlands and riparian habitat that would be crossed by the pipeline route in Idaho are given in Table 3E-1 and in Appendix E-2. Riparian forest, 50-1000 feet wide, occurs at the first, sixth, and seventh crossings of the Moyie River.

Special Native Plant Communities. ~~No special native plant communities would be crossed by the pipeline route in Idaho.~~ A natural remnant of the original Idaho fescue-dominated Rathdrum Prairie would be crossed near MP 102.

Special-Status Wildlife Species. ~~Nine~~ Eleven special-status wildlife species potentially occur in the vicinity of the proposed pipeline route in Idaho; their status and habitat requirements are described in Table 3E-3. Exact locations of occurrence, where known, are not provided in this document in order to protect the reference species from increased disturbance.

Woodland Caribou. Woodland caribou use the western portion of Boundary County and the Selkirk Mountains in Idaho, several miles west of the proposed pipeline route (Compton personal communication) Although this species may have formerly wintered along the Moyie River, the portion of the proposed pipeline along the Moyie (MP 0.0-20.9) is not considered caribou habitat (Compton, personal communication).

Important Habitat for Game Species. The proposed pipeline route would cross important habitat for moose, Rocky Mountain elk, mule deer, white-tailed deer, black bear, mountain lion, ruffed grouse, blue grouse, spruce grouse, Hungarian partridge, ring-necked pheasant, wild turkey, and waterfowl (Hanna, personal communication). This habitat is identified in Table 3E-4.

Moose, Mule Deer, and White-Tailed Deer. Moose occur primarily in mixed coniferous forests containing lakes and swamps. They are known to occur year round along the entire length of the proposed pipeline in this state. Mule deer occur in mixed conifer, ponderosa pine, and lodgepole pine forests. White-tailed deer are a common, year-round resident along the entire length of the proposed pipeline in this state (Hanna, personal communication). Important habitat for these species occurs along the Moyie River and from Cocolalla Lake to the Idaho-Washington border (Hansen, 1986).

Rocky Mountain Elk. Rocky Mountain elk occupy the semi-open mixed coniferous, ponderosa pine, and lodgepole pine forests of Idaho, and occur year round from the Idaho-British Columbia border to Rathdrum along the proposed pipeline route (Hanna, personal communication).

Black Bear. Black bears prefer forested or wooded habitats. They are known to occur from the British Columbia border to Rathdrum along the proposed pipeline route, most commonly along the Moyie River section (Hanna, personal communication).

Mountain Lion. Mountain lions occupy forested mountainous areas and semiwooded canyon areas frequented by deer. Mountain lions occur from the British Columbia border to Rathdrum along the proposed pipeline route, most commonly along the Moyie River section (Hanna, personal communication).

Table 3E-3

SPECIAL-STATUS SPECIES WHICH POTENTIALLY OCCUR IN THE VICINITY OF PGT/PG&E ROUTES

Common	Scientific Name	Legal Status[a/] Federal/State	Distribution (county)	Habitat
IDAHO				
Mammals				
Gray wolf	*Canis lupus*	E/--	Boundary, Bonner, Kootenai	Adaptable to several types of habitat but primarily utilizes undisturbed, mixed coniferous forests
Grizzly bear	*Ursus arctos horribilis*	T/--	Boundary	Remote forested mountain areas with dense shrubs
Townsend's big-eared bat	*Plecotus townsendii pallescens*	C2/--	Boundary	Caves, abandoned mine shafts, and cliff crevices
Wolverine	*Gulo gulo luscus*	C2/--	Boundary, Bonner, Kootenai	Mixed conifer, ponderosa pine, and lodgepole pine forests
North American lynx	*Felis lynx canadensis*	C2/--	Boundary, Bonner	Dense mixed conifer and lodgepole pine forests
Birds				
Bald eagle	*Haliaeetus leucocephalus*	E/--	Boundary	Nests and roosts in coniferous forests within 1 mile of the edge of lakes, reservoirs, or rivers
American peregrine falcon	*Falco peregrinus anatum*	E/--	Boundary	Protected ledges of high cliffs, usually adjacent to marshes, lakes, or rivers that support abundant bird populations
Harlequin Duck	*Histrionicus histrionicus*	FS/--	Boundary	Larger rivers with isolated backwaters and islands for nesting
White-faced ibis	*Plegadis chihi*	C2/--	Kootenai	Freshwater marshes with tules, cattails, and rushes; may nest in trees and forage in flooded agricultural fields
Upland Sandpiper	*Bartramiz longicauda*	FS/--	Kootenai	Open, wet grasslands and meadows.

Table 3E-3
(continued)
SPECIAL-STATUS SPECIES WHICH POTENTIALLY OCCUR IN THE VICINITY OF PGT/PG&E ROUTES

Common	Scientific Name	Legal Status[a/] Federal/State	Distribution (county)	Habitat
Amphibians				
Coeur D'Alene Salamander	*Plethodon idahoensis*	C3c, FS/--	Boundary	Rocky areas near springs and seeps located below 5,000 feet elevation.
		WASHINGTON		
Mammals				
Pygmy Rabbit	*Brachylagus idahoensis*	FS/T	Douglas County	Sagebrush, bitterbrush, and pine-juniper habitats in the Great Basin.
Townsend's big-eared bat	*Plecotus townsendii pallescens*	C2/WPT	Whitman, Walla Walla	Caves, abandoned mine shafts, and cliff crevices
Birds				
Bald eagle	*Haliaeetus leucocephalus*	T/T	Walla Walla	Nests and roosts in coniferous forests within 1 mile of the edge of lakes, reservoirs, or rivers
American peregrine falcon	*Falco peregrinus anatum*	E/E	Whitman, Walla Walla	Protected ledges of high cliffs, usually adjacent to marshes, lakes, or rivers that support abundant bird populations
Swainson's hawk	*Buteo swainsoni*	C2/WSC	Whitman, Walla Walla, Columbia	Nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands or irrigated fields
Ferruginous hawk	*Buteo regalis*	C2/T	Whitman, Walla Walla	Open grasslands in the valleys and lower foothills
Western sage grouse	*Centrocercus urophasianus phaios*	C2/WSC	Walla Walla	Sagebrush plains
Long-billed curlew	*Numenius americanus*	C2/PM	Whitman, Walla Walla	Freshwater or brackish marshes adjacent to agricultural fields, irrigated pastures, and meadows
Greater sandhill crane	*Grus canadensis tabida*	--/E	Whitman, Walla Walla	Shallow water adjacent to agricultural areas providing rice, barley, sorghum, or corn
Upland sandpiper	*Bartramia longicauda*	--/E	Spokane	Open, wet grasslands and meadows

Table 3E-3
(continued)
SPECIAL-STATUS SPECIES WHICH POTENTIALLY OCCUR IN THE VICINITY OF PGT/PG&E ROUTES

Common	Scientific Name	Legal Status[a/] Federal/State	Distribution (county)	Habitat
American white pelican	*Pelecanus erythrorhynchos*	–/E	Walla Walla	Nests of islands in large freshwater lakes and rivers; nonbreeding visitor to large interior lakes
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	C2/WSC	Whitman, Walla Walla	Grasslands, prairies, and grain or hay fields
Golden eagle	*Aquila chrysaetos*	Pr/–		Remote, open grasslands.
		OREGON		
Mammals				
California wolverine	*Gulo gulo luteus*	C2/T	Deschutes, Klamath	Coniferous timbered areas, especially in the mountains
Townsend's big-eared bat	*Plecotus townsendii pallescens*	C2/OSC	Gilliam, Sherman, Crook, Deschutes, Klamath	Caves, abandoned mine shafts, and cliff crevices
Pygmy rabbit	*Brachylagus idahoensis*	FS/OSC		Sagebrush, bitterbrush, and pine-juniper habitats
Washington ground squirrel	*Spermophilus washingtoni*	FS/OSC		Grassland, sagebrush, wheatfields, rocky hillsides
California bighorn sheep	*Ovis canadensis californiana*	C2/–	Gilliam	Open slopes near cliffs and rocky ridges
Kit fox	*Vulpes velox nevadensis*	–/T	Klamath	Friable soils in sagebrush steepe
Birds				
Bald eagle	*Haliaeetus leucocephalus*	T/T	Jefferson, Crook, Deschutes, Klamath	Nests and roosts in coniferous forests within 1 mile of the edge of lakes, reservoirs, or rivers
American peregrine falcon	*Falco pergrinus anatum*	E/E	Gilliam, Sherman, Klamath	Protected ledges of high cliffs, usually adjacent to marshes, lakes, or rivers that support abundant bird populations
Golden eagle	*Aquila chrysaetos*	Pr/–		Remote, open grasslands

Table 3E-3
(continued)
SPECIAL-STATUS SPECIES WHICH POTENTIALLY OCCUR IN THE VICINITY OF PGT/PG&E ROUTES

Common	Scientific Name	Legal Status[a/] Federal/State	Distribution (county)	Habitat
Burrowing owl	*Athene cunicularia*	FS/OSC		Open dry grasslands, prarie, and desert
Swainson's hawk	*Buteo swainsoni*	C2/OSC	Morrow, Sherman, Gilliam, Wasco, Jefferson, Crook	Nests in oaks or cottonwoods in or near riparian habitats; forages in grasslands on irrigated fields
Greater sandhill crane	*Grus canadensis tabida*	FS/OSC		Wet meadows, shallow lacustrine and emergent wetlands
Western snowy plover	*Charadrius alexandrinus nivosus*	C2/T	Klamath	Rarely found on alkali flats and lake shores in the arid interior
Ferruginous hawk	*Buteo regalis*	C2/OSC	All	Open grasslands in the valleys or lower foothills
Western sage grouse	*Centrocercus urophasianus phaios*	C2/OSC	All, except Jefferson, Crook, Deschutes	Sagebrush plains
Long-billed curlew	*Numenius americanus*	C2/OSC	Umatilla, Morrow, Jefferson, Klamath	Freshwater or brackish marshes adjacent to agricultural fields, irrigated pastures, and meadows
Tricolored blackbird	*Agelaius tricolor*	C2/OSC	Klamath	Cattail or tule marshes for nesting; forages in fields and meadows
Greater sandhill crane	*Grus canadensis tabida*	--/OSC	Umatilla, Jefferson, Klamath	Shallow water adjacent to agricultural areas providing grain crops
Reptiles				
Southwestern pond turtle	*Clemmys marmorata*	C2/OSC	Klamath	Marshes, ponds, sloughs, and slow-moving poritons of rivers and creeks
CALIFORNIA (Federal-listed Species Only)				
Mammals				
San Joaquin kit fox	*Vulpes macrotis mutica*	E/T	Contra Costa, Alameda, San Joaquin, Merced, Fresno	Saltbush scrub, valley grassland, oak woodland, and freshwater scrub

Table 3E-3
(continued)
SPECIAL-STATUS SPECIES WHICH POTENTIALLY OCCUR IN THE VICINITY OF PGT/PG&E ROUTES

Common	Scientific Name	Legal Status[a/] Federal/State	Distribution (county)	Habitat
Giant kangaroo rat	*Dipodomys ingens*	E/E	Merced, Fresno	Uncultivated, sandy-loam soils with sparse vegetation; prefers level or gently sloping sites
Birds				
Bald eagle	*Haliaeetus leucocephalus*	E/E	Siskiyou, Shasta	Nests and roosts in coniferous forests within 1 miles of the edge of lakes, reservoirs, or rivers
American peregrine falcon	*Falco peregrinus anatum*	E/E		Protected ledges of high cliffs, usually adjacent to marshes, lakes, or rivers that support abundant bird populations
California condor	*Gymnogyps californianus*	E/E		Nests in rocky cliffs adjacent to chaparral-covered mountains; forages in grasslands
Northern spotted owl	*Strix occidentalis caurina*	T/--	Shasta	Multistoried coniferous and hardwood forests
Reptiles				
Blunt-nosed leopard lizard	*Gambelia silus*	E/E	Merced, Fresno	Sandy soils preferred, but also found in coarse gravelly soil and hardpan areas
Insects				
Delta green ground beetle	*Elaphrus viridus*	T/--	Solzno	Native grasslands, vernal pools
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T/--	Solzno	Riparian habitat with associated elderberry shrubs

Table 3E-3
(continued)
SPECIAL STATUS SPECIES WHICH POTENTIALLY OCCUR IN THE VICINITY OF PGT/PG&E ROUTES

[a] Status definitions:

Federal: U.S. Fish and Wildlife Service (USFWS) (50 CFR 17.12; 55 FR 6184, February 21, 1990)

E = listed as endangered under the Federal Endangered Species Act
PE = proposed for listing as endangered
PT = proposed for listing as threatened
C1 = a candidate species under review for federal listing. Category 1 includes species for which the USFWS has substantial information on biological vulnerability and threats to support the appropriateness of proposing to list them as threatened or endangered
C2 = a candidate species under review for federal listing. Category 2 includes species for which the USFWS as threatened or endangered is possibly appropriate but for which further biological research and field study are needed to determin biological vulnerability and threats
C3c = plants previously considered and included on past lists but currently considered too widespread or not threatened and so not presently considered for listing
FS = Forest Service-listed sensitive species

State: California Department of Fish and Game (1989)

E = listed as endangered under the state Endangered Species Act
R = listed as rare under the state Endangered Species Act

NHP: Idaho, Washington, and Oregon Natural Heritage Program listings

Idaho: Idaho Natural Heritage Program 1989

INPS 2 = Idaho Native Plant Society priority level 2 - threatened

Washington: Washington Department of Natural Resources Natural Heritage Program 1989

WE = endangered in Washington
WS = sensitive; not presently threatened or endangered
WT = threatened in Washington
WX = possibly extirpated from Washington

Oregon: Oregon Natural Heritage Program Database, 1989

OC = threatened or endangered in Oregon but more common or stable elsewhere
OE = endangered in Oregon and elsewhere
OR = review list
OS = limited in abundance throughout range but currently stable
OT = threatened in Oregon and elsewhere
OX = possibly extinct or extirpated

Upland Game Birds. Ruffed grouse inhabit dense coniferous and deciduous stands and edges of clearings from low to intermediate elevations. They are common residents along the proposed pipeline route from the Canada-U.S. border to Rathdrum. Blue grouse occur occasionally along the Moyie River, preferring semi-open subalpine areas. Spruce grouse occupy semiopen coniferous mountain areas and occur rarely along the Moyie River. Hungarian partridges and ring-necked pheasants inhabit meadows and agricultural areas and occur infrequently along the proposed pipeline route from Rathdrum to the Idaho-Washington border (Hanna, personal communication).

Wild Turkey. Wild turkeys were introduced in Idaho in the 1960s. This species prefers open forests containing frequent clearings. Wild turkeys are common residents along the proposed pipeline route in the open agricultural areas immediately north and west of Moyie Springs (Hanna, personal communication).

Waterfowl. Waterfowl nesting habitat within the proposed pipeline vicinity exists along marshes associated with Round Prairie Creek and along Cocolalla Creek, which floods seasonally. General summer waterfowl use areas include Cocolalla and Granite Lakes (Hanna, personal communication).

Washington

In Washington, the pipeline would cross mixed conifer forest, lodgepole pine forest, ponderosa pine forest, sagebrush-steppe, and Palouse grassland.

Special-Status Plant Species. Special-status plant species with the potential to occur on the pipeline route are listed in Appendix E-1.

Wetlands. The pipeline route would cross 10 wetlands in Washington for a total distance of 1,000 feet (see Table 3E-1 and Appendix E-2). Rock Spring Gulch (MP 193.9) supports a narrow band of riparian forest.

Special Native Plant Communities. No special native plant communities occur along the route in Washington.

Special-Status Wildlife Species. ~~Eleven~~ Thirteen special-status wildlife species were identified as potentially occurring along the proposed pipeline route in Washington; their status, distribution, and habitat requirements are described in (Table 3E-3).

Important Habitat for Game Species. The proposed pipeline route passes through potential habitat for mule deer, white-tailed deer, upland game birds, and waterfowl. This habitat is identified in Table 3E-4.

Table 3E-4

IMPORTANT HABITAT FOR GAME SPECIES THAT WOULD BE CROSSED BY THE PGT ROUTE IN IDAHO, WASHINGTON, AND OREGON

Game Animal	Seasonal Use	Geographic Landmark	Mileposts
IDAHO			
Mule deer, white-tailed deer and elk	Winter range	Moyie River Valley Cocolalla Creek	0-20.9 72.6-78.0
Waterfowl	Nesting	Moyie River Valley Cocolalla Creek	10.3-13.0 72.6-78.0
WASHINGTON			
Mule deer and white-tailed deer	Fawning areas	Rock Spring Gulch Unnamed canyon Woody Gulch Unnamed canyon	194 195 196.5 231
Upland game birds	Nesting areas	Rock Spring Gulch Unnamed canyon Woody Gulch Unnamed canyon Wallula Habitat Management Unit	194 195 197.3 231 254.0-254.5
Waterfowl	Summer range and nesting areas	Wallula Habitat Management Unit	254.0-254.5

Table 3E-4
(continued)
IMPORTANT HABITAT FOR GAME SPECIES THAT WOULD BE CROSSED
BY THE PGT ROUTE IN IDAHO, WASHINGTON, AND OREGON

Game Animal	Seasonal Use	Geographic Landmark	Mileposts
OREGON			
Rocky Mountain elk	Summer range	Macken Canyon to Oregon-California border	372-612
	Winter range	Macken Canyon to Bakeoven Road	372-381
		Crawford Butte to Hildebrand	563-590
Mule deer	Winter range	Thirtymile Canyon to Hannafin and Burned Out Canyons	6-19[a]
		Burned Out Canyon to Daughtery Canyon	367-369
		Macken Canyon to Little Thorn Hollow	372-378
		Buck Hollow	374-376
		Cow Canyon to Northern Jefferson County	393-401
		Jefferson-Wasco County border to Lone Pine Flat	397-428
		O'Neil to Bend Airport	434-449
		South Bend to Lava Butte	459-466
		Crawford Butte to Hildebrand	563-590
		South Hildebrand to Alkali Lake	591-596
		Harpold Dam to Oregon-California border	599-612

Table 3E-4
(continued)
IMPORTANT HABITAT FOR GAME SPECIES THAT WOULD BE CROSSED
BY THE PGT ROUTE IN IDAHO, WASHINGTON, AND OREGON

Game Animal	Seasonal Use	Geographic Landmark	Mileposts
Mule deer (continued)	Migration corridors	Parky Springs to Buck Butte Lone Pine Flat Deschutes-Crook County border to Bend Airport Lava Butte to Gilchrist (several narrow corridors) Crescent to Soloman Butte	412-413 426-427 439-449 466-500 503-554
Pronghorn antelope	Summer and summer range	Macken Canyon to Buck Hollow Little Thorn Hollow along Ward Creek	372-378 378-386
	Spring and winter range	Mud Springs Creek to Madras Compressor Station	417-425
	Migration corridors	Rimrock Springs Wildlife Management Area to Madras Compressor Station Beaver Marsh to Lenz	417-425 527-540
Upland game birds	Nesting areas	Trout Creek Crooked River	397-398 432-433
Water fowl	Nesting areas	Umatilla Meadows Trout Creek Crooked River	283-285 397-398 432-433

a/ These are mileposts within the proposed John Day Canyon route variation.

Mule Deer and White-Tailed Deer. Mule deer occur in several types of habitat, including coniferous forests, sagebrush-steppe, and grasslands. Important fawning habitat occurs in the brushy draws crossed by the proposed pipeline route from Union Creek to the Walla Walla River (Gruenwald, personal communication).

White-tailed deer inhabit forests and nearby meadows and fields. These deer occur year round along the pipeline route in the lowlands along the Walla Walla River (Gruenwald, personal communication).

Upland Game Birds. Important nesting habitat for upland game birds occurs in the brushy draws crossed by the proposed route from Union Creek to the Walla Walla River (Gruenwald personal communication). This area also includes the Wallula Habitat Management Unit on the Walla Walla River, which is managed, in part, for upland game birds (Sunday, personal communication).

Waterfowl. Important waterfowl nesting habitat occurs at the Wallula Habitat Management Unit on the Walla Walla River (Sunday, personal communication).

Oregon

In Oregon, the pipeline would cross mixed conifer forest, lodgepole pine forest, ponderosa pine forest, sagebrush-steppe, Palouse grassland, and juniper woodland.

Special-Status Plant Species. Special-status plant species with the potential to occur on the pipeline route are given in Appendix E-1.

Wetlands. The pipeline route would cross 39 wetlands in Oregon for a total distance of 7,225 feet (see Table 3E-2 and Appendix E-2).

Special Native Plant Communities. Bluebunch wheatgrass-Sandberg bluegrass prairie and bitterbrush-Sandberg bluegrass association occur at The Nature Conservancy's Lindsay ~~Grassland~~ Prairie Preserve near MP 307.

Special-Status Wildlife Species. ~~Fourteen~~ Nineteen special-status wildlife species were identified as potentially occurring along the proposed pipeline route in Oregon; their status, distribution, and habitat requirements are described in (Table 3E-3).

Northern Spotted Owl (Threatened). Potential impacts on the northern spotted owl were not analyzed in Oregon. No suitable northern spotted owl habitat occurs along the proposed pipeline route, and no spotted owl pairs are known to exist within one mile of the alignment (Mueller, Becker, Hescock, Lockman, Floyd, Zarnowitz, personal communications). A spotted owl was observed flying across a road near MP 581 in 1981; however, this area was surveyed for spotted owls in 1989 and no owls were located (Hescock, personal communication). Habitat in this area is presently considered unsuitable for spotted owls (Hescock, Okula, personal communications). The Oregon NHDB has no records of spotted owl occurrences within the project vicinity. The pipeline would not cross any habitat conservation areas (Thomas et al., 1990).

Important Habitat for Game Species. The proposed pipeline route would cross important habitat for Rocky Mountain elk, mule deer, pronghorn, upland game birds, and waterfowl. This habitat is identified in Table 3E-4.

Rocky Mountain Elk. Rocky Mountain elk occupy semiopen mixed coniferous and ponderosa pine forests in the mountains, foothills, and plains. Elk winter range occurs in Wasco County from Macken Canyon to Bakeoven Road (Torland, personal communication) and in southern Klamath County from Crawford Butte to Hildebrand (Opp, personal communication). Summer range occurs infrequently along the proposed pipeline route from Macken Canyon to the Oregon-California border (Opp, Toman, George, Concannon, personal communications).

Mule Deer. Mule deer occur in several habitats, including coniferous forests, sagebrush-steppe areas, and grasslands. Potential habitat for mule deer exists along the entire proposed alignment in Oregon. Important winter ranges occur along the proposed alignment (Torland, personal communication). Important migration corridors occur between Parky Springs and Buck Butte, along Lone Pine Flat, between the Deschutes-Crook County border and Bend, between Lava Butte and Gilchrist, and between Crescent and Soloman Butte (Opp, Toman, George, Concannon, personal communications).

Pronghorn. Pronghorn inhabit sagebrush-steppe areas and juniper woodlands. Antelope spring and summer ranges occur between Macken Canyon and Buck Hollow and Little Thorn Hollow along Ward Creek (Torland, personal communication). Summer and winter range for this species occurs between Mud Springs Creek and the Madras Compressor Station (Concannon personal communication). Fawning and wintering areas occur in Sherman and Wasco Counties between Macken Canyon and Little Thorn Hollow and in Buck Hollow (Torland, personal communication). Important migration corridors occur between the Rimrock Springs Wildlife Management Area (WMA) and the Madras Compressor Station (Concannon, personal communication), and between Beaver Marsh and Lenz (Opp, Toman, personal communications).

Upland Game Birds. Upland game birds include western sage grouse, California quail, chukar, Hungarian partridge, and ring-necked pheasant. Western sage grouse inhabit sagebrush-steppe areas. California quail occupy brush patches and fields of semi-open to open areas. Chukars inhabit open, barren, rocky slopes in sagebrush-steppe areas. Hungarian partridges and ring-necked pheasants occupy meadows and agricultural areas within the sagebrush-steppe areas of Oregon. The proposed route would cross important nesting habitat for upland game birds at Trout Creek and the Crooked River (Elliot, personal communication).

Waterfowl. Waterfowl habitat along the proposed alignment occurs in the Rimrock Springs WMA (Concannon personal communication). Important waterfowl nesting habitat would be crossed at Umatilla Meadows, Trout Creek, and the Crooked River (Table-3E-4) (Black, Elliot, personal communications).

California - PG&E's Nonjurisdictional Facilities

In California, the pipeline route would cross sagebrush-steppe, ponderosa pine forest, mixed conifer forest, juniper woodland, oak woodland, and Central Valley grassland.

Special-Status Plant Species. ~~Special status~~ Federal-listed plant species with the potential to occur along the pipeline route in California are listed in Appendix E-1.

Special-Status Wildlife Species. Federal-listed s~~S~~pecies that were identified in the FWS letter (Kobetich personal communication) that do not occur along the proposed pipeline route in California were eliminated from additional study. These species and the reasons for their deletion follow.

Tipton Kangaroo Rat (Endangered). The Tipton kangaroo rat would not be affected by construction or operation of the pipeline because its entire range (Williams, 1985) is south of the project terminus in Fresno County.

~~**Western Snowy Plover (Candidate 2).** The western snowy plover occurs at large, inland alkaline lakes (Small 1974), and the proposed pipeline would not cross this habitat.~~

~~**Townsend's Big-Eared Bat (Candidate 2).** The proposed pipeline route is not within the range of Townsend's big-eared bat, which occurs in the humid coastal forests of California (Hall 1981).~~

~~**Spotted Bat (Candidate 2).** The proposed pipeline route is not within the range of the spotted bat, which occurs in the foothills of the southern Sierra Nevada and southeastern deserts of California (Jameson and Peeters 1988).~~

~~**Mohave Ground Squirrel (Candidate 2).** The proposed pipeline route is not within the range of the Mohave ground squirrel that occurs in the Mojave Desert (Hall 1981).~~

~~**San Joaquin Woodrat (Candidate 2).** The San Joaquin woodrat is known to occupy dense riparian habitat at the confluence of the San Joaquin, Stanislaus, and Tuolumne Rivers (Williams 1986) and may also occur in Cow Hollow on the west side of the San Joaquin Valley (Williams 1986, NDDB 1989). The project would not affect the Corral Hollow population because the pipeline would be located in annual grassland and not in dense riparian habitat.~~

~~**San Joaquin Dune Beetle (Candidate 2).** The San Joaquin dune beetle occupies sand dunes in the Ciervo Hills and Jaclitos Canyon in western Fresno County, and the Kettleman Hills in northwestern Kings County (Doyen 1976, Schreiner 1978). The proposed pipeline route would not cross any known habitat, nor would it cross any other sand dunes in the San Joaquin Valley.~~

~~**Ciervo Aegilian Scarab Beetle (Candidate 2).** The Ciervo aegilian scarab beetle occupies sand dunes from Antioch, Contra Costa County, south along the inland side of the Coast Ranges to Kettleman Hills in Fresno County (Nagano personal communication). The proposed pipeline route would not cross any sand dunes within the range of this species.~~

~~Numerous species of invertebrates, listed as Candidate 2 species, occur in the Antioch sand dunes. These include the Antioch cophuran robberfly, Antioch efferian robberfly, Antioch multilip wasp, yellow-banded andrenid bee, red-headed sphecid wasp, and Middlekauf's shieldback katydid. These species are restricted to sand dunes (Nagano personal communication) and would not be affected by the proposed project because it would not cross any sand dunes.~~

~~Special-status~~ Federal-listed species ~~with the potential to be affected~~ that may occur in the vicinity of ~~by~~ the proposed project are identified in Table 3E-3.

ALTAMONT PROJECT

Vegetation Types and Associated Wildlife

In the following analysis, the natural vegetation along the Altamont pipeline route was subdivided into four broadly defined vegetation types: mixed-grass prairie, eastern ponderosa pine forest, saltbush-greasewood shrub, and sagebrush-steppe (Kuchler, 1985, Barbour and Billings, 1988; Altamont, 1989b). A variety of wetland and riparian habitats, as well as agricultural and developed areas, occur within these vegetation types.

Wildlife species that occur along the proposed Altamont natural gas pipeline route were identified using reports that described the biological resources along the pipeline. Relevant literature describing the distribution of wildlife and their habitats (Stebbins, 1985; Burt and Grossenheider, 1976; Maser, Thomas, and Anderson, 1986; Clark and Stromberg, 1987), discussions with biologists familiar with species that occurred along the pipeline, and surveys conducted between March 20 and April 20, 1990 (Westec, 1990).

Mixed-Grass Prairie. Mixed-grass prairie occurs along the pipeline route through most of Montana and in northern Wyoming. Mixed-grass prairie is dominated by perennial grasses, including wheatgrasses, needlegrasses, and grama grasses. These grasses are accompanied by a great diversity of forbs. Most of the mixed-grass prairie has been replaced by agriculture, and the remainder is used for rangeland.

Mixed-grass prairie occurs in regions with cold, dry, windy winters, and hot, droughty summers. Precipitation is typically 14-20 inches per year, mostly falling in spring and as intense thunderstorms in summer. Mixed-grass prairie grades into Douglas-fir and ponderosa pine forests at higher elevations where precipitation is greater. In drier areas, shrub communities replace mixed-grass prairie at its southwest edge.

Amphibians and reptiles that occur in the mixed-grass prairie vegetation type include the Great Plains toad, plains spadefoot toad, short-horned lizard, wandering garter snake, and prairie rattlesnake.

These grasslands, and interspersed grain fields, provide nesting habitat for the gray partridge, horned lark, long-billed curlew, common nighthawk, upland sandpiper, and western meadow lark. Ring-necked pheasant nest where moist coulees or riparian areas cross the upland prairies. The Swainson's hawk, northern harrier, and short-eared owl are raptors that prey on small mammals and insects that occur in these grasslands.

Mammals that commonly occur in the mixed-grass prairie vegetation type include the deer mouse, Wyoming pocket mouse, prairie vole, black-tailed jackrabbit, black-tailed prairie dog, and American badger. Brushy coulees and riparian areas provide thermal and escape cover for mule deer and white-tailed deer that feed in the adjacent native prairies and agricultural fields. Rocky Mountain elk and mule deer winter range occurs at the higher elevations of this vegetation type adjacent to the Pryor and Beartooth Mountain ranges in Montana.

Three subtypes of mixed-grass prairie that would be traversed by the pipeline can be distinguished, including grama-needlegrass-wheatgrass, foothills prairie, and wheatgrass-needlegrass-shrubsteppe. These vegetation subtypes support the wildlife described for mixed-grass prairie.

Grama-Needlegrass-Wheatgrass. This association occurs on rolling terrain from the Canada-U. S. border to the uplands north of the Yellowstone River. Dominant grasses include blue grama, needle-and-thread, western wheatgrass, Sandberg's bluegrass, and prairie junegrass.

Foothills Prairie. In foothill areas, a mix of prairie and mountain species are associated as foothill prairie. Dominant grasses are typically bluebunch wheatgrass and needle-and-thread. Idaho fescue becomes an important cover component at higher elevations.

Wheatgrass-Needlegrass-Shrubsteppe. Big sagebrush and winter fat occur as an overstory to western wheatgrass and needle-and-thread in wheatgrass-needlegrass-shrubsteppe. This association is intermediate between prairie and shrub vegetation.

Eastern Ponderosa Pine Forest. Eastern ponderosa pine forest occurs along the pipeline route in south-central Montana. Eastern ponderosa pine forest supports a sparse overstory of ponderosa pine and rocky mountain juniper. The understory supports grasses and forbs of the mixed-grass prairie along with such shrubs as skunkbush sumac and snowberry. Eastern ponderosa pine forest occurs at high elevations where precipitation is greater than in the mixed-grass prairie. The eastern ponderosa pine forest grades into mixed-grass prairie on all sides.

The northern leopard frog, spotted frog, and gopher snake are representative of the amphibians and reptiles that occur in the eastern ponderosa pine forests. The dark-eyed junco, hermit thrush, and wild turkey nest on the ground in these forests. The red-crossbill, gray jay, and red-tailed hawk nest in the tree canopy. Cavity-nesting birds include the white-breasted nuthatch, Williamson's sapsucker, and three-toed woodpecker.

Small mammals that commonly occur in the eastern ponderosa pine forest include the dusky shrew, deer mouse, northern pocket gopher, yellow pine chipmunk, and golden-mantled ground squirrel. These relatively open forests and associated rugged terrain provide excellent year-round habitat for mule deer. Mammalian predators include the raccoon, coyote, bobcat, and black bear.

Saltbush-Greasewood Shrub. Saltbush-greasewood shrub occurs along the pipeline route in northern Wyoming and reaches into extreme southern Montana. Saltbush-greasewood shrub supports a generally sparse cover of shrubs dominated by several saltbush species, greasewood, big sagebrush, and rabbitbrush. The understory supports a sparse cover of grasses and forbs typical of mixed-grass prairie. Saltbush-greasewood shrub occurs in arid, saline, or alkaline regions. The soils are often heavy clays with some areas of seasonally high water tables. The rain shadow of the Beartooth and Absaroka Mountains limits precipitation to 6-10 inches per year. Saltbush-greasewood shrub is bounded by wheatgrass-needlegrass-shrubsteppe to the north and sagebrush-steppe to the west, south, and east.

Amphibians and reptiles that occur in the sagebrush-steppe include the Great Basin spadefoot toad, sagebrush lizard, gopher snake, and prairie rattlesnake. Other wildlife species that commonly occur in the saltbush-greasewood shrub also occur in the sagebrush-steppe. Lower densities of wildlife populations occur in this habitat compared to the sagebrush-steppe habitat because the higher alkaline condition in the saltbush-greasewood shrub habitat result in lower productivity of cover and forage for wildlife. Mule deer and pronghorn may feed in this habitat, but they also depend on the interspersed sagebrush, Utah juniper, and mountain mahogany for cover and forage.

Sagebrush-Steppe. Sagebrush-steppe occurs along the pipeline route in southwest Wyoming. Sagebrush-steppe supports shrub and grass vegetation dominated by big sagebrush and black sagebrush. Saltbush is a common associated species along with other shrubs, grasses, and forbs. On sandy sites, yucca, needle-and-thread, and dryland sedge species are associated with big sagebrush. On steep slopes, Utah juniper, limber pine, and curl-leaf mountain mahogany are associated with big sagebrush. Sagebrush-steppe occurs in regions of low precipitation (6-10 inches per year) in the rain shadow of the Rocky Mountains. Sagebrush-steppe is bounded to the west by lodgepole pine, Englemann spruce, and Douglas fir forests and to the east and north by mixed-grass prairie. Saltbush-greasewood shrub occurs within regions of sagebrush-steppe.

Amphibians and reptiles that occur in sagebrush-steppe are similar to those that occur in the saltbush-greasewood shrub. Birds that nest on the ground include the sage grouse, common poor will, western meadowlark, and northern harrier. Species that nest in the shrubs include the sage sparrow, Brewer's sparrow, green-tailed towhee, and sage thrasher. The canyon wren, rock wren, and Say's phoebe nest in the small rock outcrops that are scattered throughout the sagebrush-steppe. Ferruginous hawks, golden eagles, and burrowing owls are raptors that occur in the sagebrush-steppe vegetation type. Small mammals include the sagebrush vole, Ord's kangaroo rat, northern grasshopper mouse, desert cottontail, and white-tailed prairie dog. The coyote and bobcat are common mammalian predators. The sagebrush-steppe also provides critical winter range for Rocky Mountain elk, moose, mule deer, and pronghorn.

Agricultural and Developed Land. Dryland farming and irrigated cropland have replaced most of what was once mixed-grass prairie vegetation and small portions of the sagebrush-steppe and saltbush-greasewood shrub along the pipeline route.

Agricultural fields and developed land provide less habitat value compared to most wildland habitats for wildlife. Most use is by mule deer and white-tailed deer that feed along the edge between wildland habitat and agricultural fields. Agricultural lands adjacent to major rivers may provide nesting habitat for sandhill cranes and other shorebirds, and waterfowl.

Wetlands and Riparian Vegetation. Wetlands and riparian vegetation occur within the vegetation types described above. Wetlands were mapped from field reconnaissance and interpretation of ~~stereo~~ aerial photographs taken in September 1989. The locations and classifications of wetlands that would be crossed by Altamont's proposed route are shown in Table 3E-2 and Appendix E-3.

NWI maps are not available for the Altamont route in Montana and Wyoming. Wetlands and riparian vegetation were classified according to locally accepted vegetation types (Altamont, 1989b). These wetland and riparian vegetation types are more specific and descriptive than NWI classifications. Probable conversions of the named vegetation types to standard FWS NWI codes are given below.

Ephemeral Wetlands. Undrained depressions that retain water support herbaceous wetland vegetation usually in spring and during wet years. In glaciated areas of northern Montana, wetland vegetation occurs in depressions only during years with high precipitation. In unglaciated areas of Montana and Wyoming, undrained depressions (sometimes called deflation basins) periodically collect surface water and may have high water tables during wet years. None of the ephemeral wetland areas occurring along the pipeline route supported wetland vegetation in September 1989 (Elliott, personal communication). Ephemeral wetlands would likely be mapped as "emergent" (EM) by FWS.

Undrained depressions provide habitat for migrating and breeding waterfowl and shorebirds. During spring and fall migrations, snow geese, Canada geese, tundra swans, shorebirds, and ducks rest and feed near the pipeline. Mallards, pintails, teals, wigeons, and Canada geese nest in these wetlands along the route. Long-billed curlews nest in the native grasslands and pastures and feed in the wet meadows.

Saline-Alkaline Wet Meadows. Poorly drained sites with groundwater within 1-2 feet of the surface support saline-alkaline wet meadows. Dominant species include foxtail, saltgrass, western wheatgrass, curly dock, and saltwort. In wet meadows disturbed by agricultural practices, non-native grasses and forbs dominate. Saline-alkaline wet meadows would probably be mapped as EM by FWS.

Saline-Alkaline Shrubland. In arid regions of Montana and Wyoming, floodplain terraces with shallow groundwater and saline or alkaline soils support saline-alkaline shrubland. Greasewood is the dominant shrub, with an understory of western wheatgrass and saltgrass. Saline-alkaline shrubland would probably be mapped as "scrub-shrub" (SS) by FWS.

Herbaceous Riparian and Riparian Scrub Complex. A complex of herbaceous riparian and riparian scrub vegetation occurs mainly along small, perennial streams that are not subject to frequent, high-intensity flooding. The dominant shrubs include snowberry, rose, chokecherry, buffaloberry, and willow, with widely scattered cottonwoods. Areas with saturated soils for most of the growing season support rushes and sedges as the dominant cover. In Montana, this riparian vegetation type occurs associated with low-gradient prairie streams. In Wyoming, this riparian vegetation type occurs mainly at higher elevations in the South Pass area. Herbaceous riparian and riparian scrub complex would likely be mapped as SS by FWS. Riparian scrub provides habitat for red-winged blackbirds and common yellowthroats. The herbaceous riparian vegetation provides habitat for waterfowl, sandhill cranes, and long-billed curlews.

Riparian Forest. Major rivers and streams in Montana and Wyoming support riparian forest vegetation on well-drained, alluvial soils. In Montana, the overstory supports plains cottonwood with an understory of riparian scrub and herbaceous riparian vegetation. In Wyoming, the overstory supports narrow-leaf cottonwood, Russian olive, and tamarisk associated with plains cottonwood. Riparian forest would be mapped as "forested" (FO) by FWS.

Riparian forests provide habitat for a diversity of wildlife species. Nesting passerine birds include the Wilson's warbler, Swainson's thrush, northern oriole, and tree swallow. The great horned owl, saw-whet owl, and red-tailed hawk roost and nest in these stands. Raccoons and striped skunks are common mammalian predators in these riparian forests. White-tailed deer are most abundant in Montana where these riparian areas are adjacent to agricultural lands. The double-crested cormorant and great blue heron, which are community-nesting species, are restricted to the limited mature cottonwood riparian forests that occur along the major rivers and streams.

Montana

Special-Status Plant Species. Special-status plant species known to occur or potentially occurring along the Altamont pipeline route in Montana are listed in Appendix E-4.

Wetlands and Riparian Habitat. In Montana, the pipeline route would cross large areas (greater than 200 feet wide) of saline-alkaline wet meadow at Flat Creek (MP 96.7)~~, 98.3, and 103.3)~~, Wolf Creek (MP 123), Dry Wolf Creek (MP 130.2), Louse Creek (MP 139.7), Hauck Coulee (MP 148.9), Ross Fork Creek (MP 154.2 and 159.0), Roberts Creek (MP 179.9), Middle Creek (MP 225.2), a tributary of Cedar Creek (MP 228.0), Greenwood Creek (MP 236.0), and Valley Creek (MP 249.5, 250.7, and 253.4) (Appendix E-3).

A 1,000-foot-wide ephemeral wetland in an undrained depression occurs at MP 225.2. Major riparian forest crossings (greater than 200 feet wide) occur at the Musselshell River (MP 195.5), Yellowstone River (MP 257.2), Rock Creek (MP 264.9), Clarks Fork of the Yellowstone River (MP 268.2), and Cottonwood Coulee (MP 300) (Appendix E-3).

Special Native Plant Communities. No special native plant communities occur along the pipeline route in Montana.

Special-Status Wildlife Species. The proposed pipeline would cross potential habitat of the black-footed ferret, bald eagle, and peregrine falcon, all federally listed as endangered species. The pipeline would also cross habitat of five species listed as federal candidate category 2 species or Montana species of concern (Table 3E-5). The pipeline route would not cross habitat known to be occupied by the gray wolf, whooping crane, or least tern (all federally listed as endangered), or habitat occupied by the grizzly bear or piping plover (federally listed as threatened) (McMaster personal communication).

Important Habitat for Game Species. The proposed pipeline would cross important habitat for the mule deer, white-tailed deer, pronghorn, sage grouse, sharp-tailed grouse, wild turkey, and various waterfowl.

Mule Deer. Important mule deer winter range occurs in forested riparian stands and brushy coulees adjacent to mixed-grass prairie. The saltbush-greasewood vegetation also provides winter range; however mule deer population densities are lower in saltbrush-greasewood vegetation than in mixed-grass prairie. Mule deer winter ranges would be crossed by the pipeline at Milk River (MP 7-9), Sage Creek (MP 32-35), Missouri River (MP 67-75), ~~and~~ southeast of Arrow Creek (MP 110-113) and between MP 278-283. The eastern ponderosa pine forest provides year-round habitat for mule deer (MP 246-255, 257.5-260).

White-Tailed Deer. White-tailed deer are widely distributed in Montana with highest population densities in the forested riparian habitat along rivers and large streams adjacent to agricultural fields. The pipeline would cross white-tailed deer habitat range at the Missouri River (MP 68.5-68.8), Arrow Creek (MP 111.5-112.3), Judith River (MP 144.5-145.2), Mussellshell River (MP 195.5-196.0), Yellowstone River (MP 257.2-257.6), Rock Creek (MP 264.5-264.9), and Clarks Fork of the Yellowstone River (MP 268.2-268.4).

Pronghorn. The highest densities of pronghorn occur in sagebrush-steppe vegetation. Sagebrush and rabbitbrush may comprise 95 percent of the pronghorn's diet in winter, 70 percent in spring, and 35-40 percent in summer. Pronghorn also occur in the mixed-grass prairie, but in lower densities. Pronghorn winter range would be crossed by the pipeline route near Arrow Creek (MP 103-113), Stanford (MP 129-141), and north of Judith Gap (MP 158-167).

Sage Grouse. The sagebrush-steppe vegetation provides important winter habitat for sage grouse. During spring and summer, they use small meadows within the sagebrush-steppe, where their traditional courtship and breeding areas (leks) and nesting grounds are

Table 3E-5

SPECIAL STATUS WILDLIFE SPECIES WHICH POTENTIALLY OCCUR ALONG THE ALTAMONT ROUTE[a]

Common and Scientific Names	Legal Status[b] Federal/State	Distribution	Habitat
MONTANA			
Mammals			
Black-foot ferret (*Mustela nigripes*)	E/--	Central to eastern Montana	Mixed-grass prairie in association with prairie dog towns
Spotted bat (*Euderma maculatum*)	C2/MSC	Southwestern to south-central Montana	Roosts in caves, rock crevices, and buildings; forages in sagebrush-steppe, mixed-grass prairie, and eastern ponderosa pine
Preble's shrew (*Sorex preblei*)	C2/--	Throughout Montana except in the southeast portions of the state	Mixed-grass prairie
Birds			
Bald eagle (*Haliaeetus leucocephalus*)	E/--	Bald eagle nesting and wintering occurs throughout Montana	Nests and roosts in coniferous forests within 1 mile of the edge of lakes, reservoirs, or rivers
American peregrine falcon (*Falco peregrinus*)	E/--	Migrant and winter resident in Montana; nests in western and south-central Montana	Protected ledges of high cliffs, usually adjacent to marshes, lakes, or rivers that support numbers of birds
Ferruginous hawk (*Buteo regalis*)	C2/--	Nests in eastern Montana	Nests in trees, shrubs, or on the ground, and hunts in mixed-grass prairie and sagebrush-steppe
Mountain plover (*Charadrius montanus*)	C2/--	Nests in eastern Montana	Mixed-grass prairie, often associated with prairie dog towns
Long-billed curlew (*Numenius americanus*)	C2/--	Nests throughout Montana, except in northeast portion of the state	Mixed-grass prairie
WYOMING			
Mammals			
Black-footed ferret (*Mustela nigripes*)	E/--	All Wyoming	Mixed-grass prairie in association with prairie dog towns

Table 3E-5
(continued)
SPECIAL STATUS WILDLIFE SPECIES WHICH POTENTIALLY OCCUR ALONG THE ALTAMONT ROUTE[a]

Common and Scientific Names	Legal Status[b] Federal/State	Distribution	Habitat
Mammals (continued)			
Allen's 13-lined ground squirrel (*Spermophillus tridecemilineatus alleni*)	C2/--	Central and northern Wyoming	Mixed-grass prairie
Preble's shrew (*Sorex preblei*)	C2/--	Northwestern Wyoming	Riparian areas in mixed-grass prairie
Birds			
Bald eagle (*Haliaeetus leucocephalus*)	E/--	Nests throughout Wyoming	Nests and roosts in coniferous forests within 1 mile of the edge of lakes, reservoirs, or rivers
American peregrine falcon (*Falco peregrinus*)	E/--	Winter migrant in southern Wyoming	Protected ledges of high cliffs, usually adjacent to marshes, lakes, or rivers that support numbers of birds
Ferruginous hawk (*Buteo regalis*)	C2/--	Nests throughout Wyoming	Nests in trees, shrubs, or on the ground and hunts in mixed-grass prairie and sagebrush-steppe
Whooping crane (*Grus americana*)	E/--	Migrant	Wetlands associated with mixed-grass prairie and sagebrush-steppe
Mountain plover (*Charadrius montanus*)	C2/--	Nests throughout Wyoming	Mixed-grass prairie, often associated with prairie dog towns

[a] Status definitions:
-- = no classification. Montana and Wyoming do not have Endangered Species Act.
Federal (50 CFR 17.11):
E = endangered
T = threatened
C2 = a candidate species under review for federal listing. Category 2 includes species for which the USFWS presently has some information indicated that "proposing to list them as endangered or threatened species is possibly appropriate" but for which further biological research and field study are usually needed to determine biological vulnerability and threats. Category 2 species are not necessarily less rare or less threatened than Category 1 species. The distinction relates to the amount of data available and is therefore administrative rather than biological.

located. Sage grouse habitat occurs from the Clarks Fork of the Yellowstone River to the Montana-Wyoming border (MP 268-~~302~~304.5).

Sharp-Tailed Grouse. Sharp-tailed grouse occupy the mixed-grass prairie, where their traditional leks are located. Nesting often occurs within one mile of the lek, in a dense stand of grass and shrubs. Sharp-tailed grouse habitat is widely distributed in Montana, occurring in the mixed-grass prairie from the Canada-Montana border to the Yellowstone River (MP 0-257).

Wild Turkey. Wild turkey occupy the eastern ponderosa pine forest along the pipeline route in south-central Montana from MP 180 to MP 255.

Waterfowl. Mallards, pintails, teals, wigeons, and Canada geese may nest in the permanent and ephemeral wetlands along the route. BOR administers rangeland near Lonesome Lake (MP 51). Plans have been proposed to convert these lands to managed waterfowl habitat; however, the plans have not been finalized. The proposed pipeline would cross within 0.25 mile of these lands.

Noxious Weeds. Noxious weeds are usually exotic plant species that proliferate and reduce the value of land for agriculture, forestry, livestock, wildlife, native plants, or other beneficial uses.

The 1985 Montana County Noxious Weed Management Act governs the control and spread of plants designated as noxious weeds. The law specifies that noxious weeds must be prevented from becoming established and must be eradicated when possible. The Montana Legislature requires that each county establish a county weed management plan. Each Montana county crossed by the pipeline would require Altamont to prepare a revegetation and weed control plan.

Known locations of noxious weed infestations along the pipeline route are given in Table 3E-6. Noxious weed infestations are reported along approximately 50 miles of the pipeline route in Montana.

Wyoming

Special-Status Plant Species. Special-status plant species known to occur or potentially occurring along the proposed Altamont pipeline route in Wyoming are listed in Appendix E-4.

Wetlands and Riparian Habitat. The pipeline route would cross large areas (greater than 200 feet wide) of saline-alkaline wet meadow and saline-alkaline scrub at Lovell Lake (MP 323), East Fork Nowater Creek (MP 392), Kirby Creek (~~MP 407.5 and 409.6~~MP 410), Schoening Creek (MP 435.8), Badwater Creek (MP 440.1), Muskrat Creek (MP 454.4), Dry Cheyenne Creek (MP 463.8), ~~Beaver Creek (MP 480.9), West Pacific Creek (MP 532),~~ Little Sandy Creek (MP 558.2), Big Sandy River (MP 561.5), Twelvemile Canyon (MP 579.9), and Green River (MP 593.5) (Appendix E-3).

Table 3E-6

KNOWN NOXIOUS WEED LOCATIONS THAT WOULD BE CROSSED BY THE ALTAMONT ROUTE

County	Milepost	Species
MONTANA		
Hill	30.0-33.0	Leafy spurge
Judith Basin	123.0-131.0 133.0-140.0 139.0-146.0 146.0-155.0	Canada thistle Canada thistle, bindweed, and whitetop Whitetop and leafy spurge Leafy spurge, spotted knapweed, and whitetop
Wheatland	195.0-196.0	Spotted knapweed
Carbon	257.0-258.0 261.0-262.0 265.0-266.0 268.0-269.0 272.0-273.0 276.0-277.0 279.0-285.0 295.0-298.0	Leafy spurge Leafy spurge Spotten knapweed Canada thistle Whitetop Whitetop and leafy spurge Leafy spurge Spotted knapweed and Russian knapweed
WYOMING		
Big Horn	319.0-320.0 346.0-348.0 361.0-362.0 354.0-368.0	Canada thistle Canada thistle Canada thistle Canada thistle
Washakie	471.0-388.0	Canada thistle and Russian knapweed
Hot Springs	406.0-413.0	Canada thistle
Fremont	440.0-441.0 494.0-496.0	Russian knapweed Leafy spurge
Sweetwater	556.0-562.0 581.0-584.0 593.0-594.0	Perennial pepperweed Canada thistle Canada thistle
Lincoln	592.0-620.0 611.0-613.0	Halogeton and whitetop Spotted knapweed and Canada thistle

Note: Counties that would be crossed by the pipeline but are not listed have no known noxious weed locations.
Sources: County Weed Boards, Montana and County Weed and Pest Control Districts, Wyoming.

The pipeline route would cross three large ephemeral wetlands in deflation basins (MP 450.2, 565.8, and 580.9). It would also cross large riparian forest areas (greater than 200 feet wide) at the Shoshone River (MP 319.1), Greybull River (MP 352.0), Bighorn River (MP 374.2), East Fork Nowater Creek (MP 392.0), Nowater Creek (MP 399.2), ~~Kirby Creek (MP 407.5 and 409.6),~~ Sweetwater River (MP 526.5), Green River (MP 593.5), and Hams Fork (MP 613.1) (Appendix E-3).

Special Native Plant Communities. A BLM-designated unique plant community, the "Kemmerer" endemic cushion plant community, may occur along the pipeline route on outcrops of Green River shale in Wyoming.

Special-Status Wildlife Species. In Wyoming, the proposed pipeline would cross habitat of the black-footed ferret, bald eagle, peregrine falcon, and whooping crane, all federally listed as endangered species. (Table 3E-5).

Important Habitat for Game Species. The proposed pipeline route would cross important habitat for moose, Rocky Mountain elk, mule deer, pronghorn, sage grouse, and waterfowl (Table 3E-7).

Moose. Moose occupy forested riparian areas that provide browse habitat in fall and winter and aquatic vegetation in summer. At Beaver Creek (MP 510) and the Sweetwater River (MP 527), the pipeline route would cross important moose winter range adjacent to the Wind River range.

Rocky Mountain Elk. Rocky Mountain elk summer at the higher elevations of the Wind River range and winter in the sagebrush-steppe near Sheep Mountain (MP 500) and Beaver Creek (MP 510) (BLM 1985).

Mule Deer. The mixed-grass prairie adjacent to the mountain ranges provides winter habitat for mule deer. Important mule deer winter range would be crossed by the pipeline at East Fork Nowater Creek (MP 392), Kirby Creek (MP 408) and on the south and east slopes of the Bridger Mountains (MP 430) (BLM 1986).

Pronghorn. The pipeline route would cross pronghorn winter range in several locations. Important winter range in the mixed-grass prairie would be crossed near Kirby Creek (MP 408) and Badwater Creek (MP 440) (BLM 1986). Important winter range also would be crossed in the sagebrush-steppe near Shoshone (MP 440-455) and east of Lander (MP 490-495) (BLM 1985).

Sage Grouse. The pipeline route would cross mixed-grass prairie and sagebrush-steppe associations with high concentrations of sage grouse leks, nesting habitat, and important winter range. A high density of sage grouse leks occurs between East Fork Nowater Creek and upper Kirby Creek (MP 393-415), and from north of the South Pass area to west of Farson (MP 570).

Table 3E-7

IMPORTANT GAME SPECIES HABITAT THAT WOULD BE CROSSED BY THE ALTAMONT ROUTE IN WYOMING

Species	Seasonal Use	Milepost
Moose	Winter	503-506, 508-511, 595.5-596.0
	Winter and year round	506-508, 511-512, 514.0-514.5, 516.0-516.5, 522.0-522.5, 524.5-527.0
	Year round	612-614
Rocky Mountain elk	Winter	503.5-506.5
	Year round	506.5-514.0
	Winter and year round	407.5-412.0
	Spring, summer, and fall	412.0-425.0, 529.0-533.5
Mule deer	Winter	351, 373-377.5, 407.5-418.0, 492.5-505, 544.0-550.5
	Winter and year round	430.0-431.5, 440.5-441.5, 450-451 480.5-481.5, 492.5-507.5, 550.5-556.0
	Year round	307-329, 347.5-373.0, 377.5-407.5, 440.0-440.5, 441.5-445.0, 481.5-492.5
	Spring, summer, and fall	418-430, 507.5-525.5
Pronghorn	Winter and year round	352-372.5, 433.5-441.5, 453.5-466.0, 478-487, 593.5-594.0
	Winter	395.5-406.5, 411.0-416.0
	Crucial winter	365-370
	Year round	332.5-345.5, 385-395.5, 424.5-433.5, 441.5-446.0, 466.0-474.5, 487-495, 594-620
	Spring, summer, and fall	406.5-411.0, 416.0-423.0, 494-514
Sage grouse	Lekking range	352-372.5, 389.0-402.5, 408.5-416.0, 419.5, 429.5, 433, 451.5, 526.0-526.5, 527.5-528.0, 600-602, 606-608

Waterfowl. The riparian areas adjacent to agricultural lands along the Shoshone (MP 319.1-319.6), Greybull (MP 352.0-352.3), and Bighorn (MP 374.2-374.3) Rivers provide important habitat for nesting and migratory waterfowl. The proposed route would cross within 0.6 mile of the Seedskadie NWR on the Green River (MP 593). The refuge is inhabited by more than 170 species of birds and is a major breeding, staging, and migration area for waterfowl.

Noxious Weeds. The Wyoming Weed and Pest Control Act of 1973 (Title 11, Chapter 5) lists noxious weeds and specifies control measures. County weed and pest control districts maintain databases on the location of weed infestations. Known locations of weed infestations along the pipeline route are listed in Table 3E-6. Noxious weed infestations are reported along approximately 46 miles of the pipeline route in Wyoming.

SOUTH PASS ROUTE VARIATIONS

Vegetation along the South Pass Variations is similar to that found along the proposed route. ~~However, neither NWI maps nor aerial photographs (which were used to help identify wetland areas along the proposed route) are available for the Variations. Therefore, no direct and reasonably accurate measure of potential impact on wetland areas along the route variations is possible.~~ Although NWI maps are not available, field reconnaissance and aerial photographs taken in August 1990 were used to map wetlands. Wetland and riparian areas which would be crossed by the various South Pass Variations, as well as by the portion of Altamont's proposed route that these variations would replace, are listed in Table 3E-8.

The same four federally listed wildlife species potentially occur in the vicinity of both the South Pass Variations and proposed route. These species include the bald eagle, American peregrine falcon, whooping crane, and black-footed ferret.

The South Pass Variations also would cross important range for mule deer, pronghorn, moose, and elk. For purposes of this discussion, important range was defined to include the following Wyoming Game and Fish Department range categories: winter, crucial winter, winter/yearlong, crucial winter/yearlong, and severe winter relief.

Jeffrey City Variation

Construction along the Jeffrey City Variation would not affect any federally listed, proposed, or candidate species. Two Federal candidate status plant species (meadow pussytoes - status C2; Fremont's bladderpod - status C3) may potentially occur in the vicinity of the proposed route. In addition, this variation route may traverse portions of a unique plant community dominated by Porter sagebrush and bluebunch wheatgrass located near the community of Lysite.

The Jeffrey City Variation would cross important range for mule deer, pronghorn, moose, and elk. Construction along this variation route would result in the linear crossing of 37.8 miles of mule deer range, 82.8 miles of pronghorn range, 5.5 miles of moose range, and 21.0 miles

Table 3E-8

SUMMARY OF WETLAND AND RIPARIAN AREAS CROSSED BY THE SOUTH PASS ROUTE VARIATIONS AND THE PROPOSED ROUTE (MP 428-620)

Route	Classification[a]	Number	Total Crossing Width (feet)
Jeffrey City	PSS	26	11,535
	PEM	5	560
	PSS/POW	1	5,000
TOTAL		32	17,095
Alkali Butte	PSS	69	22,305
	PSS/POW	1	1,500
	PEM	4	2,230
TOTAL		74	26,035
Northern Utilities	PSS	69	24,305
	PEM	7	690
	PSS/POW	1	1,500
TOTAL		77	26,495
Route 28	PSS	15	6,900
	PFO	3	2,750
	PEM	8	6,575
	PSS/EM	2	1,550
	PEM/SS	2	3,900
	PFO/SS	2	1,100
TOTAL		32	22,775
Proposed Route	PSS	20	8,300
	PEM	6	6,225
	PFO/SS	3	1,200
	PSS/EM	2	1,550
	PEM/SS	2	3,900
TOTAL		33	21,175

[a] Classification system:

PSS = Palustrine scrub/shrub
PEM = Palustrine emergent
PFO = Palustrine forested
PSS/EM = Palustrine Scrub/shrub and emergent mix
PFO/SS = Palustrine forested and scrub/shrub mix
PSS/POW = Palustrine scrub/shrub and open water mix
PEM/SS = Palustrine emergent and scrub/shrub mix

of elk range. Six sage grouse leks would be crossed (MPs 514-517, 518-519, 527-531, 539-540, 547-551, and 554-557).

Alkali Butte Variation

Construction along the Alkali Butte Variation could potentially affect one Federal candidate plant species, the Beaver Rim phlox (status C2). Two Federal candidate status species (meadow pussytoes - status C2; Fremont's bladderpod - status C3) may potentially occur in the vicinity of the proposed route. In addition, this variation route may traverse portions of two plant communities identified by the BLM as unique or in need of further study. Both of these plant communities occur in the Beaver Divide area. A cushion plant community which occurs in this area and contains Beaver Rim phlox has been designated by the BLM as an unique plant community, while a limber pine/bluebunch wheatgrass community which occurs in the same general area has been designated as a community which needs further study.

The Alkali Butte Variation would cross important range for mule deer, pronghorn, moose, and elk. Construction along this variation route would result in the linear crossing of 35.1 miles of mule deer range, 52.1 miles of pronghorn range, 5.1 miles of moose range, and 21.0 miles of elk range, and would cross 4 sage grouse leks.

Northern Utilities Variation

Construction along the Northern Utilities Variation could potentially affect one Federal candidate plant species, the Beaver Rim phlox (status C2). Two Federal candidate status species (meadow pussytoes - status C2; Fremont's bladderpod - status C3) may potentially occur in the vicinity of the proposed route. In addition, this variation route may traverse portions of two plant communities identified by the BLM as unique or in need of further study. Both of these plant communities occur in the Beaver Divide area. A cushion plant community which occurs in this area and contains Beaver Rim phlox has been designated by the BLM as an unique plant community, while a limber pine/bluebunch wheatgrass community which occurs in the same general area has been designated as a community which needs further study.

The Northern Utilities Variation would cross important range for mule deer, pronghorn, moose, and elk. Construction along this variation route would result in the linear crossing of 42.6 miles of mule deer range, 66.7 miles of pronghorn range, 5.1 miles of moose range, and 26.9 miles of elk range, and would cross 4 sage grouse leks.

Route 28 Variation

Vegetation along the Route 28 Variation is similar to that found along the proposed route. However, because this variation would cross a number of streams in their headwater reaches, a higher proportion of riparian vegetation would be affected. At this point in time, no information is available concerning the potential presence of unique plant communities along the Route 28 Variation.

The entire Route 28 Variation would be located within crucial moose range. No other important big game range would be crossed.

KERN RIVER DOWNSTREAM FACILITIES

Compressor Station 2 would be located in the mountain brush-sagebrush scrub vegetative communities of the Middle Rocky Mountains province. No federally listed, proposed, or candidate plant species are located at this site. This portion of the Kern River route, however, is essentially big game habitat with wintering range deemed important to the Utah Division of Wildlife Resources. The preliminary site appears to be located in high-priority mule deer wintering range and could potentially affect sage grouse critical breeding habitat, as well. While the area is also potential habitat for the federally listed endangered peregrine falcon and bald eagle, no nests have been identified at the site. Federal candidate species that may occur in the vicinity include the ferruginous hawk, Swainson's hawk, and the yellow-billed cuckoo.

Compressor Station 3 would be located in an agriculturally-dominated vegetative community of the Basin and Range province. No federally listed, proposed, or candidate plant species are located at this site. The area is potential habitat for the federally listed peregrine falcon, bald eagle, and black-footed ferret. However, no nests or winter roost sites have been identified in the site vicinity. No prairie dog communities are currently located along this portion of the route. Federal candidate species potentially occurring in the vicinity include the ferruginous hawk, Swainson's hawk, mountain plover, western snowy plover, long-billed curlew, white-faced ibis, and the western yellow-billed cuckoo.

Compressor Station 5 would be located in the sagebrush scrub vegetative community of the Basin and Range province. Construction at this site would not affect any federally listed, proposed, or candidate plant species. Two federally listed wildlife species, the Utah prairie dog and the bald eagle, may be found along this portion of the route. Federal candidate species potentially occurring in the site vicinity include the peregrine falcon, ferruginous hawk, Swainson's hawk, mountain plover, western snowy plover, long-billed curlew, white-faced ibis, and the western yellow-billed cuckoo.

Compressor Stations 6 and 8 would both be located in the Mojavean creosote bush scrub vegetative community of the Sonoran Desert section of the Basin and Range province. In Nevada (Station 6), 5 federal candidate plant species, including the Nevada state designated endangered wild buckwheet, may occur in this community. There are eight federal candidate plant species which potentially occur in this community in California (Station 8). One of these species, the red rock tarweed, is also listed by the state of California as rare.

Federally listed endangered animal species potentially occurring in the vicinity of Compressor Station 6 include the peregrine falcon and the bald eagle, although no nesting sites or wintering roosts are known to occur in the site vicinity. (Both species are thought to occur only as rare migrants.) The desert tortoise has recently been listed as federally endangered, and the sites of both stations are located in potential habitat.

Federal candidate animal species potentially occurring in both site vicinities include the ferruginous hawk, Swainson's hawk, and the yellow-billed cuckoo. All are thought to be migrants or winter residents. The Gila monster and the western snowy plover may also occur in the vicinity of Station 6. No nesting sites for the plover nor sensitive habitat for the Gila have been identified in the area.

Chapter 3F. Affected Environment: Fisheries

This chapter describes the fishery resources of the perennial streams that would be crossed by the proposed PGT and Altamont projects. A crossing was designated as a stream crossing of concern when special-status species, salmonids, or other game species were present, or when local fisheries biologists indicated that important fisheries habitat located at the site or adjacent to the site could be affected. For information on each water crossing, see Appendices C-1 and C-2.

PGT PROJECT

Lists of typical game fish and special-status fish species that may occur in streams near the proposed pipeline are included in Tables 3F-1 and 3F-2, respectively.

Idaho

Game fish in Idaho are representative of coldwater fish communities and are listed in Table 3F-1.

Stream Crossings of Concern. The following are individual descriptions of crossings in Idaho designated as stream crossings of concern.

The proposed route would cross the Moyie River at eight sites (MPs 0.3, 1.0, 5.0, 5.8, 7.8, 10.0, 10.7, and 13.6). The reach provides habitat for trout and supports an important recreational fishery for both native cutthroat and rainbow trout, as well as stocked rainbow trout.

Bussard Creek (MP 7.3) is a tributary of the Moyie River that provides habitat for rainbow trout. No critical habitat exists at the proposed crossing site.

Cocolalla Creek (MP 77.3) provides habitat for brook and brown trout. The reach near the proposed crossing provides transportation water for trout migrating upstream from Cocolalla Lake to their spawning grounds. No critical spawning habitat occurs at the crossing site; however, this stream reach provides rearing habitat for juvenile brook and brown trout.

Table 3F-1

TYPICAL GAME FISH IN STATES THAT WOULD BE CROSSED BY THE PGT PROJECT

State	Classification	Common Name	Scientific Name
Idaho	Cold water	Rainbow trout Cutthroat trout Brown trout Brook trout	*Oncorhynchus mykiss* *Oncorhynchus clarki* *Salmo trutta* *Salvelinus fontinalis*
Washington	Cold water	Chinook salmon Steelhead trout Rainbow trout	*Oncorhynchus tshawytscha* *Oncorhynchus mykiss* *Oncorhynchus mykiss*
	Warm water	Largemouth bass Smallmouth bass Black crappie White sturgeon	*Micropterus salmoides* *Micropterus dolomieui* *Pomoxis nigromaculatus* *Acipenser transmontanus*
Oregon	Cold water	Chinook salmon Steelhead trout Rainbow trout Brown trout Redband trout Cutthroat trout	*Oncorhynchus tshawytscha* *Oncorhynchus mykiss* *Oncorhynchus mykiss* *Salmo trutta* *Oncorhyncus mykiss* ssp. *Oncorhyncus clarki*
	Warm water	Smallmouth bass Black crappie Yellow perch	*Micropterus dolomieui* *Pomoxis nigromaculatus* *Perca flavescens*

Table 3F-2

SPECIAL-STATUS FISH THAT MAY OCCUR IN STREAMS ALONG THE PGT ROUTE

Common Name	Scientific Name	Legal Status[a/] Federal/State
IDAHO		
Bull trout	*Salvelinus confluentus*	C2/--
Ling	*Lota lota*	FS
Westslope cutthroat trout	*Salmo clarki* spp.	FS
Rainbow trout	*Oncorhynchus mykiss*	FS
WASHINGTON		
Bull trout	*Salvelinus confluentus*	C2/--
OREGON		
Redband trout	*Oncorhynchus mykiss* ssp.	C2/--
Lost River sucker	*Catostomus luxatus*	E/OE
Shortnose sucker	*Chasmistes brevirostris*	E/OE
Klamath largescale sucker	*Catostomus snyderi*	C2/--
Warner sucker	*Catostomus warnerensis*	T/OT
CALIFORNIA[b/]		
Modoc sucker	*Castostomus microps*	E/--
Winter-run chinook salmon	*Oncorhynchus tshawytscha*	T/--
Shasta crayfish	*Pacifasticus fortis*	E/--

Note: -- = not applicable.

a/ Status definitions:
E = endangered
T = threatened
C2 = federal candidate 2
FS = FS-designated sensitive species
OE = Oregon endangered
OT = Oregon threatened

b/ Only federally listed threatened and endangered species in California are identified for the PG&E facilities in California.

Special-Status Fish Species. Bull trout (*Salivelinus confluentus*) is a federal candidate 2 species that may occur in the Moyie River (Horner personal communication). Special-status fish that may occur in streams along the PGT project route in Idaho are listed in Table 3F-2.

Washington

Game fish in Washington are representative of coldwater and warmwater fish communities and are listed in Table 3F-1.

Stream Crossings of Concern. The following are individual descriptions of crossings in Washington designated as stream crossings of concern. For information on each water crossing, see Appendice C-1 and C-2.

The Walla Walla River (MP 254.2) supports populations of fall chinook, winter steelhead, resident trout, largemouth bass, smallmouth bass, crappie, channel catfish, and sturgeon. At the proposed crossing site, the river provides transportation water and rearing habitat for anadromous salmonids. It also provides rearing habitat and a recreational fishery for the warmwater species listed above. The river must remain passable to boat traffic at all times.

Special-Status Fish Species. Special-status fish species that may occur in streams along the PGT project route are listed in Table 3F-2. In Washington, this is limited to the bull trout.

Oregon

Game fish in Oregon are representative of coldwater and warmwater fish communities and are listed in Table 3F-1.

Stream Crossings of Concern. The following are individual descriptions of crossings in Oregon designated as stream crossings of concern.

Willow Creek (MP 318) provides habitat for resident rainbow trout. Spawning and rearing habitat exists in the vicinity of the proposed crossing; however, this area is not considered critical habitat.

The proposed route would cross Hay Creek (MP 346) near the headwater region. This tributary to the John Day River provides habitat for steelhead trout and resident rainbow trout. The proposed crossing would be approximately five miles upstream of the reach used by steelhead, in an area populated by resident trout. No critical habitat exists in the vicinity of the proposed crossing.

The John Day River (MP 357.3) supports populations of spring chinook, summer steelhead, smallmouth bass, resident trout, and a remnant run of fall chinook. At the proposed crossing site, the river provides transportation water for anadromous salmonids and rearing habitat for smallmouth bass. Recreational boat use and fishing occur in the vicinity of the proposed crossing. The river must remain passable to boat traffic at all times.

Trout Creek (MP 397.4), a tributary to the Deschutes River, provides habitat for summer steelhead and resident trout. The reach near the proposed crossing provides transportation water for steelhead and seasonal habitat for resident rainbow trout. No critical habitat exists in the vicinity of the proposed crossing; however, steelhead spawning habitat is located downstream (Newton personal communication).

Rainbow trout and mountain whitefish occur in the Crooked River (MP 432.7) and support an important recreational fishery. The river also provides habitat for various warmwater species. ~~No e~~Critical habitat for rainbow trout exists in the vicinity of the proposed crossing of Willow Creek.

The Lost River (MP 598.5) provides rearing habitat for a variety of coldwater and warmwater game fish species in the vicinity of the proposed crossing. Warmwater game fish, such as bass, crappie, perch and catfish, occur at the proposed crossing site. Spawning habitat for trout is located in the reach immediately downstream below Harpold Dam.

Special-Status Fish Species. Three sucker species, shortnose sucker (*Chasmistes brevirostris*) and Lost River sucker (*Catostumus luxatus*), and Warner sucker (*Catostomus warnerensis*) are federally listed as endangered and occur in the vicinity of the proposed route. Additional special-status fish species that may occur along the PGT project route are listed in Table 3F-2.

California - PG&E Nonjurisdictional Facilities

Special-Status Fish Species. Federally listed fish species that may occur in streams along the PG&E project route in California are listed in Table 3F-2.

Because of the marked decline in stock size in recent years, the winter-run chinook salmon (*Oncorhynchus tshawytscha*) has been emergency-listed as a threatened species under the federal ESA. The Modoc sucker (*Catostomus microps*), a federally listed endangered species, is known to occur in three small tributary systems of the Pit River.

The Shasta crayfish (*Pacifasticus fortis*), a federally listed and state-listed endangered species, is known to occur in isolated populations in several river systems.

ALTAMONT PROJECT

Montana

In Montana, streams are classified by their potential to support fisheries populations. Not all streams in Montana have been classified. Class I streams are those streams considered by the Montana Department of Fish, Wildlife and Parks (DFWP) to provide exceptional habitat for outstanding populations of highly valued species. Class II streams provide moderate habitat for highly valued species and exceptional habitat for less highly valued species. Class III streams provide substantial habitat for highly valued species and moderate habitat for less valued species.

Class IV streams have moderate fishing resources. Typical game fish and special-status fish species that may occur in Montana are listed in Tables 3F-3 and 3F-4, respectively.

Stream Crossings of Concern. The following are individual descriptions of crossings in Montana designated as stream crossings of concern.

The Milk River (MP 8.3) provides habitat for walleye, sauger, northern pike, yellow perch, and various nongame species. The recreational fishery in this reach is limited (Class IV); however, the Fresno Reservoir (located about 5 miles downstream) supports an important walleye fishery. No critical fish habitat exists in the vicinity of the proposed crossing (Gilge personal communication).

The Missouri River (MP 69.0) provides habitat for walleye, sauger, shovelnose sturgeon, channel catfish, and various nongame species. Three species of special concern, the paddlefish, pallid sturgeon and blue sucker, occur in the vicinity of the proposed crossing site.[1/] The Missouri River also supports an important recreational fishery (Class I) for the game species listed.

The Judith River (MP 145.1) provides habitat for game fish, such as rainbow trout, brown trout, and smallmouth bass, and supports a limited recreational fishery (Class IV). No critical fish habitat exists in the vicinity of the proposed crossing.

The proposed route would cross Ross Fork Creek, a tributary to the Judith River, at ~~six~~ two locations (MP 154.8~~, 161.3, 162.2, 162.3, 162.7,~~ and 165.8). The stream provides habitat for trout and nongame species, and supports a low-value recreational fishery. It has not received a state fishery classification. No critical fish habitat is known to exist in the vicinity of the proposed crossing.

The Musselshell River (MP 195.5) provides habitat for brown trout, largemouth and smallmouth bass, and various nongame species. The river supports a recreational fishery (Class III) for the game species. No critical fish habitat exists in the vicinity of the proposed crossing.[2/]

[1/] In Montana, the paddlefish is designated as a Class A species of special concern, indicating that elimination from Montana would be a significant loss to the gene pool. The blue sucker is designated as Class B, indicating that elimination from Montana would be at least a moderate loss to the gene pool.

[2/] During the summer of 1991, the DFWP plans to survey the Musselshell River and its tributaries in the vicinity of the proposed crossing for the hybrid between the northern redbelly dace and the finescale dace. This hybrid, previously found near Delphia, is a Montana species of special concern.

Table 3F-3

TYPICAL GAME FISH IN STATES THAT WOULD BE CROSSED BY THE ALTAMONT ROUTE

State	Classification	Common Name	Scientific Name
Montana	Cold water	Rainbow trout	*Oncorhynchus mykiss*
		Brown trout	*Salmo trutta*
		Cutthroat trout	*Salmo clarki*
		Brook trout	*Salvelinus fontinalis*
		Mountain whitefish	*Prosoeium williamsoni*
	Warm water	Walleye	*Stizostedion vitreum*
		Sauger	*Stizostedion canadense*
		Largemouth bass	*Micropterus salmoides*
		Smallmouth bass	*Micropterus dolomieui*
		Channel catfish	*Ictalurus punctatus*
		Burbot (Ling)	*Lota lota*
		Northern pike	*Esox lucius*
		Yellow perch	*Percha flavescens*
		Shovelnose sturgeon	*Scaphirhynchus platorynchus*
Wyoming	Cold water	Rainbow trout	*Oncorhynchus mykiss*
		Cutthroat trout	*Salmo clarki*
		Brown trout	*Salmo trutta*
		Brook trout	*Salvelinus fontinalis*
	Warm water	Walleye	*Stizostedion vitreum*
		Sauger	*Stizostedion canadense*
		Channel catfish	*Ictalurus punctatus*

Table 3F-4

SPECIAL-STATUS FISH THAT MAY OCCUR IN STREAMS ALONG THE ALTAMONT ROUTE

Common Name	Scientific Name	Legal Status[a/] Federal/State
MONTANA		
Pallid sturgeon	*Scaphirhynchus albus*	E/M
Sturgeon chub	*Hybopsis gelida*	--/M
Paddlefish	*Polyodon spathula*	C3C/M
Yellowstone cutthroat trout	*Salmo clarki bouvieri*	--/M
Westslope cutthroat trout	*Salmo clarki* spp.	--/M
Blue sucker	*Cycleptus elongatus*	C2/M
Northern redbelly-finescale dace hybrid	*Phoxinus eos x neogaeus*	--/M
WYOMING		
Colorado River cutthroat trout	*Salmo clarki pleuriticus*	C2/Wy
Shovelnose sturgeon	*Scaphirhynchus platorynchus*	--/Wy
Sturgeon chub	*Hybopsis gelida*	C2/Wy
Roundtail chub	*Gila robusta*	--/Wy
Bluehead sucker	*Catostomus discobolus*	--/Wy
Flannelmouth sucker	*Catostomus latipinnis*	--/Wy
Goldeye	*Hiodon alosoides*	--/Wy
Silvery minnow	*Hybognathus nuchalis*	--/Wy

Note: -- = not applicable

[a/] Status definitions:
E = endangered
C2 = federal candidate 2
C3C = federal candidate 3, subcategory C
M = Montana fish of special concern
Wy = Wyoming rare and declining fish

Fish Creek (MP 204.2) provides habitat for rainbow and brook trout and various nongame species. It has not received a state fishery classification. No critical fish habitat exists in the vicinity of the proposed crossing.

The proposed route would cross Valley Creek at three sites (MP 250.7, 253.5, and 254.8). The stream provides habitat for rainbow and brown trout. It has received a state fisheries classification. The recreational fishery is limited, and no critical fish habitat exists in the vicinity of the proposed crossing.

The Yellowstone River (MP 257.4) provides habitat for rainbow and brown trout, ling, and a variety of nongame species. Spawning habitat for the game species (particularly for ling, which are concentrated in this reach) exists in the vicinity of the proposed crossing. The river also supports a recreational fishery (Class ~~III~~ II) with a high level of boat traffic.

Rock Creek (MP 265.0) provides habitat for rainbow and brown trout and ling; however, the recreational fishery (Class IV) is limited by withdrawals for irrigation. No critical fish habitat exists in the vicinity of the crossing site.

The Clarks Fork of the Yellowstone River (MP 268.1) is affected by high turbidity. The reach near the crossing provides habitat and a limited recreational fishery (Class III) for ling. No critical fish habitat exists in the vicinity of the crossing site.

The proposed route would cross North Fork Bluewater Creek (MP 280.1), Bluewater Creek (MP 282.3), and South Fork Bluewater Creek (MP 284.5) in reaches supporting Class III fisheries. The streams provide habitat for rainbow and brown trout and various nongame species. No critical fish habitat exists in the vicinity of the crossing sites.

Sage Creek (MP 289.5) provides habitat for rainbow, brook, and cutthroat trout and various nongame species. The creek supports a limited recreational fishery (Class IV) for the game species. No critical fish habitat exists in the vicinity of the crossing sites.

Piney Creek (MP 298.5) provides habitat for brook trout. It has not received a state fishery classification. No critical fish habitat exists in the vicinity of the crossing sites.

Special-Status Fish Species. The paddlefish (*Polyodon spathula*), pallid sturgeon (*Scaphirhynchus albus*), and blue sucker (*Cycleptus elongatus*) are Montana state species of special concern that occur in the Missouri River. The pallid sturgeon is a federally listed endangered species (Table 3F-4). The paddlefish is a federal category 3 species, and the blue sucker is a federal candidate category 2 species. Montana has also designated the Yellowstone and cutthroat trout, the sturgeon chub, and the hybrid between the northern redbelly dace and the finescale dace as special-status fish species.

Wyoming

In Wyoming, streams are also classified by the GFD for their potential to support fisheries populations. Not all streams in Wyoming have been classified. Class I streams indicate a premium trout water of national importance. Class II streams indicate very good trout water of statewide importance. Class III streams are important trout waters. Class IV streams are low production waters. No Class II streams would be crossed by the proposed pipeline. Typical game fish and special-status species that may occur in Wyoming are listed in Tables 3F-3 and 3F-4, respectively.

Stream Crossings of Concern. The following are descriptions of crossings in Wyoming designated as stream crossings of concern.

The Shoshone River (MP 319.5) provides habitat for rainbow, cutthroat, brown trout; channel catfish; and various nongame species. The river supports a recreational fishery (Class III) for the game fish. No critical fish habitat exists in the vicinity of the crossing site.

The Bighorn River (MP 374.2) provides habitat for walleye, sauger, channel catfish, and various nongame species. This reach provides key spawning habitat for sauger and channel catfish, and a limited fishery (Class IV) for the game fish.

The proposed route would cross Kirby Creek (MPs 408.2 and 408.9) and West Kirby Creek (MP 417.8) near the headwaters of these drainages. These streams provide habitat for brook trout; however, recreational fisheries (Class IV) are limited due to public access limitations (Yekel personal communication).

West Bridger Creek (MP 423.9) provides habitat for brook trout and supports a recreational fishery (Class IV). No critical fish habitat exists in the vicinity of the crossing site.

Twin Creek (MP 503.8) provides habitat and a limited recreational fishery (Class IV) for rainbow trout, brook trout, and a few brown trout. No critical fish habitat exists in the vicinity of the crossing site.

~~Tweed Creek (MP 504.0) and~~ Stambaugh Creek (MP ~~505.6~~ 505.3) provides habitat and a recreational ~~fisheries~~ fishery for brook trout. No critical fish habitat exists in the vicinity of the crossing sites.

The upper reach of Beaver Creek (MP ~~508.2~~ 508.1) provides habitat for brown trout, brook trout, and a few rainbow trout, and supports a limited recreational fishery (Class IV). No critical fish habitat exists in the vicinity of the crossing site.

Little Beaver Creek (MP 510.9) provides habitat for brook trout and various nongame species. It has not received a state fishery classification. No critical fish habitat exists in the vicinity of the crossing sites.

Rock Creek (MP 514.3) provides habitat and a recreational fishery (Class III) for brook, brown, and rainbow trout. No critical fish habitat exists in the vicinity of the crossing site.

Willow Creek (MP 516.4) supports populations of brook and cutthroat trout and supports a recreational fishery (Class III). No critical fish habitat exists in the vicinity of the crossing site.

Pine Creek (MP 522.1) and Fish Creek (MP 525.6) provide habitat and limited recreational fisheries (Class IV) for brook trout. No critical fish habitat exists in the vicinity of the crossing sites.

The Sweetwater River (MP 526.8) provides habitat for rainbow and brown trout and supports a recreational fishery (Class III). No critical fish habitat exists in the vicinity of the crossing site.

Little Sandy Creek (MP 558.2) provides habitat for channel catfish and various nongame species. It has not received a state fishery classification. No critical fish habitat exists in the vicinity of the crossing site.

The Big Sandy River (MP 561.5) provides habitat and a limited recreational fishery (Class IV) for brown trout and channel catfish. No critical fish habitat exists in the vicinity of the crossing site.

The Green River (MP 593.5) provides habitat for rainbow, cutthroat, and brown trout; kokanee; mountain whitefish; and smallmouth bass. An important recreational fishery (Class II) exists for the species listed above. ~~No~~ ~~c~~Critical ~~fish~~spawning habitat exists in the vicinity of the crossing site for Kokanee salmon, rainbow trout, and brown trout.

The Hams Fork (MP 613.3) provides habitat for channel catfish and supports a Class IV recreational fishery. A small population of brown trout exists several miles downstream. No critical fish habitat exists in the vicinity of the crossing site.

Special-Status Fish Species. Special-status fish species which may occur in the vicinity of the proposed route in Wyoming are listed in Table 3F-4.

SOUTH PASS ROUTE VARIATIONS

Jeffrey City Variation

Construction along the Jeffrey City Variation would result in six crossings of four streams which contain ~~sensitive~~ coldwater fisheries. ~~Sensitive~~ Coldwater fisheries contained in the streams crossed by this variation are primarily composed of ~~cold water (~~salmonid~~)~~ sport fisheries, and occur in the Sweetwater River, Green River, Crooks Creek (two crossings), and Blacks Fork (two crossings). No federally listed, proposed, or candidate fish species would be affected by construction along the Jeffrey City Variation.

Alkali Butte Variation

Construction along the Alkali Butte Variation would result in four crossings of three streams which contain ~~sensitive~~ coldwater fisheries. ~~Sensitive~~ Coldwater fisheries contained in the streams crossed by this variation are primarily composed of ~~cold water (~~salmonid~~)~~ sport fisheries, and exist in the Sweetwater River, Green River, and Blacks Fork (two crossings). No federally listed, proposed, or candidate fish species would be affected by construction along the Alkali Butte Variation.

Northern Utilities Variation

Construction along the Northern Utilities Variation would result in four crossings of three streams which contain ~~sensitive~~ coldwater fisheries. ~~Sensitive~~ Coldwater fisheries contained in the streams crossed by this variation are primarily composed of ~~cold water (~~salmonid~~)~~ sport fisheries, and occur in the Sweetwater River, Green River, and Blacks Fork (two crossings). No federally listed, proposed, or candidate fish species would be affected by construction along the Northern Utilities Variation.

Route 28 Variation

Construction along the Route 28 Variation would result in crossing eight streams at different locations than the proposed route that contain ~~sensitive~~ coldwater fisheries. ~~Sensitive~~ Coldwater fisheries contained in the streams are primarily composed of ~~coldwater (~~salmonid~~)~~ sport fisheries, and occur in Twin Creek, Beaver Creek, Rock Creek, Big Hermit Gulch, Willow Creek, Pine Creek, Fish Creek, and the Sweetwater River. Two other streams, the Big Sandy and the Green River, would be crossed at the same locations as the proposed route.

KERN RIVER DOWNSTREAM FACILITIES

No ~~important~~ coldwater fisheries are located in areas which would be disturbed by construction and operation of the new compressor facilities which Kern River would require.

Chapter 3G. Affected Environment: Socioeconomics

PGT PROJECT

The PGT project would cross 15 counties in three states. All of the counties are rural with economies based primarily on agriculture or forestry. The existing socioeconomic conditions are illustrated in Table 3G-1 which lists county statistics on population, income, and employment.

Spokane County, Washington, has the largest total population and the highest level of per capita income in the project study area. Gilliam County, Oregon, has the smallest total population. Boundary County, Idaho, has the lowest level of per capita income. With the exception of the City of Spokane, all of the communities located within 50 miles of the pipeline have populations under 35,000. Over 75 percent of these communities have populations under 10,000 (Table 3G-2).

The major types of employment in the states crossed by the PGT project are in the services and government sectors. The unemployment rates range from 14.7 percent in Wasco County, Oregon, to 3.9 percent in Whitman County, Washington.

An estimate of the temporary housing available along the PGT route is provided in Table 3G-3. This listing includes those campsites and mobile home parks that accommodate recreational vehicles (RVs) within 50 miles of the route. The motel data represents only those rooms available in the major communities along the pipeline.

ALTAMONT PROJECT

The Altamont project would cross 15 counties in two states. All of the counties are rural and characterized by their sparse populations. Table 3G-4 illustrates the existing socioeconomic conditions with a list of county statistics on population, income, and employment.

Sweetwater County, Wyoming, has the largest total population in the study area. Golden Valley, Montana, has the smallest total population. Sublette County, Wyoming, has the highest level of per capita income. Big Horn County, Wyoming, has the lowest per capita income level and the highest unemployment rate. Judith Basin, Montana, has the lowest rate of unemployment.

Table 3G-1

EXISTING SOCIOECONOMIC CONDITIONS IN THE PGT PROJECT AREA IN 1986

State County	Total Population	Population Density (sq mi)	Per Capita Income [a]	Civilian Labor Force	Unemployment Rate
IDAHO					
Boundary	7,600	6.0	$6,351	3,411	9.0
Bonner	25,900	15.0	6,988	11,631	12.0
Kootenai	67,500	54.4	8,544	30,835	11.0
WASHINGTON					
Spokane	356,900	202.6	9,742	162,619	8.2
Whitman	40,700	18.9	8,988	18,228	3.9
Walla Walla	48,000	38.1	9,537	23,516	9.8
OREGON					
Umatilla	60,200	18.7	8,291	31,047	11.8
Morrow	8,100	4.0	8,580	4,047	13.6
Gilliam	1,800	1.5	9,155	883	6.6
Sherman	2,100	2.5	8,501	1,006	9.9
Wasco	21,300	8.9	8,919	10,094	14.7
Jefferson	12,300	6.9	8,090	6,079	9.2
Crook	13,200	4.4	9,218	6,555	10.1
Deschutes	68,700	22.7	9,255	34,827	10.3
Klamath	57,500	9.7	8,295	24,842	12.0

[a] Data for 1985

Source: U.S. Bureau of Census (1988)

Table 3G-2

COMMUNITIES AND THEIR POPULATIONS IN THE VICINITY OF THE PGT ROUTE

Communities with Population Greater than 1,000	Population (1980)	Milepost	Distance from Existing Line (miles)	Communities with Population less than 1,000	Milepost	Distance from Existing Line (miles)
IDAHO						
Bonners Ferry	1,906	27	0.2	Eastport	0	adjacent[a]
Sandpoint	4,460	58	1	Moyie Springs	21	0.5
Priest River	1,639	67	15-16	Elmira	43	0.25
Rathdrum	1,369	98	0.5	Bayview	80	5
Hayden	2,586	98	4	Athol	85	0.25
Coeur d'Alene	20,054	99	10			
Post Falls	5,736	104	3			
WASHINGTON						
Liberty Lake	1,599	113	2	Rosalia	146	2
Opportunity	21,241	115	4	Spangle	133	2
Spokane	171,300	115	12	Malden	148	1.5
Medical Lake	3,600	125	19	St. John	160	1
Cheney	7,630	130	12	Endicott	172	2-3
Colfax	2,780	165	17	La Crosse	184	0.5
Pullman	23,579	165	40	Starbuck	207	4
Dayton	2,565	235	30			
Walla Walla	25,618	254	27			
College Place	5,771	254	25			

Table 3G-2
(continued)
COMMUNITIES AND THEIR POPULATIONS IN THE
VICINITY OF THE PGT ROUTE

Communities with Population Greater than 1,000	Population (1980)	Milepost	Distance from Existing Line (miles)	Communities with Population less than 1,000	Milepost	Distance from Existing Line (miles)
WASHINGTON (continued)						
Pasco	17,944	254	19			
Kennewick	34,397	254	20			
Richland	33,578	254	25			
OREGON						
Hermiston	9,408	283	4	Echo	283	3
Umatilla	3,199	283	10	Ione	318	0.25[a]
Milton-Freewater	5,086	264	28	Condon	345	4
Stanfield	1,568	283	0.5[a]	Shaniko	380	1
Pendleton	14,521	285	27	La Pine	484	0.5
Heppner	1,498	318	17	Gilchrist	501	0.25
The Dalles	10,820	390	50	Cresent	502	0.5
Madras	2,235	412	5	Sprague River	579	2.5
Redmond	6,452	438	3	Bonanza	598	2
Prineville	5,276	433	16	Malin	611	2
Bend	17,263	455	1			
Klamath Falls	16,661	596	17			
Altamont	19,805	597	15			

Note: Distances are shortest distance from milepost noted (not necessarily driving distance).
[a] Route may cross city boundaries.

Table 3G-3

NUMBER OF VISITOR ACCOMMODATIONS BY COUNTY
ALONG THE PGT ROUTE

State	County	Campsites and Recreational Vehicle Sites	Motel/Hotel Units
Idaho	Boundary	137	68
	Bonner	1,097	366
	Kootenai	280	812
TOTAL		1,514	1,246
Washington	Spokane	563	3,358
	Whitman	62	143
	Garfield	75	u
	Columbia	33	u
	Franklin	337	602
	Walla Walla	102	315
	Benton	100	1,153
TOTAL		1,279	5,571
Oregon	Umatilla	308	386
	Morrow	74	51
	Gilliam	0	60
	Sherman	0	66
	Wasco	152	301
	Jefferson	624	257
	Crook	365	34
	Deschutes	1,722	1,477
	Klamath	1,364	286
TOTAL		4,609	2,918

Table 3G-4

EXISTING SOCIOECONOMIC CONDITIONS IN THE ALTAMONT PROJECT AREA IN 1986

State County	Total Population	Population Density (sq mi)	Per Capita Income [a]	Civilian Labor Force	Unemployment Rate
MONTANA					
Hill	18,000	6.2	$12,102	8,715	7.7
Chouteau	5,900	1.5	13,928	2,644	6.1
Fergus	12,500	2.9	11,434	5,921	8.6
Judith Basin	2,600	1.4	10,979	1,271	5.3
Wheatland	2,200	1.6	13,435	1,054	6.1
Golden Valley	1,100	0.9	12,436	564	6.7
Stillwater	6,200	3.5	11,444	2,604	8.3
Carbon	8,500	4.1	10,691	4,247	7.9
WYOMING					
Big Horn	12,300	3.9	9,566	4,826	12.3
Washakie	10,000	4.5	11,157	4,749	9.6
Hot Springs	6,100	3.0	11,900	3,025	8.0
Fremont	35,300	3.8	10,344	16,463	11.3
Sublette	6,300	1.3	15,967	4,264	7.0
Sweetwater	47,000	4.5	12,966	21,595	9.2
Lincoln	15,600	3.8	15,330	10,055	8.4

Source: U.S. Bureau of Census (1988)

[a] Data for 1985

Table 3G-5

NUMBER OF VISITOR ACCOMMODATIONS BY COUNTY
ALONG THE ALTAMONT PROJECT ROUTE

State	County	Campsites and Recreational Vehicle Sites	Motel/Hotel Units
Montana	Hill	627	374
	Liberty	35	38
	Chouteau	80	31
	Cascade	1,475	1,558
	Fergus	163	289
	Judith Basin	90	12
	Wheatland	88	92
	Meagher	144	93
	Musselshell	91	52
	Sweetgrass	198	59
	Yellowstone	3,308	2,817
	Stillwater	139	72
	Carbon	303	229
TOTAL		6,706	5,716
Wyoming	Big Horn	344	212
	Washakie	246	197
	Park	99	160
	Hot Springs	179	233
	Fremont	543	737
	Sublette	106	157
	Sweetwater	202	1,477
	Lincoln	26	192
	Uinta	222	1,239
TOTAL		1,967	4,604

With the exception of Hill County, Montana, all of the counties crossed by the Altamont pipeline project have population densities below five persons per square mile. In 1988, Montana ranked second in the nation for acreage of land in farms and ranches. The economies of both states are based primarily on agriculture, including cattle ranching, and natural resource development. The major employment sectors in Montana and Wyoming are services, agriculture, and mining.

An estimate of the temporary housing available within 70 miles of the route is provided in Table 3G-5. Some of the communities with the largest number of visitor accommodations are located in counties that would not be crossed by the Altamont project.

SOUTH PASS ROUTE VARIATIONS

The population, income, and employment discussion for the counties that would be crossed by the proposed route in Wyoming is applicable to the South Pass Variations. The temporary housing described along the proposed route is expected to be used for the variations.

KERN RIVER DOWNSTREAM FACILITIES

Table 2-13 identified the counties and the preliminary locations of the required downstream facilities on Kern River's system. Relevant information regarding population, housing, and economic characteristics in the counties where the additional compressor stations would be constructed is presented in the EOR FEIR/FEIS, Sections 3.1.8 of Volume II (for Stations 2, 3, 5, and 6) and Volume I (for Station 8).

Chapter 3H. Affected Environment: Air Quality

Air quality can be affected by both pipeline construction and the operation of compressor stations. During pipeline construction, a temporary reduction in local ambient air quality could result from fugitive dust and emissions generated by construction equipment, as well as smoke generated from the burning of woody slash cleared from the right-of-way. This short-term impact would be limited to the immediate vicinity of the pipeline ROW. As construction is completed, the fugitive emissions would subside. And given the sequential nature of pipeline construction, the length of time that any one area would be exposed to elevated concentrations is limited. After the pipeline is built, nitrogen oxides (NO_x) would be the primary air pollutant emitted by the compression facilities. PGT proposes to install additional compression at existing stations in the states of Idaho and Washington; Altamont proposes to construct new compressor stations in Montana and Wyoming; and Kern River would install compression in Utah, Nevada, and California.

REGULATORY REQUIREMENTS

Ambient air quality is protected by federal and state regulations. The EPA has developed ambient standards for certain criteria air pollutants. These standards are referred to as the National Ambient Air Quality Standards (NAAQS). Primary standards are designed to protect the public health, while secondary standards are intended to protect the public welfare from effects such as visibility reduction and nuisance. Under federal law, air quality standards for each state cannot be less stringent than the NAAQS. Of the states in which new or additional compressor facilities would be located, only Montana and California have established an air quality standard which differs from the NAAQS for the pollutants of concern. The primary and secondary NAAQS for NO_x (measured as NO_2) and carbon monoxide (CO), as well as the more stringent state standards are presented in Table 3H-1.

Areas that exceed the primary NAAQS are designated as "nonattainment" areas, while those that comply with the primary standards are designated "attainment" areas. Areas for which monitoring data are lacking are formally designated "unclassified" areas, but are generally treated as attainment areas. The classification of areas into attainment and nonattainment areas is pollutant specific.

Existing ambient air quality is also protected by EPA's Prevention of Significant Deterioration (PSD) regulations. These regulations are intended to preserve the existing air quality in attainment areas where pollutant levels are below the NAAQS. PSD regulations impose specific limits on the extent to which new or modified stationary sources may degrade existing air quality. These limits, or air quality increments, are based on the area where the source is located (See Table 3H-1). Class I areas permit the smallest air quality

Table 3H-1

RELEVANT FEDERAL AND STATE
AMBIENT AIR QUALITY STANDARDS

Pollutant Averaging Time	Federal Standards Primary and Secondary	Montana	California
Carbon Monoxide			
8 hour	9 ppm 10 $\mu g/m^3$	same	same
1 hour	35 ppm 40 $\mu g/m^3$	same	same
Nitrogen Dioxide			
Annual	0.05 ppm 100 $\mu g/m^3$	same	same
1 hour	none	0.30 ppm	470 $\mu g/m^3$
PSD Increments for Nitrogen Dioxide (annual average)			
Class I	2.5 $\mu g/m^3$		
Class II	25 $\mu g/m^3$		
Class III	50 $\mu g/m^3$		
Notes: $\mu g/m^3$ = micrograms per cubic meter. ppm = parts per million.			

increments and include international parks, national wilderness areas, national memorials over 5,000 acres, and national parks over 600 acres. All areas not designated as Class I are defined as Class II areas and are allowed larger air quality increments. However, a major stationary source located in a Class II area with the potential to adversely affect air quality in an adjacent Class I area would have to demonstrate that its emissions would not exceed either the Class I or the Class II increments. A major source subject to PSD regulations is required to submit a review of existing air quality; use modeling analyses to demonstrate compliance with the NAAQS and applicable increments; apply the best available control technology (BACT); and include an analysis of the general impact on the environment.

PGT PROJECT: AMBIENT AIR QUALITY

Air quality is generally good throughout the Pacific Northwest, with the exception of exceedances of the ozone and CO NAAQS in the larger urban areas. Exceedances of the NAAQS for inhalable particulates having an aerometric diameter of 10 microns or less (PM10) have also been recorded in areas where temperature inversions are frequent.

Idaho

PGT proposes to install additional compression at two existing stations in Boundary and Kootenai County. Pipeline looping would also involve Bonner County. The compressor stations and proposed looping are located in predominantly rural regions of the state where air quality is good. Although PM10 violations have been monitored in Sandpoint (Bonner County) and once in Coeur d'Alene (Kootenai County), all three Idaho counties are currently in attainment or unclassified for all criteria pollutants. PM10 emissions along the pipeline route in Idaho are primarily caused by agricultural tilling and burning, entrained vehicle dust, windblown dust, and wood stoves.

Oregon

PGT does not propose to install any additional compression facilities in Oregon. However, the central Oregon area is currently non-attainment for PM10. The regional haze problem caused by PM10 currently affects the visibility in several Class I areas. The current regional smoke management plan restricts outdoor open burning between July 4 to Labor Day.

Washington

PGT proposes to install additional compression at an existing station in Walla Walla County. Pipeline looping would also involve Spokane and Whitman Counties. The compressor station and proposed looping are located in rural regions where air quality is generally good. The city of Spokane (Spokane County) has monitored high concentrations of CO and PM10 which has resulted in the county being classified as nonattainment for these pollutants. The Spokane River Valley's frequent temperature inversions are thought to be the cause of the elevated CO and PM10 levels. The Wallula area of Walla Walla County is also classified as a nonattainment area for PM10. Here farming, agricultural burning, entrained road dust, construction activities, and wood stoves usage appears to be contributing factors. All three counties in which construction would occur are classified as attainment areas for all remaining criteria pollutants.

ALTAMONT PROJECT: AMBIENT AIR QUALITY

Altamont proposes to construct three compressor stations in Montana, at locations in Hill, Fergus, and Stillwater Counties. In Wyoming, an additional three stations would be constructed in Big Horn, Fremont, and ~~Stillwater~~ Sweetwater Counties. Additional counties in which construction of the proposed pipeline would occur are listed in Table 2-9. The project elements would be located in rural areas where ambient air quality is good due to frequent winds, relatively gentle terrain, and a lack of major pollution sources and vehicular traffic.

Montana

All eight Montana counties in which facilities would be constructed are in attainment of federal and state standards or are unclassified for all criteria pollutants.

Wyoming

Ambient concentrations of regulated pollutants in all seven Wyoming counties where facilities are proposed for construction are all well below both the NAAQS and the Wyoming standards. The only exception is an area in Sweetwater County near the Green River where total suspended particulates (TSP) have been measured in excess of the Wyoming state standard. The probable cause of elevated TSP levels at this location is windborne dust and the emissions from the five trona plants west of Green River, Wyoming.

SOUTH PASS ROUTE VARIATIONS: AMBIENT AIR QUALITY

Adoption of the Jeffrey City, Alkali Butte, or Northern Utilities Variation would require relocation of either one or two of Altamont's proposed compressor stations and construction of an additional or seventh station. Both of the potential relocation sites, as well as the new site, are located in the same two counties of southern Wyoming as Altamont's proposed sites for Compressor Station Nos. 5 and 6. Ambient air quality along the South Pass Variation routes and at the alternative compressor station sites is identical to that described for the proposed route.

Adoption of the Route 28 Variation would not require any change in the locations proposed for Compressor Station Nos. 5 and 6. Altamont's proposed horsepower requirements would also be unaffected.

KERN RIVER DOWNSTREAM FACILITIES: AMBIENT AIR QUALITY

In order to accommodate transportation of up to 700 MMcfd for Altamont, the Kern River system would require approximately ~~18,000~~ 140,000 hp of additional compression at two certificated compressor stations and five new compressor stations located in Utah, Nevada and California. The locations and distribution of horsepower among these stations is presented in Table 2-13.

Utah

Kern River would require additional compression at one certificated compressor station in Millard County, and construction of three additional compressor stations in Morgan, Utah, and Iron Counties. Utah is in attainment of the NAAQS criteria pollutants except for CO and PM10. The closest PSD Class 1 area is Zion National Park which would be approximately 33 miles southeast of the preliminary site of Compressor Station No. 5 in Iron County. Kern River has not yet constructed the certificated Compressor Station No. 4.

Nevada

Kern River would require additional compression at one certificated compressor station and one new compressor station in Clark County. Nevada is in attainment of the NAAQS criteria pollutants except for CO and PM10. Kern River has not yet constructed the certificated Compressor Station No. 7.

California

Kern River would require construction of a new compressor station in San Bernardino County. In addition to the NAAQS annual standard for NO_2, California has established a 1-hour NO_2 guideline of 470 $\mu g/m^3$. California is in attainment for NO_2 in San Bernardino County.

Chapter 3I. Affected Environment: Noise

CHARACTERISTICS OF NOISE

At any location, both the magnitude and frequency of environmental noise may vary considerably over the course of the day, throughout the week, and seasonally. This variation is caused in part by variations in output level from noise sources, changing weather conditions, and the effects of seasonal vegetative cover. Two measures commonly used to relate the time-varying quality of environmental noise to its known effect on people are the equivalent sound level (L_{eq}) and the day-night sound level (L_{dn}). The $L_{eq(24)}$ is the level of steady sound with the same total (equivalent) energy as the time-varying sound of interest, averaged over a 24-hour period. The L_{dn} is the $L_{eq(24)}$ with a 10-dBA weighting applied to night time sound levels between the hours of 10 p.m. and 7 a.m. to account for people's greater sensitivity to sound during the night.

Noise associated with pipeline construction activities would be intermittent and brief at any single location. Neighbors may sometimes hear the construction noise, but the overall impact would be temporary. Because of the temporary nature of noise associated with pipeline construction, it is unnecessary to provide an analysis of the existing ambient sound levels along the proposed ROWs. Both pipeline proposals would be primarily located in rural areas where ambient noise levels are expected to be low, on the order of 40 to 45 dBA L_{dn}. The scope of this analysis will be limited to those compressor stations which are proposed (Altamont's), those existing stations at which compression would be added (PGT's), and compressor stations that are part of Kern River's facilities.

PGT PROJECT

PGT proposes to install additional compression at one existing station and to replace existing compressors with larger units at two other stations. Information on existing noise levels and distances to the nearest noise-sensitive areas (NSAs) in each station's vicinity is presented in Table 4I-1. At Compressor Station No. 3, one ~~25,000 hp~~ 30,000 hp Cooper-Rolls Cabera Model 6462 natural gas-fired turbine-compressor unit would be installed to supplement the existing 12,500-hp unit. At Compressor Station Nos. 5 and 7, an existing 9,100-hp turbine-compressor would be replaced by a ~~25,000 hp~~ 30,000 hp Cooper-Rolls Cabera Model 6462 natural gas-fired turbine-compressor unit. At both stations, an existing 12,500-hp turbine-compressor would remain operational.

Compressor Station No. 3 is located on the west side of U.S. 95, a out two miles south of the town of Eastport in Boundary County, Idaho. The station is located in a rural wooded area with scattered nearby residences. The compressor station is currently the major noise source in the area. The nearest NSA is a residence located on the east side of U.S. 95, approximately 850 feet east of the existing compressor building. Sound measurements at this location were taken by PGT in ~~early~~ July 1990~~. A~~ and a L_{dn} was calculated to be ~~52.9~~ 52.5 dBA at the NSA when the existing engine units were operating at full load.

Compressor Station No. 5 is located about 2 miles southwest of the town of Athol in Kootenai County, Idaho. The station is surrounded by conifers and is located in a rural area with scattered residences. The compressor station is currently the major noise source in the area. The nearest NSA is a residence located approximately 3,200 feet northwest of the existing compressor building. Sound measurements taken by PGT in early 1990 recorded an existing L_{eq} sound level of 35 dBA at the residence, which corresponds to a L_{dn} of 41.4 dBA.

Compressor Station No. 7 is located about 5 miles southeast of the town of Ayer in Walla Walla County, Washington. The station is located in a rural agricultural area with scattered residences. The compressor station is currently the major noise source in the area. The nearest NSA is a residence located approximately 4,800 feet southeast of the existing compressor building. Sound measurements taken by PGT in early 1990 recorded an existing L_{eq} sound level of 39 dBA at a distance of 2,500 feet, which corresponds to a L_{dn} of 39.8 dBA at the residence.

Idaho has no state environmental noise standards. Washington's Department of Ecology has established limits on noise levels that various land uses can produce on adjacent properties. The maximum noise from an industrial facility upon a residential property line is 60 dBA during the day and 50 dBA at night. However, the rural character of the land surrounding Compressor Station No. 7 and the distance to the nearest NSA would be the more significant factors limiting the noise impact.

ALTAMONT PROJECT

Altamont proposes to construct six new compressor stations, three in Montana and three in Wyoming. Table 4I-1 presents information on NSAs in each station's vicinity. At Compressor Station No. 1, four 12,600-hp natural gas-fired turbine compressor units would be installed. The remaining five stations would all house a single 12,600-hp turbine-compressor and appurtenant facilities.

Compressor Station No. 1 would be located on the U.S. side of the International Boundary with Canada, about 1.5 miles ~~east~~ west of the Wild Horse Port of Entry in Hill County, Montana. The station would be sited on rangeland in a rural agricultural area. The nearest NSA to the site is a farmhouse located approximately 5,000 feet to the southwest.

Compressor Station No. 2 would be located on the south side of SR 81, about three miles northwest of the town of Denton in Fergus County, Montana. The proposed site is presently devoted to dryland cultivation. The nearest NSA to the site is a farmhouse located approximately 8,500 feet to the southeast.

Compressor Station No. 3 would be located on the south side of a graveled road just west of SR 306, about three miles south of the town of Rapelje in Stillwater County, Montana. The surrounding land use is dryland cultivation. The nearest NSA to the site is a farmhouse located approximately 2,500 feet to the south-southeast.

Compressor Station No. 4 would be located on the north side of U.S. 14/16/20, about five miles west of Greybull in Big Horn County, Wyoming. The site is immediately adjacent to an existing Montana-Dakota Utilities (MDU) pipeline ROW and is presently rangeland, although irrigated farmland lies to the east of the MDU ROW. The nearest NSA is ~~an unidentified building~~ approximately ~~2,400~~ 7,000 feet to the ~~south~~east.

Compressor Station No. 5 would be located in rangeland on the north side of U.S. 20/26, about 12 miles west of the town of Moneta in Fremont County, Wyoming. There are no known NSAs within one mile of the proposed site.

Compressor Station No. 6 would be located on the south side of S.R. 28, about 13 miles north of the town of Farson in Sweetwater County, Wyoming. The site is immediately adjacent to an existing AT&T right-of-way and is presently rangeland. There are no known NSAs within one mile of the proposed site.

Neither Montana nor Wyoming have state environmental noise standards.

SOUTH PASS ROUTE VARIATIONS

Jeffrey City

Adoption of the Jeffrey City Variation would require Compressor Station Nos. 5 and 6 to be relocated and construction of an additional (seventh) compressor station. Compressor Station 5 would be relocated to a rangeland site about 0.5 mile northwest of the town of Lysite in Fremont County. The proposed site is adjacent to a county road and the ~~Chicago,~~ Burlington Northern~~& Quincy~~ Railroad line. The nearest NSA is a residence located approximately 2,900 feet to the southeast.

Compressor Station No. 6 ("Bastard Butte") would be relocated to a site about four miles north of Bush Lake where the existing Frontier/Bairoil pipeline right-of-way crosses Rocky Crossing Road in northern Sweetwater County. Compressor Station No. 7 ("Skunk Canyon") would be located adjacent to a county road and the Frontier/Bairoil right-of-way about 16 miles north of Green River in Sweetwater County. Both sites are presently on rangeland. There are no known NSAs within one mile of either site.

Alkali Butte

Adoption of the Alkali Butte Variation would require Compressor Station No. 6 to be relocated to the Bastard Butte site and construction of an additional station at the Skunk Canyon site. As previously discussed, there are no known NSAs within one mile of either site.

Northern Utilities

Use of the Northern Utilities Variation would require relocation of Compressor Station No. 5 to the site near Lysite and construction of an additional station at the Skunk Canyon site. NSAs in the vicinity of these sites has been previously discussed. This variation would also require relocation of Compressor Station No. 6 to a site north of Rocky Crossing Road at Stratton Lakes in northern Sweetwater County. The proposed Stratton Lakes site is on rangeland adjacent to the Frontier/Bairoil ROW. There are no known NSAs within one mile of the site.

Route 28

Adoption of the Route 28 Variation would not require any change in the locations proposed for Compressor Station Nos. 5 and 6. Altamont's proposed horsepower requirements would also be unaffected.

KERN RIVER DOWNSTREAM FACILITIES

In order to accommodate transportation of up to 700 MMcfd for Altamont, the Kern River system would require the addition of approximately ~~60,000~~ 30,000 site-rated hp of compression at two certificated compressor stations and approximately ~~120,000~~ 110,000 site-rated hp at five new compressor stations. The MP locations for these stations is presented in Table 2-13.

Compressor Station No. 2 would be located in Morgan County, Utah, with a capacity of 20,000 hp. The nearest NSA is a residence located approximately 1,500 feet west of the compressor building. Based on the area's rural character, an ambient L_{dn} of 40 dBA is estimated at the nearest NSA.

Compressor Station No. 3 would be located in Utah County, Utah, with a capacity of 30,000 hp. The nearest NSA is a residence located approximately 6,200 feet east of the compressor building. Based on the area's rural character, an ambient L_{dn} of 40 dBA is estimated at the nearest NSA.

Compressor Station No. 4 would be located in Millard County, Utah, and is currently certificated with a capacity of 9,200 site-rated hp. Kern River would require an additional 10,000 hp of compression at this site. The nearest NSA is a shop building located approximately 4,000 feet east of the compressor building. Based on the area's rural character, an ambient L_{dn} of 40 dBA is estimated at the nearest NSA. Previous analysis for this site has projected a theoretical L_{dn} associated with operation of the certificated facilities of approximately 40 dBA at the nearby NSA. This would result in a theoretical total L_{dn} at the NSA of about 44 dBA.

Compressor Station No. 5 would be located in Iron County, Utah. Kern River would require approximately 30,000 hp at this site. The nearest NSA is located approximately 4,500 feet west of the compressor building. Based on the area's rural character, an ambient L_{dn} of 40 dBA is estimated at the nearest NSA.

Compressor Station No. 6 would be located in Clark County, Nevada, with a capacity of ~~3~~20,000 hp. Existing noise sources in the site's vicinity include a rail siding within one mile to the east at Moapa and a small landing strip, electrical generating station, and I-15 within two miles to the east at Glendale. The nearest NSA is located approximately 2,000 feet east of the compressor building. Based on the area's rural character, an ambient L_{dn} of 45 dBA is estimated at the nearest NSA.

Compressor Station No. 7 would be located in Clark County, Nevada, and is currently certificated with a capacity of 9,400 site-rated hp of compression. Kern River would require an additional 20,000 hp at this site. The nearest NSA, a house associated with the town of Goodsprings, is located approximately 5,000 feet northwest of the compressor building. Based on the area's rural character, an ambient L_{dn} of 40 dBA is estimated at the nearest NSA. Previous analysis for this compressor site has projected a theoretical L_{dn} associated with operation of the certificated facilities of approximately 38 dBA at the nearby NSA. This would result in a theoretical total L_{dn} at the NSA of about 42 dBA.

Compressor Station No. 8 would be located in San Bernardino County, California, with a capacity of ~~40,000~~ 10,000 hp. The station site lies within 2,000 feet of I-40 on the south and a major rail corridor on the north. An electrical generating station is located immediately north of the rail corridor. The nearest NSA is located approximately 3,000 feet northwest of the compressor building and some 700 feet south of the rail corridor. Based on the area's rural/industrial character, an ambient L_{dn} of 50 dBA is estimated at the nearest NSA.

Chapter 3J. Affected Environment: Transportation

PGT PROJECT

The proposed pipeline route would cross major highway transportation routes in 47 locations and railroads in 31 locations. Major transportation routes are defined as all interstate and U.S. highways and state routes. The locations of the route crossings are identified in Table 3J-1. Average daily traffic (ADT) on the major highway transportation routes is also identified in Table 3J-1. ADT varies from a low of 220 vehicles to a high of 65,000 vehicles. Of the 47 major highway crossings, 10 had ADT volumes of less than 1,000 vehicles and nine had ADT volumes of greater than 10,000 vehicles.

Neither Idaho, Washington, nor Oregon have a general construction standard for roads crossed by pipelines. All these states, however, have a permit process that considers the importance of the roads. In most cases, boring would be required at federal highway and state route crossings. If the road has a low volume of traffic or if the crossing would not occur in an area designated as important by the respective state transportation department, the open-cut crossing method may be permitted. PGT plans to use the open-cut method where permitted. All railroad crossings would be bored.

Pipe and other supplies would be transported to the route by railroad. Proposed locations of railheads are not known, but they would be spaced throughout the pipeline route at regular intervals. The supplies would then be trucked to the project site using highways and local roads.

Idaho

The proposed pipeline would cross state and federal highways at five locations. The proposed pipeline route also would cross a total of 28 county roads and eight railroad~~s at eight locations.~~lines.

Washington

The proposed pipeline would cross federal highways and state routes in Washington at three locations. In addition, the pipeline route would cross 20 county roads and railroads at four locations.

Table 3J-1

MAJOR TRANSPORTATION ROUTES THAT WOULD BE CROSSED BY THE PGT PROJECT

State	Milepost	Route	Average Daily Traffic[a/]
Idaho	0.2	Union Pacific RR	--
	1.2	Union Pacific RR	--
	3.5	US 95	550
	10.6	Spokane International RR	--
	14.1	Spokane International RR	--
	83.0	US 95	4,030
	84.0	Burlington Northern RR	--
	84.7	Union Pacific RR	--
	84.8	SR 54	4,030
	91.6	Burlington Northern RR	--
	96.1	SR 53	4,630
	98.3	SR 41	4,630
	104.5	Burlington Northern RR	--
Washington	185.2	SR 26	970
	185.9	Union Pacific RR	--
	225.4	Burlington Northern RR	--
	234.0	SR 124	No data
	234.3	Burlington Northern RR	--
	254.0	Northern Pacific RR	
	254.8	SR 140/US 12	4,250
Oregon	282.3	SR 32/US 395	8,200
	285.0	US 30/I-84	4,700
	288.5	SR 207	590
	318.4	SR 74	570
	318.5	Union Pacific RR	--
	337.2	SR 19	220

Table 3J-1
(continued)
MAJOR TRANSPORTATION ROUTES THAT WOULD BE CROSSED BY THE PGT PROJECT

State	Milepost	Route	Average Daily Traffic[a]
Oregon (continued)	337.3	Union Pacific RR	--
	347.1	SR 206	220
	372.2	US 97	1,500
	380.6	US 97	1,700
	422.9	US 26	1,000
	433.2	City of Prineville RR	--
	438.3	US 126/SR 126	3,050
	453.9	US 20	5,200
	484.2	Burlington Northern RR	--
	484.7	Burlington Northern RR	--
	487.1	SR 31	960
	505.9	US 97	2,600
	511.2	SR 58	1,600
	516.6	Southern Pacific RR	--
	529.6	SR 138	1,150
	551.8	US 97	3,550
	552.1	Southern Pacific RR	--
	580.8	Oregon, Central, and Eastern RR	--
	591.4	SR 66 and 140	1,850
	595.8	SR 70	390

Notes: RR = railroad
-- = Information on average daily traffic volumes of RR crossings is not applicable.

[a] All counts were made in 1987, except Idaho where counts were made in 1986.

Oregon

The proposed pipeline would cross federal highways and state routes in Oregon at 18 locations. In addition, the pipeline route would cross 96 county roads and railroads at eight locations.

ALTAMONT PROJECT

Construction of the pipeline would require the crossing of railroads, state and federal highways, and local roads. Highways, developed roads, and railroads would be crossed primarily by boring, except where prevented by geologic conditions and when crossing by other methods is allowed by authorities. Most undeveloped roads would be crossed using the open-cut method.

Montana and Wyoming road crossing standards do not allow open-cutting of state and federal highways unless boring is not feasible. Crossing methods for county and local roads are determined by the appropriate local agency. Railroads would have to be bored.

Highways and local roads would be used to transport materials and construction workers to the pipeline site. Primary access would be through public roadways and the pipeline right-of-way. Except for Compressor Station No. 1, all of the proposed compressor stations would be sited adjacent to a paved roadway.

Pipe and other supplies would be transported to the route by railroad. Proposed locations of railheads are not known, but they would be spaced throughout the pipeline route at regular intervals. The supplies would then be trucked to the site using highways and local roads.

Montana

The proposed pipeline would cross federal highways and state routes in Montana at 10 locations and active railroads at six locations. In addition, the pipeline route would cross 220 county roads.

Wyoming

The proposed pipeline would cross federal highways and state routes in Wyoming at 15 locations and active railroads at four locations. In addition, the pipeline route would cross 243 county roads.

SOUTH PASS ROUTE VARIATIONS

Transportation routes which would be crossed by the South Pass Variations are listed in Table 3J-3. Additionally, local road crossings would total 39, 29, 37, and 5 for the Jeffrey City, Alkali Butte, Northern Utilities, and Route 28 Variations, respectively. The alternative compressor station sites are all located adjacent to either light duty paved or unimproved dirt roads.

Table 3J-2

MAJOR TRANSPORTATION ROUTES THAT WOULD BE CROSSED BY THE ALTAMONT ROUTE

State	Milepost	Route
Montana	29.7	Burlington Northern RR
	30.3	US 2
	62.9	US 87
	120.9	US 81
	141.6	Burlington Northern RR
	146.7	US 87/SR 200
	167.4	US 191
	171.5	Unknown railroad
	195.3	US 12
	229.3	SR 306
	255.8	I-90
	255.8	Burlington Northern RR
	264.6	US 212
	264.6	Burlington Northern RR
	266.9	US 310
	267.8	Burlington Northern RR
Wyoming	319.9	Burlington Northern RR
	320.0	US 310/SR 789
	346.8	US 14/16/20
	355.8	SR 30
	373.3	SR 433
	375.2	Burlington Northern RR
	375.4	US 20/SR 789
	384.9	US 16
	440.1	Burlington Northern RR
	445.5	US 20/26
	464.5	SR 136
	476.9	SR 135
	493.4	US 287/SR 789
	529.1 537.7 556.9	SR 28
	561.9	US 191
	595.3	SR 372
	612.6	US 30
	612.9	Union Pacific RR

Table 3J-3

MAJOR TRANSPORTATION ROUTES THAT WOULD BE CROSSED BY THE SOUTH PASS VARIATIONS

Variation	Milepost [1/]	Crossing Description
Jeffrey City	JC 440.6	Burlington Northern RR
	JC 449.2	US 20/26
	JC 470.9	SR 136
	JC 497.8	US 287
Alkali Butte	440.0	Burlington Northern RR
	445.6	US 20/26
	AB 480.9	SR 135
	AB 498.2	US 287
Northern Utilties	JC 440.6	Burlington Northern RR
	JC 449.2	US 20/26
	NU 470.8	SR 136
	NU 498.2	SR 135
	NU 515.2	US 287
All Three of the Above Variations Would Cross the Following:		
	JC 589.5	U.S. Steel Corp. RR (abandoned)[2/]
	JC 597.6	US 191
	JC 621.1	SR 372
	JC 623.0	Union Pacific RR
	JC 628.0	Union Pacific RR
	JC 635.0	US 30
	JC 636.0	SR 374
	JC 639.5	Union Pacific RR

Table 3J-3
(continued)
MAJOR TRANSPORTATION ROUTES THAT WOULD
BE CROSSED BY THE SOUTH PASS VARIATIONS

Variation	Milepost [1/]	Crossing Description
Route 28	440.1	Burlington Northern RR
	445.5	US 20/26
	464.5	SR 136
	476.9	SR 135
	493.4	US 287/SR 789
	RT 515.3	U.S. Steel Corp. RR (abandoned)[2/]
	529.1	SR 28
	537.7	SR 28
	556.9	SR 28
	561.9	US 191
	595.3	SR 372
	612.6	US 30
	612.9	Union Pacific RR

1/ JC, AB, NU, and RT denote MPs for the Jeffrey City, Alkali Butte, Northern Utilities, and Route 28 variations, respectively. These prefixes are used only when the variation route differs from the proposed route.

2/ U.S. Steel has transferred its interests in this easement to Universal Equipment.

KERN RIVER DOWNSTREAM FACILITIES

The preliminary locations for Compressor Station Nos. 3, 5, 6, and 8 are accessible from existing primary or light duty paved roadways. The site for Compressor Station No. 2 is currently accessible only by an unimproved dirt road.

Chapter 3K. Affected Environment: Public Safety

DESIGN AND CONSTRUCTION SAFETY STANDARDS

All of the proposed pipeline facilities would be designed, constructed, operated, and maintained in accordance with DOT's Subchapter D, "Pipeline Safety," as prescribed in Title 49 CFR Parts 190, 191, and 192. DOT's 49 CFR governs the design, construction, and operation of gas transmission lines. Its purpose is to ensure adequate protection of the public from natural gas pipeline accidents. Part 190, "Pipeline Safety Program Procedures," dictates the procedures used by the Office of Pipeline Safety regarding pipeline safety under the Natural Gas Pipeline Safety Act.

Part 191, "Transportation of Natural and Other Gas by Pipeline: Annual Reports, Incident Reports, and Safety-Related Condition Reports," describes the requirements for the reporting of incidents and other annual pipeline summary data by operators of gas pipeline facilities. The most significant of these requirements is that the operator of a pipeline system must immediately report to the DOT's Office of Pipeline Safety any incident that involves a release of gas or that results in death, in injury requiring hospitalization, or in property damage of $50,000 or more.

Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards," the most detailed of the regulatory sections, has several provisions. It prescribes minimum safety requirements for pipeline facilities and gas transportation, including material selection, minimum design requirements, and protection required from internal, external, and atmospheric corrosion.

Part 192 also defines class locations for pipeline routes. The "class location unit" is the area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipe. These classes determine pipeline design and safety measures, such as thickness of the pipe wall, design pressure, valve spacing, and depth of cover. Area classifications are based on population density in the vicinity of the pipeline, with more densely populated areas requiring more rigorous safety measures. The four area classifications are as follows:

- o Class 1 - Locations with 10 or fewer buildings intended for human occupancy.
- o Class 2 - Locations with more than 10 but fewer than 46 buildings intended for human occupancy.
- o Class 3 - Locations with 46 or more buildings intended for human occupancy, or where the pipeline lies within 100 yards of any building or small, well-defined outside area occupied by 20 or more people during normal use.

- o Class 4 - Locations where buildings with four or more stories aboveground are prevalent.

Higher class locations require greater safety considerations in pipeline design, testing, and operation. Pipelines buried in Class 1 locations must be installed with a minimum cover of 30 inches in normal soil and 18 inches in consolidated rock. Class 2, 3, and 4 locations, as well as drainage ditches of public roads and railroad crossings, require 36 inches of cover in normal soil and 24 inches in consolidated rock.

Part 192 specifies welding practices, including procedures, qualifications of welders, inspection, and testing. Nondestructive testing of welds is required for at least 10 percent of welds in Class 1; at least 15 percent in Class 2; and 100 percent in Class 3 and 4, and at crossings of major or navigable rivers, within railroad or public highway rights-of-way, including tunnels, bridges, and overhead road crossings. If 100 percent is impracticable, then at least 90 percent of welds in these locations must be tested. At pipeline tie-ins, 100 percent of welds must be tested.

Part 192 prescribes minimum requirements for the protection of pipelines from external, internal, and atmospheric corrosion. The project pipelines are required to have an approved external protective coating and to be equipped with a cathodic protection system that must be tested at least once a year.

Each pipeline must be electrically isolated from other underground metallic structures, unless the pipeline and the other structures are electrically connected and cathodically protected as a single unit. Where a pipeline is located close to electrical transmission tower footings, or in other areas where fault currents or unusual risk of lightning may be anticipated, the pipeline must be provided with protection against damage due to fault currents or lightning, and protective measures must also be taken at insulating devices.

Part 192 also prescribes minimum leak-test and strength-test requirements for pipelines. Test pressure is determined according to class location and the proposed maximum allowable operating pressure (MAOP) as follows:

Class	Test Pressure
1	1.1 x MAOP (except 1.25 x MAOP if pipeline is within 300 feet of building)
2	1.25 x MAOP
3 and 4	1.5 x MAOP

Water must be used as a test medium in all Class 3 and 4 locations; water, air, or gas may be used, depending on specific circumstances, in Class 1 and 2 locations.

Class locations also determine the maximum distance allowed between sectionalizing block valves as follows: Class 1 - ~~10~~ 20 miles, Class 2 - 7.5 miles, Class 3 - 4 miles, Class 4 - 2.5 miles.

In addition to the specifications described above, a number of other safety design features would be built into the pipeline engineering. For instance, the pipeline would be buried deep enough so that tillage activities in agricultural areas would not pose a threat to pipeline integrity. Thicker wall pipe would be used at road, major creek, and river crossings.

Each pipeline operator is required to have a patrol program to observe surface conditions on and adjacent to the pipeline right-of-way for indications of leaks, construction activity, and other factors that might affect safety and operation. The maximum allowable frequency between patrols is as follows:

Class	At Highway and Railroad Crossings	At All Other Places
1 and 2	7.5 months but at least twice each calendar year	15 months but at least once each calendar year
3	4.5 months but at least four times each calendar year	7.5 months but at least two times each calendar year
4	4.5 months but at least four times each calendar year	4.5 months but at least two times each calendar year

Part 192 prescribes the minimum standards for operating and maintaining pipeline facilities, including the requirement to establish a written plan governing these activities. Under section 192.615, Part 192, "Emergency Plans," each pipeline operator must also establish an emergency plan that provides written procedures to minimize the hazards from a gas pipeline emergency. Key elements of the emergency plan include procedures for:

- receiving, identifying, and classifying emergency events, such as gas leaks, fires, explosions, and natural disasters;
- establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response;
- making personnel, equipment, tools, and materials available at the scene of an emergency;
- protecting people and property from actual or potential hazards; and
- providing for the emergency shutdown of the system and its safe return to service.

Each pipeline operator must also maintain a liaison with fire, police, and public officials; know the resources and responsibilities of each organization that may respond to a gas pipeline emergency; and coordinate mutual assistance in responding to emergencies. The operator must also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials.

The storage, transportation, handling, and use of explosives would be conducted in accordance with the Safety and Health Regulations for Construction - Blasting and Use of Explosives (29 CFR 1926). Blasting and the use of explosives would be in accordance with construction right-of-way and trenching specifications outlined in 18 CFR 2.6.9.

During the period from July to October there is a potential that wildfires may accidentally be started during construction. Receipt of all required burning permits, and adherence to approved fire prevention procedures, will minimize the potential for wildfires to occur.

Chapter 3L. Affected Environment: Visual Resources

This section describes the existing visual setting for the natural gas pipeline projects. In the following sections, general landscape types along the various pipeline routes are described, and areas having high or visually sensitive scenic qualities are identified by state.

Because BLM or FS administer federal lands that would be traversed by the natural gas pipeline projects, visual resources along the routes are described and evaluated using each agency's visual resource management (VRM) system where possible. The FS and BLM recognize that scenic values and visual quality are important public resources and manage activities on federal lands to protect visual resources. Both agencies have developed standard methodologies to identify and evaluate visual resources. The FS visual management system and the BLM VRM system also provide frameworks for developing and meeting objectives for maintaining scenic values and visual quality. The two systems are briefly described below.

FOREST SERVICE VISUAL QUALITY OBJECTIVES (VQO)

The FS visual management system evaluates and uses the following parameters to determine visual quality objectives (VQOs) for the natural landscape of a specific land area:

- Variety Classes. These classes are used to identify and described scenic quality: Class A - distinctive, Class B - common, and Class C - minimal. Variety classes are based on landform and vegetation.

- Sensitivity Levels. These levels are a measure of the public's concern for scenic quality: Level 1 - highest sensitivity, Level 2 - average sensitivity, and Level 3 - lowest sensitivity. Sensitivity levels are based on visibility and volume of use.

- Distance Zones. These zones are the divisions of the landscape in view: foreground, middle ground, and background.

These VQOs include the following designations: Preservation, Retention, Partial Retention, Modification, and Maximum Modification.

Preservation (P)

The Preservation VQO allows ecological changes only. Management activities, except very low visual impact recreation facilities, are prohibited. This objective applies to wilderness areas, primitive areas, other special classified areas, areas awaiting classification, and some unique management units that do not justify special classification.

Retention (R)

The Retention VQO provides for management activities that are not visually evident. Under the Retention VQO, activities may only repeat form, line, color, and texture which are frequently in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, and pattern, should not be evident.

Duration of Visual Impact. Immediate reduction in form, line, color, and texture contrast in order to meet Retention should be accomplished either during operation or immediately after. It may be done by such means as seeding vegetative clearings and cut-or-fill slopes, hand planting of large stock, and painting structures.

Partial Retention (PR)

According to the Partial Retention VQO, management activities remain visually subordinate to the characteristic landscape when managed. Activities may repeat form, line, color, or texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, pattern, ~~and~~ must remain visually subordinate to the characteristic landscape.

Activities may also introduce form, line color, or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape.

Duration of Visual Impact. Reduction in form, line, color, and texture to meet partial retention should be accomplished as soon after project completion as possible or at a minimum within the first year.

Modification (M)

Under the Modification VQO, management activities may visually dominate the original characteristic landscape. However, activities of vegetative and landform alteration must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area of character type. Additional parts of these activities, such as structures, roads, slash, and root wads, must remain visually subordinate to the proposed composition. Activities that are predominately an introduction of facilities, such as buildings, signs, and roads, should borrow naturally established form, line, color, and texture so completely and at such scale that its visual characteristics are compatible with the natural surroundings.

Duration of Visual Impact. Reduction in form, line, color, and texture should be accomplished in the first year or, at a minimum, should meet existing regional guidelines.

Maximum Modification (MM)

Under the Maximum Modification VQO, management activities of vegetative and landform alterations may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding area or character type. When viewed as foreground or middle ground, it may not appear to borrow completely from naturally established form, line, color, and texture. Alterations may also be out of scale or contain detail which is incongruent with natural occurrences as seen in foreground or middle ground. Introduction of additional parts to these activities, such as structures, roads, slash, and root wads, must remain visually subordinate to the proposed composition as viewed in background.

Duration of Visual Impact. Reduction of contrast should be accomplished within 5 years.

BLM VISUAL RESOURCE MANAGEMENT (VRM) OBJECTIVES

The BLM VRM system evaluates similar parameters to determine appropriate VRM classes. VRM Classes I-V describe the different degrees of modification allowed in the basic elements of the landscape. BLM's parameters are as follows:

- Scenic Quality. Classes are assigned based on landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. Class A scenery has the highest scenic value and Class C the lowest.

- Sensitivity Levels. These levels are a measure of use volumes and user or public attitudes. The public's concern for proposed changes in scenic quality is rated as high, medium, or low.

- Distance Zones. These zones identify the visibility of the landscape from major viewing routes and key points: foreground/middle ground, background, and seldom seen.

Class I

The management objective for Class I is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention. This class is applied to specially designated areas, such as the wild sections of National Wild and Scenic Rivers and Wilderness Areas. This class may be prescribed for natural areas and Areas of Critical Environmental Concern where management activities are to be restricted.

Class II

The management objective for Class II is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes should repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III

The management objective for Class III is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV

In Class IV areas, management activities may be allowed that result in major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

Class V

Class V is applied to areas where the natural character of the landscape has been disturbed through cultural modification to a point where rehabilitation is needed to bring it back into harmony with the surrounding landscape. It should be considered an interim or short-term classification until one of the other VRM class objectives can be reached through rehabilitation or enhancement.

Comparison of FS and BLM Methodologies

The FS and BLM methodologies are similar. The two systems evaluate basically the same parameters to determine appropriate management objectives. In both systems, a matrix involving the evaluated parameters is used to determine the applicable VRM class or VQO.

The final management objectives determined by FS and BLM are not equivalent. The FS VQO of Preservation and VRM Class I are approximately equal in that they allow only natural ecological changes. Generally, only low-level management activities are permitted in these areas, such as low-level management of recreational facilities. These management activities must have a low visual impact and must not attract attention.

VRM Class II is similar to aspects of both the VQOs of Retention and Partial Retention designations. VRM Class II allows for management activities that may be seen, similar to the management activities allowed by the VQO of Partial Retention. However, the VQO of Retention allows only management activities that are not visually evident.

VRM Class III falls between the VQOs of Partial Retention and Modification. VRM Class III allows for moderate management activities, whereas the VQO of Modification allows management activities that may visually dominate the original visual character.

VRM Class IV is generally equal to the VQO of Maximum Modification. This management activity allows for a high degree of change to the visual character of the landscape.

BLM has determined VRM Class V to be unacceptable. Areas that are determined to be Class V have been disturbed to a point where rehabilitation is needed to bring them back into harmony with the surrounding landscape.

Areas with high or visually sensitive scenic qualities are identified in Tables 3L-1 and 3L-2. Maps, aerial photographs, and FS and BLM management plans were used to identify these areas. Areas designated as BLM VRM Class I or II or as FS VQOs of Preservation or Retention are identified as scenic or visually sensitive. No visual management system exists for private lands. Most ~~L~~locations where the pipelines would be adjacent to existing rights-of-way were not characterized as visually sensitive because the visual impact on these sites is primarily incremental.

PGT PROJECT

General Landscape Types

General landscape types along the pipeline route are described by state and physiographic province. Physiographic provinces represent regions of similar topography, climate, vegetation, and geology. Seven physiographic provinces, or landscape types, were identified along the natural gas pipeline route. Almost the entire PGT route would be located on or adjacent to existing pipeline right-of-way.

Idaho. The pipeline route would traverse the Panhandle Region of Idaho, an area of steep, irregularly shaped mountain ranges separated by river valleys characteristic of the Northern Rocky Mountains province. Where the pipeline route would parallel the Moyie River valley, heavily forested valley walls give way to small open meadows. The meadows are lined with fir and pine forests, and occasional aspen groves. The thickly wooded hillsides provide a backdrop of dark green and grey-green colors. Mountain peaks form a distant skyline of barren, rugged rock formations. Lower, gently rolling hills are topped with small stands of fir. The open meadows provide brilliant wildflower displays in spring. Reds, golds, and browns are predominant fall colors.

South of Moyie Springs (MP 20.5), the visual character changes to a less dominating landscape. Here, the mountain ranges descend into the open rangeland of the Columbia Plateau province. Near Rathdrum, mountains can be seen in the distance. Farming and open grazing form the predominant land surface patterns.

Washington. The route would cross the Columbia Plateau province, which is predominantly level terrain with occasional rolling hills. In the north near LaCrosse (MP 184), the pipeline route would cross portions of this province that are mainly in agricultural use. The land gives way to open grasslands near the Walla Walla River (MP 254.2) to the south. Flat

Table 3L-1

VISUALLY SENSITIVE RESOURCES ALONG THE PGT ROUTE

Milepost	Location	Critical Viewpoint	Visual Rating		Relationship to Pipeline	Comments
			VRM	VQO		
IDAHO						
0.3	Moyie River	US 95		R	Crosses	Idaho Panhandle National Forest
1.0	Moyie River	US 95		R	Crosses	Idaho Panhandle National Forest
5.0	Moyie River	Moyie River		R	Crosses	Idaho Panhandle National Forest
5.8	Moyie River	Moyie River		R	Crosses	Idaho Panhandle National Forest
7.0	Buzzard Lake viewshed	Buzzard Lake		R	Passes 0.125 mile east	Recreation area - Idaho Panhandle National Forest
7.3	Buzzard Creek	Buzzard Creek		R	Crosses	Idaho Panhandle National Forest
7.8	Moyie River	Moyie River Road		R	Crosses	Idaho Panhandle National Forest
9.6	Snyder Creek	Snyder Creek		R	Crosses	Idaho Panhandle National Forest
10.0	Moyie River	Moyie River Road		R	Crosses	Idaho Panhandle National Forest
10.7	Moyie River	Moyie River Road		R	Crosses	Idaho Panhandle National Forest
13.6	Moyie River	Moyie River		R	Crosses	Idaho Panhandle National Forest
13.8-19.2	Eileen Road	Eileen Road		R	Crosses and Parallels	Idaho Panhandle National Forest
WASHINGTON						
None						
OREGON						
350-367	John Day Canyon Area	John Day River	II		Crosses	BLM Management Area (Prineville District)
358.0	John Day River	John Day River	II		Crosses	National Recreational Wild and Scenic River; BLM Management Area (Prineville District)

Table 3L-1
(continued)
VISUALLY SENSITIVE RESOURCES ALONG THE PGT ROUTE

Milepost	Location	Critical Viewpoint	Visual Rating		Relationship to Pipeline	Comments
			VRM	VQO		
OREGON (continued)						
404.0-429.0	Crooked River National Grassland	US 97		PR	Crosses	Federally designated national grasslands; Ochoco National Forest
422.9	US 26 viewshed	SR 26		R	Intersects	Primary travel route - recreation area; Ochoco National Forest
432.7	Crooked River	O'Neil Highway	II		Crosses	BLM Management Area (Prineville District)
433.0	US 26 viewshed	SR 26	II		Intersects	Primary travel route - recreation area; BLM Management area (Prineville District)
465.0	Lava Butte	Lava Butte		R	Passes 0.5 mile east	Recreation area; Deschutes National Forest
465.5-468.0	Newberry National Volcanic Monument	US 97		R	Crosses	Recreation area; Deschutes National Forest
467.0	Lava River Cave	Cave entrance		R	Passes 0.125 mile east	Recreation area; Deschutes National Forest
505.9	US 97 viewshed	US 97		R	Intersects	Primary travel route - recreation area; Deschutes National Forest
511.2	SR 58 viewshed	SR 58		R	Intersects	Primary travel route - recreation area; Deschutes National Forest
519.5	Miller Lake Road viewshed	Miller Lake Road		R	Intersects	Primary travel route - recreation area; Winema National Forest

Notes: R = Retential VQO
PR = Partial Retention VQO
II = BLM Class II VRM

Table 3L-2

VISUALLY SENSITIVE RESOURCES ALONG THE ALTAMONT ROUTE

Milepost	Location	Critical Viewpoint	Visual Resource Management Class	Relationship to Pipeline	Comments
MONTANA					
69.0	Missouri River	Missouri River	II	Crosses	Recreational National Wild and Scenic River: BLM-designated utility corridor; BLM and state management area
257.4	Yellowstone River	Yellowstone River	II	Crosses	Lewis and Clark Trail
268.1	Clarks Fork Yellowstone River	Clarks Fork Yellowstone River	II	Crosses	Lewis and Clark Trail
WYOMING					
352.2	Greybull River	Local road	II	Crosses	BLM management area
423.9	West Bridger Creek	Local road	II	Crosses	BLM management area
425.4	Old Bridger Trail Road	Old Bridger Trail Road	II	Intersects	BLM management area
508.1	Beaver Creek	Beaver Creek	II	Crosses	BLM management area
510.9	Little Beaver Creek	Same	II	Crosses	BLM management area
525.6	Fish Creek	Same	II	Crosses	BLM management area
526.8	Sweetwater River	Local roads	II	Crosses	BLM management area
a/ 529.0-555.0	SR 28 viewshed	SR 28	II	Parallels	Primary recreation travel route
a/ 536.5	Oregon-Mormon Trail	Same	I	Intersects	Second of three crossings
a/ 593.5	Green River	Local road, river	II	Crosses	Seedskadee NWR approximately 0.5 mile south
a/ 612.6	US 30 viewshed	US 30N	II	Intersects	Primary travel route
a/ 613.3	Hams Fork	US 30N	II	Crosses	Scenic area

Table 3L-2
(continued)
VISUALLY SENSITIVE RESOURCES ALONG THE ALTAMONT ROUTE

Milepost	Location	Critical Viewpoint	Visual Resource Management Class	Relationship to Pipeline	Comments
SOUTH PASS ROUTE VARIATIONS					
b/ AB MP 489.4	Beaver Divide Rim	Local road, scenic overlook	II	Crosses	BLM management area
c/ JC MP 495.5	Sweetwater River	River	II	Crosses	Moderate recreational use
c/ JC MP 496.2	Oregon-Mormon Trail	Trail	II	Crosses	Historic significance
b/ AB MP 498.2	Sweetwater River	US 287, river	II	Crosses	Moderate recreational use
b/ AB MP 500.3	Oregon-Mormon Trail	Trail	II	Crosses	Historic significance
a/ RT MP 504.5-529.5	South Pass ACEC	Local roads	II	Crosses	BLM management area
d/ JC MP 618.7	Green River	River	II	Crosses	Moderate recreational use
d/ JC MP 637.9	Oregon-Mormon Trail	Trail	II	Crosses	Historic Significance

Note: VRM = BLM visual resource management class

a/ also crossed by the Route 28 Variation
b/ crossed by both the Alkali Butte and Northern Utilities Variations
c/ crossed by the Jeffrey City Variation
d/ crossed by the Jeffrey City, Alkali Butte, and Northern Utilities Variations

raised plateaus or soft rolling hills on the distant horizon are common throughout this province. Farming patterns cover much of the land, creating vast quiltlike images. Farming has also created strong horizontal lines visible on hillsides. Color contrast varies throughout the year and includes the bright to deep rich green of crops, green to light gold of grazing lands, and chocolate brown of newly tilled earth. Fields and open grazing land are dotted with occasional scrub vegetation and lined with wire fencing to the south.

Oregon. The route would cross the Columbia Plateau, the Blue Mountains, the High Lava Plains, and the Basin and Range Physiographic Provinces. The characteristics of the Columbia Plateau province, described above for Washington, would vary in the south. Where the pipeline would cross the Columbia Plateau Province in Oregon, the visual setting becomes semidesert, with low grasses and sagebrush. Steep, rugged river valleys are carved into the land. The John Day River canyon (MP 350-367) is characterized by its steep, barren canyon walls. The John Day River (MP 358) provides sparse riparian vegetation that adds to the visual quality. Mima mounds (MP 380-390) have unique visual quality within the province, with their numerous hillocks dotting the landscape.

The landscape setting of the Blue Mountains province is characterized by steep, hilly terrain in the northern portion and gently rolling to fairly flat topography in the southern portion. The PGT pipeline route would be located in the extreme western portion of this province, where steep, jutting buttes are common. These hills have a barren appearance with the exception of occasional scrublands or small juniper forests. The steep buttes descend into the open, flat plateaus of the Crooked River National Grasslands (MP 404-429). These plateaus have occasional rock outcroppings and large stands of juniper.

The natural landscape of the High Lava Plains province is generally a flat plain with isolated high volcanic mountains, covered in thick stands of mixed conifer and pine forests and sagebrush. The Crooked River (MP 432) provides subtle relief to the forest. The forests are deep green and grey-green with grey sagebrush understories. Valleys are generally cleared plateaus, interspersed with small stands of pines and introduced broadleaf trees. Spring grasses create lush green carpets in the open areas that turn gold in summer. Fall colors consist of reds, golds, and browns.

The Basin and Range province varies from forested, flat valleys to high ridges with steep, high escarpments. The proposed pipeline route would cross a portion of the extreme western boundary of this province. Forested ridges with occasional barren hilltops dominate views in the north. Flat, expansive valley floors are covered with heavy mixed conifer and pine forests and occasional scrub grassland areas. Localized low ridges and valleys are covered with mixed conifer and pine forest with sparse understories. Deep green and grey-green colors dominate year round and are interspersed seasonally with reds, golds, and browns.

Areas with High or Visually Sensitive Scenic Quality

Idaho. The PGT natural gas pipeline route generally would follow the Moyie River valley in northern Idaho. Background views of the proposed pipeline route are varied throughout this region. Within the Moyie River valley, valley walls and thick forest obscure most background views. In the south, near Rathdrum, the mountain ridges are to the north and east. They appear as a silhouette on the skyline in the distance. To the south, open expanses of grazing lands form the background.

Middleground views are dominated by the dark lush greens of the forests in the north and the gently rolling grasslands to the south. Foreground views are dominated by thick forest through the Moyie River valley. In the south, foreground views are lush green agricultural lands. The FS classified much of the Panhandle National Forest in this area as Retention VQO.

The Moyie River watershed is used heavily for recreation; it provides sightseeing, camping, fishing, and hunting opportunities. The pipeline route would cross the access road to the Meadow Creek Campground (MP 13.6) and would pass within 0.125 mile of Buzzard Lake (MP 7). The pipeline route also would parallel and cross US 95, used heavily by travelers and vacationers in the Panhandle National Forest.

Washington. The PGT pipeline route would generally traverse the rural landscape of southeast Washington. The pipeline would enter the state from Idaho east of Spokane (MP 115) and exit after crossing the Walla Walla River (MP 254.2) near Lake Wallula.

Background views of the proposed pipeline route in Washington are panoramic skylines of rolling hills and low plateaus. Middleground views are dominated by the effects of dryland farming. Quilt patterns and parallel lines left by farm equipment are evident in all directions. In the foreground, fields and open grazing land are dotted with occasional scrub vegetation and wire fencing.

The area where the pipeline would cross the Walla Walla River is within the Wallula Habitat Management Unit. The Walla Walla River is an important recreation area, but its scenic quality sensitivity is not high.

Oregon. The PGT pipeline route would cross the central section of the state in a north-south direction. The pipeline would enter Oregon from Washington north of Stanfield, and traverse several landscape types, including three national forests, before exiting near the town of Klamath Falls. In the northern section of the state, the background, middleground, and foreground views are similar to those in Washington, discussed above. The southern section of the state, however, has background views that vary from rugged, barren mountain tops to forested ridges.

Middleground views are localized deep green juniper forests over gently rolling hills in central areas of the state, and are thick stands of mixed conifer and pine forests in the southern portions of the state. Middleground views would open into cleared valleys and occasional grass scrublands in some areas. Foreground views are usually associated with cleared high plateaus with small stands of pines and introduced broadleaf trees.

The John Day River (MP 358) has been designated as a "recreation" Wild and Scenic River. Recreation rivers are defined as being readily accessible by road or railroad and have a greater degree of development along their shorelines than scenic or wild rivers. Becuase of the John

Day Canyon's limited access and largely undeveloped nature, the recreation designation on this portion of the river is not entirely reflective of its acutal condition. BLM has classified the John Day Canyon as VRM Class II in the view zone rim to rim.

The Crooked River National Grasslands (MP 404-429) have been congressionally designated as national grasslands. Several small annual streams with rock outcroppings that are sensitive to change exist along the proposed pipeline route. Hiking trails and recreational areas are particularly sensitive in this area. The Crooked River National Grasslands have been classified as VQO Partial Retention.

The Newberry National Volcanic Monument (MP 465.5-468.0), Lava River Cave (MP 467), and Lava Butte (MP 465) are destination recreation areas. These areas are located adjacent to the proposed pipeline route and to US 97. The cave is 0.125 mile and the butte is 0.5 mile from the route, both at elevations higher than the pipeline. The pipeline route in this area has a VQO Retention.

Sightseeing is particularly important on or near highways leading to destination recreation areas and national forests. SR 26 (MP 422.9), US 97 (MP 505.9), SR 58 (MP 511.2), and Miller Lake Road (MP 519.5) are primary recreation travel routes to these high scenic sensitivity areas.

ALTAMONT PROJECT

General Landscape Types

The proposed route would cross two physiographic provinces, the Great Plains and the Wyoming Basin Physiographic Provinces. The route also would cross some portions of the Northern Rocky Mountains Physiographic Province.

Montana. The pipeline route in northern and central Montana can be described as predominantly level terrain with broad, gently rolling low hills characteristic of the Great Plains province. Occasionally, where streams or drainageways are present, erosion has carved steep breaks into the ground plain. The natural vegetation consists primarily of wheat grasses, with occasional stands of willow or cottonwood in the wetland areas. Agriculture dominates most of the viewshed in the province and results in large, expansive quilt patterns in all directions. The agricultural practices create displays of contrasting colors made up of deep greens, browns, and white against the naturally dark terrain.

The visual character of the route in southern Montana, from the Yellowstone River to the Wyoming border, changes dramatically due to scattered, open pine forest on the sandstone rims above the Yellowstone River; the abrupt rise of the nearby Beartooth Mountain Range; and the geological formations, colors, and vegetation associated with the Chugwater sandstone and other formations west of the Pryor Mountains. This visual character reflects the influence of the Northern Rocky Mountain province.

Wyoming. The visual character of the route in northern and central Wyoming, part of the Great Plains province, is dominated by badlands, flat plains, and isolated drainages, with the Bighorn and Wind River Mountain Ranges in the background. Brown, tan, gray, and white earthtones create a landscape of pastel colors amidst sparse vegetative cover.

Between South Pass (MP 525) and Opal (MP 620), the topography is a gently rolling landscape covered with gray-green sagebrush characteristic of the Wyoming Basin province. Expansive vistas dominate in this area. An occasional river valley provides a contrasting belt of green in the midst of the arid plains.

Areas with High or Visually Sensitive Scenic Quality

Montana. The Altamont pipeline route would generally traverse a rural landscape through Montana. Background views of the proposed pipeline route are of broad, generally flat horizons that are open and unrestricted. Middleground views are mixed with large expanses of semiarid grasslands and quilted farmlands. Foreground views illustrate lush greenscapes in the river and wetland areas, and gentle low geographic formations in the grassland areas.

The Missouri River has been designated a National Wild and Scenic River, with this segment of the river being classified as Recreational. The river itself is also a designated historic trail - the Lewis and Clark. The Missouri River is important for recreational use, and its sensitivity is high (VRM Class II). The Yellowstone River (MP 257.4) and the Clarks Fork of the Yellowstone River (MP 268.1) are also classified as VRM Class II.

Sightseeing is particularly important on or near highways leading to Yellowstone National Park and Grand Tetons National Park. US 212 (MP 264.6) and US 310 (MP 266.9) are primary recreation travel routes to these high-scenic-sensitivity areas.

Several historic roads and trails would be crossed by the pipeline route in Montana. The Lewis and Clark Trail has received a VRM Class II rating where it is adjacent to the Missouri River and the Clarks Fork of the Yellowstone River. The Bozeman Trail, located east of Edgar, Montana, near the Clarks Fork of the Yellowstone River, also would be crossed by the pipeline and has been assigned a VRM Class III rating.

Wyoming. The pipeline route would cross a generally arid, open, rolling rangeland in Wyoming. Background views are similar to those described for Montana. Broad, open expanses dominate the view. Middleground views are of low, rolling hills and flat rangelands. Foreground views are of an arid landscape with sagebrush as the dominant vegetation.

The Greybull River (MP 352.2) is classified as VRM Class II.

The South Pass (MP 503[illegible]-540) area has been designated by BLM as a destination recreation area. The pipeline route would pass within approximately 1.5 miles south of the proposed South Pass Historical Mining District (MP 518), which has historical and recreational value.

The Oregon-Mormon Trail would be crossed ~~twice (MP~~three times (MPs 521.2, 537.7, and ~~MP~~ 560.9) by the pipeline route in Wyoming, but only the second crossing has a high visual sensitivity. Several other historic trails and roads also would be crossed in Wyoming.

SOUTH PASS ROUTE VARIATIONS

The topography and surface characteristics of the area crossed by the Jeffrey City, Alkali Butte, and Northern Utilities Variations in Wyoming are similar to those described for the proposed route between South Pass and Opal. Most of the land that would be affected is rated as BLM Class IV~~ or V~~. The Route 28 Variation would cross more steep terrain, woody riparian areas, and forested tracts than the proposed route or the other variations. Those areas that have been designated Class II are listed in Table 3L-2. The Route 28 Variation would also cross those sites listed under the proposed route between MPs 529 and 620.

KERN RIVER DOWNSTREAM FACILTIES

Visual elements associated with the certificated Kern River system through Utah, Nevada, and California are discussed in the EOE FEIR/FEIS, Sections 3.1.12 of Volumes I and II. These discussions remain relevant to the preliminary sites of the new compressor stations which Kern River would require in order to transport gas for Altamont. No areas designated as scenic or visually sensitive have been identified near these new compressor station sites.

Chapter 3M. Affected Environment: Cultural Resources and Paleontology

PGT PROJECT

A cultural resource ~~study~~ inventory of the PGT project has been completed. The report documents the results of the archeological survey of the majority of the area of potential effect (APE) for the PGT project, the evaluation of sites for NRHP eligibility, the assessment of project effects on significant or potentially significant properties, and the cultural resource assessment report. These steps are integral components of compliance with Section 106 of the amended National Historic Preservation Act (NHPA) of 1966. Some of the laydown areas, temporary work areas, and access roads have not yet been defined. These areas will be surveyed upon their identification.

The background information presented below for is derived from a literature and records review (Class I inventory) and an intensive archeological field survey of the APE prepared in 1990. The study corridor for the Class I inventory extended for 0.5 mile on either side of the mapped centerline of the proposed route. The inventory included an examination of regional and local cultural resource overviews; information obtained from contacts with State Historic Preservation Officers (SHPOs); and data from previously documented archeological site records, surveys, and excavation reports. The field effort involved an intensive pedestrian survey of the currently defined APE, including the right-of-way, temporary working strips~~, routes of proposed access roads,~~ and other areas where ground disturbance is likely.

The eligibility of many recorded sites for listing in the National Register of Historic Places (NRHP) has not been formally determined. This report does not discuss the significance of sites that have not been formally evaluated against the NRHP-eligibility criteria found in 36 CFR 60.4.

The section on paleontological resources is derived from an extensive literature review. A detailed field inspection of the entire route has not been conducted. The exact nature and location of specific fossil deposits along the project route could not be determined during the literature review.

Archeology

Idaho

Prehistoric Resources. Human occupation of the Idaho Panhandle is believed to have started as early as 10,000 B.C. Small, mobile groups of hunters used the area on a seasonal basis, primarily in pursuit of large game. Prior to about 5500 B.C., these peoples located their hunting camps on the highest terraces of drainages, such as the Kootenai River. The subsequent Early Middle Period (5500 B.C. to 2500 B.C.) evidenced continued use of big game, with fish and plant resources becoming more prevalent. Between about 2500 B.C. and A.D. 700 (the Late Middle Period), use of fish and plants by Native Americans continued to increase in importance, and residential sites were sometimes located close to the rivers. Extensive use of riverine habitats and a reliance on fish and plant foods characterized the Late Period (A.D. 700 to A.D. 1750).

~~Only one~~ Four prehistoric sites, including a scatter of twelve fire altered rocks and three lithic scatters, ~~is~~ are present~~ed~~ in the APE for the Idaho segment of the project (Table 3M-1). No sites in the APE have been listed in, or determined eligible for, the NRHP.

Historic Resources. Use of northern Idaho by Euro-Americans has been sporadic since the early 1800s because of the geographic isolation of this region. Fur trappers, such as David Thompson of the North West Company, first explored the area in 1808. The Lewis and Clark expedition of 1804 and 1806, which spurred growth in the fur industry, also crossed the vicinity. Between 1809 and 1811, two or three fur posts were occupied briefly in northern Idaho. The Hudson's Bay Company was a dominant force in fur trading in northern Idaho from 1821 until about 1860. Four Jesuit mission stations, at Spalding, Kamiah, and the Sacred Heart missions, also existed in the early 1800s in northern Idaho.

In spite of the discovery of gold in many of the streams of northern Idaho in the 1850s and 1860s, settlement remained infrequent. A few settlers occupied the region in the 1870s, and cattle and sheep ranchers used the summer pastures of the area from about 1875 to 1900. The next major event in the history of the Idaho Panhandle was the completion of the Northern Pacific and Great Northern Railroads, in 1883 and 1886, respectively. The railroads opened the area to development.

Although dryland farming and lumbering interests have existed since 1900, wood pulp production and hunting, fishing, and other tourism activities have recently become more important to the local economy. Federal land management agencies, such as USFS, have influenced development of the region through the twentieth century.

Historic resources present in the APE consist of 12 sites and four isolates (including blazed trees and possible vehicle remains). Of the 12 sites, eight are roadside dumps apparently not associated with other structures or settlement. The remaining sites are a partially standing log structure, a residential location, a trail, and a townsite (Table 3M-1). Eleven sites date to the first half of the twentieth century; one may predate the turn of the century. Only the historic Meadow Creek Townsite, ca. 1906, is considered eligible for the NRHP by the Idaho SHPO. ~~The site, which was bulldozed in the 1950s, consists of at least 26 features including building foundations, stone walls and dumps in an area approximately 500 by 500 meters. The location is proposed for use as a pipe laydown area.~~ Though no standing structures remain (the site was bulldozed in the 1950s), at least 26 features are present. These include at least eight foundations (some with basements or root cellars), stone walls, dumps and possible sawmill remains, in an area approximately 500 by 500 meters. The town was one of several now abandoned sites established ca. 1905-1906 when the Spokane International Railroad was built. In the early 1900s, Meadow Creek had a population of 250 - 300 people and supported a dance hall, saloon, hotel and schoolhouse. There was also a ranger station and a lumber mill, and a water tank and depot for the railroad. The town served as one of the centers for railroad maintenance, logging, mining and forest management. As such, it possesses both local and regional significance. Although PGT originally proposed to utilize this location for a pipe laydown area, it has since chosen a new laydown area in response to the FERC staff's recommendation contained in the Draft EIS.

Washington

Prehistoric Resources. The occupation of eastern Washington may have begun as early as 11,000 B.C. Human populations at this time are believed to have consisted of small, mobile groups with a generalized hunting and foraging subsistence pattern. Six subsequent phases (Windust, Cascade, Tucannon, Harder, Piqunin, and Numi'pu) are identified for the region near the Columbia and Snake Rivers. These phases demonstrate a trend toward increasing specialization and use of riverine resources over the past 10,000 years. Housepits are first observed in the archeological record at about 1500 B.C., but large housepit villages are not seen until after 500 B.C. About 200 years ago, contact with Euro-Americans resulted in the introduction of horses and trade goods into the native cultures.

Only one site with prehistoric material was identified within the APE for Washington (Table 3M-1). This consisted of a low density lithic scatter (4 flakes) and faunal remains. The site also contained an historic component (see below). No sites within the APE for Washington have been listed in, or determined eligible for, the NRHP.

Historic Resources. Early explorations into the interior of the Pacific Northwest by parties such as that of Lewis and Clark in 1805 and 1806, and the subsequent fur trade during the first half of the 1800s, led to the future development of the region. The North West Company established Fort Nez Perces near the mouth of the Walla Walla River in 1818. An overland trail from Fort Colville and an exploratory route followed by Isaac Stevens between 1855 and 1860 were located near the pipeline route.

Shortly after Euro-American contact, the Native American populations were decimated by disease, abuse, and war, and were deprived of traditional use areas after the land cessions imposed by Governor Stevens in 1855. The Hudson's Bay Company, an important influence in this area for the previous 35 years, reduced its presence in this area at about the same time.

Despite two gold strikes in eastern Washington in the 1850s, mining never became important to the region, although transportation to mines in Montana and British Columbia did influence later development. Three early roads of the 1860s and 1870s, the Colville, Mullan, and Wild Horse Roads, were used heavily by miners, their suppliers, and cattle herds. Two small settlements, at Colville and Walla Walla, were established in the 1860s.

Throughout the 1870s, more settlers entered eastern Washington, but populations remained small. The completion of the transcontinental railroads in the early 1880s changed this pattern drastically. Small towns and farms were established wherever land could be farmed or livestock grazed. Cattle herds and horses dominated the ranching industry in the 1870s and 1880s, with dryland grain farming supplementing income. Sheepherding and commercial grain production became more important during the 1880s.

After 1900, lumbering became prevalent in the wooded mountains, government regulation of federal lands led to gradual decreases in livestock herds, and the flat lowlands of the region

Table 3M-1

IDENTIFIED CULTURAL RESOURCES WITHIN THE PGT/PG&E PROJECT AREA

County	Loop No.	Prehistoric Sites	Prehistoric/ Historic Sites	Historic Sites	Prehistoric Isolates	Historic Isolates
IDAHO						
Boundary	1	4	--	9	--	3
Bonner	2	--	--	1	--	--
Kootenai	2	--	--	2	--	1
WASHINGTON						
Spokane	2	--	--	--	--	--
Whitman	3	--	--	2	--	--
Walla Walla	4	--	1	5	--	2
OREGON						
Umatilla	5	--	--	1	--	--
Morrow	5	--	--	1	--	--
Gilliam	5	9	1	1	7	--
Sherman	5	12	1	2	3	--
Wasco	5	19	1	1	4	1
Jefferson	5	12	2	--	2	--
Jefferson	6	15	2	2	3	--
Crook	6	2	--	--	2	--
Deschutes	6	14	2	4	8	--
Klamath	6	--	--	2	--	1
Klamath	7	14	3	8	12	8
California						
Modoc	8	27	1	--	8	--
Siskiyou	8	4	--	--	6	--
Shasta	8	5	3	--	5	--
Shasta	9	2	1	1	2	--
Tehama	9	2	1	1	2	--
Glenn	9	--	--	--	--	--
Colusa	10	1	--	2	7	3
Yolo	10	1	--	--	--	--
Yolo	11	4	--	1	1	--
Solano	11	5	--	--	1	--
Contra Costa	12	4	--	--	1	--
Alameda	12	--	--	--	--	--
San Joaquin	12	--	--	--	--	--
Stanislaus	12	--	--	1	--	--
Merced	12	--	--	1	1	--
Fresno	12	--	--	--	--	--
TOTAL		156	19	48	75	19

were converted to grain production. After World War II, rivers were dammed for hydroelectric generation and the irrigation of lands previously unsuitable for farming.

The archeological survey of the APE in Washington resulted in the identification of seven historic sites and one prehistoric/historic site (see above for prehistoric component). Two historic isolates, a machine cut nail and a fragmentary farm implement, were located as well (Table 3M-1). Of the seven exclusively historic sites, three were debris scatters or dumps, one was the remains of a windmill with associated ditch features, and three were railroad grades with the tracks and ties removed. The historic portion of the dual component site consisted of twentieth century debris. The earliest site, one of the dumps, appears to date to the 1890s - 1910s; the remainder appear to date to the early to mid twentieth century. No sites within the APE have been listed in, or determined eligible for, the NRHP.

Oregon

Prehistoric Resources. The pattern of cultural development of north-central Oregon is essentially the same as that discussed for southeastern Washington. The patterns are less clearly understood in central and south-central Oregon, although evidence of a similar sequence of increasing specialization and emphasis on riverine resources is expected.

A total of 97 prehistoric sites, 12 dual component (prehistoric/historic) sites, and 41 prehistoric isolates have been identified within the project APE in Oregon (Table 3M-1). Of the exclusively prehistoric sites, 72 were sparse lithic scatters of varying size and density. Two of these contained rock features such as cairns, stacked or piled rocks, alignments, etc. Larger lithic scatters occurred 11 times. Rock features were found at five of these sites. Complex lithic scatters, containing not only flaked stone materials but also other tools or features, also occurred 11 times. One quarry site and two lithic sites with middens were also present. The prehistoric component of the prehistoric/historic sites occurred as small lithic scatters eight times, lithic scatters three times, and once as a complex lithic scatter. Isolates included 29 individual flakes, 5 biface fragments, 4 projectile points (or fragments thereof), a core, a pestle, and a modified nodule. No sites within the APE for Oregon have been listed in, or have yet been formally determined eligible for, the NRHP.

Historic Resources. The history of eastern and central Oregon began indirectly with the Spanish explorations along the Pacific coast in the late 1700s. These expeditions led to the formation of the maritime fur trade between 1788 and 1810; the interior fur trade grew in importance after 1800. Fur traders (e.g., Stephen Meek, Peter Skene Ogden, and Nathaniel Wyeth), military parties, and scientific expeditions (e.g., Lewis and Clark) represented the only Euro-American entrance into the project area until about 1850. The Lee Mission (founded at The Dalles) and the Whitman Mission (at present day Walla Walla) were the only white settlements in eastern Oregon before 1846.

The earliest activity in the vicinity was related to the fur trade, dominated by the North West Company between 1800 and 1821 and the Hudson's Bay Company from 1822 to 1850. By the 1830s, however, overland migration from the east had begun. The first settlers were Protestant and Catholic missionaries. After 1841, the missionaries were followed by other emigrants using the Oregon Pioneer Trail and various routes crossing eastern Oregon. Although wars between Native Americans and Euro-Americans from 1848 to the 1870s restricted early settlement of the region, the Oregon Pioneer Trail continued to be used.

Gold was found during the Civil War in the streams of the Blue Mountains. Placer gold mining continued during the 1860s and transportation routes in the region were improved to serve the growing number of small communities. Hardrock mining expanded in the last decades of the 1800s. Hardrock mining diminished during World War I, returned during the 1930s, declined again around World War II, and has not recovered significantly. Settlements grew near mining areas like Canyon City and along the Columbia River, but otherwise they were scarce during the 1870s.

The history of Oregon in the late 1800s paralleled that of eastern Washington. The scattered settlement pattern of earlier years changed dramatically with the completion of the transcontinental railroad in 1883, and many towns in eastern Oregon were founded the following decade. The burgeoning cattle grazing industry of the 1870s and 1880s declined rapidly as sheepherding expanded. This transition was uneasy and gave rise to range wars between cattle ranchers and sheepherders, who fought at the water holes and gullies of eastern Oregon.

After 1900, increasing federal management of rural lands in Oregon led to a decrease in the numbers of sheep and cattle permitted to graze on public lands. Dryland wheat farming became the dominant agricultural activity in the region at this time, and irrigation and drainage projects were constructed near Bend, Richmond, and in the Upper Klamath Basin. A significant growth spurt in the first decade of the 1900s led to the doubling of populations in many Oregon communities. Lumbering, recreation, and small-scale farming and livestock grazing have dominated eastern Oregon for the last 75 years.

A total of 22 historic sites, 12 dual component (prehistoric/historic) sites, and 10 historic isolates were recorded for the project APE in Oregon (Table 3M-1). Four of the exclusively historic sites consisted of structural remains and associated debris (most dating to the first half of the twentieth century). Three of the sites were historic roads or trails (one of these is the Bend-Prineville Wagon Road, still in use, but dating to the 1870s). The remainder consist of cisterns (2), dumps or debris scatters dating to the first half of the twentieth century (8), railroad grades dating between 1900 and 1940 (2), a railroad logging camp (1900-1920s), an electric transmission line structure, and an irrigation ditch.

The historic portions of the dual component sites consist of seven debris scatters or dumps, three sites with structural remains, a stone wall, and an electric transmission structure. Isolates included three tobacco cans/tins, two amethyst glass sherds, two electric insulator fragments, an auto trunk lid, a 5 gallon can, and a white ceramic sherd. The bulk of the material dates to the early to mid twentieth century. No sites within the APE for Oregon have been listed in, or have yet been formally determined eligible for, the NRHP.

California - PG&E's Nonjurisdictional Facilities

Prehistoric Resources. The diverse environments in California have led to the formation of various cultural groups and a complex archeological record. Human occupations began approximately 12,000 years ago, with an orientation toward resources of the lakeshores present at that time. This early occupation is known as the Western Pluvial Lakes Tradition. Regional subsistence specializations are seen in California as early as 6000 B.C., as the pluvial lakes evaporated. Local environments have been exploited in different ways across the state since that time.

The archeology of northeastern California, located in a contact zone with cultures of the Great Basin, the Columbia Plateau, the North Coast Ranges, and the Central Valley, is not clearly understood. The Western Pluvial Lakes Tradition and the later Archaic Stage are not well documented in the region, although long-term occupations are known at some sites (e.g., Nightfire Island and Squaw Creek). A specialization toward riverine resources is demonstrated in more recent sites.

Within the Central Valley, a three-part cultural sequence is generally accepted, originating about 2500 B.C. This relatively late date is probably attributable to the recent alluvial depositions of the region that buried earlier sites. The Squaw Creek site in Shasta County represents the longest archeological sequence in the northern portion of the valley, with an original occupation occurring about 6500 B.C. To the south, the sites near Farmington Reservoir have yielded artifacts dating to approximately 10,000 B.C.

Prehistoric resources present in the APE for the California section of the proposed pipeline include 55 sites, 6 dual component sites (prehistoric/historic) and 34 isolates (Table 3M-1). The majority of the sites are lithic scatters (19), sparse lithic scatters (15), complex lithic scatters (8), and middens (11). A bedrock milling station and a possible hearth site were also present. At least three of the midden sites contained milling features such as pestles, milling stones, or mortars. Of the six dual component sites, two contained lithic scatters, one contained a complex lithic scatter, and three were midden deposits.

Isolates included 14 flakes, 6 projectile points or fragments thereof, 4 biface fragments, 3 handstones, 2 pebbles with retouch, 2 cobbles with end battering, 1 milling stone, 1 mortar fragment, and 1 cobble core tool.

The Lake Britton Archeological District is currently listed in the NRHP. Twelve sites within the district are within the project study area (1 mile), and at least two are within the APE.

Historic Resources. The Spanish explorations in interior California date to the late 1700s, with colonization following soon after at the missions established in a narrow band along the California coast. Subsistence farming and livestock grazing were the main secular interests carried out at these early missions. Between 1822 and 1846, California history was greatly influenced by the policies of the Mexican government. Granting lands (ranchos) to private parties during the 1830s and 1840s greatly influenced development of central California.

The fur trade entered California in the 1820s and 1830s, with explorations by trappers such as Jedediah Smith and Peter Skene Ogden influencing early contacts with Native Americans. Adventurers and settlers entered California from the east in the 1840s, pioneering routes over the rugged Sierra Nevada mountain range. Travelers from the north entered California along the Applegate Cutoff from the Oregon Pioneer Trail. The Noble's Emigrant Trail was opened in 1852 and served as a cutoff from the Applegate Trail into the Central Valley. Another travel route established in the first half of the 1800s was the California-Oregon Road, pioneered by Jedediah Smith in the 1820s and used as a road, stage route, railroad corridor, and interstate highway since that time.

The activities of the Gold Rush Era, started in 1848, took place east of the project area, although the population growth and development of all northern California was heavily influenced by this momentous episode. Transportation through the San Joaquin Valley during this time, via Pacheco Pass and along the Butterfield Overland Stage Line, led to growth of this region east of the project area. Another mining area near the project was based on the 1855-1885 exploitation of coal fields within the Mount Diablo Range. Oil fields near the East San Francisco Bay (East Bay) and in the southern end of the San Joaquin Valley (McKittrick Field) were important as early as 1887.

During the 1850s and early 1860s, as the ranchos of the coast and Central Valley prospered, homesteaders settled near Alturas, Susanville, and Cedarville in northeastern California. Cattle ranching and subsistence farming were the primary interests in both areas. In the San Joaquin Valley in particular, the large cattle operations of the Miller and Lux partnership dominated the local economy through the end of the 1800s.

Near the East Bay, ranchos quickly evolved from generalized agriculture to specialized crop production designed to meet demands from the burgeoning population of that vicinity. These adaptations were delayed until the latter part of the 1800s due to the marshes and swamps of the region. Following the Swamp Act of 1855 and the large-scale reclamation of land through the construction of levees, the region became a remarkably productive agricultural center.

The livestock industry, although still important in much of California, gave way to agricultural experimentation in parts of the Sacramento Valley as early as 1856. The diversion of water from Cache Creek and the experiments of John Wolfskill near Woodland resulted in the development of fruit and nut orchards. In 1905, the University of California, Davis, established the University Farm, an agriculture center located in Davis. The Davis campus and the landmark Wolfskill Grant Experimental Station evolved from these agricultural beginnings.

Subsequent development through the twentieth century has relied on irrigation projects, prosperous agriculture, and large-scale land holdings in the Central Valley. In northeastern California, lumbering, ranching, and recreation dominated the economy of the last 50 years. The expansion of resident populations near the Delta region and East Bay have recently affected previous agricultural lands near the project.

The cultural resource survey for the California APE identified eight historic sites, six dual component (prehistoric/historic) sites and three isolates (Table 3M-1). The sites consisted of four historic debris scatters or dumps (dating to the late nineteenth to early twentieth centuries), a stone wall, a farm equipment site, and the Historic Adams Canal (one of the first irrigation ditches in Yolo County, built from 1857 to 1870). The historic portions of the dual component sites include four debris scatters or dumps, and the remains of two structures with associated debris (possibly late nineteenth to early twentieth centuries). Isolates consisted of three amethyst glass sherds.

The Noble's Emigrant Trail is listed in the NRHP and though the route is documented historically as crossing the proposed project route, no traces of it were identifiable by the survey.

California - CPUC Certificated Route Variations

Jepson Prairie Preserve Alternatives ~~A and~~ B. Results of the archeological survey of Alternative Route B indicate that one prehistoric site, ~~a dense lithic scatter, is present~~

~~within the route APE. One prehistoric site,~~ a lithic scatter with flakes and stone tools, was present within the Alternative Route B APE.

Brentwood Route Alternative 4. All but 2.3 miles of the 22.3 mile long alternative was surveyed for cultural resources (due to denied access). Three sites were identified within the APE, two prehistoric occupation and burial mounds and an historic refuse scatter. The two mounds had been previously recorded by earlier surveys. None of the sites have been officially assessed for NRHP eligibility.

~~**Brentwood Alternatives.** The Brentwood route alternatives and alternative compressor station sites are within areas considered to be generally sensitive for both prehistoric and historic archeological resources. Information has been gathered from information centers, but field surveys and archeological research have been sporadic within the area. The Brentwood route alternatives and the Brentwood Compressor Station Expansion and alternative compressor station sites have not been surveyed as the right-of-way alignment has not yet been defined.~~

~~**Pipeline Route Alternatives 2, 3, and 4.** No archeological sites have been recorded within the proposed right-of-way for Alternatives 2 and 3. Two historic sites, several ranchos established in the 1840s, and historic landings are known to occur close to these routes. Prehistoric resources are most likely to occur on indurated sand rises, knolls, and well-drained landforms near major drainages and springs. Although no known prehistoric or historic archeological sites have been identified along the Alternative 4 route, several locations are within one mile of the proposed project, and the general environment is considered sensitive for archeological resources.~~

~~**Alternative**~~ **Compressor Station Sites** ~~**A, B, and**~~ **C.** ~~No archeological sites have been recorded within one mile of Compressor Station Site A; however, only limited research and surveys have been conducted in this generally sensitive area. One prehistoric archeological resource and one historic farmstead have been recorded in the vicinity of Compressor Station Site B. In addition, a nearby survey south of Site B resulted in the recording of several historic complexes, and nearby springs make this a highly sensitive area for both prehistoric and historic archeological resources.~~ Although no archeological sites have been recorded in the immediate vicinity of Compressor Station Site C, one prehistoric resource is noted within one mile, and buried archeological deposits may exist in the area.

Contra Costa Alkali Meadows and Vernal Pool Reroute, and Shasta County Cypress Forest Reroute - West. Because these two reroutes were recently identified and certificated by the CPUC, no cultural resource surveys have yet been undertaken. All required cultural resource survey will be performed prior to construction.

Native American Concerns

Idaho. Comments were elicited from various tribes, groups, and individuals including the ~~Kalipsel, Coleville, and Kutenai~~ Nez Perce, Coeur D'Alene, Kootenai, for the proposed project. General concern over archeological and Native American sites was expressed, with particular concern for burials. Notification of sites occurring in tribal areas, document review, Native American participation, and consultation were among requests received. ~~Comments from the Yakima and the Coeur D'Alene Tribal Councils are still pending.~~ The Kootenai have identified the Moyie River Valley as historically significant and currently sensitive. They also voiced specific concern over the maintenance of burials in situ, treatment of "dissociated remains" and the treatment of objects with religious significance. The Kootenai share territory with the Kalispel and Pend Oreille Tribes. The Kootenai and the Kalispel share the same concerns and are currently consulting to coordinate monitoring activities. At least one Kootenai and two Pend Oreille ethnographic sites have been identified within one mile of the project in Idaho.

Washington. The Colville Tribal Council expressed concern for gathering areas and archeological, burial, ceremonial and vision quest sites. They also requested consultation with the Tribe for management of the resources. The Spokane Tribal Council, Kalispel and Yakima had general cultural resources concerns. The Kalispel and Yakima also had more specific concerns regarding village sites and disturbance of burials, respectively. At least five ethnographic sites of various tribal affiliation have been identified within one mile of the project in Washington.

~~**Washington.** The Coleville Tribal Council expressed concern for burial grounds and gathering areas. They also requested consultation regarding management of cultural resources. The Spokane Tribal Council did not comment.~~

Oregon. The Umatilla and Klamath/Modoc Tribal Councils, the Northern Paiute (Burns Paiute) as well as the ~~Atsugewi Band~~ Warm Springs Tribal Council, expressed various concerns regarding communication, Native American employment on the project, burial grounds, protection of sites, and review of reports. ~~No comments were received from the Northern Paiute (Burns Paiute). Comments are pending from the Warm Springs Tribal Council.~~ At least two ethnographic sites (Klamath/Modoc) have been identified within one mile of the Project.

California. The ~~Tule River~~ Yokuts, ~~Cortina and Grindstone~~ Patwin, ~~Redding Rancheria~~ Wintu, ~~and the~~ Pit River (Eleven Bands, Atwansini Band, Achumawi Band, and Ilmawi Band) and the Costanoan/Ohlone/Muwekma commented on the proposed route. General concerns included those for sites and burials, with specific concerns regarding notification, monitoring, information flow, and review of documents. ~~The Santa Rosa and Table Mountain Yokuts, the Amador and Shingle Springs Miwok, the Rumsey and Colusa Patwin, Fort Bidwell Paiute, Berry Creek Nisenan, and the Wintu Education and Cultural Council had no concerns.~~ Comments from the ~~Yara~~ Yana are pending. At least nine ethnographic sites of various tribal affiliation have been identified within one mile of the Project in California. In addition, the Eastern Miwok had unspecified concerns, while the Northern Paiute and Nisensan had no concerns.

Paleontology

Idaho. The Moyie River valley may include exposed clays or silts associated with lake deposits. Microscopic fossil materials, such as spores, pollen, and diatoms and fish scales, may be discovered. The limestones of the Wallace Formation near MP 13 may contain the ancient remains of calcareous algal reefs known as stromatolites. Stromatolites have been discovered in other locations in rocks of this age (about 1 billion years old). Between MP 73 and MP 108, mammalian bones and fossilized wood may be found in glacial outwash areas. The clay and silt sediments from ancient lakebeds may include the microscopic materials noted above.

Washington. Fossil deposits may be discovered in the Palouse Formation (MP 179-198), a series of dunes composed of loess that may contain scattered nonmarine mollusks and mammalian bones or teeth. The Palouse Formation is of the Pleistocene Epoch. (See Table 3A-3 for a geologic time line.) Several fossil deposits of this type have been described for the Palouse Formation, although none are apparently within the project corridor.

Oregon. Alluvial deposits along the Umatilla River and Butter Creek (MP 283-290) may contain fossilized mammal bones or teeth dating to the Holocene Epoch. An older deposit, the Shutler Formation, is located between MP 309 and MP 317. This underlying stratigraphic feature is thought to represent the edge of a large Pliocene-age lake and is composed of clay, ash, silt, sand, and beach gravels. A major vertebrate deposit (including the remains of frogs, turtles, bats, beavers, and mammoths) occurs in a similar setting at McKay Reservoir to the east.

The well-preserved remains of a large, diversified vertebrate fauna may be found in the water-deposited tufaceous sediments of the John Day Formation in the Blue Mountains Physiographic Province (MP 396-433). Important vertebrate fossil localities have been known to exist in the project vicinity (near MP 398) for over 100 years. This formation, dating between 25 and 31 million years ago, also contains fossils of insects, leaves, seeds, blossoms, and wood. Elephant and horse bones were discovered at a river terrace site in the Blue Mountains province. It is likely that alluvial sediments adjacent to the streams in this province contain other fossil deposits.

Fossilized plants or vertebrate remains may be found in lenses of alluvium or lacustrine sediments that are interlaced with the lava flows of central Oregon near MP 450. Further south, within the Basin and Range Physiographic Province, the sediments of the Yonna Formation would be crossed by the pipeline (MP 570-590). The Yonna Formation (dating to the Pliocene Epoch) consists of two layers: an ashy layer of diatomite, sandstone, siltstone, and waterlain volcanic sediments; and a thick upper unit of basaltic tuff. Diatoms, mollusks, and vertebrate remains (including fish bones) have been found within the Yonna Formation.

Near the Sprague River (MP 575), Buck Creek (MP 585), Yonna Valley (MP 593), and Lost River (MP 598), the project would cross alluvial deposits that may contain vertebrate or botanical fossil deposits. Similar resources may also be found within the Tule Lake beds between MP 608 and MP 615.

ALTAMONT PROJECT

The information presented for cultural resources ~~and paleontology~~ along the Altamont project route and the South Pass Variations is derived from two major sources. A ~~a~~ Class I inventory (literature, map, and records review) ~~prepared~~ was prepared for the proposed route in 1990. The study corridor extended for 1,000 feet on either side of the mapped centerline of the route. Information on areas outside the study corridor is occasionally included within the text to enhance the setting discussion.

In order to provide a set of comparable data for the proposed route and the South Pass Route Variations, an updated file search was undertaken in October 1990 and March 1991, specifically for that portion of the proposed route in Wyoming, as well as the variations. This information was provided by the Wyoming SHPO and was based on both a computer search and a manual search of all relevant files of known sites. This information was provided by Township, Range and Section number. If a known site is located in a Section crossed by the proposed pipeline, or a variation, it has been included here. Consequently, these sites could be located up to a mile from the proposed route or variation. Any discrepancies in the total numbers of cultural resources reported in the original Class I inventory (Montana and Wyoming) and this most recent SHPO search are due to source material, updated material and difference in corridor width.

Information presented for paleontology along Altamont's proposed route is derived from a literature, map and records review conducted in 1990.

Archeology

Montana and Wyoming. The existing archeological records in Montana and Wyoming include sites dating to both the prehistoric and historic past. The following discussion incorporates known site record data. ~~, although intensive archeological surveys have not been completed for the entire route.~~ The eligibility of ~~many~~ most recorded sites for listing in the NRHP has not been formally determined. No attempt is made here to discuss the relative significance of sites that have not been formally evaluated against the NRHP-eligibility criteria 36 CFR 60.4. These field inventory and evaluation phases are required by Section 106 of the NHPA and will be completed later.

Prehistoric Resources. Human occupation of the Northwestern Plains of Montana and Wyoming began at least 11,000 years ago. The following is a cultural chronology for the region in six periods:

- o Paleo-Indian Period (9050 B.C.-5050 B.C.) - oriented toward the hunting of Pleistocene megafauna (e.g., mammoth);
- o Early Plains Archaic Period (5050 B.C.-3000 B.C.) - characterized by a change in subsistence practices toward more generalized hunting and gathering;
- o Middle Plains Archaic Period (3000 B.C.-1000 B.C.) - with more specialized use of certain plant foods and human expansion into the open plains and intermontane basins the area;
- o Late Plains Archaic Period (1000 B.C.-A.D. 200-500) - including an increase in human populations and with hunting activities focusing on bison;
- o Late Prehistoric Period (A.D. 450-A.D. 1600) - characterized by the advent of pottery traditions and a refinement in lithic technologies; and
- o Protohistoric Period (after A.D. 1600) - which included the introduction of the horse and increasing Euro-American influence.

The remaining archeological evidence of these cultural periods includes habitation sites, tepee rings, lithic scatters, rock art and lithic procurement locations. The original Class I inventory noted that a total of 98 prehistoric archeological sites have been recorded within 1,000 feet of the Altamont project route. These sites, ~~combined with the~~ as well as historic sites, are presented by state and milepost in Table 3M-2. The ~~literature search~~ Class I inventory identified five prehistoric sites within the APE (within 100 feet of the centerline) for the Montana segment, and at least 49 prehistoric sites within the APE for the Wyoming segment.

Table 3M-2

IDENTIFIED CULTURAL RESOURCES WITHIN 1,000 FEET OF THE ALTAMONT ROUTE

Milepost	Prehistoric	Historic	Total
Montana			
0-20	9	5	14
20-40	-	5[a]	5
40-60	-	2	2
60-80	2	9[a]	11
80-100	-	2	2
100-120	-	2[a]	2
120-140	-	-	-
140-160	-	1	1
160-180	1	9	10
180-200	-	3	3
200-220	-	-	-
220-240	-	-	-
240-260	-	8[a]	8
260-280	-	11[a]	11
280-304	2	10	12
TOTAL	14	67	81
WYOMING			
304-320	-	3	3
320-340	1	3	4
340-360	11	1	12
360-380	32	4	36
380-400	2	1	3
400-420	-	3[a]	3
420-440	3	6	9
440-460	4	5	9
460-480	2[b]	4	6
480-500	11	4[a]	15
500-520	-	18[a]	18
520-540	1	11	12
540-560	-	4	4
560-580	-	1	1
580-600	13	4	17
600-620	4	5	9
Total	84	77	161
TOTAL	**98**	**144**	**242**

Source: GCM Services, Inc.

[a] Number reflects multiple crossings of route by linear features (e.g., the Bridger Trail would be crossed twice between MP 410 and 411). As a result there are a total of 18 additional "sites".

[b] Includes one destroyed site

The updated SHPO file search revealed that a total of 251 prehistoric sites have been previously documented for the proposed route between MP 428 (where all route variations begin) and MP 620 (the project endpoint) in Wyoming. The prehistoric sites occurring within a mile of the proposed route include lithic scatters, hearth features (some with fire-cracked rock), lithic procurement sites, habitation/occupation sites, tepee rings or stone circle sites, cairns, quarries and burials.

Areas considered most likely to contain significant numbers or types of prehistoric sites include the high terraces and river bottoms of the Milk, Missouri, Yellowstone, and Musselshell Rivers; the Lonesome Lake and Rattlesnake Coulee areas; the valley of the Clarks Fork of the Yellowstone River, and the foothills of the Pryor Mountains in Montana. In Wyoming, sensitive areas include the terraces of the Shoshone, Bighorn, and Green Rivers; valley of the Bighorn River; the Bighorn Basin; the Copper Mountain area; the South Pass area; and Sweetwater and southern Fremont Counties.

Historic Resources. The historic setting of the project area encompasses major events in the history of the American West, beginning with the early explorations of the Lewis and Clark Expedition of 1804-1806. In this era, the fur trade created the first extensive contact with the Native Americans of the region and led to the first settlements and forts. The Oregon-Mormon Trail (a National Historic Trail, as well as listed on the NRHP) gained importance to emigrants traveling through the area to the west, spurred on by such events as the 1847 travels of Brigham Young and the Mormons and the discovery of gold in California in 1848. (The Oregon Trail and the Mormon Trail follow basically the same route in the project area. For this reason, "Oregon-Mormon" is used in this discussion.) The project would cross or parallel portions of the route of the Oregon-Mormon Trail, as well as the Hams Fork, Lander, Slate Creek, and Kinney Cutoffs.

The next major historic activity of the region centered on the mining of gold, silver, and, later, copper and coal. One substantial effect of mining was the gradual establishment of a secure transportation system. The Bozeman Trail (portions of which are eligible for listing in the NRHP) and the Bridger Road (which would be crossed in six locations by the project) were among the routes used, for varying periods of time, to reach the area in the latter half of the 1800s. Completion of the Union Pacific Railroad in 1869 facilitated travel into the area, and smaller roads and trails were created after this time. Many of the roads and trails built during this time ~~as well as the mining communities of South Pass City, Atlantic City, Miners Delight, and Fort Stambaugh (all listed in the NRHP),~~ are within the project area and will be assessed for integrity and NRHP eligibility.

The proposed route would pass within approximately 4.0 miles of South Pass City, 3.3 miles of Atlantic City, 3.8 miles of Miners Delight, and 2.0 miles of Fort Stambaugh. All of these are listed in the NRHP. Due to the distance of the proposed route and the intervening hilly terrain, no impact to these historic resources would occur.

Other primary influences on the growth and development of the area came from military activity (including Fort Bridger, which became a military establishment in 1858); the completion of the Union Pacific, Northern Pacific, Great Northern, and Chicago-Milwaukee Railroads between 1869 and 1909; the booming cattle industry in the 1880s; the settlement of numerous farm homesteads circa 1900; and the recent expansion of oil exploration and drilling. The project would cross the Union Pacific, Northern Pacific, Great Northern, and Chicago-Milwaukee Railroad alignments.

Archeological evidence of these historic activities can be found throughout the Altamont project corridor. Segments of road and railroad and agricultural or farming remains (canals, cabins, ranches, and homesteads) are particularly numerous. The original Class I inventory noted that a total of ~~142~~ 144 historic sites (or historic features noted from maps) are ~~noted~~ within 1,000 feet of the proposed Altamont project route. This number includes multiple crossings of the route by linear features and includes the Lander to Lost Cabin Road, the Big Horn to Woolton Road, the Casper to Lander Road, the Rawlins to Fort Washakie Road, the Fort Thompson Road, the St. Mary's to Lander City Road, the Point of Rocks to South Pass City Road, the Green River to Fort Washakie Stage Road, the Pinedale Stage Road, the Green River to South Pass City Stage Road, the Slate Creek Road, the Kinney and Hams Fork Cutoffs as mentioned above, as well as numerous old roads. These sites, ~~combined with~~ as well as prehistoric sites, are presented by state and milepost in Table 3M-2. The ~~literature search~~ Class I inventory also identified 65 historic resources within the APE for the Montana segment, and ~~74~~ 75 historic resources for the Wyoming segment. Both numbers include multiple crossings.

The updated SHPO file search revealed that a total of 45 historic sites have been previously documented for the proposed route between MP 428 and MP 620 in Wyoming. The historic sites occurring within a mile of the proposed route include trail/stage routes, the Astorian route, oil/gas wells, historic sites, the Casper to Lander Road (twice), the Rawlins to Fort Washakie Road (twice), South Pass, the Fort Thompson Road, the Oregon Trail (five times), the Bryan to South Pass City Road (four times), the Lander to Pinedale Road, the Lander Cutoff, the Green River to South Pass City Stage Road (three times), the Hams Fork Cutoff, bridges, ranching/homesteading sites, irrigation features and trash dumps.

In addition to the specific trails, roads, railroads, and mining towns mentioned above, the Altamont project would pass through the sensitive areas of the South Pass (a portion of which has been designated an NHL, as well as an NRHP district) in Wyoming and the Missouri River in Montana. Although historic resources are generally scattered throughout the project area, these two locations are particularly sensitive.

Native American Concerns

~~The Pryor Mountains and foothills in Montana are noted as traditionally important to the Crow Indians. No tribal lands would be crossed by the Altamont project in Wyoming or Montana.~~

No present Indian reservations are traversed by the proposed route, although it passes near the Rocky Boys Reservation in northern Montana, close to the southwest corner of the Crow Reservation in southern Montana, and just southeast of the Wind River Reservation in Wyoming. It does, however, cross the aboriginal and historic territories of the Blackfeet, Assiniboine, Gros Ventre, Chippewa-Cree, Crow, Shoshone and Arapaho. Contact with these groups has been initiated. The Pryor Mountains and foothills in Montana are noted as traditionally important to the Crow Indians, as are the Bear Paw Mountains (Montana) to the Hidatsa, Blackfeet and Assiniboine Indians. The Northern Arapaho voiced specific concerns regarding identification of cultural and traditional ground and sites in the area of the Wind River Reservation. The proposed route traverses land that was formerly part of the 1868 treaty lands.

Additionally, the Northern Arapaho have identified sensitive areas in the Nowood-Lost Cabin region. Nontribal lands are considered to be important by Native Americans in Wyoming, particularly the Bridger Mountains. Other areas of concern may yet be identified.

Paleontology

The pipeline would cross fossil-bearing geologic features dating from the Jurassic and Cretaceous Period (65-180 million years ago) and Eocene Epoch (37.5-54 million years ago.) Fossil ceratopsians (dinosaurs with horns, such as Triceratops and Monoclonius), ichthyosaurus, hadrosaurs (e.g., Trachodon), and carnivorous dinosaurs (such as Tyrannosaurus and Deinonychus), are found in the older deposits of the region. Mammalian fossils encountered in the area include remnants of megafauna (including mammoth, bison, and Titanothere), as well as rodents, primates, and protohorses. The Gypsum Spring, Sundance, and Morrison Formations contain fossils of importance.

The general region has been the focus of attention by paleontologists since 1876 and is still considered a valuable resource area. In 1964, John Ostrom of Yale University discovered the remains of Deinonychus at a site in the hills west of Bridger in Carbon County. Ostrom believed the physiology of this relatively small dinosaur suggested a metabolism comparable to that of warm-blooded mammals. This interpretation sparked professional controversy among paleontologists and the reconsideration of many traditional views of dinosaurs and their limitations. Investigations are ongoing throughout Montana and Wyoming and include fossil-bearing deposits within the project vicinity (e.g., the Ostrom site). The sensitive nature of these fossil features makes it difficult to obtain specific information. As a result, precise locations of many of the paleontological locations relative to the pipeline route have not been determined.

Paleontologically sensitive areas in Montana include the Cretaceous sediments of Carbon County, portions of the Judith River Basin (near MP 145), and areas along the Musselshell River (MP 195). Significant fossil deposits have also been found in Hill County. Montana State University is conducting a dig west of Hedgesville in Wheatland County (MP 184) to search for other fossil deposits.

Sensitive areas for paleontological deposits in Wyoming include the early Cretaceous sediments of Big Horn County in northern Wyoming, the Wind River Basin, and the Kemmerer area to the south in Lincoln County. The Wildwood Formation of Wasatchian age, encountered in Big Horn and Washakie Counties, is known to contain significant mammalian assemblages. In Hot Springs County, fossil mammalian remains are also known from the Aycross Formation. Fossil Butte National Monument, a fossil site, is located approximately 20 miles northwest of Opal (MP 620).

SOUTH PASS ROUTE VARIATIONS

Archeology

Jeffrey City Variation

Prehistoric Resources. Prehistoric sites can be expected in areas of major topographic change and near water sources. Areas of particular sensitivity may include the

Buffalo Hump region, (approximately JC MP 546), on both sides of the Continental Divide, along White Mountain, at the Green River crossing, and around the Sweetwater River crossing and Crooks Gap. ~~A recent cultural resource inventory (for the Bairoil pipeline) of the final 130 miles of the alternative found approximately 80 sites. Of these, approximately 85 percent were lithic scatters.~~ The updated SHPO file search identified 311 prehistoric sites along this variation including lithic scatters, hearth features (some with fire-cracked rock), burials, cairns, lodges, habitation/occupation sites, quarries, tepee ring or stone circle sites, chipping/knapping stations, ceramic scatters, house pit sites and trails.

Historic Resources. ~~Based on old series Government Land Office (GLO) maps, at least 81 historic roads or trails would be crossed by the alternative. These include the Bridger Trail which crosses in the northern portion of the route, the Oregon Trail near Jeffrey City and the Oregon-Mormon Trail near Granger. Homesteads and ranches can be expected especially around the Sweetwater River crossing and Crooks Gap. Railroad crossings would occur at least three times.~~ The updated SHPO file search identified 59 historic sites along this variation including ranching/homesteading sites, historic sites, trail/stage routes, the Casper to Lander Road, the Astorian Road (twice), the Rawlins to Fort Washakie Road (twice), the Oregon Trail (twice), the Lost Cabin to Rongis Road (twice), the Overland Trail (twice), the Blacks Fork Cutoff (three times), the Hams Fork Cutoff, the Green River to South Pass City Stage Road (twice), the Bryan to South Pass City Road (three times), the Rock Springs to Lander Road (three times), the Point of Rocks to South Pass City Stage Road, stage stations, historic incising, bridges, historic debris and numerous unidentified historic roads.

Alkali Butte Variation

Prehistoric Resources. ~~A recent Class I (literature) cultural resource survey identified seven prehistoric sites within 1000 feet of the first 43 miles of this alternative. These included five habitation/occupation sites (one with cairns) and two tepee ring sites. Between the point where this alternative leaves the proposed route and joins the Jeffrey City Variation, potential for sites is only moderate.~~ South of the Sweetwater River ~~however,~~ higher site densities would be expected because of the generally more varied topography and intermittent drainages. A greater potential for sites may also be expected in the Buffalo Hump area (approximately JC MP 546), on both sides of the Continental Divide, along White Mountain, and at the Green River crossing. ~~A recent cultural resource inventory (for the Bairoil pipeline), of the final 130 miles of the alternative found approximately 80 sites. Of these, approximately 85 percent were lithic scatters.~~ The update SHPO file search identified 242 prehistoric sites along this variation including lithic scatters, hearth features (some with fire-cracked rock), burials, cairns, habitation/occupation sites, quarries, tepee ring or stone circle sites, chipping/knapping stations, ceramic scatters, house pit sites, rockshelters and trails.

Historic Resources. ~~A recent Class I (literature) cultural resource survey identified 11 historic sites within 1000 feet of the first 43 miles of this alternative. These included ten old roads and an oil/gas well. Based on old series GLO maps, at least 58 historic roads or trails as well as two railroads would be crossed by the proposed alternative. The roads/trails include the Oregon Trail and the Emigrant Trail, both south of Sweetwater Station, and the Oregon-Mormon Trail near Granger. An historic stage stop and mining areas are also present near the route. A relatively high potential for sites exists along the Sweetwater River.~~ The updated SHPO file search identified 42 historic sites along this variation including ranching/homesteading sites, historic sites, trails/ stage routes, the Astorian Road, the Casper to Lander Road, the Oregon Trail, the Rawlins to Fort Washakie Road, the Seminoe Cutoff, the Overland Trail (twice), the Blacks Fork Cutoff (three times), the Hams Fork Cutoff, the Green River to South Pass City Road (twice), the Bryan to South Pass City Road (three times), the Rock Springs to Lander Road (three times), the Point of Rocks to South Pass City Stage Road, historic cairns, oil/gas wells, bridges, stage stations and historic debris.

Northern Utilities Variation

Prehistoric Resources. ~~While the potential for sites along the first 43 miles of the route does not appear to be high, it may increase after this point.~~ South of the Sweetwater River, higher densities would be expected because of the generally varied topography and intermittent drainages. ~~A recent cultural resource inventory (for the Bairoil pipeline) of the final 130 miles of this alternative found approximately 80 prehistoric sites. Of these, approximately 85 percent were lithic scatters.~~ Along ~~this~~ the southern portion of the route, a greater potential for sites exists in the Buffalo Hump area (near JC MP 546), on both sides of the Continental Divide, along White Mountain, and at the Green River crossing.

The updated SHPO file search identified 309 prehistoric sites along this variation including lithic scatters, hearth features (some with fire-cracked rock), burials, cairns, habitation/occupation sites, quarries, stone circle sites, chipping/knapping stations, ceramic scatters, house pit sites and trails.

Historic Resources. ~~Based on old series GLO maps, at least 82 historic roads or trails would be crossed by the alternative. These include the Bridger Trail in the northern portion of the route, the Casper to Lander Road, the Oregon Trail and the Emigrant Trail, both south of Sweetwater Station, and the Oregon Mormon Trail near Granger. An historic stage stop and mining areas are also present near the route. A relatively high potential for sites exists along the Sweetwater River. Railroad crossings would occur at least three times.~~ The updated SHPO file search identified 59 historic sites along this variation including ranching/homesteading sites, historic sites, trail/stage routes, the Casper to Lander Road (three times), the Astorian Road (twice), the Lost Cabin to Rongis Road, the Oregon Trail, the Rawlings to Fort Washakie Road, the Seminoe Cutoff, the Overland Trail (twice), the Blacks Fork Cutoff (three times), the Hams Fork Cutoff, the Green River to South Pass City Road (twice), the Bryan to South Pass City Road (three times), the Rock Springs to Lander Road (three times), the Point of Rocks to South Pass City Stage Road, bridges and historic debris.

Route 28 Variation

Prehistoric Resources. Sites may be expected in areas of major topographic change and near water sources. Such areas would include river and stream fords, confluences of streams, rock shelters and scarps with potential for rock shelters, ridge tops and level upland benches. The updated SHPO file search identified 269 prehistoric sites along this variation including lithic scatters, hearth features (some with fire-cracked rock), lithic procurement sites, cairns, quarries, habitation/occupation sites, tepee rings or stone circle sites, rockshelters, burials and a trail.

Historic Resources. This variation would deviate from the proposed route at MP 501.7 and rejoin it at MP 529. At its closest point, the variation would pass within approximately 2.5 miles of historic Fort Stambaugh, 0.8 miles of Miners Delight, 1.3 miles of

Atlantic City, and 1.5 miles of South Pass City. Miners Delight, Atlantic City, and South Pass City are all listed in the NRHP.

The variation would pass through the BLM-designated South Pass ACEC for approximately nine miles. The ACEC encompasses the slightly smaller proposed South Pass Historic Mining District. The variation would pass through this proposed District for approximately 7.5 miles. The route would also pass near numerous mining features such as mine tunnels or cave entrances (a minimum of 6), mine shafts (a minimum of 6), and prospects (a minimum of 25). Mines passed would include the Gold Dollar, the Caribou, the Diana, the Garfield, the Carissa, and the Franklin. The distance separating these mines from the variation route would vary from 0.15 to 1.3 miles.

The updated SHPO file identified 44 historic sites along this variation including trail/stage routes, the Astorian route, oil/gas wells, historic sites, the Casper to Lander Road (twice), the Rawlings to Fort Washakie Road (twice), South Pass, the Fort Thompson Road, the Oregon Trail (five times), the Bryan to South Pass City Road (four times), South Pass, the Lander to Pinedale Road, the Lander Cutoff (twice), the Green River to South Pass City Stage Road (three times), the Hams Fork Cutoff, bridges, ranching/homesteading sites, irrigation features, and trash dumps.

Native American Concerns

~~No tribal lands would be crossed by any of the South Pass Route Variations.~~ No present Indian reservations would be crossed by any of the South Pass Route Variations. However, both the Alkali Butte and Route 28 Variation pass close to the southeast corner of the Wind River Reservation In Wyoming. Portions of the variations may cross the aboriginal and historic territories of the Shoshone and Arapaho. Contact with these groups has been initiated. The Northern Arapaho voiced specific concerns regarding identification of cultural and traditional ground and sites in the area of the Wind River Reservation. Additionally, the Northern Arapaho have identified sensitive areas in the Nowood-Lost Cabin region. Nontribal lands are considered to be important by Native Americans in Wyoming, particularly the Bridger Mountains. Other areas of concern may yet be identified.

Paleontology

In the area traversed by the northern portions of the Jeffrey City, Alkali Butte, and Northern Utilities Variations, the Fort Union (Paleocene) and the Wind River (Eocene) Formations are known to contain significant fossil resources. The Wind River Formation, the early Eocene age equivalent of the Willwood in the Big Horn Basin, underlies much of the area but is exposed only in specific locations. Significant modern research has been performed near the towns of Lysite and Lost Cabin. Well preserved mammalian specimens have been recovered from the area. A relatively narrow swath of Jurassic and Cretaceous rocks that could yield dinosaur remains may also be crossed.

The southern portion of the Jeffrey City, Alkali Butte, and Northern Utilities Variations would cross the Green River Basin where three formations are known to contain significant fossil remains. Along the south flank of the Wind River Range, the main body of the Wasatch Formation, known to be richly fossiliferous at Tabernacle and Oregon Buttes, would be crossed. North of the Green River, the Laney Shale member of the Green River Formation (Middle

Eocene) would be crossed. The Green River Formation is world renowned for its excellently preserved fossil fish. Southwest of the Green River, rocks of the Bridger Formation (Middle Eocene), also known worldwide for its excellent fossil turtle and mammal specimens would primarily be crossed.

Paleontological resources crossed by the Route 28 Variation would be similar to those found along the proposed route in Fremont and Sweetwater Counties.

KERN RIVER DOWNSTREAM FACILITIES

Archeology and Native American Concerns

A detailed inventory of all known archeological, cultural, and historic resources within the one-mile-wide pipeline corridors proposed by Kern River and Mojave was prepared in conjunction with the EOR FEIR/FEIS in 1986. Information on the documented resource sites is presented in sections 3.1.10, 3.3.1.10, and 3.3.4.10 of Volume II and sections 3.1.10 and 3.2.2.10 of Volume I. A discussion of Native American concerns is also presented in the referenced volumes. These discussions remain relevant to the preliminary sites of the new compressor stations which Kern River would require in order to transport gas for Altamont. Although Kern River has completed intensive on-the-ground surveys of all portions of its certificated route (including the sites of the new compressor stations), no information specific to the new station sites themselves is available at this time.

Paleontology

A Paleontologic Resource Assessment was completed for the Kern River project in September of 1990. The assessment included an updated literature and records review, and field survey of a 75 to 150 foot wide survey corridor.

The assessment revealed that the East Canyon area of northern Utah (the preliminary location for Compressor Station No. 2) is characterized by an extremely thick association of Eocene volcanic agglomerate, sandstone, conglomerate, mudstone, siltstone, limestone, and tuff. The volcanic nature of most of the area would have discouraged fossilization. The area has a low potential for paleontological remains.

The assessment identified that the area where Compressor Station No. 3 would be located is comprised of undifferentiated Quaternary lacustrine, alluvial, colluvial, and eolian deposits. The lacustrine deposits consist of gravel, silt, and clay. The alluvial deposits consist of variable amounts of gravel, sand, silt, and minor clay, deposited by perennial and intermittent streams. The eolian deposits are usually thin, discontinuous deposits of loess. Paleontological finds in the area seem to be scattered and concentrated in sand and gravel quarries along the Wasatch and Oquirrh Mountain fronts.

The area where Compressor Station No. 5 would be located in southern Utah is comprised of Basin fill/alluvium dating to the Late Tertiary (possibly) and/or the Quaternary Period. Some of the older tufaceous sediments present here have produced vertebrate fossils. However, most of the alluvium/basin fill in the right-of-way appears to be Holocene and unfossiliferous. The area has a low potential for paleontological remains.

Between Meadow Valley Wash and Muddy Creek in Nevada (the preliminary location of Compressor Station No. 6), the Kern River right-of-way crosses the fossiliferous Miocene Muddy Creek Formation. The formation here consists of flat-lying sandstones, siltstones, and clays. The paleontological assessment recorded evidence of root casts and vertebrate fossils near the compressor site. There is a high potential for paleontological remains.

Chapter 4A. Environmental Consequences: Geology

IMPACTS

Potential geologic hazards associated with construction of the PGT and Altamont projects include slope instability, active or potentially active faults, earthquakes, liquefaction and volcanic activity. In addition, construction of either project could potentially affect mineral exploitation operations.

Criteria for Determining Significance

Significant Impacts. Geologic hazards and impacts were considered significant if implementation of either project would subject people, structures, or other resources to geologic hazards; or cause substantial damage to, eliminate, or otherwise render mineral resources unusable. The occurrences of the following geologic hazards along the proposed pipeline route were considered significant:

- active landslides, ancient landslides, avalanches, or other features indicative of unstable slopes;
- faults crossed by the alignment or faults within five miles of the alignment that are known to be active historically or are thought to have been active in the Holocene epoch with the capability of ground displacement;
- faults that are known to be active within 10 miles of aboveground facilities that have the capability to cause strong vibratory ground motion;
- soils prone to liquefaction as a result of seismic activity;
- historic volcanic activity that may cause damage to the pipeline or ancillary facilities; or
- active or proposed mineral or energy development that would be directly affected and disrupted due to pipeline construction or operation.

Impact Mechanisms

Impacts that are related to unstable slopes include several types of landslides or avalanches. Landslides occur as a result of natural or man-made stresses on naturally weakened earth materials. A major landslide could dislodge or severely damage the pipeline or ancillary facilities, or even rupture the pipeline.

Impacts related to active faults that are either crossed by, or are within 10 miles of the pipeline alignment include fault displacement and earthquake-induced strong vibratory ground motion. Although it is difficult to quantify the probability of surface fault rupture, it is generally accepted that the more recently a fault has moved, the more likely it is to move again in any given period of time. Surface fault rupture in an area that is crossed by the pipeline could result in offset of the fault blocks, which could, in turn, rupture an unprotected pipeline. Earthquake-induced strong vibratory ground motion is capable of damaging an unprotected pipeline directly.

Impacts related to soils that are prone to liquefaction include ground failure which could result in damage to the pipeline and/or its ancillary facilities. Soil liquefaction occurs as a result of earthquake-induced strong ground shaking of water-saturated alluvial or lacustrine surface deposits. The liquefaction potential of otherwise susceptible deposits is very low where groundwater depth exceeds 50 feet.

Impacts related to volcanic activity include lava, debris, or mud flows which could dislodge and damage the pipeline or compressor stations.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE PGT PROJECT

Slope Stability. The potential for landslides to occur along most of the PGT route is low. However, some areas of concern exist, including areas having potentially unstable slopes where ground disturbance associated with construction activities may increase the potential for landslides. Ancient unstable deposits may be activated by ground vibrations associated with construction activities, water saturation, or a combination of these factors, posing a hazard to pipeline integrity. One area along PGT's proposed route, the John Day Canyon Variation (MPs 352-366), contains numerous landslide areas that were active during the Holocene Epoch.

Of particular concern is the area where the PGT route passes along the toe of a landslide near the confluence of Thirtymile Creek and the John Day River (JDV MP 9.6). In 1974, a geotechnical study of this landslide area was undertaken by Earth Science Associates which concluded that: a) the landslide is a dormant series of slides that began at a time of high rainfall, probably near the end of the Pleistocene (older than 10,000 years ago), and the last slide occurred between several hundred to a few thousand years ago; b) the general region is not subject to strong ground motion from either local or distant earthquakes; and c) no significant sliding has occurred during the last 37 years, in spite of the occurrence of two 300 plus year floods. The study also found no open cracks or fresh scarps in the area, which are indicative of slow, steady water and wind erosion.

Due to potential reactivation of this landslide area, construction of the PGT project in this area would be a significant impact. PGT's mitigation measures for this area (and other areas of potential slope instability) include undertaking preconstruction field studies; limiting the size of cuts and fills in sensitive terrains; and quickly backfilling or shoring trenches in areas of soft ground to avoid soil creep. At this time, PGT's proposed mitigation measures have not been developed to a sufficient level to minimize the potential for construction to reactivate this landslide area. Therefore, we recommend that PGT develop a detailed, site-specific construction, restoration and monitoring plan for its proposed construction across the landslide area at JDV MP 9.6 and file the plan with the Secretary of the Commission for ~~the~~ staff review ~~of the Director of Office of Pipeline Producer and Regulation (OPPR)~~ prior to construction.

In addition, the John Day Canyon Variation (JDV) would cross extremely steep and rough terrain in the vicinity of Hannafin Canyon (JDV MP 17.6), at the southern end of the Variation route. Construction across the steep slopes of Hannafin Canyon raises numerous concerns for the potential of significant adverse environmental impact to occur, not only due to the potential for landslide activity which would threaten the integrity of the pipeline, but also due to the potential for visual impact and right-of-way restoration difficulties.

While we believe that it is technically feasible to construct a pipeline across the steep terrain associated with Hannafin Canyon, ~~we seriously question~~ in our Draft EIS we questioned why a new pipeline right-of-way should be sited in such terrain when a reasonable alternative route ~~is~~ may be available which would avoid Hannafin Canyon. This variation would deviate from the JDV at MP 15.6 on McInnes Norton Ridge. The variation would proceed to the northeast along an existing unimproved road to the vicinity of the "Wilson Airstrip." Here, it would turn to the southwest, again following existing roads to skirt the beginnings of both Hannafin and Daugherty Canyon. The variation would eventually turn to the southwest and rejoin PGT's existing right-of-way on the upstream side of Compressor Station No. 10.

The Hannafin Canyon Variation would be approximately 4.6 miles longer than the portions of the JDV and existing route that it would replace (10 miles vs. 5.4 miles). However, the Hannafin Canyon Variation would be located entirely on the level plateau surrounding Hannafin Canyon, and would avoid the steep terrain associated with PGT's proposed JDV. A further discussion of the Hannafin Canyon Variation is presented in Chapter 6: "Conclusions and Recommendations".

Surface Faulting. The PGT route would ~~not~~ cross ~~any known~~ two potentially active fault zones. ~~However,~~ The existing pipeline crosses the Wallula Gap Fault at MP 256.1, about 0.5 mile south of the terminus of Loop No. 4; the Northwest Rift Zone crosses the proposed route between MP 458 and MP 467; and the Walker Rim fault system crosses the proposed route between MP 499.0 and MP 526.5. The Walker Rim and the Wallula Gap fault zones offset Pleistocene rocks and are therefore considered to be of Holocene age (less than 10,000 years old). The Northwest Rift Zone is associated with 2,000-year-old volcanic flows of the Newberry Volcano. Based on this information these faults are considered to be potentially active. Therefore, impacts associated with construction across these areas are potentially significant.

Where such faults would be crossed, PGT proposes to construct its pipeline within enlarged and deepened trenches. Such trenches should accommodate movement of the pipe in the event of fault activity. We believe that implementation by PGT of this mitigation measure would be appropriate and sufficient to reduce the impact of crossing these faults to less than significant.

Ground Shaking. In spite of the presence of the above described fault systems within the PGT project area, buried pipelines, due to a certain amount of ductility, tend to resist strong ground shaking, although surface facilities such as compressor stations could experience some damage. However PGT's project lies within Seismic Risk Zones 1 and 2, and is not expected to experience significant ground shaking events. We therefore believe that the impact of strong ground shaking on the PGT Project is less than significant.

Liquefaction. ~~Two~~ Three locations along the PGT route have been identified as having liquefiable sediments. One occurs west and southwest of Lake Pend Oreille in Idaho (MP 72.7-108.3). ~~One~~ The other locations occur~~s~~ at the Walla Walla River crossing in Washington (MP 255.0), and~~. The other occurs~~ in the Tule Lake basin near the Oregon-California border (MP 610.0). Liquefaction damage to the PGT pipeline is not considered likely because there is a very low likelihood of earthquake-induced strong ground shaking at these locations. We therefore believe that the impact of liquefaction is less than significant.

Volcanic Activity. The possibility of damage occurring to the proposed PGT pipeline as a result of volcanic activity is considered remote. Although PGT's route would traverse the western flank of the Newberry Volcano (MPs 460-485), the nearest lava flows in the region are carbon-14 dated at approximately 2,000 years, and renewed activity during the life of the project is not considered to be likely. We therefore believe that the impact due to volcanic activity is less than significant.

Mineral Resources. No mines, quarries, ~~or~~ oil and gas fields, or geothermal fields would be crossed by the PGT pipeline route. The impact related to mineral resources is therefore less than significant.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE ALTAMONT PROJECT

Slope Stability. The potential for landslides or other forms of mass movement to affect the pipeline is low along most of Altamont's proposed route. Eight areas on or along the proposed right-of-way have been identified as being potentially unstable (see Table 3A-6). Several of these areas (the Sag, Sage Creek, one location at West Kirby Creek, and Cottonwood Divide) are stabilized or would pose no risk to the pipeline. However, the presence of active slides in the vicinity of Arrow Creek (MPs 112.9-115.0), West Kirby Creek (MPs 417.0-417.1 and MPs 417.8-418.1), and Twin Creek (MP 495.6-496.3) would be a significant hazard for the pipeline. Table 4A-1 locates these areas.

Table 4A-1

LANDSLIDE AREAS ALONG THE PGT AND ALTAMONT ROUTES

Milepost	Location
PGT	
9.6 - 10.0[a]	John Day Canyon, Gilliam County, Oregon
Altamont	
112.9 - 115.0	Gullied terrain due south of Arrow Creek, Fergus County, Montana
417.0 - 417.1	West and south of West Kirby Creek, Hot Springs County, Wyoming
417.8 - 418.1	West and south of West Kirby Creek, Hot Springs County, Wyoming
495.6 - 496.3	Badlands due west and south of Twin Creek, Fremont County, Wyoming
[a] The location of this landslide area is on the John Day Canyon Variation, between 0.25 and 0.50 mile due northwest of mainline MP 359.5.	

Altamont proposes to implement the following measures to mitigate hazards posed by potentially unstable slopes:

- o conduct geological/geotechnical studies to determine an optimal route through the landslide area at the Arrow Creek Breaks;
- o conduct geological/geotechnical studies to determine the possible need to reroute around the West Kirby and Twin Creek landslide areas;
- o implement one or more of the following measures in landslide-prone areas --
  - a. divert water seeps and concentrated surface runoff by using standard erosion and sediment control measures;
  - b. install ditch plugs at slope crests and significant breaks in slope;
  - c. install subsurface drains; and
  - d. avoid undercutting landslide toes with the trench or with sidecuts on the construction side of the right-of-way.

- o stabilize landslides that are directly crossed by the pipeline, either by dewatering or buttressing at the toe or within the slide mass;

- o monitor by site visits all active landslides crossed by the pipeline; and

- o monitor and regularly maintain all structures installed to stabilize landslides.

We believe that Altamont's proposed measures would be useful in mitigating the potential hazards of landslides on the pipeline. However, to reduce the potential for landslide-related hazard to less-than-significant levels, we recommend that the detailed geologic and geotechnical studies proposed by Altamont fully characterize the extent and potential severity of the geologic hazards in these areas. If avoidance of these areas is found to be impractical, this information should then be used as the basis for designing the pipeline facilities at these locations, as well as formulating specific mitigation measures that would be undertaken during construction at each landslide-prone area. Both the results of Altamont's proposed studies (and proposed reroutes) and the detailed designs and related mitigation plans should be filed with the Secretary of the Commission for the review of the Director OPPR prior to construction.

Surface Faulting. The proposed route would not cross any fault zones known to be active historically or thought to be active during Holocene times, although two faults that may have had late-Quaternary activity would be crossed. And while preliminary reconnaissance at both the Cedar Ridge/Dry Fork fault system (MP 432.4) and the Continental Fault (MP 532.1) suggest no evidence of offset since Quaternary times, the possibility of more recent activity at one or both of these faults cannot be precluded. Crossing or passing within five miles of active or potentially active surface faults would be a significant hazard. Rupture of crossed faults may cause displacement that could cause the pipeline to fail.

To protect its pipeline from displacement-induced damage at these two locations, Altamont proposes to conduct detailed geological/geotechnical studies during the detailed design phase. If evidence of Holocene surface displacement is found, Altamont indicates that "appropriate design measures," including placing the pipe in a V-shaped trench across the fault zones "would be considered". Depending upon the particulars of the fault, this approach can be effectively employed to accommodate movement at the fault while limiting shear and compressive strains on the pipeline.

To reduce the hazard associated with crossing these faults to less-than-significant levels, we recommend that Altamont's proposed geotechnical study characterize the potential for and the extent of surface offset at these two areas prior to commencing the detailed design phase of the pipeline. If evidence of Holocene displacement is found, this information should then be used as the basis for designing the pipeline crossing at these locations, as well as formulating any other appropriate mitigation. Both the results of Altamont's geotechnical study and the crossing designs and related mitigation should be filed with the Secretary of the Commission for the review of the Director of OPPR prior to construction.

Ground Shaking. The Altamont project lies entirely within Seismic Risk Zone 1. In spite of the presence of fault systems and moderate seismicity in and near the areas that would be crossed by the proposed route, ground shaking is not expected to pose a significant hazard for the pipeline and associated facilities, except possibly near Opal, Wyoming. Near the Opal Metering Station, ground accelerations probably would not be strong enough to damage the buried pipeline but could be sufficiently strong to significantly affect the aboveground facilities. The proposed metering facilities would be constructed adjacent to Kern River's Compressor Station No. 1 and are expected to incorporate an equivalent seismic design standard to that used for the compressor station. Given the minor nature of the metering facilities, the potential for seismic damage is not considered significant.

Liquefaction. The proposed pipeline route would cross potentially liquefiable sediments at three small areas in Wyoming. The specific locations are at Badwater Creek (MP 440.0-440.7) in Fremont County; Poison Creek (MP 447.1-447.3) in Fremont County; and the sandy terraces and floodplains of the Big Sandy River and Little Sandy Creek (MP 557.1-564.0) in Sweetwater County. However, the potential for strong ground shaking during an earthquake in the three areas is considered low. The probability of liquefaction-related damage to the pipeline is therefore considered less than significant.

Volcanic Activity. Given that no historic volcanic activity has occurred near the route in either Montana or Wyoming and the proximity of the nearest volcano (over 100 miles to the west), the possibility of eruption-related damage occurring to the pipeline or ancillary facilities is considered remote. The potential for damage due to volcanic activity is therefore less than significant.

Mineral Resources. While there are no known active mines within 0.5 mile of the proposed route, numerous active mineral claims would be crossed. The route would also cross a number of active oil and gas fields in Montana and Wyoming (see Table 3A-7). Directly affecting or disrupting active or proposed mineral or energy development would be a significant impact. Based on information available to us at this time, there is no clear evidence that construction and operation of the proposed pipeline would significantly affect or disrupt active or proposed mineral or energy resource development. In the case of gas fields crossed, the pipeline may actually be of benefit.

~~The staff will continue to study the issue of significant adverse impact on the development of mineral or energy resources on or adjacent to the pipeline route. If information documenting the potential for significant conflict becomes available, we will make appropriate recommendations for mitigating the conflict in the Final EIS. Public comment on this determination is specifically sought.~~

In response to our request in the Draft EIS for public comment on potential impact to mineral resources, Altamont clarified its proposed mitigation. Altamont plans to identify mineral resource owners with interests in lands crossed by the proposed pipeline, negotiate acceptable terms and conditions for crossing these claims, make minor routing adjustments as required, or acquire the necessary right-of-way.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE SOUTH PASS ROUTE VARIATIONS

Slope Stability. No areas that would be subject to landslides or other forms of mass movement were identified along the Jeffrey City Variation. Therefore, the potential for slope stability-related hazards to the pipeline along this variation was considered less than significant. While no active landslides would be crossed by either the Alkali Butte or Northern Utilities Variations, both variations would cross an ancient landslide area at AB MP 489. The Route 28 Variation would cross two areas that are potentially unstable at MP 495.6-496.3 and RT MP 508. Because construction could reactivate an ancient landslide or activate an unstable area, this would be a significant hazard along these three variations.

We believe that Altamont's proposed landslide mitigation measures would be useful in limiting the potential hazard on the pipeline. If either the Alkali Butte, Northern Utilities, or Route 28 Variation was ultimately selected, we would recommend that appropriate studies be performed by Altamont to characterize the potential for landslide-related hazards in the above-identified areas as we have recommended for several areas on the proposed route. These measures would reduce the potential for landslide-related hazard to less-than-significant levels.

Surface Faulting. Although the Jeffrey City Variation would cross five fault systems and the Alkali Butte and Northern Utilities Variations would each cross six faults, all of these faults are considered inactive, having shown no evidence of movement during Holocene times. Two of the four faults that would be crossed by the Route 28 Variation are likewise considered inactive. However, the WGS suspects both the Roundtop Fault (RT MP 515-516) and the Anderson Ridge Fault (RT MP 520) to be active. Crossing of an active or potentially active surface fault would be a significant hazard. Rupture of a crossed fault may cause displacement that could cause the pipeline to fail. If any of these variations were ultimately selected, we would recommend that appropriate studies be performed by Altamont to verify the absence of Holocene movement and/or characterize these fault systems as we have recommended for the Cedar Ridge/Dry Fork and Continental Fault systems on the proposed route. These studies, and the subsequent design and mitigation which the studies would form the basis of, would reduce any hazard associated with crossing these faults to less-than-significant levels.

Ground Shaking. All of the South Pass Variations lie entirely within Seismic Risk Zone 1. The potential hazard associated with ground shaking along any of the variations is the same as described above for the proposed route, and is not expected to be significant.

Liquefaction. The Jeffrey City and Northern Utilities Variations would cross potentially liquefiable sediments at the Bridger (JC MP 436), Badwater (JC MP 441), and Poison Creek (JC MP 450) crossings. Potentially liquefiable sediments would also be encountered at the Badwater and Poison Creek crossings by the Alkali Butte and Route 28 Variations at MPs 440 and 447, respectively. The Route 28 Variation would also cross potentially liquefiable sediments in the Big Sandy/Little Sandy Valley at MP 557.1-564.0. However, the potential for strong ground shaking during an earthquake in these areas is considered low. The probability of liquefaction-related damage to the pipeline is therefore considered less than significant.

Volcanic Activity. The impact of volcanic activity on a pipeline routed along any of the South Pass Variations would be identical to that discussed for the proposed route. The potential for damage is not considered to be significant.

Mineral Resources. Oil and gas fields that would be crossed by the South Pass Variations are presented in Table 3A-8. The Jeffrey City and Northern Utilities Variations would both cross the same uranium prospect pits at Fraser Draw (JC MP 467). The Alkali Butte and Route 28 Variations would both cross about a mile of the same coal prospects north of Kirby Draw, but at slightly different locations (AB MP 472 and MP 474, respectively). The Alkali Butte and Northern Utilities Variations would both cross uranium mineland at the same location in the Buffalo Basin (AB MP 516). The impact of pipeline construction on mineral resources along any of the South Pass Variations would be identical to that discussed for the proposed route.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

The potentially significant impacts associated with the new compressor stations are seismic activity, slope stability, liquefaction, and conflicts with mineral resources. Although the compressor station sites are located within seismically active regions, the sites themselves are not crossed by any active or potentially active faults, nor are such faults located within five miles of any of the sites. Because the terrains upon which the new compressor stations would be sited are relatively flat, slope-related instability would not be expected.

Compressor Station 3 would be sited upon sediments that could liquefy during a seismic event. This site is also adjacent to an existing sand and gravel extraction operation. None of the other compressor station sites have any liquefaction potential, nor are they located near any existing or known potential area of mineral development.

If Kern River files an application with the FERC to construct the facilities required to transport gas for Altamont, recommended mitigation measures relevant to liquefaction impacts would be the same as those that were described in the EOR FEIR/EIS and subsequently attached to Kern River's certificate. These measures consist of review and approval by the FERC staff of geotechnical studies and mitigating design measures where potentially liquefiable deposits are crossed. With regard to the sand and gravel operations in the vicinity of Compressor Station 3, we believe that construction of the station at this location would neither affect these operations nor limit the regional availability of sand and gravel. If an economically recoverable amount of sand and gravel were found to underlie the preliminary site, the landowner would be compensated by Kern River for any resources that would be precluded from exploitation.

Chapter 4B. Environmental Consequences: Soils

IMPACTS

Impacts on soils from pipeline construction could result in the potential for increased water and wind erosion, and reduced soil productivity as a result of soil compaction, damage to soil structure, mixing of topsoil and subsoils, and interference with agricultural drainage systems. Soil associations and the distribution of dominant and restrictive features along each of the proposed routes and route variations were reviewed prior to the preparation of the following analysis.

Criteria for Determining Significance

Significant Impacts. Impacts on soils were considered significant if increased erosion rates or reductions in soil productivity resulting from project activities would prevent successful rehabilitation and the eventual reestablishment of vegetative cover. The occurrences of the following impacts on the proposed PGT and Altamont routes were considered significant.

- o Agricultural productivity of the soil is reduced for greater than three years by disruption, displacement, or compaction.
- o Erosion rates are increased to such a level that successful revegetation would be impaired or rehabilitation potentials are such that revegetation success would be limited.
- o Construction or long-term erosion causes siltation to increase to such a level that significant impact on water quality or aquatic habitats occurs.
- o Erosion rates exist or are increased to such a level that the pipeline is exposed, or support is removed from the pipeline or ancillary facilities.

Impact Mechanisms

The impacts pertaining to the reduction of agricultural soil productivity would result from loss of topsoil, mixing of topsoil with less suitable subsoil, removal of vegetative cover, disruption of soils ~~in arid areas~~ resulting in increased wind and water erosion, soil compaction and damage to soil structure resulting from vehicular traffic, and disruption or damage to surface and subsurface drainage systems. Successful rehabilitation is based on whether the disturbed soils would stabilize to near-preconstruction conditions and/or support pre-existing agricultural uses within three years following implementation of restoration measures.

~~The impacts pertaining to the impairment of successful revegetation due to existing or increased erosion rates include the potential for increased levels of water and wind erosion to occur. The degree of susceptibility to water and wind erosion varies according to soil erodibility characteristics, topography, surface roughness, and the amount and type of vegetative cover.~~

Revegetation success could be limited by soil loss through erosion and/or if soils exhibit properties which would restrict plant growth. Erosion rates are accelerated on disturbed soils and are influenced by climate, topography, soil type, and vegetative cover. Soils with excessive restrictive properties (including those with little or no topsoil) were rated as having a poor rehabilitation potential.

The impacts on water quality or aquatic habitats include increased siltation rates due to erosion caused by pipeline construction. Trenching and backfilling operations during pipeline construction in or near streams would temporarily increase turbidity levels in the immediate vicinity of stream crossings and downstream of the crossing. This could result in increased sedimentation rates which could affect water quality and aquatic wildlife habitats. The magnitude, extent, and duration of construction-related sedimentation would depend on the stream discharge velocity, water turbulence, streambank and bottom composition, sediment particle size, and the method, duration, and time of year of construction (See Chapter 4C "Hydrology and Water Quality", and Chapter 4F "Fisheries").

The impacts of pipeline exposure or removal of support from the pipeline or ancillary facilities due to existing or increased erosion rates relate to the construction and installation of such pipeline facilities in regions that are prone to severe water and/or wind erosion. If uncorrected, the pipeline and ancillary facilities' support could be undermined, resulting in collapse. Implementation of proper engineering and design measures would ensure that these impacts would not be significant.

IMPACTS AND MITIGATION MEASURES COMMON TO THE PGT AND ALTAMONT PROJECTS

Potential adverse soil impacts include damage to soil structure, mixing of soil horizons, compaction and rutting, loss of soil through erosion, and increased sedimentation in streams and other water bodies. These impacts could be separate or interrelated. All of these impacts could reduce the success of reclamation activities.

Both PGT and Altamont prepared erosion and sedimentation control (E&SC) plans and filed them with their FERC applications. We evaluated each plan to determine if the proposed mitigation measures would prevent or minimize the occurrence of significant soil-related impacts. Both E&SC plans contain components that are adequate and others that are not. Since each plan contains certain aspects that we do not consider sufficient to reduce impacts to acceptable levels, we have developed a standard set of procedures that each applicant would be required to implement as part of its erosion control, revegetation and maintenance procedures. These standard procedures are presented in Appendix B-1 as the FERC's Erosion Control, Revegetation and Maintenance Plan (Plan). Except where otherwise noted in this chapter, any deviations from our Plan that involve less protective measures must be filed with the Secretary of the Commission for review and approval by the Director of OPPR prior to implementation. On Federal lands, deviations must be approved by the appropriate federal land management agency.

The applicants' proposed mitigation of soil related impacts of pipeline construction as provided in their E&SC plans, and additional mitigation procedures that we would require in our Plan are discussed below.

Supervision and Inspection. The mitigation measures discussed in this chapter and in our Plan could be successfully implemented only if construction and restoration activities are carefully monitored by environmental inspectors. Our Plan requires that each applicant employ at least one environmental inspector or other qualified professional who is knowledgeable of the soil conditions and conservation plantings in the project area per construction spread to monitor the implementation of our Plan. Any noncompliance with the Plan must be reported to the chief inspector by the environmental inspector. In addition, the environmental inspectors shall interact with landowners and land managing agencies, soil and water conservation district personnel, state representatives, and SCS personnel to ensure compliance with the Plan during the preconstruction, construction, and restoration phases, as well as follow-up inspections.

PGT's E&SC plan did not provide for on-site supervision and inspection. Altamont's E&SC plan contains provisions for supervision and inspection which, in many respects, would be adequate. Altamont would assign environmental experts to the project and would provide at least one trained environmental inspector for each construction spread. However, Altamont did not provide sufficient detail on the duties and responsibilities of the environmental inspector.

Soil Erosion Control. Pipeline construction activities include vegetation clearing, grading, topsoil segregation, trenching and backfilling. These activities destabilize the soil surface and increase ~~ing~~ its susceptibility to water and wind erosion. The most critical time for soil erosion to occur is after initial site clearing and grading and before the reestablishment of vegetation. Water erosion primarily occurs in loose or exposed soils located on moderate to steep slopes, and increases with the length and gradient of the slope. Wind erosion occurs in dry soils located in arid and semi-arid regions, where vegetation is difficult to reestablish and maintain.

Slope Breakers. Slope breakers are berms of soil that are constructed on the contour across the pipeline right-of-way on sloping areas in order to reduce erosion by water flowing down the cleared right-of-way, and to provide a safe and stable outlet for the runoff by channeling the water to an area of established vegetation or appropriate energy-dissipating devices. Temporary slope breakers are used after initial grading, and permanent slope breakers are installed during final grading following trench backfilling.

In their E&SC plans both PGT and Altamont proposed to use a variety of drainage control structures including slope breakers. However, PGT did not provide spacing specifications for slope breaker installation, and Altamont's specifications were somewhat less rigorous than our standard requirements. Section III.D. of our Plan presents spacing requirements for temporary slope breakers and requires that temporary breakers be constructed on slopes greater than 5 percent at the end of each working day. In addition, Section IV.F. establishes specifications for the construction of permanent slope breakers.

Vegetation Strip/Sediment Barriers. The potential exists for increased sedimentation and siltation of streams and other water bodies. Trenching and back filling operations during construction in or near streams could temporarily increase turbidity levels. This could increase sedimentation rates which could affect water quality and aquatic habitats. Excessive erosion could have similar impacts if sediments were to be delivered to the streams. (See Chapter 4C "Hydrology and Water Quality" and Chapter 4F Fisheries".)

In order to prevent erosion in areas such as stream or river banks and road crossings, a buffer strip of natural vegetation, as wide as practicable, should be left undisturbed until construction is ready to proceed in these areas. Where the vegetation strip is inadequate, silt fences or sediment barriers constructed of staked hay bales should be used to intercept sediment carried by running water from cut slopes, spoil piles, or other areas of exposed soil.

In its E&SC plan PGT stated that sediment barriers and filtration structures constructed of hay or straw bales, stone, brush bound with twine, or other materials, would be used where necessary to minimize sedimentation. However, no specifications for their construction or use were provided. Altamont's E&SC plan contains no such provisions at all.

We require that temporary silt fences or sediment barriers be used at the base of all slopes adjacent to streams and at the base of slopes adjacent to road crossings where vegetation has been disturbed within the following distances from the road.

Slope (percent)	Vegetation Strip Required (feet)
<5	25
5-15	50
16-30	75
>30	100

Drainage Tile System Repair/Testing. Movement of heavy pipeline construction equipment along the right-of-way in agricultural lands could push drainage tiles out of alignment or cause breakage. Trenching activities could also damage tile systems. Crop production would be lowered if tile damage is not corrected. Although drainage tiles are not likely to be found in most areas crossed by either project, our Plan contains contingency measures to mitigate the effect of pipeline construction activities on drainage tile systems should they be encountered.

Our Plan requires that all drainage systems be probed with a sewer rod or pipe snake to determine if damage to drain tiles has occurred. All tiles damaged during construction should be repaired to their original or better condition. Detailed records of drainage system repair should be kept and given to the landowner for future reference.

Soil Compaction and Damage to Soil Structure. Compaction of the soil within the right-of-way by heavy construction equipment could result in reduced soil productivity by lowering water infiltration and gas exchange, reducing the soil's water-holding capacity, and increasing runoff and erosion. Soil compaction also makes seedbed preparation difficult during restoration.

PGT stated in its E&SC plan that it would scarify compacted soils to a depth of 4 inches, or as required. Altamont stated that it would minimize soil compaction by the use of construction equipment that includes low ground-pressure tracks or tires, blade shoes, and brush rake attachments. PGT's proposed mitigation with regard to soil compaction is insufficient and unclear. While Altamont's use of the above-described construction equipment would be of some benefit to the soil (though not to a sufficient depth), the use of blade shoes and brush rake attachments may mix topsoil with subsoil~~, resulting in diminished soil fertility~~.

Our Plan requires that soils be tested for compaction across the right-of-way in agricultural areas during the cleanup phase of construction. The tests would be conducted on the same soil type under the same moisture conditions and would include soil from undisturbed areas, the trenched zone, the work area, and any traffic area related to the project. Devices such as the COE-style cone penetrometer or other appropriate devices would be utilized to test for compaction. Our Plan also requires that, depending upon arrangements with the landowner, structurally damaged soils be either planted with a "green manure" crop such as alfalfa to decrease the soil's bulk density and promote granulation or, alternatively, the soil be plowed with a paraplow or a similar "winged" deep plow to loosen the soil without turning it over. If plowing is employed, the stripped right-of-way should be plowed first, and then followed by replacement of the segregated topsoil.

Soil structure can be damaged through excessive handling and through the impact of heavy construction vehicles. Damaged soil structure can result in reduced water infiltration and permeability, reduced water holding capacity, and impaired seedling emergence.

Topsoil Segregation. Topsoil and subsoils differ in physical and chemical properties. Topsoils contain higher amounts of organic matter than subsoils. Generally, topsoils also have higher water retention capacities and are more fertile than subsoils. These properties make topsoils more suitable to plant-root development. Trenching and backfilling operations can result in mixing of topsoil and subsoil materials, which could degrade the chemical and physical properties of the upper horizons, and potentially result in a reduction of the rehabilitation potential of the soil and loss of ~~crop~~ productivity. If the subsoil is ~~gravelly~~ rocky, the water retention capacity and the organic matter content within the topsoil may be lowered by mixing with subsoils. Furthermore, large stones brought to the surface during construction could interfere with operation of agricultural equipment. In some cases productivity could be improved by mixing topsoil with subsoil. Such would be the case where an upper horizon high in salts were to be mixed throughout the subsoil or where a cemented layer would be broken up.

Both PGT and Altamont stated that topsoil stripping would be conducted in accordance with directions, consultations, or agreements with the landowners. In agricultural lands, PGT would remove between 12 and 24 inches of the surface soil and stockpile it for replacement.

Altamont, on the other hand, would salvage between 4 and 12 inches of topsoil or available surficial material along the entire length of its proposed route. Neither PGT nor Altamont specified the width along their construction rights-of-way where topsoil segregation would take place.

Our Plan specifies that topsoil be segregated to a depth of at least 12 inches in deep soils such as floodplains, or to whatever depth the topsoil extends in more shallow soils. In agricultural lands rangelands, residential and other improved areas, our Plan requires that topsoil be segregated by one of two possible methods, depending on the desire of the landowner or land-managing agency. The applicant may either strip topsoil from the full width of the construction right-of-way (full work area method) or from a width encompassing both the ditch line and adjacent subsoil storage area (ditch plus spoilside method). ~~On other improved lands and in residential areas, the Plan requires the ditch plus spoilside method to be used.~~ In either case, the overall width of the construction right-of-way would be limited to 100 and 75 feet for the full work area and ditch plus spoilside method, respectively. ~~Using either method, the total area for topsoil storage would not exceed 33 percent of the construction right-of-way width.~~

BLM has commented that in rangeland areas operation of construction equipment on the topsoil on the working side of the right-of-way causes severe damage and loss of topsoil viability which would jeopardize reclamation success. This topsoil damage is caused by compaction and the destruction of topsoil structure (pulverization) by operation of tracked equipment. ~~We agree with this position and therefore recommend that PGT and Altamont segregate topsoil from the entire construction right-of-way in rangeland areas to protect the topsoil and to enhance reclamation efforts, unless otherwise stipulated by the property owner or land managing agency.~~ The drawbacks to full width topsoil stripping include exacerbating already low soil moisture; increasing susceptibility to wind erosion; and disrupting intact root systems, microbes, and viable seed. Where topsoils are shallow, there is little margin for loss from movement by typical construction equipment. Since soil conditions and the climate differ from place to place, our Plan allows landowners and land managing agencies to specify the width of topsoil segregation as they deem appropriate for right-of-way restoration of rangelands.

Revegetation. Soils marginally suited for reclamation (fair-to-poor and poor rehabilitation potentials) could impact the success of reclamation measures. This could lead to inadequate vegetative cover resulting in increases in wind and water erosion. Poor reclamation success could also result in the invasion of undesirable vegetation (see **Weed Control**).

PGT and Altamont propose a variety of seed mixes and soil amendments based on site-specific characteristics. We believe that elements of these mixes are inappropriate for the project areas, and instead, based on consultations with ~~regional SCS offices~~ soil conservation officials, we recommend the seed mixes shown in Appendices B-2 and B-3. The seed mixes that we recommend for the PGT Project are based on regional precipitation rates, adaptability to varied soil conditions, soil protection value, and value as wildlife habitat and livestock forage. In addition, the FS and/or BLM may require PGT to implement special revegetation plans, which include the planting of trees, on federal-administered lands. The seed mixes that we recommend for the Altamont Project are based on adaptability to various soil types and efforts to utilize native species as much as possible. ~~since such species are widely adapted to the~~

~~Montana and Wyoming regions.~~ The use of native species would ~~also~~ help mitigate long-term visual effects of the right-of-way.

We do not recommend the use of temporary seeding in non-wetland areas. The SCS and FS indicates that non-native temporary seed species are not desirable in the proposed pipeline project areas because they compete for space and nutrients with perennial species, and because warm season annual species are not used in those states.

Timing of Seeding. PGT suggests that it may seed in the fall. SCS officials recommend a range of seeding dates depending on the location. The optimal time for seeding varies with the area. In Idaho, this will be no later than mid-May; in some parts of Oregon, this will be in February. We recommend that PGT consult with the appropriate District SCS offices for privately owned lands, or with the BLM/FS for federally administered lands, to determine the optimal timing for planting and then seed according to these recommended dates.

Altamont proposes to seed in the fall or the spring. We recommend seeding the right-of-way in the fall as soon as possible after construction, but after the temperatures are low enough to prevent germination that year. Altamont should ensure that the seed remains dormant by seeding only after the soil temperature reaches 40° F or below and is dropping. In Montana this condition usually occurs after October 1, and in Wyoming it usually occurs after October 15. Seeding prior to these dates or conditions can result in seed germination and subsequent seedling death from freezing temperatures. If reseeding is necessary in the spring, we recommend that Altamont seed no later than May 15 in Montana and May 1 in Wyoming to ensure sufficient root development by the summer warm season. In terms of plant establishment, spring seeding is risky in Hill, Chouteau, Fergus, and Judith Basin Counties in Montana because of the unseasonal winds (chinooks) causing dramatic temperature changes. We therefore recommend fall seeding only in Hill, Chouteau, Fergus, and Judith Basin Counties.

Permanent Seeding. PGT suggested in its application that it may implement a program to harvest native seed and hay from specific areas along its proposed right-of-way for subsequent revegetation efforts. We recommend that where sufficient seed is not gathered for each area, where the native hay seeding techniques would not be employed, or where landowners or land managing agencies dictate otherwise, PGT use the seeding mixes described in Appendix B-2 to revegetate all noncultivated and non-wetland areas disturbed by construction.

While Altamont has proposed a variety of seed mixes based on soil type, it has not proposed to reseed all areas. We recommend that Altamont reseed all areas disturbed by construction except for annually cultivated areas. Privately owned lands should be reseeded either in accordance with our recommendations that are presented in Appendix B-3 or with a seed mix specified by the landowner. We recommend inoculation of legumes with the proper rhizobium where legumes are included in the seed mixes.

The complexity of Altamont's seeding plan would require careful inspection ~~and~~ or testing of the soil to ensure that the seed mixture applied reflec s site-specific soil conditions. Based on consultations with the BLM, SCS and the Montana DNRC, we have specified some changes in species composition proposed by Altamont. In addition, we have adjusted the seeding rates in Altamont's proposed mixes. The changes made to Altamont's proposed seed mixes are summarized in Appendix B-3. If some species are not available Altamont should consult with local land managing agencies or soil conservation authorities to determine replacement seed species. Landowners and land managing agencies may require changes to these seed mixes.

Fertilizing. PGT does not have a definite plan for fertilizing. In Idaho we recommend PGT ~~use 16-20-0 at the rate of 60 pounds of nitrogen (of which at least 50 percent must be of slow release form) per acre~~ consult with the SCS and/or FS to determine appropriate fertilizer mixtures and application rates. In Washington and non-National Forest lands of Oregon, fertilizer is not recommended unless otherwise indicated by the local soil conservation authorities or landowners. We recommend that PGT consult with the FS or BLM, depending on jurisdiction, or other soil conservation authorities to determine what, if any, fertilizer requirements these agencies recommend for use on federally managed lands. See Appendix B for more information.

We recommend that no fertilizer be used by Altamont except for where excessively calcareous soils of the broad terraces north and south of Harlowtown, Montana are encountered (the Windham, Utica, and Musselshell series), or if requested by landowners. Where ~~calcareous~~ these soils are encountered ~~in Montana~~, we recommend that Altamont apply 100 pounds of sulfur-coated 16-20-0 per acre. Otherwise, it is generally agreed that fertilizing will compound weed infestation problems and attract an excessive amount of grazing animals.

Weed Control. The invasion of undesirable plant species, or weeds, can impair restoration and spread to adjacent properties. Many weeds do not possess the soil stabilizing properties that grasses do, and they compete with the desirable species for nutrients and water in the soil. Many weeds have low nutritive values or can be toxic to animals thus reducing the quality of the feed source to wildlife and livestock. Weeds growing on the right-of-way can spread to adjacent properties where they become a management and economic problem to the landowners.

PGT did not include a weed control component in its preliminary rehabilitation plan. It is likely that weeds could be a problem in some areas. The most notable of these is spotted ~~napweed~~ knapweed in Boundary, Bonner and Kootenai Counties in Idaho, and in other areas of high rainfall or where irrigation occurs. Therefore, we recommend that PGT develop a plan, in coordination with the appropriate federal, state, or local agencies, to control weed problems where they are encountered.

Altamont has committed to spot spray areas where weed problems occur. This would be adequate unless the problem is on a grand scale. In some areas in central Montana broadcast spraying may be necessary such as in Judith Basin and Fergus Counties. The Montana County Noxious Weed Management Act would require Altamont to develop a revegetation and weed control plan for approval by the weed board of each county crossed. In Wyoming, we recommend that the environmental inspector determine what type of weed control, if any, is necessary and that Altamont prepare a plan in consultation with appropriate federal, state, or local agencies to control infestations based on these determinations.

Grazing Deferment. We recommend that PGT coordinate deferred grazing with willing landowners to keep livestock off of newly seeded areas for at least one full growing season. ~~See Appendix B-1 for more information.~~

In Montana, much of the land proposed to be crossed is privately owned and coordination with landowners can afford grazing deferment agreements. Where landowners are willing, we recommend grazing deferment for the first growing season and then controlled grazing for the next season to allow for establishment of vegetative cover. In Wyoming grazing deferment is less feasible because of wide open areas traversed by the route. However, if landowners are willing, Altamont should develop a deferment program to enhance the establishment of vegetation.

Off-Road Vehicle Control. Off-road-vehicles can seriously interfere or defeat efforts to rehabilitate the right-of-way or any temporary access roads after construction. Our Plan recognizes this possibility and requires the implementation of measures agreed upon with the landowner or land management agency for the life of the project. These measures may include installation of locking gates or extending fences, posting signs, placing physical barriers or planting trees across the right-of-way, or taking other steps appropriate to the specifics of the site.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE PGT PROJECT

Increased Soil Erosion. Several areas along the PGT route have been identified as having either a moderate or a high susceptibility to water and/or wind erosion. These areas are as follows:

Locations by County and State	Milepost	Soil Type	Erosion Susceptibility
Boundary, ID	0-20.1	Silt and volcanic ash	Moderate
Kootenai, ID	84-97	Silty to clayey gravel	Moderate
Whitman, WA	179-185	Silt and silty sand	Moderate
	186-187	Silt and silty sand	Moderate
Walla Walla, WA	225-250	Silt and silty sand	Moderate
	250-252	Silty sand	High
Umatilla, OR	277-292	Silty sand	High
	292-295	Silt	Moderate
Morrow, OR	295-331	Silt	Moderate
Gilliam, OR	331-337	Silt	Moderate
Klamath, OR	580-587	Silty gravel	Moderate
	596-607	Silty gravel	Moderate

PGT stated in its E&SC plan that erosion control devices would be installed to prevent soil erosion on slopes along its right-of-way, and that soil stabilization and restoration adjacent to water crossings would be accomplished expeditiously.

In addition to the requirements of our Plan that were described above (see "Impacts Common to the PGT and Altamont Projects"), our Plan also requires that final cleanup and permanent erosion control measures be completed within 10 days after the trench is backfilled, weather and soil conditions permitting. Implementation of our Plan would ensure that these impacts are not significant.

Volcanic Rock Areas. PGT's route through central and southern Oregon crosses numerous areas that are heavily laden with volcanic rock intrusions. Construction through these areas will generate large quantities of waste rock as a result of trench excavation. In addition, revegetation in these areas will be difficult due to the lack of a suitable soil substrate. ~~To minimize these impacts we recommend that PGT develop a specific construction, restoration, and revegetation plan for these areas, and submit the plan to the staff for inclusion in the Final EIS.~~ To minimize these impacts PGT has developed specific construction and restoration plans for these areas. We have found that some items were sufficient while other items were insufficient to mitigate impacts on soils in this area.

In the construction portion of this plan, PGT stated it would follow the standard "General Construction, Operation and Maintenance Procedures" outlined in Section 2.2. In addition, PGT stated it will dispose of excess rock excavated as part of the Expansion Project, as well as dispose of rocks left on the side of the right-of-way following the original pipeline construction in the 1960s. PGT included two methods that it would likely use for rock disposal. One would be hauling away rock to approved disposal sites, and the other would be scattering rock throughout the right-of-way to approximate natural terrains. To make this more specific, we recommend that PGT dispose of all rock that is displaced from pipe installation and select bedding by hauling away rock to approved disposal sites. Surface rock may be scattered over the right-of-way to approximate natural, pre-construction surface conditions with the agreement of the landowner or landmanaging agency.

PGT has also specified elements of a restoration plan including topsoil salvage, reseeding, fertilizing, and mulching. Most elements were less stringent than those required in our Erosion Control, Revegetation and Maintenance Plan (Plan). Since revegetation would be difficult on these marginal soils, the less stringent measures would not be sufficient to effectively restore this area. Therefore, we recommend that PGT follow the guidelines of our Plan, included as Appendix B-1 and B-2 to mitigate impacts on soils in the volcanic rock intrusion areas of Oregon.

Because topsoils are shallow in the area, PGT stated it would salvage 3 or 4 inches of topsoil from the surface as per a BLM recommendation. Successful revegetation to approximate predisturbance cover is dependant upon salvaging a sufficient amount of the highest quality soil material to support the desired plantings. In areas other than the BLM Prineville jurisdictional region, if topsoils are found to be deeper in any of the project area, we recommend excavation of available topsoil up to twelve inches unless otherwise specified by the landowner, FS or BLM, depending on jurisdiction.

PGT proposes to use ammonium phosphate sulfate (16-20-0) at a rate of 375 pounds per acre in the volcanic rock intrusion area of Oregon. We require 50 percent slow release form, therefore, the fertilizer must be formulated accordingly to arrive at the recommended rates. In order to provide readily available nutrients to seedlings in the root zone, our plan requires that fertilizer be incorporated into the soil where possible. Fertilizer specifications may be changed by the land manager or landowner.

We encourage working with the land managing agencies and landowners to develop specific seed mixes to avoid species contrast with adjacent areas as would be accomplished with PGT's native straw seeding program. PGT specified it would use the seed mixes identified in Appendix B if native seeding is not feasible. The seeding rates given in Appendix B-2 are intended for drill seeding only. Since PGT intends to broadcast seed, the seeding rates must be doubled when these seed mixes are used. PGT will add the following seed species to seed mixes in areas where woody species are dominant: bitterbrush, big sagebrush, low sagebrush, curlleaf mountain mahogany, winter currant, and rabbitbrush. When making adjustments to seed mixes, the landowner or land managing agency must agree to the composition and rates of the seed mix.

Finally, PGT has specified application of 1,000 lbs. of mulch. Our plan requires using between 1 and 2 tons per acre of a weed-free straw or hay mulch depending on moisture limitations. One half ton of mulch would be too sparse upon spreading to provide adequate mulching benefits.

Permanent Seeding in National Forest Lands. The PGT route would cross several stretches of National Forest lands (see Chapter 4D "Land Use"). PGT would consult with the FS ~~district authorities~~ Regional PGT/PG&E Natural Gas Pipeline Liaisons for each National Forest that would be crossed to determine the suitable criteria for seeding and the specific seeding recommendations for each of these National Forests. The National Forest authorities will require that PGT perform site-specific surveys to determine the existing vegetative conditions and to identify any problem areas. PGT would then be required to submit its final seeding plans to the FS for approval.

Liming. Liming is necessary on acidic soils that have a pH of less than 6.0. Such acidic conditions are not generally conducive to plant growth and seed germination. In Idaho, acidic soils are found intermittently in Bonner and Kootenai Counties between MPs 73.9 and 84.8. In Washington, acidic soils can be found in Whitman County between MPs 179.0 and 179.8. The acidic soils in Oregon are found in Deschutes and Klamath Counties between MPs 450.0 and 507.0.

PGT proposes to determine the amount of lime application by contacting local agronomy extension services or by testing the soil. Our Plan requires that areas with acidic soils be amended with finely ground agricultural or dolomitic limestone to obtain a soil pH of at least 6.0. Our Plan also requires that the lime be incorporated into the top 2 inches of the soil prior to seeding. ~~Implementation of our Plan would ensure that these impacts are not significant.~~

Conservation Reserve Program Lands. PGT's proposed facilities would cross land in the States of Idaho, Washington, and Oregon that is under lease to the U.S. Department of Agriculture's Conservation Reserve Program (CRP). While construction of PGT's proposed facilities would not affect the lands eligibility for the CRP, failure to restore it to its pre-construction condition would jeopardize the landowner's CRP lease. Therefore, we will recommend that PGT, in coordination with the SCS and landowners, identify all lands which are part of the CRP prior to construction. On these lands, PGT shall document existing vegetative cover (in terms of species composition, stage of development, and percent of cover), and shall be responsible for restoring pre-construction vegetative cover to the satisfaction of the landowner and the SCS.

Root-Knot Nematode. Root-knot nematode (*Meloidogyne* spp.) is known to exist in the Tulelake basin of Oregon. This microscopic pest exists in plant tissue, soil and water, and can cause severe damage to certain agricultural crops. The USDA has expressed concerns that nematode could be spread by PGT's vehicles and equipment during construction and restoration operations. Because the nematode is extremely difficult to eradicate once a field is infested, "clean" fields must be protected from infestations.

Growers face serious economic consequences in production and marketing when nematode infest their fields. The only effective method of control is prevention. Therefore, we recommend that PGT obtain specific and detailed instructions from USDA officials and landowners or growers to prevent transferring nematode from infested fields to non-infested fields.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE ALTAMONT PROJECT

The Altamont project will encounter special restoration problems in some areas. The most significant of these is the Arrow Creek area in Montana and the South Pass area in Wyoming.

In the Arrow Creek area, exposed middle Cretaceous Colorado ~~"bear paw"~~ shale~~, a highly acidic rock,~~ can be found along slump areas. This area can be effectively rehabilitat if stringent measures are taken. We recommend that a jute mesh be applied or another equally effective erosion control measure be implemented immediately after seeding on ~~all~~ disturbed areas with exposed shale on 10 percent or greater slopes.

The South Pass area contains soils with poor rehabilitation potentials most notably between MPs ~~526.4~~ 504 and ~~526.9, and between MPs 527.8 and 531.5~~ 520. These soils exhibit restrictive features such as wind and water erosion hazards, salinity and sodicity problems, steep slopes (over 15 percent), ~~and~~ shallow topsoils ~~of between 0 and 4 inches~~ , and surface stoniness. These restrictive features could limit successful regeneration of vegetation and may result in significant, ~~long-term visual~~ impact on ~~the~~ soils in this area.

Because the South Pass area (MPs 502 to 540) has special cultural and historic significance and is visually sensitive, Altamont must take extreme care in restoring this area. In response to our request for the development of detailed mitigation, Altamont ~~has~~ commissioned a team of reclamation specialists to evaluate methods of mitigating visual impacts of pipeline construction in the South Pass area through right-of-way reclamation. ~~In addition, we are considering the imposition of special construction measures to minimize the length of time that topsoil is disturbed. Our goal is to reestablish native and pre-existing floral species on all areas disturbed by construction in as rapid a time frame as is reasonably possible. The results of this ongoing analysis will be presented in the Final EIS, along with specific recommendations.~~ Following consultation with local BLM specialists, the results of this effort were submitted to both the FERC staff and the BLM as Altamont's Construction and Rehabilitation Plan MP 511.0 to MP 540.8 (South Pass Plan). The objectives of the South Pass Plan are to mitigate visual impact in the referenced interval and to address the specific rehabilitation issues of the area. The Plan has now been reviewed by each agency. A summary of the Plan follows. Major elements in the Plan with which we disagree are addressed. The full text of Altamont's South Pass Plan is included as Appendix B-5.

It should be noted that we would require Altamont to implement our Erosion Control, Revegetation, and Maintenance Plan (Appendix B-1) and our Stream and Wetlands Construction and Mitigation Procedures (Appendix C-3) in the interval addressed by the South Pass Plan. Our inclusion of Altamont's Plan in this EIS does not relieve Altamont from compliance with these requirements. The only exceptions are where we approve deviations or differences on a site-specific basis prior to construction, where deviations are adopted in this summary, or where our requirements conflict with those of the state or Federal land managing agency.

Altamont's South Pass Plan

BLM Plan of Development. We have reviewed the South Pass Plan and discussed its contents with BLM representatives in Wyoming. Prior to construction, the BLM would require Altamont to complete and submit a detailed construction Plan of Development (POD) for it's approval. The BLM would have final authority on construction and mitigation through most of the South Pass area because most of the land proposed to be crossed is managed by the BLM. The POD would be based largely on the South Pass Plan, but would be more specific in addressing potential construction, operation, and maintenance impacts. The POD would also incorporate the results of Altamont's route surveys proposed for 1991 and 1992, including identification of possible blasting locations, Class III cultural resource surveys, wildlife surveys, and more detailed soils and vegetation studies. Therefore, the South Pass Plan would be refined as more detailed information became available and as required by the BLM. On non-federal lands, further refinements which result in significant differences from the present South Pass Plan would require FERC approval.

Rehabilitation Units. Mitigation proposed in the South Pass Plan is based on rehabilitation units that are distinguished as follows: six major land types were identified according to topography, soil characteristics and vegetative cover. The land types were then further divided into rehabilitation units according to the level of visual sensitivity (including historic or cultural values) of the area in question. The BLM's VRM Class System was used as a guide to address the scenic quality and visual sensitivity of the landscape.

Objectives. Specific objectives are established for each rehabilitation unit according to the degree of visual sensitivity and the characteristics of the land types. To meet the given objectives, unique construction and revegetation measures were developed for each rehabilitation unit. The more sensitive the unit, the more intensive the mitigation assigned.

Elements specific to the South Pass Plan are:

Construction. Altamont would minimize overall disturbance by using a smaller specialized pipeline construction spread in the South Pass interval. Because this spread would have reduced manpower and equipment requirements, construction speed would also be reduced to near one half mile per day. Rigid restrictions would be imposed on areas where equipment may access the right-of-way. Once on the right-of-way, personnel and equipment activity beyond the flagged width would be prohibited. All personnel not required to operate a vehicle would be bussed to and from the job site. Construction equipment which would minimize surface disturbance, soil compaction, and loss of topsoil would be utilized. The width of the construction right-of-way would be reduced to 75 feet at selected locations. Vegetation would be hand cleared from willow bottomlands and from erodible slopes where grading was not required.

Water Crossings. Altamont proposes to open cut river and creek crossings, with the exception of streams with cold water fish species present where the dam and pump-around method or the dam and flume method may be used. Our Stream and Wetland Construction and Mitigation Procedures (Procedures) require the use a flume to construct a "dry crossing" at minor streams containing coldwater fisheries or warmwater fisheries considered significant by state fish management authorities. This requirement minimizes sediment suspension and downstream turbidity. Pump-around methods are not allowed because of the possibility of pump failure and the impact to flow that would result. Altamont would also be required to follow our Procedures at major stream and river crossings.

Topsoil Handling. Altamont proposes to strip topsoil for one blade width over the trench area. Our Erosion Control, Revegetation, and Maintenance Plan (Plan) requires that at a minimum, topsoil be stripped over the ditch and spoil storage area. This requirement minimizes the mixing of subsoil with topsoil where the spoil pile is placed. The BLM has stated that there are some situations encountered where the topsoil is more saline than the subsoil, and thus mixing would be beneficial. The environmental inspector would determine the preferred method of topsoil stripping depending on subsoil conditions.

The BLM would require Altamont to strip topsoil from at least the trench and working side of the right-of-way. This specification would be written into the BLM's POD. The BLM feels that stripping over the full right-of-way would avoid pulverization of these soils as they have witnessed on past projects.

Other Soil Handling Techniques. Altamont also proposes to leave gaps in topsoil piles for drainage, employ special handling techniques for saline and sodic soils, and avoid pre-clearing vegetation on steep areas until trench and pipe installation is scheduled. Backfilling would commence immediately after the pipe was lowered into the trench. Replaced soil would be left in a roughened condition until seeding to discourage wind erosion. Topsoil would not be used to pad the pipe in rocky areas (select bedding or rock jackets would be used). Altamont would spray some topsoil piles with a tackifier to reduce losses from wind erosion. Mechanical and manual rock pickers would be utilized during clean-up to ensure that the end result resembles the surrounding terrain as closely as practicable. All surplus rock material not required for trench backfilling or for redistribution on the right-of-way would be hauled away to a pre-approved disposal site.

Weed Control. Altamont would conduct weed prevention and control activities as specified by the appropriate weed control authorities. In addition Altamont has committed to monitor and combat existing weed problems. Contractors would be required to have equipment arrive at construction sites in a clean condition, free of weeds.

Revegetation. Another major element of Altamont's mitigation strategy is to use a separate, experienced revegetation contractor to maximize rehabilitation. Revegetation would be handled by a technically competent firm experienced in the specific revegetation aspects of the project. Revegetation would include using one of two seed mixes, possibly using annual rye to temporarily seed riparian areas, and replanting shrub species in some areas. An upland seed mix and a bottomland seed mix are proposed for use. Sagebrush would be transplanted on those visually sensitive areas where it occurred prior to disturbance, and willow would be hand planted along drainages. (A literature review on the reestablishment of sagebrush is included as an appendix to the South Pass Plan.)

Redtop and creeping foxtail were removed from Altamont's proposed riparian/wetland seed mix (see Appendix B-3) because of their non-native status. As recommended by the BLM, streambank wheatgrass was added to this seed mix. The BLM may require the addition of western wheatgrass to the upland seed mixture. Landowners may specify other requirements, and the BLM may require final adjustments to seed mixes in the POD. This should be based on the inventories to be conducted by Altamont in order to reestablish preexisting native species to the disturbed areas. In areas where grazing animals would interfere with revegetation, species with low palatabilities may be utilized if approved by the appropriate regulatory agencies.

Altamont's bottomland seed mix proposed for use in wetland areas would be inconsistent with the requirement in our Procedures to use annual ryegrass to stabilize disturbed wetlands. Annual ryegrass is normally required because it allows native or preexisting plant species to reinvade disturbed areas. However, because Altamont's bottomland seed mix would approximate currently existing species, we accept Altamont's proposal. Altamont would also plant native willow cuttings on streambanks where willows presently occur. We have required that site-specific revegetation plans for all riparian areas be filed with the Commission for review and approval prior to construction.

The South Pass Plan would possibly allow landowners to be responsible for seeding. We would require that Altamont carry out all seeding activities. Although landowners may require changes to the seed mixes specified in Appendices B-3 and B-5, Altamont would be required to conduct the seeding.

Seeding Method. Altamont would broadcast seed to avoid the visual impacts of drill seeding in the South Pass interval. Because of the semi-arid climate, drill rows would be visible for many years as are currently evidenced along some portions of the SR 28 right-of-way. Altamont proposes to dozer-track steeper slopes to provide microsites to facilitate plant growth. In visually sensitive areas, hand raking or other effective measures would be required to avoid the visual impacts of the tracks.

Mulching. Altamont proposes to apply between one and two tons per acre of hydromulch or between 0.5 and 1.5 tons per acre of straw mulch. Our Plan requires using 1.5 to 2.0 tons of weed free straw or hay or its equivalent. The BLM has stated that it would require two tons per acre of a straw or hay mulch. The final adjustment would be made in the BLM's POD.

Fertilizer. Fertilizer is not generally recommended for this area. If it appears that nutrient deficiencies are hindering revegetation success, Altamont would conduct soil tests to determine any macro- and micro-nutrient deficiencies in the soil.

Fencing and Grazing Deferment. Limited areas would be fenced to keep livestock away from construction activities and reclaimed portions of the right-of-way. Altamont may negotiate grazing deferment with the BLM, landowner or tenant. Our Plan strongly encourages Altamont to negotiate grazing deferment with willing landowners. The BLM would specify its requirements in the POD.

Maintenance. Operational monitoring would be conducted in cooperation with the BLM to ensure that the rehabilitation measures were effective. We would require Altamont to follow the maintenance procedures outlined in our Plan. In addition, specific standards are presented to evaluate the success of erosion control and revegetation. Revegetation would not be considered successful (and thus additional restoration measures would be taken) until the standards were achieved for two consecutive years. Areas would be reseeded after two growing seasons where revegetation standards are not met. Remedial revegetation efforts would be repeated every two to three years until the right-of-way resembles the adjacent land areas in terms of species composition and density, and ability to withstand previous grazing pressures.

Above-Ground Facilities. No aerial markers would be installed along this portion of the proposed route. Both of the mainline valves required to be located in this interval would receive special treatment to reduce visual impacts, including installation of the valve near MP 515.5 in an underground concrete vault. See section L in this chapter for a discussion of visual effects of the minor above-ground facilities.

Following our review of the South Pass Plan and discussions with BLM specialists, we are satisfied with Altamont's efforts thus far to resolve the revegetation and visual concerns identified during our analysis, and with its commitment to continue working towards a more refined South Pass Plan through the BLM's POD process. Given the fragile nature of the soils in portions of this area, the low rainfall and sparse vegetation, the potential to impart long-term significant impacts to soils along portions of the proposed route in the South Pass interval still exists. However, with implementation of the South Pass Plan and other recommended mitigation, significant impacts to soils would be greatly reduced.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE SOUTH PASS ROUTE VARIATIONS

Beyond the impacts that are discussed above for the proposed route, there are no additional soil-related impacts that are unique to the lands crossed by the South Pass Variations. Consequently, the impacts to, our concerns for, and mitigation measures for, the variations would be identical to those that are discussed above for the proposed route.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

The potentially significant impact associated with the new compressor stations is the removal of vegetative cover and/or desert pavement, resulting in increased erosion. Due to the arid climatic conditions existing in the vicinity of the new station sites and the relatively flat terrains at the preliminary station locations, the potential for significant water ~~and/or wind~~ erosion at these sites is considered low. No significant impact would be anticipated as a result of the construction and operation of these facilities. If Kern River files an application with the FERC to construct the facilities required to transport gas for Altamont, the mitigation measures relevant to this potential impact would be the same as those that were described in the EOR FEIR/EIS and subsequently attached to Kern River's certificate. Some of these measures include minimizing the amount of vegetation removed, minimizing the time interval between site clearing and restoration, and the use of mulches and other soil stabilizing practices to control the effects of wind and water erosion.

Chapter 4C. Environmental Consequences: Hydrology and Water Quality

IMPACTS

Potential impact on water resources would result from construction and operation of both projects, as well as from increased access along the right-of-way following construction. Temporary, short-term, and long-term impacts have been defined as impacts that last up to one year, one to three years, and over three years, respectively, following the end of construction. Impacts were judged as significant based on criteria discussed below.

Criteria for Determining Significance

Significant Impacts. Adverse surface water and groundwater quality impacts were considered significant if they would result in either the short- or long-term violation of state or federal agency numerical water quality standards or narrative water quality objectives. Water quality objectives are not numerical standards but are general goals of an agency as stated in the agency's water quality control plans or resource management plans.

Adverse impacts of stream or river crossings were considered significant if the crossing would alter channelbed armoring resulting in short- or long-term bed erosion on streams of high erosion potential; result in the resuspension of heavy metals or organic contaminants that would degrade the quality of water serving downstream beneficial uses; or result in long-term sedimentation that would affect the operation of irrigation water control structures, gates, and valves.

Adverse impacts of construction or operation of the pipeline were considered significant if they would modify the quantity of streamflow. Such impacts include water withdrawals and instream construction to the extent that current streamflows would be substantially reduced. Stream withdrawals required for hydrostatic testing that would constitute 10 percent or more of the streamflow during the withdrawal period were considered to have a potentially significant impact on downstream beneficial uses.

Adverse impacts on shallow groundwater were considered significant if pipeline construction or operation would alter flow or reduce the flow of groundwater to wetland areas, or degrade groundwater uses for municipal and industrial purposes. Impacts on groundwater springs were considered significant if pipeline construction would sever or restrict the natural hydraulic flow of water to the spring.

Adverse impacts of flooding within floodplains that would be crossed by the pipeline projects were considered significant if aboveground facilities would be located within the 100-year floodplain.

IMPACTS COMMON TO THE PGT AND ALTAMONT PROJECTS

Impacts from Stream and River Crossings. Potential impact on surface waters could occur due to pipeline construction and hydrostatic testing. Construction techniques that can cause impact include clearing and grading of stream banks, in-stream trenching, trench dewatering, backfilling, and blasting. Potential impact includes increased turbidity, sedimentation, decreased dissolved oxygen concentrations, stream warming, releases of chemical and nutrient pollutants from sediments, and introduction of chemical contaminants such as fuels and lubricants.

In-stream construction would temporarily increase sedimentation and turbidity in the vicinity of the proposed crossing. The extent of sedimentation and turbidity would depend on stream discharge velocity, turbulence, streambank composition, and sediment particle size. Faster flows or smaller particles (e.g. clay or silt) would result in material traveling farther downstream. In addition to the temporary increase in sediment loading due to instream construction, longer-term sediment loading could result from erosion of cleared streambanks and rights-of way until they are revegetated.

Clearing vegetation from streambanks at proposed crossings and where streams lie parallel to the proposed pipeline right-of-way could result in a decrease of fish cover and an increase in insolation of the water body. It is unlikely there would be any impact on water temperature or primary production from vegetation clearing at most proposed stream crossings, because the crossing would be oriented perpendicular to the stream. Therefore, the length of a streambank segment cleared for pipeline installation would be relatively narrow, usually only 75 to 100 feet.

Use of heavy equipment for clearing and grading of banks, and land construction of the proposed projects could cause compaction of the soil, resulting in increased surface runoff of water into streams and other surface water bodies. This increased runoff could cause erosion of streambanks and an increase in turbidity and sedimentation in recipient water bodies. Because the length of streambank segment that would be cleared for pipeline installation would be relatively narrow and would be revegetated, we believe there would not be significant impact from increased runoff. In Montana, the state would make a site-specific determination to assure that headwall erosion was not initiated or aggravated by bank clearing.

Turbidity and sedimentation could cause slight chemical changes in overall stream water quality. Increased turbidity reduces light penetration and, thus, photosynthetic production of oxygen. Organic and inorganic materials in the sediments can, when resuspended, cause an increase in oxygen demand, resulting in a decrease in dissolved oxygen. This impact would be expected to be minimal in trout streams, which have colder temperatures and have gravelly, rubble stream bottoms and high levels of dissolved oxygen. However, during spawning periods or periods of low flows, reduction of dissolved oxygen could have significant impact on fish populations. Again, the more susceptible fish species (trout) inhabit faster-flowing streams, where this would not be a problem.

Alteration of the streambed could create an unstable channel condition, resulting in aggradation or degradation of the channel. The initial pipeline disturbance could trigger long-term channel erosion characterized by downcutting. A downcutting channel could lower the grade of the channel, resulting in further downcutting that would proceed upstream with time. This process would lead to degradation of the channel both upstream and downstream of the pipeline crossing. Long-term deposition of sediments may occur. These processes are sometimes very gradual with long-term effects on stream quality and flood capacity.

To identify streams where a moderate to high bank-erosion potential exists, PGT has provided a review of the 30-year history of erosion control along the existing right-of-way. Table 4C-1 lists stream crossings that have experienced lateral bank erosion and have required some form of bank stabilization, such as riprap. A list of stream crossings along the Altamont project route that could be sensitive to streambank erosion and channel scour is also presented in Table 4C-1. The Altamont list is based on a review of the geologic and geotechnical information supplied in the Altamont environmental report and is more speculative than that presented for the PGT Project. For streams and rivers in Montana having designated floodplains, Altamont would be required to place the pipeline a minimum of 6 feet below the maximum calculated scour depth or at least twice the maximum calculated scour depth, whichever is greater, for the 100-year flood of the stream or river. The maximum depth of scour would be determined from any of the accepted hydraulic engineering methods, but the final calculated depth would be subject to approval by the floodplain permit issuing authority.

Refueling of vehicles and storage of fuel, oil, or other fluids near surface waters could create a potential for contamination if a spill were to occur. Construction equipment could potentially leak fluids into water bodies during stream construction. Immediate downstream users of the water would be affected by the degradation in water quality, while acute and chronic toxic effects on aquatic organisms would potentially result from such a spill.

This type of impact could be avoided or minimized by restricting the location of refueling and storage facilities and by requiring immediate cleanup in the event of a spill or leak. We recommend that prior to commencing construction, each applicant ~~submit for inclusion in the Final EIS a~~ develop and submit a project-specific Spill Prevention, Containment, and Control Plan (SPCCP) that would describe the preventive and mitigative measures they would employ to minimize the impact associated with such occurrences. These measures should include but not be limited to: requiring all fueling and lubricating to be done in areas designated for such purposes, with such areas to be located at least 100 feet away from all water bodies; requiring each construction crew to have on hand sufficient supplies of absorbent and barrier materials to allow the rapid recovery of any spills; and development of standing procedures regarding excavation and offsite disposal of any soil materials contaminated by spillage. In addition, it is recommended that the applicants ensure that construction contractors are able to demonstrate to environmental, local, or state inspectors their ability to implement the SPCCP.

Similar adverse water quality impact could result from the resuspension of pollutants from previously contaminated sediments during excavation activities. The amount of contamination released from resuspended sediments would depend on the existing concentration and on the sorptive capacity of the sediments. Pipeline construction at stream crossings with known sediment contamination could resuspend sediments and affect downstream beneficial uses. The Crooked River, crossed by the PGT project in Oregon at MP 432.7, is known to contain elevated levels of zinc in its sediments. Along the Altamont route, sediments in Rock and Willow Creek in Fremont County, Wyoming, are thought to contain mercury. Although the resuspension of contaminated sediments would most likely be temporary, the potential exists for significant impacts on downstream beneficial uses. To reduce these impacts to less-than-significant levels, we recommend that both applicants conduct surficial and deep sediment testing at sites known to have, or suspected of having, contaminated sediments and submit the results to the FERC, COE, and the appropriate state water quality management agencies, as well as obtain the required permits from the appropriate agencies to proceed with construction.

Impacts from Hydrostatic Testing. Pipeline integrity is verified by hydrostatic testing, which is conducted by pumping water into the installed pipe and checking for losses in pressure resulting from leakage. Large quantities of water are needed for testing. PGT's 42-inch-diameter pipeline would require approximately 3.3 million gallons per 10-mile-section, while Altamont's 30-inch-diameter line would take approximately 1.8 million gallons for a similar section. Diversion of such volumes from streams and rivers could adversely affect downstream users and aquatic organisms, primarily fish populations, if the diversion would constitute a large percentage of the source's total flow. Impact could include temporary disruption of surface-water supplies, loss of habitat, warming of water, depletion of dissolved oxygen levels, and interruption of spawning, depending on time of withdrawal and current downstream uses. However, the sources of water for testing generally contain large volumes, and withdrawal would be conducted at a rate that would minimize downstream impact. Additionally, the applicants have indicated that test waters would be reused from one pipe segment to the next, when technically feasible, to avoid excessive water use.

Depending on the source, rate, timing, and duration of withdrawal, hydrostatic pressure testing may have a substantial effect on streamflows and cause a significant impact on downstream water uses. Tables 4C-2 and 4C-3 show the proposed withdrawal points along the PGT and Altamont project routes. Unless otherwise specified, hydrostatic test withdrawals are assumed to occur during low-flow periods. Based on preliminary construction schedules, the bulk of the hydrostatic test withdrawals would likely occur during the low-flow months of August-October. Water taken from perennial streams during high flows would have less of an impact than water taken from perennial streams during a low-flow period.

Withdrawals could be as high as 14 cfs for the PGT project and an estimated 7 cfs for the Altamont project, and could affect the designated beneficial uses on many of these streams, especially if withdrawals were made in a dry or critically dry year. Proposed stream withdrawals that would constitute 10 percent or more of the monthly streamflow during the designated withdrawal period are considered to be a potentially significant impact on downstream beneficial uses.

Table 4C-1

STREAM CROSSINGS THAT ARE POTENTIALLY SENSITIVE TO CHANNEL EROSION

Water Body	Milepost
PGT PROJECT	
Buck Hollow	374.8
Hay Creek	403.8
ALTAMONT PROJECT	
Missouri River	69.0
Arrow Creek	112.1
Musselshell River	195.5
Yellowstone River	257.4
North Fork Bluewater Creek	280.1
Bluewater Creek	282.3
Shoshone River	319.5
Greybull River	352.2
Elk Creek	361.9
Bighorn River	374.2
Nowater Creek	399.2
West Kirby Creek	417.8
Twin Creek	495.5
Beaver Creek	508.2

Table 4C-2

PROPOSED HYDROSTATIC TEST WITHDRAWAL LOCATIONS
AND TIMING FOR THE PGT PROJECT

Location	Milepost	Proposed Withdrawal Timing
IDAHO		
Moyie River Crossing #7	10.7	Late July 1992 to early August 1992
Moyie River Crossing #8	13.6	Late July 1992 to early August 1992
Irrigation water well (Thayer Seed Farm)	98.0	Late June 1992 to mid-July 1992
WASHINGTON		
City of LaCrosse well	184.0	Late September 1992 to mid-October 1992
Walla Walla River	254.2	Late September 1992 to mid-October 1992
OREGON		
Umatilla River	283.3	Early June 1993 to mid-August 1993
John Day River	360.6[a]	Under study
Crooked River	432.7	Under study
Central Oregon Canal	454.8	Late June 1993 to early August 1993
Williamson River	552.2	Under study
Lost River	598.5	Mid-August 1992 to mid-October 1992

[a] Milepost 10 on the John Day Variation, a 20-mile-long route variation that would depart from the existing route at MP 350.6 and rejoin it at MP 367.6.

Table 4C-3

PROPOSED HYDROSTATIC WITHDRAWAL AND DISCHARGE LOCATIONS FOR THE ALTAMONT PROJECT

Withdrawal Location	Milepost	Discharge Location	Milepost
MONTANA			
Milk River	8.3	Milk River	8.3
Missouri River	68.5	Missouri River Coyote Creek	68.5 124.0
Judith River	145.1	Judith River Middle Creek	145.1 225.3
Yellowstone	257.2	Yellowstone River Bluewater Creek	257.2 282.3
WYOMING			
Shoshone River	319.5	Shoshone River	319.5
Big Horn River	374.2	Bighorn River West Kirby Creek	374.2 417.8
Twin Creek	495.5	Poison Creek Twin Creek Beaver Creek	447.0 495.5 508.0
Sweetwater River	526.8	Sweetwater River	526.8
Little Sandy Creek	558.2	Little Sandy Creek	558.2
Green River	593.5	Green River Hams Fork	593.5 613.1

To mitigate these impacts to less-than-significant levels, both applicants will be required to apply for permits from appropriate agencies for withdrawal of streamflows and to withdraw hydrostatic test water in accordance with appropriate permit requirements. If surface waters are not available, recycled water from previously tested loops or trucked-in water from approved sources may be required.

Potential impact that could result from discharge of hydrostatic test waters into streams and upland vegetated areas would be generally limited to erosion of soils and subsequent temporary degradation of water quality from increased turbidity and sedimentation. Tables 4C-3 and 4C-4 show the proposed hydrostatic discharge points for the Altamont and PGT projects. High-velocity flows could cause erosion of the banks and bottom resulting in a temporary release of sediment. A longer term impact could result from continued erosion of the discharge area after the proposed pipeline was in operation, if the discharge area were not properly stabilized. This impact could be generally minimized by the use of energy dissipator devices, regulation of the discharge velocity, and regulation of the discharge location. In addition, both applicants should notify state water quality and fishery management agencies of the intent to use specific water resources prior to testing activities and obtain a National Pollutant Discharge Elimination System (NPDES) and other state-issued withdrawal and discharge permits, as required in the FERC Procedures.

Table 4C-4

PROPOSED HYDROSTATIC TEST
DISCHARGE LOCATIONS
FOR THE PGT PROJECT

Location	Milepost
Moyie River (7)	10.6
Moyie River (8)	13.5
Thayer Seed Farm	97.6
Walla Walla River	254.2
Willow Creek	319.5
Rock Creek	332.2
Hay Creek	333.2
John Day River	360.4
Mud Springs Creek	413.0
Crooked River	432.7
Williamson River	552.2
Lost River	598.5

Impacts from Pipeline Operation. During pipeline operation, small amounts of gas condensate and compressor oil would become mixed with the natural gas, and the mixture would be routinely removed at points along the pipeline designed to trap and store these liquids. Collection and disposal of these substances in accordance with applicable federal and state permitting requirements would ensure that these substances do not contaminate sensitive groundwater resources.

If the gas line ruptured during operation, released gas would vent upward rather than downward into the soil. If a rupture were to occur at a stream crossing, the stream may become supersaturated with methane at the point of the rupture. Because of methane's low solubility in water, levels would rapidly decline within a short distance downstream. The impact of pipeline ruptures on water quality in streams and groundwater would not be significant.

Impacts on Groundwater. Both the PGT and Altamont projects would cross many groundwater aquifers that may be affected by pipeline construction and operation activities. In general, the potential for impacts on shallow aquifers is much greater than for impacts on deeper aquifers. Most groundwater systems that supply municipal uses are deep aquifers. Potential impacts on groundwater resources include groundwater contamination, temporary overdrafting of aquifers for hydrostatic testing, and alteration of subsurface flow patterns.

Shallow aquifers could experience minor impact from changes in overland water flow and recharge caused by clearing and grading of the proposed right-of-way. Enhanced water infiltration provided by a well-vegetated cover could be temporarily lost until successful revegetation has occurred. Near-surface soil compaction caused by heavy construction vehicles could also reduce the soil's ability to absorb water. This minor impact would not be expected to significantly affect groundwater resources.

In order to protect groundwater resources, which are vital for public and private supply systems, we recommend the applicants be required to submit ~~to FERC for inclusion in the Final EIS~~ a groundwater monitoring plan prior to commencing construction that would identify community and private supply wells and springs located ~~near~~ within 100 feet of the proposed ~~routes~~ pipeline. The plan would be required to document preconstruction and postconstruction well- and spring-water quality and yields and would be of adequate detail to determine with relative certainty whether the pipeline construction activities had been responsible for any adverse impact on any groundwater user. In the unlikely event that groundwater supply systems are affected by the applicants' activities, the applicants would provide for an emergency potable water source and for the necessary repairs, replacement, and/or relocation of the affected facilities to restore the supply system to its former capacity. The groundwater monitoring plan should provide protocols for determining how compensation would be provided to homeowners in the event damage does occur as a result of pipeline construction, including measures that would be taken if it were not technically possible to restore a well to its original capacity and not possible to install a new well.

Grade and trench blasting would be necessary where bedrock is exposed or is less than six feet below the ground surface. Use of proper blasting techniques, such as time-delayed detonation of each series of charges or loading of less explosive in each hole, can minimize the resulting ground motion and lessen the possibility that blasting would open new fractures in bedrock units, seal existing fractures, or disrupt confining layers. We believe that compliance with the mitigation measures described herein would allow construction to be completed with minimal impact on groundwater resources.

Studies conducted by the U.S. Bureau of Mines (Suskind and Fumanti, 1974) found that when shot holes approximately four inches in diameter are used, blasting in rock generally produces rock fractures no more than 10 feet from the shot hole. While this distance will vary depending on the type of rock being excavated, it is unlikely that changes in groundwater flow paths due to rock fracturing would extend beyond the right-of-way of the pipeline.

All blasting activities by both applicants would be supervised by a licensed blaster, who would be responsible for types of explosives, loading quantities and procedures, drill patterns, and timing of delays. We recommend that the applicants use alternative rock excavation methods, such as "ripping" trench excavations, rock saws, and pneumatic hammers, where feasible, in residential areas having domestic water wells.

Refueling of vehicles and storage of fuel, oil, or other hazardous materials during the construction phase of the project could create a potential contamination hazard to aquifers. Localized spills of fuel, oil, or lubricants could be expected to occur during the proposed construction. Spills or leaks of hazardous liquids could contaminate groundwater and affect users of the aquifer. Soil contamination could continue to add pollutants to the groundwater for a period of time after the spill had occurred.

We recommend that the applicants be prohibited from conducting refueling activities or storing any hazardous materials within 200 feet of private wells. Groundwater supply systems would be adequately protected from potential contamination with this restriction and the required SPCCP.

Dewatering of the pipeline trench may require groundwater pumping in areas where there is a high water table. The potential affect of groundwater withdrawal on users of the aquifer would depend on the rate and duration of pumping. Pipeline construction activities are typically completed within several days. Our procedures require that all water produced from trench dewatering activities either be discharged into a well-vegetated upland area~~, which~~ or returned to the wetland from which it was pumped. This would allow the water to return to the aquifer, either via ground infiltration or through surface water recharge areas. If this recommendation is followed, dewatering during the proposed pipeline construction generally would have minimal impact on groundwater.

MITIGATION MEASURES COMMON TO THE PGT AND ALTAMONT PROJECTS

The following paragraphs describe the required mitigation measures common to both the proposed PGT and Altamont projects.

Stream Construction and Mitigation Procedures. In response to concerns raised by federal, state, and local agencies regarding the potential environmental impact of the construction of pipeline projects, we have developed general stream and wetland construction and mitigation procedures (Procedures) (see Appendix C-3). We recommend that each of the applicants be required to comply with the Procedures in order to provide the minimum level of protection for the surface waters that would be affected by the proposed projects. On federally administered lands, the appropriate land managing agency may require the applicant to implement different and/or additional construction and mitigation measures.

The Procedures would, at a minimum, require that each applicant comply with nationwide Section 404 permit Nos. 12 and 14 conditions (33 CFR 330). State jurisdictional permits, including Section 401 water quality certification, would be acquired as needed. Stream encroachment permits from state and local agencies could require the applicants to follow more stringent procedures.

Our Procedures were reviewed by the applicants, who agreed that they would comply with most of the requirements. The applicants took exception to some general measures of the Procedures and proposed alternative measures that we have reviewed. The following is a general description of the Procedures presented in Appendix C-3.

Staging Areas. Our Procedures require that all staging areas be located at least 50 feet from streambanks where topographic conditions permit. Potential contamination of surface water by spills of fuels, oil, or other hazardous materials would be minimized or eliminated by ~~restricting~~ requiring a SPCCP for the refueling of construction vehicles, and prohibiting the storage of hazardous materials, ~~to areas further than~~ within 100 feet from all surface waters. In addition, our Procedures require that these activities be prohibited in all municipal surface water-supply watershed areas. ~~We believe that refueling greater than 100 feet from a surface water can be accomplished at most crossing locations.~~ In situations where this requirement is technically infeasible, our recommendation allows the applicants to request an exemption on a site-specific basis.

Spoil Placement. Our Procedures require that spoils from trench excavation in streams be placed at least 10 feet away from the streambank and that silt fence and/or haybale filters be used to prevent the flow of silt-laden water into streams. We understand that this requirement may not be technically feasible at all stream crossings because of topographic conditions or other constraints. In these cases, our recommendation would allow the applicant to provide site-specific reasons why this is not feasible. Excavation spoils should not be placed in-stream except at major river and lake crossings where storage of spoils on the streambank or on a flotation device is not feasible.

Time Window for Construction. To minimize impact on reproducing fish populations, the proposed in-stream construction would be prohibited during spawning periods and periods of high water flows. Impact on intermittent and ephemeral streams could be avoided by scheduling construction during the dry season when these channels contain little or no flow. Our Procedures require that in-stream construction be allowed only from June 1 to September 30 unless otherwise expressly permitted or further restricted by the appropriate state permitting agencies on a site-specific basis. The states that would be crossed by the PGT and Altamont projects may, during review of the project, attach conditions to any state-issued stream-crossing permit in order to protect individual streams and fisheries. Site-specific state review may result in additional information that would form the basis for a reasoned judgment regarding construction windows and procedures. In this regard, changes to the recommended windows would be allowed as appropriate. For instance, Montana would not allow construction across coldwater streams or rivers to begin until after July 15 to allow spring spawning fish to complete spawning and to allow undisturbed egg incubation, hatching, fry emergence, and a minimal amount of growth.

We also require that the applicants notify authorities of public surface-water supplies located less than three miles downstream of any crossing location prior to FERC certification and 72 hours before in-stream construction commences.

Crossing Procedures. Our Procedures for stream crossings require that 1) the applicant provide us with a copy of the COE's determination regarding the project's need for individual Section 404 and/or Section 10 permits, 2) apply for state-issued stream crossing permits, and 3) obtain Section 401 water quality certification or waiver. In addition, the applicants would be require to comply with nationwide Section 404 permit Nos. 12 and 14 conditions at a minimum.

Pipe installation at minor stream crossings (less than 10 feet wide and 2 feet average depth) containing coldwater fisheries or warmwater fisheries considered significant by the state fish management agency would be accomplished by the "dry crossing" technique. This technique involves routing the stream flow through a flume pipe prior to excavation. Trenching, pipe installation, and backfilling activities would then proceed across a "dry" trench, thereby minimizing suspension of sediments downstream. For minor crossings and warmwater fisheries not containing significant fisheries, construction equipment would cross the stream on a bridge consisting of equipment pads or clean rock fill over culvert pipes, or flexifloat or portable bridges.

Where existing roads and bridges are not available, major streams (greater than 10 feet wide or 2 feet average depth and less than 100 feet wide) would be crossed by constructing a temporary equipment bridge consisting of a portable bridge, equipment pads, or crushed rock fill over pipe culverts. All construction vehicles would be required to utilize the temporary bridge, with the exception of in-stream equipment needed to construct the crossing.

~~We believe that notification of state authorities 48 hours prior to trenching or blasting across major streams is necessary to ensure the applicant's compliance with the recommended stream crossing procedures; therefore, we require that the applicants comply with these notification requirements. The Procedures also require that in-stream work (not including blasting) within major streams should be completed within 48 hours, or if not possible, within a maximum of 72 hours.~~

Our Procedures require that site-specific construction plans for crossing rivers greater than 100 feet wide be submitted to FERC for review and approval prior to construction. These plans should be developed in close coordination with the appropriate federal and state agencies. The proposed PGT Project would involve 13 major (i.e., greater than 100 feet wide) water body crossings; the Altamont Project would involve 9 major water crossings. These crossings are listed in Table 4C-5.

Bank Stabilization/Revegetation. Streambank stabilization would be enhanced by allowing native herbaceous and woody plant species to permanently revegetate a 10-foot-wide riparian strip along the stream embankment.

Trench Dewatering/Hydrostatic Testing. Trench dewatering and discharge of hydrostatic test waters could temporarily impact water quality in the project area. Our Procedures require that the discharge of silt-laden water from dewatering of pipeline trenches be allowed only in upland vegetated areas. Under no circumstances should silt-laden waters be permitted to flow into surface waters.

Our Procedures require the applicants to notify state water-quality and fishery management agencies of the intended source of hydrostatic test water 48 hours prior to withdrawal. In areas where water rights are heavily appropriated, water use arrangements and permits may have to be obtained well in advance of hydrostatic testing. The use of state-designated exceptional value waters or streams designated as public water supplies would be prohibited unless appropriate state and/or local permitting agencies grant permission. Adequate flow rates must be maintained to protect aquatic life, provide for all in-stream uses, and provide for downstream withdrawals of water by existing users.

Discharge of hydrostatic test waters would be conducted at a controlled rate and energy dissipation devices would be utilized to prevent erosion, streambottom scour, suspension of sediments, and excessive stream flows. The applicants would have to comply with federal and state regulations regarding discharge activities in surface waters as prescribed by the NPDES. In some cases it could be necessary to analyze water samples for various water quality parameters upon the completion of hydrostatic testing and prior to discharge to surface waters.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE PGT PROJECT

Idaho - Moyie River

Increased Risk of Erosion and Sedimentation. Construction of the PGT project along the proposed route would require eight crossings of the Moyie River. Seven of these crossings would be longer than 100 feet (see Table 4C-5). Construction along the proposed route would result in significant cumulative impact on the water quality of the Moyie River, due to increased levels of turbidity and downstream sedimentation during construction, as well as an increased risk of long-term erosion over the life of the project.

Table 4C-5

MAJOR RIVERS CROSSED BY THE PGT AND ALTAMONT PROJECTS

Project	State	Name	Milepost	Width (feet)
PGT	Idaho	Moyie River 1	0.3	100
		Moyie River 2	1.0	125
		Moyie River 3	5.0	200
		Moyie River 4	5.8	125
		Moyie River 5	7.8	125
		Moyie River 6	10.0	125
		Moyie River 8	13.6	100
		Cocolalla Creek	77.3	125
	Washington	Walla Walla River	254.2	125
	Oregon	John Day River	10.0 JDV	150
		Crooked River	432.7	100
		Williamson River	552.2	250
		Lost River	598.5	125
Altamont	Montana	Milk River	8.3	250
		Missouri River	69.0	750
		Judith River	145.1	125
		Yellowstone River	257.4	750
		Clarks Fork Yellowstone River	268.1	125
	Wyoming	Shoshone River	319.5	200
		Greybull River	352.2	200
		Bighorn River	374.2	125
		Green River	593.5	200

~~In order to reduce these impacts to an acceptable level, we believe that an alternative alignment for the PGT project may need to be developed between MP 0.0 to 20.9 (Loop 1). However, at this time, we do not have sufficient environmental and engineering information to recommend a specific alternative alignment for Loop 1. Therefore, we recommend that PGT develop an alternative alignment for Loop 1 which eliminates or reduces the number of crossings of the Moyie River. This alternative alignment should be developed in close coordination with the FS, appropriate state agencies, affected landowners, and other interested parties, and must be submitted for inclusion in the Final EIS. See Chapter 6: "Conclusions and Recommendations" for additional discussion of this alternative route.~~

In order to either minimize or avoid potentially significant impact on the Moyie River, in our Draft EIS we requested PGT to provide the following information for inclusion in our Final EIS: a) a detailed environmental, engineering, and economic analysis of the staff's Camp Nine Alternative; and b) a detailed, site-specific construction and mitigation plan for its proposed crossings of the Moyie River. Please see Chapter 6 for a discussion of both of these items. In addition, please see Appendix F for PGT's "Moyie River Pipeline Crossings Construction, Mitigation, Restoration Plan."

Disturbance of Cobble Armor and Increased Risk of Erosion. The Moyie River bed is armored by large cobbles that protect the channel from bed erosion. Construction in the channel would disturb this natural armor and increase the risk of channelbed erosion. This impact could be significant. To reduce this impact to a less-than-significant level, we recommend that PGT develop as part of its site-specific construction plan specific procedures to ensure that the cobble armor is replaced after construction and the disturbed areas are monitored and maintained.

Idaho - Bussard Creek

Disturbance of Streambed Substrate and Increased Risk of Erosion. Bussard Creek is a source of trout recruitment for the Moyie River. This creek has high gradients and a high potential for downcutting erosion. Construction at the crossing would disturb the streambed substrate and increase the risk of erosion. To reduce this impact to a less-than-significant level, we recommend that PGT replace the streambed substrate after construction, and perform long-term monitoring at this location to ensure that downcutting erosion is controlled.

Oregon - Crooked River

Disturbance of Contaminated Sediments. As was previously mentioned above, streambottom sediments at the proposed crossing location of the Crooked River are known to contain elevated levels of zinc. Although the resuspension of contaminated sediments would most likely be temporary, the potential exists for significant impacts on downstream beneficial uses. To reduce this impact to less-than-significant levels, we recommend that PGT conduct surficial and deep sediment testing at this location to determine the extent of sediment contamination, submit the results to the FERC, COE, and the appropriate state water quality management agencies, and obtain the required permits from the appropriate agencies to proceed with construction.

Oregon - Willow Creek

Disturbance of Critical Habitat for Rainbow Trout. PGT's proposed crossing of Willow Creek (MP 421) would disturb critical spawing habitat for native populations of rainbow trout. To ensure that these impacts are not significant, we recommend that PGT develop a site-specific construction and restoration plan that is acceptable to the FS, and submit the plan to the Commission prior to construction.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE ALTAMONT PROJECT

~~Montana - Milk River~~

~~**Increased Risk of Erosion.** The banks and channel bottom of the Milk River are considered unstable; therefore, any construction activity in or adjacent to the channel may greatly increase erosion. Disturbance of the streambed and banks that would be caused by trenching and placement of the pipeline across the Milk River could be a significant impact. To reduce this impact to a less-than-significant level, we recommend that Altamont develop, as part of its site-specific construction plan, specialized techniques for stabilizing the highly erosive streambanks and streambottom.~~

Montana - Missouri River

Depth of Burial to Avoid Scour Damage, Sedimentation. To comply with Montana's floodplain development regulations, the pipeline would have to be buried twice the maximum calculated scour depth. Montana indicates that this could be approximately 30 feet. Altamont proposes to collect field data for a determination of maximum scour depth during the summer of 1991, and submit this information as part of its permit applications to the State of Montana. If Montana's estimated scour depth is found to be accurate, then open-cutting a trench 30 feet deep in alluvial materials would require a very large trench and have severe short-term impacts on water quality due to sedimentation. To reduce this impact to less-than-significant levels, we recommend that Altamont install its pipeline across the Missouri River through the use of directional drilling techniques. (This recommendation is also made for other reasons in Chapter 4F "Fisheries".)

~~Montana - Ross Fork Creek~~

~~**Increased Sedimentation and Decreased Water Quality due to Multiple Crossings.** Altamont's proposed route crosses Ross Fork Creek at least six times between MP 154.8 to 166.0. The majority of these crossings occur between MP 159.0 to 166.0. These multiple crossings would result in cumulative significant impact on the water quality of Ross Fork Creek, due to increased turbidity levels during construction, resultant downstream sedimentation, and a reduction in water quality due to potential long-term erosion caused by the removal of riparian vegetation. To reduce this impact to a less-than-significant level, we recommend that the number of crossings of Ross Fork Creek between MP 154.8 to 166.0 be reduced. However, at this time, we do not have sufficient environmental and engineering information to recommend a specific alternative alignment in this area. Therefore, we recommend that Altamont develop~~

~~an alternative alignment between MP 154.8 to 166.0 which reduces the number of crossings of Ross Fork Creek. This alternative alignment should be developed in close coordination with the appropriate federal and state agencies, affected landowners, and other interested parties, and must be filed with the Secretary of the Commission and submitted for inclusion in the Final EIS.~~

Montana - Yellowstone River

Depth of Burial to Avoid Scour Damage, Sedimentation. Because there are no upstream controls on discharge past the proposed crossing location, the MDH considers the full 13 feet of alluvium (measured at bridge crossings both upstream and downstream) to be within the scour zone. This crossing may therefore require blasting in order to comply with Montana's floodplain development regulations for depth of burial below the maximum calculated scour depth.

Montana has expressed the concern that a traditional open-trench crossing could have significant long-term effects on the stability of the channel bed. As a result, the State of Montana recommends that an alternative crossing method such as directional drilling be investigated. ~~Although we are not prepared at this time to recommend that the Yellowstone River be crossed by directional drilling, we wish to remain open on the issue of the construction method used at this location. Public comment is specifically sought on the need to directionally drill the Yellowstone River. Commentors should support their positions with specific rationale and are encouraged to suggest mitigation applicable to traditional open trench construction or to identify issues which cannot be mitigated if this method is used. We will evaluate public comment on this issue and present any recommendation(s) in the Final EIS.~~ Despite a specific request in the Draft EIS for public comment on the need to directionally drill the Yellowstone River crossing, only Altamont and the State of Montana responded. We remain unprepared to support Montana's rationale for this recommendation. We note that Altamont's comments on Montana's recommendation reference its intent to determine the hydraulic and geomorphic characteristics of the proposed crossing site and to analyze the potential scour depth as part of its permit acquisition program. Altamont acknowledges that the actual crossing construction method would depend on the results of these studies, and that alternatives to its proposed open trench crossing would be evaluated. Given that Altamont would be required by our Stream and Wetland Construction and Mitigation Procedures to submit site-specific construction procedures for our review and approval prior to construction, we feel that no further recommendations are needed at this time.

~~Wyoming - Little Sandy Creek~~

~~**Increased Risk of Erosion.** Altamont's proposed route crosses the main channel of Little Sandy Creek at MP 558.2. However, based on our review of route maps and aerial photographs filed by Altamont, the proposed route appears to cross several meanders of Little Sandy Creek at approximately MP 558.8. Assuming that the route maps are accurate, these multiple crossings of Little Sandy Creek would have a significant impact on water quality, due to the removal of riparian vegetation, increased turbidity and sedimentation during construction, and potential long-term erosion. Therefore, we recommend that Altamont realign its proposed route to the northwest between MP 558 to 559 in order to eliminate multiple crossings of Little Sandy Creek, and submit detailed route realignment information for inclusion in the Final EIS.~~

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE SOUTH PASS VARIATIONS

Impact on Water Quality. Potential impact associated with construction along either the Jeffrey City, Alkali Butte, or Northern Utilities Variation would be similar to those previously discussed for the proposed route. However, construction along any of these alternatives would result in less impact on water quality, as fewer waterbodies would be crossed than along the corresponding portion of the proposed route.

Construction along the Route 28 Variation would also result in similar water quality impact as found along the proposed route. The majority of these impacts would be less severe than those found along the proposed route, as most of the waterbodies crossed by the Route 28 Variation are crossed in their headwater reaches. However, the Route 28 Variation would cross Willow Creek (MP 519.5) at a location where steep slopes are present, and a high potential for uncontrolled short- and long-term erosion exists. Therefore, in the event that this variation is found to be the environmentally preferable route, we will recommend that Altamont develop site-specific construction and restoration plans for the Route 28 Variation crossing of Willow Creek, and to file these plans with the Secretary of the Commission for review and approval by the Director OPPR prior to construction.

IMPACTS SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

Construction of the Kern River downstream facilities would not result in impact on water quality or hydrology, as no perennial waterbodies would be crossed or otherwise affected.

Chapter 4D. Environmental Consequences: Land Use

IMPACTS

Impact on land use along the pipeline routes would result from the clearing of the entire construction right-of-way for the installation of the pipelines and from the maintenance of a permanent right-of-way. The construction right-of-way consists of a combination of a temporary and a permanent right-of-way. The temporary right-of-way is work space that would be returned to the landowner following construction and allowed to return to its previous use and condition. The permanent right-of-way would be kept cleared in a generally grassy condition (although most agricultural practices would be allowed) and no trees, large shrubs, or structures, except roads, would be permitted.

Agricultural lands affected by the project include cropland, pasture, and rangeland. Impact on agriculture areas during construction would include the loss of standing crops, loss of crop productivity, loss of topsoil, soil compaction, and damage to drainage tiles (see Chapter 4B "Soils" for a discussion of these effects). During operation of the pipeline, cropland and pastures would be allowed to revert to their previous use. Land used for pipeline construction would take row crops out of production for up to one growing season; hay fields and pastures would take approximately two years to return to previous production levels. The applicants would compensate the owner for any crop damage caused during routine pipeline maintenance.

Woodlands cleared during construction of the pipeline represent long-term impact of the project. Although woodlands within the temporary work space would be allowed to proceed through succession to their former vegetated state, they would be considered lost for approximately 20 years or more. Depending on the types and locations of the woodlands, right-of-way clearing may result in the loss of marketable timber for firewood and lumber. Merchantable timber often remains the property of the landowner and, if the landowner requests, may be piled along the right-of-way. For a more detailed discussion of the projects' impact on Agricultural and Forest resources see Chapter 4G "Socioeconomics".

Pipeline construction in residential areas would result in temporary construction impact which could include:

- inconvenience from noise and dust generated by construction equipment and personnel, and from trenching of roads or driveways;
- ground disturbance and the removal of trees, landscaping, and other plantings;
- potential damage to existing septic systems or wells due to trenching or blasting; and

- o the removal of any aboveground structures, such as sheds, from within the construction right-of-way.

Long-term impact associated with pipeline operation includes the land easement encumbrance for the permanent right-of-way and its restrictions. The easement encumbrance would prohibit certain types of continued residential use such as the construction of any aboveground structures (e.g., house additions, garages, patios, pools). Additionally, the necessary inspection and maintenance activities are often considered a minor nuisance. The construction and operation of either pipeline would not require the removal of any homes.

The easement, usually negotiated with the landowner, is the instrument used to convey right-of-way to the pipeline company. The easement gives the company the right to operate and maintain the pipeline and the permanent right-of-way and, in return, compensates the landowner for the use of the land. The easement negotiations between the pipeline company and the landowner would include compensation for loss of use during construction, loss of nonrenewable or other resources, and the restoration of unavoidable damage to property during construction.

If an easement cannot be negotiated with the landowner and the project has been certificated by FERC, the pipeline company may use the right of eminent domain granted to them under Section 7(h) of the Natural Gas Act (NGA) to obtain a right-of-way. The pipeline company would still be required to compensate the landowner for the right-of-way, as well as for any damages incurred during construction; however, the level of compensation would be determined by the court according to state laws. State laws set out procedures for the use of eminent domain once a FERC certificate is issued. Generally, the pipeline company would file in either state or federal court for the right to take land by eminent domain. The level of compensation determined as a result of condemnation proceedings could be the same, more, or less than the amount of money offered during earlier negotiations with the company.

Criteria for Determining Significance

Adverse impacts on land uses were considered to be significant if the project implementation would:

- o conflict with existing land use designations, or

- o conflict with the plans, policies, or regulations established by the governmental entities of the directly affected jurisdictions.

Impacts that continued to exist one year after construction of the proposed facilities were considered to be long-term.

The impacts on some specific land uses were determined to be significant if they meet the following criteria:

Urban Resources. Adverse impacts on urban resources were considered significant if the project would conflict with the development of any urban project that had received either tentative or final approval from the jurisdiction in which it is located, or if the pipeline would impede an urban-industrial use, such as a landfill operation.

Recreational Resources. Adverse impacts on recreational resources were considered significant if project implementation would remove a portion of an established or planned recreation area for more than one year.

IMPACTS COMMON TO THE PGT AND ALTAMONT PROJECTS

Although right-of-way, aboveground facility, and temporary storage facility acreage requirements would vary for the two projects, basic similarities exist in terms of physical impacts caused by these requirements. None of the impacts common to the PGT and Altamont projects are significant.

The PGT proposed route would require 217 acres of new permanent right-of-way in addition to its existing ~~3,500~~ 4,753 acres of permanent right-of-way. The Altamont project would require approximately 3,945 acres of permanent right-of-way. Aboveground facilities would add approximately 9 and 54 acres, respectively, to the permanent right-of-way requirements for the PGT and Altamont projects. This estimate assumes that the Altamont project would need 31 mainline valves. See Tables 4D-1 and 4D-2 for the locations and existing land uses for the proposed aboveground facilities.

~~If the~~ For river crossings that are constructed by the open trench technique, there would be a short-term impact on recreationists. Although the river channel would not be completely blocked at any time, the instream activity would require boaters to avoid equipment and spoil piles. Also, if any instream blasting is necessary, river travel at the crossing site would be temporarily halted. The water downstream would be muddied as a result of the instream activity, temporarily reducing the quality of the fishery. ~~Since~~ The actual instream work would normally be completed in ~~approximately~~ less than 2-3 weeks; ~~and~~ Because the turbidity would clear within 12 hours at the crossing site, these short-term impacts would be less-than significant.

To protect boaters and fishermen during instream construction on major river crossings, we recommend that the applicants install appropriate warning signs upstream and print a notice of the upcoming river crossing schedule in a local newspaper for general distribution. This should be referenced in the site-specific plans required for all major river crossings by our Stream and Wetland Construction and Mitigation Procedures.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE PGT PROJECT

Aboveground Facilities. The construction and operation of the aboveground mainline valves, pressure limiting stations, and the expansion of Compressor Station No. 12 would permanently preclude other land uses within the required area.

Table 4D-1

ABOVEGROUND FACILITY REQUIREMENTS FOR THE PGT PROJECT

Milepost	Facility	Requirements (acres)	Land Ownership	Existing Land Use
19.3	Pressure limiting station	0.3	Private	Forestland
97.6	Mainline valve	0.12-0.24	Private	Dry cropland
120.0	Mainline valve	0.24	Private - already looped	Dry cropland
212.6	Pressure limiting station	0.3	Private - already looped	Cropland
241.9	Mainline valve	0.12-0.24	Private	Irrigated cropland
295.2	Mainline valve	0.12-0.24	Private	Dry cropland
308.8	Mainline valve	0.12-0.24	Private	Rangeland
336.5	Mainline valve	0.12-0.24	Private	Dry cropland
350.7	Mainline valve	0.12-0.24	Private	Dry cropland
376.1	Mainline valve	0.24	Private	Rangeland
385.2	Mainline valve	0.12-0.24	Private	Rangeland
396.2	Mainline valve	0.12-0.24	Oregon State Highway	Rangeland
410.2	Mainline valve	0.12-0.24	Ochoco National Forest	Rangeland
437.0	Mainline valve	0.12-0.24	BLM	Forestland
450.8	Mainline valve	0.12-0.24	Private	Pasture
460.4	Mainline valve	0.12-0.24	Deschutes National Forest	Forestland
472.8	Compressor Station No. 12	4.0	Deschutes National Forest	Forestland
486.5	Mainline valve	0.12-0.24	BLM	Forestland
502.2	Mainline valve	0.12-0.24	Private	Forestland
516.5	Mainline valve	0.12-0.24	Winema National Forest	Forestland
546.7	Mainline valve	0.12-0.24	Private	Forestland
562.1	Mainline valve	0.12-0.24	Winema National Forest	Forestland
606.1	Mainline valve	0.24	Private	Forestland
TOTAL		7.4-9.4		

Table 4D-2

ABOVEGROUND FACILITY REQUIREMENTS FOR THE ALTAMONT PROJECT

Milepost	Facility	Requirements (acres)	Land Ownership	Existing Land Use
0.0	Compressor Station No. 1	9	Private	Rangeland
121.0	Compressor Station No. 2	8.3	Private	Dryland cultivation
229.0	Compressor Station No. 3	8.3	Private	Dryland cultivation
347.0	Compressor Station No. 4	8.3	BLM	Rangeland
445.4	Compressor Station No. 5	8.3	BLM	Rangeland
549.4	Compressor Station No. 6	8.3	BLM	Rangeland
620.0	Metering Station No. 1	2	BLM	Rangeland

Note: Locations of mainline valves have not yet been finalized; the valves, requiring 0.014 acre each, would spaced at least every 20 miles. Fifty-seven percent of the valves would be on private land, 29 percent would be on BLM land, 4 percent would be on BOR land, and 10 percent would be on state land. Sixty-five percent of the valves would be on rangeland, 29 percent would be on dryland cultivation, and 6 percent would be on irrigated cropland.

The siting of aboveground facilities would require approximately 3.0 acres of agricultural land and 9.0 acre of forested land. This impact on agricultural and forest uses, when compared to county or state totals of these land uses would be less than significant.

Urban Resources. The PGT pipeline route generally crosses undeveloped rural areas with scattered farm complexes and rural residences. The proposed route would, however, locate the edge of the permanent right-of-way within 50 feet of 34 residences (see Table 3D-4). Although the impacts on these residences would be temporary and less than significant, these impacts should be minimized. We recommend that in all instances where occupied residences are located within 50 feet of the working side of PGT's existing right-of-way, PGT confine all construction activities to the existing right-of-way and not utilize any additional temporary workspace. We further recommend that PGT utilize the following techniques in the vicinity of these residences: a) drag-line or stove-pipe construction to minimize the length of open trench, b) minimize the length of time the trench remains open, c) fence any trench or bore pits left open overnight. One characteristic of the relatively isolated rural residences along the PGT route is that most can be assumed to have private water supply wells. As shown in Table 3D-4, blasting may be necessary in 14 locations along the route where residences are located within 50 feet of the right-of-way. In order to protect domestic water supplies, particularly those that are sole sources of drinking water for rural residences, we recommend that PGT submit to the FERC an inventory of all water supply wells and springs that may be affected by construction activities and a plan for documentation of preconstruction water quality and yield. In the event a water supply is adversely affected by construction of the project, PGT must provide a temporary source of potable water and be responsible for the necessary repairs to restore the system to its former capacity (see Chapter 4C "Hydrology" for a more complete discussion).

No known urban-industrial uses, such as landfill operations or resource extraction operations, would be significantly affected by pipeline construction and operation. The primary long-term land use constraint on urban-industrial uses would be the prohibition against future expansion into the permanent easement during the life of the project. This impact is less than significant because the route would be predominantly aligned with existing right-of-way.

Recreational Resources. Construction of the pipeline would have a short-term effect on areas in recreation use, limited to the season of construction. Most of the recreational lands that would be crossed by the pipeline are in the national forests and/or associated with water crossings. These areas are used for such recreational activities as hunting, fishing, boating, camping, hiking, horseback riding, swimming, winter sports, and birdwatching. Since most of the recreational activities occurring within the proposed right-of-way are of a dispersed nature (such as boating, hiking, or hunting), impacts from the pipeline would be minor. These recreational activities would be diverted during construction but could resume once construction ended. Because of their short duration, these impacts are less than significant.

Plans and Policies. No applicable zoning requirements along the pipeline route preclude pipeline routing. Land uses designated by planning policies along the right-of-way would not be affected by the pipeline, as the pipeline would follow an existing utility corridor. There is no known conflict with existing plans or policies.

Idaho

The Panhandle National Forest would be crossed in both Bonner and Boundary counties. The areas that would be affected by the project within the forest are designated in the Panhandle National Forest Management Plan as areas that are available for transmission facilities, such as a gas pipeline. No conflict with this plan would be expected. Because PGT's route does not cross the Meadow Creek Campground, construction-related impact on the campground would be temporary, and considered less than significant.

The project would affect part of the fishing season on the Moyie River. It would also disturb, on a short-term basis, other recreational uses of the river and adjacent areas, such as boating and camping. Impacts on recreational areas would be less than significant because of the short-term nature of the disturbance. See Chapters 4C "Hydrology" and 4F "Fisheries" for a further discussion.

The Shoreline Management Plan for Bonner County, which would regulate the pipeline route crossing of the Cocolalla Creek, is expected to be completed by the construction phase of the project. It is not known what the management plan would require for crossing the creek; however, the proposed crossing would be adjacent to the existing pipeline on PGT's permanent easement. No conflict with the management plan would be expected.

An area along the pipeline right-of-way is proposed for residential development in Kootenai County (MP 101.8-102.7). Although a detailed project description of this development has not been received, the pipeline project would not be expected to affect this development because all of the pipeline loop in this area would be located within the existing right-of-way.

Washington

An area along the pipeline right-of-way is proposed for a sand and gravel operation in Spokane County (MP 107.3-108.0). Although a detailed description of this development has not been received, the pipeline project would not be expected to affect this resource extraction operation because all of the pipeline loop in this area would be located within existing right-of-way.

The Washington Shoreline Management Act, as administered through the WDE, protects the shores of Washington State waterways.

A utility crossing of Union Flat Creek would be permitted but the shorelines must be restored to pre-project conditions, and a shoreline permit would be required. Crossing of the Walla Walla River by utilities would be permitted, although a shoreline permit would be required. The Washington Department of Wildlife could assign conditions to the project with respect to the river crossing.

A small section of the right-of-way would cross the Wallula Habitat Management Unit, an area managed by COE. Activities such as camping and hunting are permitted in the area.

These activities would be affected temporarily during pipeline construction. Because the project would follow the existing right-of-way, no conflicts would be expected.

Oregon

The Oregon-Pioneer Trail would be crossed in Morrow County at MP 298.6. PGT would provide alternate trail routes to cross the affected area during the construction period in order to minimize disturbance to local tourism and recreational use.

The pipeline would cross Nature Conservancy land preserved for education and ~~recreation~~ scientific use near Juniper Canyon, also in Morrow County. Presently, the area is ~~not in use nor is it designated for any uses~~ in a non-use status ~~(McDonald personal communication),~~ therefore, no conflict with land use plans would be expected.

In Gilliam and Sherman Counties, the project would be under the jurisdiction of the BLM's Two Rivers Resource Management Plan. The proposed pipeline route would deviate outside the existing right-of-way in order to cross the John Day River at a location considered by PGT to be more environmentally preferable. Recreational uses of the John Day River and surrounding area include canoeing, rafting, kayaking, hunting, and ORV use.

As part of its discretionary review process, Umatilla County would require PGT to obtain a combined stream crossing permit from the state and the COE for the crossing of Butter Creek. Because the proposed pipeline would be located adjacent to the existing pipeline, no land use conflicts would occur.

The entire length of the existing right-of-way through Gilliam, Sherman, Wasco, Jefferson, Deschutes, and northern Klamath County has, where it crosses public lands administered by BLM, been designated a utility corridor in BLM land use plans. The existing John Day River Canyon crossing and John Day River variation are both located in this corridor which occupies a "window" between Wilderness Study Areas.

The BLM management plan restricts all crossings of the John Day River, a designated National Wild and Scenic River to approved utility corridors. ~~because the river is designated as having high visual and natural quality. The project, however, crosses the river on private land which is not under the jurisdiction of the management plan,~~ Because the proposed crossing location is within an approved utility corridor ~~so~~ there would be no conflict with the BLM management plan. ~~Because~~ Impacts to recreational uses would be temporary, and land use impacts would be less than significant.

In Jefferson County, the pipeline would cross a portion of the Crooked River National Grassland, administered by the Ochoco National Forest. The existing pipeline right-of-way parallels roadway corridors through much of this area. Since the pipeline loop would follow the existing utility corridor and the disturbance of the area would be temporary, no conflict with the land use plans would be expected.

The PGT project would cross the Deschutes National Forest and approximately 20 miles of BLM land and existing utility corridors in Deschutes County. ~~Where the project route crosses the Deschutes National Forest, access to Newberry Crater, which would be the center of the Newberry National Volcanic Monument, would be temporarily disrupted by construction of the pipeline (Mueller personal communication).~~ Where the project route crosses the Deschute National Forest, access to the Newberry Crater, which is in the newly designated Newberry National Volcanic Monument, would be temporarily disrupted by the construction of the pipeline. Blasting on the portion of the route that passes nearest to Lava River Cave would temporarily disrupt access to the cave.

The proposed pipeline would pass approximately 700 feet from the entrance to the Lava River Cave which is located within the Newberry Volcanic National Monument. Although no reported damage occurred when the existing pipeline trench was constructed in 1961, there is a possibility that blasting could damage the walls and ceiling of the cave and pose a safety hazard to visitors in the cave. To reduce the risk of accidental injury, we recommend that PGT coordinate its blasting schedule within the boundaries of the Newberry National Volcanic Monument with the FS and provide the FS the opportunity to temporarily close the Lava River Cave to visitors.

PGT's route also crosses the Winema National Forest in Klamath County. The FS Resource Management Plan encourages development of utilities within existing utility corridors. Since the pipeline would be constructed within the existing utility corridor within the Winema National Forest, no land use conflict with this plan would be expected.

Approximately four acres of forestland would be permanently removed for the expansion of Compressor Station No. 12 at MP 472.8. When compared to Deschutes County's total acreage in forest production, the small amount that would be lost permanently would be less-than-significant impact.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE ALTAMONT PROJECT

Aboveground Facilities. The siting of aboveground facilities would require permanent removal of 0.014 acre of agricultural land per mainline valve in 31 locations, approximately 10 acres each in the six locations for the compressor stations, and approximately 2 acres for the metering station (see Table 4D-2). When compared to county or state totals of land in agricultural production, these impacts on agricultural uses would be less than significant.

Urban Resources. Pipeline construction would not occur through major concentrations of rural or suburban development. Where construction would occur near development, it would be beyond existing buildings, and never within 50 feet of a residence. The primary long-term land use constraint would be the prohibition of new structures or earthworks on the permanent easement during the life of the project. The impact on urban resources in limiting location of development would be less than significant because the route is predominantly aligned through rangeland and farmland, future development of which could accommodate the presence of the permanent easement.

Recreational Resources. The pipeline would not cross any state- or county-designated parks or recreation areas. Construction of the pipeline would have a short-term effect on areas in recreation use and would be limited to the season of construction. Since most of the recreational activity that would be disturbed by the pipeline is of a dispersed nature (such as hiking or hunting), disturbance from the pipeline would be minor. Some recreational activities would be diverted during construction, but could resume once construction ended. Because of the short duration these impacts would be less than significant.

Plans and Policies. No applicable zoning requirements along the pipeline route preclude pipeline routing. Certain counties in both Montana and Wyoming have a type of permit system for siting a pipeline facility; however, the route would comply with all adopted county comprehensive plans. The route would traverse various parcels of BLM-administered land and would need to comply with BLM management plans for the appropriate jurisdiction. No conflict with plans and policies would be expected.

Montana

The BLM's ~~management plan for~~ West Hi-Line RMP covering the Upper Missouri National Wild and Scenic River recreation area designates a utility crossing window but siting the pipeline within this window would adversely affected ferry travel, as well as soil, vegetation, and water quality resources. These impacts required selecting a new site for crossing the UMNWSR, approximately one mile downstream where land use resources would be affected. Problems with the window include numerous cottonwood groves in the area along the river. These would serve to screen a powerline, but the process of burying the pipeline would cause large numbers of trees to be cut thus creating a visual scar and loss of significant amounts of riparian vegetation. This crossing location has a fast flow and is on a bend in the river which would increase the likelihood of erosion around the pipe, and be more susceptible to problems from flood water and ice jams. Further complicating the situation, this location is also a ferry crossing. Construction at this site during an active use season would severely disrupt north-south travel. On the south side of the river the pipeline would be forced into an unnamed coulee just south of the Virgelle Ferry. Due to canyon walls and the narrow V shape of this drainage, massive amounts of surface disturbance would occur, soil erosion would increase, and reclamation and stabilization of the disturbed area would be difficult. The result would be increased sedimentation to the river.

Use of Altamont's proposed route at the Missouri River crossing would not have major adverse impacts. Access to the river crossing would be across a plowed field. Possibly no cottonwood trees would need to be cut, or at the most four or five. River banks in this section are gently sloping on both sides of the river. After crossing the river, the pipe would proceed up a moderately sloping grass-covered hillside which currently has both a water pipeline and access road coming down. Reclamation in this area would be relatively easy and visual impacts would be limited to one season. Revegetation with native species should blend the disturbed area into the existing vegetation in one full season. This is a relatively straight stretch of river with slower flow, thus making for an easier crossing during construction and less likelihood of problems developing from floods or ice jams. Because environmental impacts would be significantly less for this crossing outside the currently designated utility window, ~~there is no conflict with the BLM management plan~~ this EIS will constitute an amendment to the West Hi-Line RMP.

Pipeline construction would affect moderate to heavy water-related recreational ~~activities~~ use of ~~on~~ the Missouri, Musselshell, Yellowstone, and Clarks Fork of the Yellowstone Rivers and Rock Creek. These recreation resources would undergo temporary impacts because of noise and the obstacle produced by the pipeline during construction, as well as muddied waters for a short time afterward. These impacts would be less than significant because they would be temporary and because they would interfere only minimally with the use of the recreational facilities.

The pipeline route would cross the Laredo Gas Fields in Hill County. Impacts on this land use would be less than significant because placement of the pipeline would not reduce production.

Because the irrigation and recreation reservoir proposed for the southern part of Stillwater County along the pipeline route has not been developed enough to receive any jurisdictional approval, the impact is considered less than significant.

Wyoming

The pipeline route would cross the Shoshone and Bighorn Rivers, in BLM-designated SRMAs, that provide water-based recreational opportunities. The project would also cross the Green River approximately 0.8 mile northwest of the Seedskadee NWR. A temporary impact would be realized from noise and the obstacle that would be produced by the pipeline during construction. Impacts would be less than significant because of their short duration and minor interference with the use of the recreational facilities.

Although the pipeline route would pass within 500 feet of the Lovell-Cowley-Byron airport in Big Horn County, placement and operation of the pipeline would not affect the airport operations.

Development on BLM land in Wyoming is regulated by BLM resource area management plans including the Cody Resource Management Plan, Bighorn River Habitat and Recreation Management Plan, Grass Creek Resource Area Stream Habitat Management Plan and Grass Creek Grazing Management EIS, Washakie Resource Management Plan, Lander Resource Management Plan, Rock Springs Wilderness EIS, Big Sandy Resource Area Management Framework Plan, and Kemmerer Resource Management Plan. No known conflicts with the plans and policies set forth in these documents would result from the proposed pipeline route.

The pipeline route would cross a private airstrip on the Fuller Ranch in Fremont County. Placement and operation of the pipeline would not affect airstrip operations. The pipeline route would also cross the Beaver Creek ~~and Sand Draw~~ Oil and Gas Field~~s~~; impacts on this land use would be less than significant because placement of the pipeline line would not reduce oil production.

The crossing of the ~~Wind River Mountain Range through~~ South Pass area could cause inconvenience to visitors traveling to historical sites in the area. Although construction activity would result in a temporary disturbance of aesthetic qualities, no travel routes would be put out of use and no long-term interruption of recreational use would occur. Because the right-of-way would not be considered a modern, human-made feature, especially after restoration has occurred, no change to the semi-primitive motorized ROS class would be expected.

BLM policy and plans prescribe placement of rights-of-ways in corridors on the public lands wherever practical and feasible. Placement of rights-of-way immediately adjacent and parallel to existing lines where practical, and away from areas identified as having high scenic and cultural values, is encouraged. While the proposed route does not follow an established right-of-way between MPs 502 and 528, our review of the Lander RMP indicates that a new right-of-way through this area would not be prohibited. This view was confirmed by the BLM in its comments on the Draft EIS, which stated that the proposed route (as modified by Altamont's November 1990 realignments) "is not inconsistent with the current planning decisions of the affected BLM resource areas." The proposed route does not cross the nearby South Pass Management Unit that has been designated by the BLM in the Lander RMP as an area of avoidance for utility lines.

~~The proposed route does not cross the nearby South Pass Management Unit that has been designated by the BLM as an area of avoidance for utility lines in the Lander Resource Management Plan.~~

The proposed route would~~, however,~~ cross the Oregon-Mormon Trail. ~~and an area near MP 531 that is designated a National Historical Landmark (NHL) because of the local confluence of numerous historic trails. The pipeline right-of-way should avoid crossing the boundaries of this Landmark in consideration of special provisions for the care of NHLs, as stipulated by the NHPA and its implementing regulations.~~ For a more detailed discussion of the Oregon-Mormon Trail ~~and the South Pass NHL, their~~ its significance~~,~~ and ~~their~~ regulatory context, see Chapter 4M "Cultural Resources".

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE SOUTH PASS ROUTE VARIATIONS

The general land use impacts for the South Pass Route Variations would be similar to those described for the proposed route. No residences are located within 50 feet of any of the variations. No known conflict with county plans or policies would be expected.

All of the variations would cross the Sweetwater and Green Rivers. The project would temporarily affect these recreational resources during construction. The associated impacts to recreation would be short-term, so they are considered less than significant. All variations would also cross the Oregon-Mormon Trail, although at different locations. See Chapter 4M "Cultural Resources".

The Alkali Butte and Northern Utilities Variations would cross the northeast corner of the Beaver Rim ACEC, part of the BLM's Beaver Creek Management Unit. No conflict would be expected with the plans of the BLM since its Lander Resource Management Plan (RMP) allows for construction of major utility lines in the Beaver Creek Management Unit.

The Route 28 Variation would cross approximately 1.9 miles of the Shoshone National Forest. The FS has indicated the Route 28 corridor through the national forest land is not assigned a restrictive management class. Since the variation would essentially parallel the highway, no land use conflict with the FS plans would be expected.

The Route 28 Variation would cross more than nine miles of the BLM's South Pass Management Unit and transect a portion of this unit that is designated an ACEC by the BLM. The South Pass area receives fairly intensive recreational use for camping, hiking, and fishing, in addition to the tourist and educational attractions of the historic sites in the South Pass Mining Area. Pipeline construction would have a temporary impact on the recreational use of the area; this would be less than significant.

The Lander RMP identifies the South Pass Management Unit as an avoidance area for major utility systems in order to protect the historic and cultural values of the area. ~~This route~~ The Route 28 Variation would be in conflict with the BLM's management plan and is, therefore, considered a significant land use impact.

After rejoining the proposed route, the Route 28 Variation would cross a National Historic Landmark near MP 531. See Chapter 4M "Cultural Resources".

IMPACTS SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

The additional facilities required downstream on Kern River's system would be constructed within the pipeline corridor analyzed in the EOR FEIR/EIS. Since the surrounding land use designation is either rangeland or grazing for all of the compressor station sites, the resultant effects on land use would not be expected to alter the less-than-significant impact conclusion of the EOR FEIR/EIS.

Chapter 4E. Environmental Consequences: Vegetation and Wildlife

IMPACTS

Potential impact on vegetation and wildlife resources would result from construction and operation of either pipeline project, as well as from increased access along the right-of-way following construction. Construction-associated impacts include the removal of vegetation and disturbance of wildlife during construction, and the potential mortality of wildlife from construction. Operational impacts on wildlife could occur due to vegetation management practices along the right-of-way, the presence of new structures in important habitat areas, from periodic surveys of the pipeline, and from the operation of the compressor stations. In addition, removing vegetation along the right-of-way may increase vehicle access along the right-of-way and increase disturbance of vegetation and wildlife that occur along and adjacent to the right-of-way.

Resource recovery time was considered in the determination of significant impacts. Biological resources require temporary, short, or long periods to recover from adverse impacts. Impacts were considered temporary if the biological resources would recover from impacts during or immediately after construction. If biological resources would recover from impacts within three years after construction, impacts were considered short-term. If biological resources would not recover from impacts within three years after construction, impacts were considered long-term. Permanent impacts, from which the resource would never recover, were considered long-term impacts.

Section 7 of the Endangered Species Act requires that any project authorized, funded, or conducted by any federal agency (e.g., FERC) should not "...jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species which is determined to be critical..." [16 USC 1536 (a) (2) (1988)]. FERC is required to consult with the FWS or the NMFS to determine if any federally listed or proposed endangered or threatened species, or their designated critical habitat, occur in the vicinity of the proposed project. If, upon review of existing data, FERC determines that these federally listed species or designated critical habitats may be affected by the proposed project, FERC is required to initiate formal consultation to identify the nature and extent of the adverse impact, as well as identify mitigation measures that would either avoid or reduce potential impact to acceptable levels. If, however, FERC determines that no federally listed or proposed species or their designated critical habitat would be affected by the proposed project, then no further action would be necessary.

To comply with Section 7 requirements, FERC (as lead federal agency for this NEPA process) and the project applicants have consulted informally with the appropriate FWS and the NMFS threatened and endangered species experts regarding the presence of federally listed or proposed species in the project area. In accordance with our responsibilities under the ESA, the FERC ~~is currently preparing~~ staff prepared a BA to determine if either project would affect a federally listed or proposed threatened or endangered species. The BA process ~~will~~ was also ~~be~~ utilized by the FERC to develop site-specific mitigation recommendations to minimize or eliminate impact on federally listed or proposed species. Based on the determinations reached in the BA, the FERC ~~will enter~~ staff has entered into formal consultation (as necessary) with the appropriate regional office(s) of the FWS and NMFS, and will secure a Biological Opinion for the project(s) prior to the commencement of any proposed construction activities. ~~Additional~~ Information developed ~~during~~ ~~this process will be~~ in the BAs is included, as appropriate, in ~~our~~ this Final EIS.

Criteria for Determining Significance

Significant Impacts. Impacts on general vegetation types (excluding special native plant communities) were considered significant if a substantial portion of a vegetation type within a local region would be disturbed and regeneration would not restore the vegetation to its pre-project plant and wildlife habitat value during the life of the project. Defining "substantial" in a general case is impossible; the determination of what is substantial was based on literature reviews and professional judgment for each vegetation type.

Impacts on individuals of federally listed or proposed species were considered significant if any of the following criteria were met. Impacts on substantial portions of local populations of federal status 1 or 2 candidate species; FS- or BLM-designated sensitive species, state-listed endangered, threatened, rare, or special concern species; or game species were also considered significant if any of the following criteria were met:

- direct mortality,
- permanent loss of existing or potential habitat,
- temporary loss of habitat that may result in increased mortality or lowered reproductive success, or
- avoidance by wildlife of biologically important habitat for substantial periods that may increase mortality or cause lowered reproductive success.

Impacts were also considered significant if they would substantially alter portions of biological communities that are especially diverse, regionally uncommon, or of special concern to federal or state agencies. These communities include riparian communities, wetlands, communities of special concern listed by BLM or FS, and communities protected on land owned by The Nature Conservancy. The determination of substantial impacts was based on literature reviews, discussions with local experts, limited field surveys, and professional judgment.

Two federal laws direct weed control on federal lands: the Carlson-Foley Act of 1968 and the federal Noxious Weed Act of 1974. BLM supports a policy of controlling noxious weeds on BLM land. In addition, Montana and Wyoming have state and local weed control laws (see discussions for each state). Construction activities that would lead to the expanded range of existing weed species or the introduction of new weed species were considered significant impacts.

Method of Analysis

Vegetation. Estimates of total area to be removed of each vegetation type were calculated as the linear extent of vegetation that would be crossed, multiplied by the construction right-of-way width. Estimates of vegetation affected by construction of the PGT and Altamont projects are contained in Tables 4E-1 and 4E-10, respectively.

Construction right-of-way widths for the PGT/PG&E project would vary along the length of the route. The construction right-of-way was assumed to be the sum of the existing right-of-way, new right-of-way (where needed), and temporary work space (see Appendix D-1). It was assumed that all vegetation within the construction right-of-way would be removed. A cleared operational right-of-way is maintained through forest, woodland, and shrub vegetation along most of the existing PGT right-of-way. An approximately 40-foot-wide operational right-of-way that supports ruderal vegetation is currently maintained along the existing PGT pipeline through most of these areas. To estimate the areas of forest, woodland, and shrub vegetation to be removed, the width of the operational right-of-way was subtracted from the width of the construction right-of-way.

For the Altamont project, the construction right-of-way width was estimated to be 100 feet, except at major river crossings. It was assumed that all vegetation in the construction right-of-way would be removed.

Special-Status Species. The potential for adverse impacts on special-status species was estimated based on known ranges and habitat requirements of species identified in Chapter 3E, "Vegetation and Wildlife," and on the results of intensive field surveys documenting the locations of plant and wildlife populations in relation to the pipeline routes.

Rare wildlife and plant surveys were conducted along the proposed PGT route during March-~~May~~ November 1990. Surveys have been continuing during the preparation of this report. The construction right-of-way plus 50- to 200-foot-wide buffer zones (wider buffers were surveyed in open, level terrain) on each side of the right-of-way were surveyed for the presence of special-status plant species. Field surveys were floristic (all species encountered were identified) and conducted during appropriate phenological periods for special-status plant species. In California, some segments were surveyed several times to encompass the flowering periods of different target species.

Field surveys of habitats likely to be inhabited by sensitive wildlife and plant species along the Altamont route were conducted in summer and fall 1989, and spring and summer 1990. Known locations of sensitive species on and near the pipeline route were also surveyed.

Table 4E-1

IMPACTS ON VEGETATION OF THE PGT PROJECT

Vegetation Type	Vegetation Removed for Construction and Allowed to Regenerate (acres)	Vegetation Periodically Removed for Operation (acres) [a]
Mixed conifer forest	373	0
Ponderosa pine forest	531	0
Lodgepole pine forest	599	0
Juniper woodland	240	0
Sagebrush-steppe	860.5	37
Palouse grassland	147	0

[a] Since most of the new pipeline would be constructed in existing right-of-way with an existing maintained operational right-of-way, no net change in periodically removed vegetation would occur along most of the route.

The information from these surveys was incorporated into the impact assessment of this document.

Wetlands and Riparian Habitat. Impact areas for wetland and riparian vegetation were estimated as the linear extent that would be crossed, multiplied by the construction right-of-way width. As previously discussed in Chapter 3E, due to the different wetland identification methods used for PGT and Altamont, wetland impacts for PGT have more likely been underestimated and wetland impacts for Altamont have most likely been overestimated. The same right-of-way width assumptions were made as described above under "Vegetation," except at major river crossings. At major river crossings (bank-to-bank widths greater than 100 feet) the area cleared of vegetation adjacent to the river was estimated as the river-crossing width multiplied by a 200-foot-wide construction right-of-way. A directionally drilled river crossing would require no clearing of riparian vegetation. It would, however, require extra workspace away from the banks on both sides of the river to accommodate the drilling equipment.

~~As previously discussed in Chapter 3E, wetland and riparian acreage affected for the PGT and Altamont Projects are not directly comparable due to the different methods the FERC was required to utilize in order to identify these areas.~~

Wildlife. Impacts on wildlife are based on the distribution of known and potential habitats identified in Chapter 3E, "Vegetation and Wildlife." Wildlife habitat that would be affected by construction was calculated the same way as the vegetation that would be affected for each pipeline project.

IMPACTS AND MITIGATION MEASURES COMMON TO THE PGT AND ALTAMONT PROJECTS

Vegetation. The primary impact on vegetation during construction and routine maintenance of either proposed project would be the temporary and permanent alteration of vegetative cover, especially the removal of forestland. Forest cover on ~~the~~ new permanent right-of-way would be converted to herbaceous and open shrub cover. Allowed to revegetate naturally, the temporary right-of-way would grow into a young-aged forest stand in 15 to 25 years. However, the FS may require the planting of tree seedlings on National Forest System (NFS) lands in order to reduce this time period to 5 to 7 years.

In addition to direct impact from vegetation clearing, there could be secondary effects on uncleared vegetation. Construction of a right-of-way through forested areas would create sharp vegetation edges where none existed previously. This may expose the new edge trees to elevated levels of sunlight and wind, which could increase moisture evaporation and the probability of wind throws. Root damage or soil erosion near the root zone could also occur as a result of construction activity that would be near the right-of-way edge. Clearing through large tracts of mature forestland could result in the fragmentation of those tracts, possibly causing a change of forest community in the areas adjacent to the right-of-way. Shade-intolerant species may become established and persist in the understory along the right-of-way edge (Carvell and Johnston, 1978). Creating and maintaining an open right-of-way may also allow early successional vegetation to invade the construction and maintained rights-of-way, as well as the edges of the uncleared forest.

Impact on nonforest vegetation should be relatively short-term in most areas, although some areas with poor reclamation potential exist along both project routes (see Chapter 4B "Soils"). Non-forested wetlands should return to preconstruction condition in one or two growing seasons. Construction through agricultural land, in most cases, would result in the loss of only one growing season. Abandoned agricultural land in early successional stages could also revert back to preconstruction conditions in a relatively short time (one to three growing seasons). Effects on vegetation in residential areas should be short-term, except in those instances where trees would be removed for construction.

Noxious Weeds. Construction of either pipeline project has the potential to transport, establish, or expand populations of noxious weeds. This would be a significant impact. Please refer to Chapter 4B - "Soils" for a more detailed description of impacts, as well as mitigation recommendations.

Wildlife. Impact on wildlife species, due to construction and operation of the proposed projects, would largely result from temporary and permanent alteration of habitats. The impact on individuals would include disturbance, displacement, and direct mortality. During construction, the more mobile species would be temporarily displaced from the right-of-way and surrounding areas into nearby similar habitats. Wildlife displaced from the construction right-of-way should return to adjacent, undisturbed habitats soon after construction would be completed. Less mobile species, primarily small mammals, reptiles, and amphibians, and bird nests located in the proposed right-of-way would be more directly affected by pipeline construction and could be destroyed. Regardless of mobility, some individuals would suffer loss of cover, nesting, and foraging habitat. Similar impact, although less extensive, would result from routine vegetation maintenance.

In order to minimize impact on bird species that would utilize the permanent right-of-way for breeding purposes, we recommend that the applicants not conduct vegetation maintenance of the right-of-way prior to August 1 of any year, and that vegetation maintenance be performed no more frequently than once every three years.

The most significant impact on wildlife would result from the long-term or permanent alteration of vegetative cover types. The cover types most altered by the proposed construction and maintenance would include forested lands, riparian areas, and wetlands vegetated with woody cover. Clearing would not only permanently decrease the available habitat, but could also contribute to the fragmentation of habitat. Forest habitat on the permanently maintained right-of-way would be converted to open shrub and herbaceous cover. Forest cleared for the temporary construction right-of-way would be allowed to naturally revegetate following construction, and return to a young-aged forest stand within 15 to 25 years. However, the FS may require the planting of tree seedlings on NFS lands, to reduce this time period to 5 to 7 years.

The wildlife species that would be most directly affected by the clearing of forested and riparian areas would be those interior species that require large tracts of unfragmented habitat to ensure breeding and nesting success. Large contiguous forest tracts are more likely to support breeding individuals of less common species than smaller forest tracts. However, smaller tracts in proximity to other forested areas may attract or retain area-sensitive species (Robbins et al., 1989). According to the most recent and extensive scientific research on the subject, a permanently maintained 50-foot-wide right-of-way would not result in significant fragmentation impact on large forest tracts.

Fragmentation of forest habitat is a general concern in areas where new right-of-way would be constructed. In addition, populations of some forest interior species, primarily songbirds, have been shown to be limited by the size of available unbroken forest tracts. For these species, construction of the proposed right-of-way through forest tracts of marginal size could fragment available habitat into patches of unsuitable size.

Creation of additional edge habitat may result in increased competition and nest depredation by opportunistic edge species. In larger forested areas, the creation of early successional and edge habitats would decrease the quality of habitat for forest interior species in the right-of-way, and possibly up to 100 feet on either side (Anderson et al., 1977). Construction of the pipeline could therefore reduce the density of forest interior species in a forested corridor much wider than the actual cleared right-of-way. While the width of permanent right-of-way would possibly not be a barrier to movement of forest interior species, it could affect the amount of breeding and foraging habitat available to these species, particularly in those areas or regions where large forested areas are currently limited. Forest clearing for pipeline construction could therefore have a greater impact than that suggested by measuring the amount of forest habitat lost.

While forest interior species could be negatively affected by the clearing of forest habitats, species that utilize early- and mid-successional stage habitats would benefit from right-of-way clearing in large forested areas. Density and diversity of both small mammal and bird species often increase after the initial clearing of forest tracts (Monthey and Soutiere, 1985; Anderson et al., 1977) and remain high for about three years.

Predatory species, including raptors, coyote, and foxes would utilize the right-of-way for hunting. Little benefit to these species would result where forest habitat would be cleared in areas that already have abundant early successional habitat (e.g., agricultural land, residential areas, existing rights-of-way). Blasting within rock outcrop in forested areas may destroy some denning and nesting habitat for some species.

The clearing of right-of-way could also provide ready access to previously inaccessible areas for not only mammalian predators (fox, coyote, skunk, and raccoon) but also for humans. These corridors are often used as unauthorized ORV routes, which can disturb wildlife, prolong erosion, and prevent revegetation along the right-of-way. In order to reduce the uncontrolled use of rights-of-way, we have recommended that the applicants develop methods to screen the right-of-way from road or trail crossings, as well as establish barriers to prevent ORV use of the right-of-way (see Chapter 4B - "Soils").

Nonforested habitats that would be affected by construction and operation of either proposed project include nonforested wetlands, agricultural lands, and industrial and residential developments. Impact on these habitat types, and associated wildlife species, would be relatively minor and short-term. We have recommended techniques for construction through nonforested wetlands that would allow emergent wetlands vegetation to recover within one or two growing seasons following construction. Agricultural habitats (pasture, hay fields, abandoned fields) on the right-of-way would also recover within one or two growing seasons following pipeline construction. The temporary alterations to these habitats would generally not be expected to have significant impact on wildlife species.

Wetlands. The primary impact on wetlands as a result of the construction and operation of either proposed project would be the temporary and long-term alteration of wetland vegetation. Additional impact could include temporary changes to wetland hydrology, water quality, aesthetic values, and the quality of wildlife habitat. Pipeline construction would not significantly alter any wetlands since wetlands would not be filled or drained. Therefore, no wetland "loss" would occur. Implementation of our recommended wetlands construction procedures would ensure that impact on wetland areas would be of a short-term nature, and that long-term impact would be restricted to the alteration of vegetation on the maintained right-of-way.

Several additional effects could result from the clearing of right-of-way through wetlands. Soil compaction and rutting may result from the temporary stockpiling of soil and the movement of heavy machinery. Surface drainage patterns and hydrology may be temporarily altered, and there would be increased potential for the trench to act as a drainage channel. Increased siltation and turbidity may result from trenching activities. Trenching could remove an impervious soil layer and consequently drain a perched water table. This would result in dryer soil conditions which could inhibit the reestablishment of wetland vegetation. Erosion and flood control capabilities of affected wetlands could be altered.

The clearing of wetland vegetation could result in the temporary loss and alteration of wildlife habitat. A temporary displacement of wildlife or loss of some individuals could also result from construction activities. Impact on the aesthetic or recreational value of wetlands would be relatively short-term where the proposed pipeline would pass through wetlands dominated by herbaceous vegetation, and long-term for those wetlands vegetated by woody cover. Aesthetic effects would be long-term where the pipeline would cross forested wetlands, since regrowth of the vegetation within right-of-way would take from 10 to 20 years. Aesthetic effects would also occur during the period of construction to initial revegetation.

The COE has not yet determined whether a single (or several) individual Section 404 permit would be required for the proposed projects, or if either project could be constructed under the Nationwide Section 404 Permit Program. In the event that individual Section 404 Permits are required, a Section 404(b)(1) guidelines analysis would be conducted by the COE to ensure that the discharge of dredged and fill materials would be minimized and that all practical construction alternatives have been identified and utilized to reduce impact on wetland resources. These guidelines require that dredged or fill materials would not result in violations of state water quality or toxic effluent standards; nor jeopardize the existence of species listed as endangered or threatened under the Endangered Species Act of 1973; nor cause significant degradation to waters of the United States (as demonstrated by chemical testing); nor result in significantly adverse individual or cumulative effects on human health or welfare, aquatic life or wildlife dependent on aquatic ecosystems, or on recreation, aesthetic, and economic values. As a result any COE analysis, additional conditions could be imposed on the applicants in the proposed crossings of wetlands.

In order to establish a rigorous level of protection during pipeline construction through wetlands, we have developed a common set of Stream and Wetland Construction and Mitigation Procedures (Procedures) that we recommend be employed by both PGT and Altamont for all unavoidable wetland crossings. These Procedures are presented in Appendix ~~E~~ C-3. Implementation of these Procedures would eliminate or significantly reduce the majority of adverse effects associated with pipeline construction. The Procedures were developed in cooperation with the FWS, EPA, and several state agencies. In addition, certain state or local agencies could require PGT or Altamont to follow more stringent construction and mitigation procedures and could also require the applicants to prepare site-specific wetland crossings plans.

The applicants have reviewed and commented on the Procedures, and, in general, have agreed to comply with the majority of its measures. The applicants have not agreed to all of the Procedures, however, and in some cases have proposed alternatives that we have reviewed. Based on the applicants' comments and our continued review, some of the Procedures have been modified. Our recommended Procedures are described below. If the applicants determine that they cannot comply with one or more of the Procedures at a specific location, they may submit site-specific alternative measures for our review and approval prior to construction. Where we determine that these alternative measures differ significantly from our Procedures, they would need to be submitted to the Director of OPPR for review and approval prior to construction.

The Procedures require that all staging areas be located at least 50 feet from wetland edges where topographic conditions permit, and that these areas be limited in size to the minimum area needed for prefabrication of pipe segments. Potential contamination of surface water by spillage of fuels, oil, other hazardous materials, or concrete would be minimized or eliminated by ~~restricting~~ requiring a SPCCP for the refueling of construction equipment, and prohibiting the storage of hazardous materials or concrete coating activities, ~~to areas further than~~ within 100 feet from all wetland boundaries. All wetland boundaries must be delineated using the Unified federal Method prior to construction. In addition, no aboveground facilities would be constructed within the limits of federally delineated wetlands.

The Procedures require that sediment filter devices be used to prevent the flow of trench excavation spoils off of the right-of-way. Because of the potential for large amounts of sediment to enter surrounding undisturbed wetland areas, we feel that sediment filter devices should be used around all spoil piles and at the edges of the right-of-way within all wetland areas, regardless of length of crossing or depth of standing water.

Our Procedures require that construction through wetlands comply with nationwide Section 404 permit conditions (33 CFR 330) at a minimum, and that applicants apply for state-issued wetland-crossing permits, where appropriate, and obtain Section 401 water quality certification or waivers. The Procedures include a requirement that if a wetland cannot be avoided, the route be located to minimize disturbance to the wetland. One method of minimizing disturbance to wetlands is to locate the route adjacent to existing rights-of-way. Where pipeline looping is to occur, the new loop line would be located no more than 25 feet away from the existing pipeline.

In order to minimize the area of wetland vegetation affected, our Procedures require that the construction right-of-way width be limited to 75 feet or less in wetlands. Evidence submitted by the applicants, as well as numerous pipeline companies and independent contractors, indicates that pipeline construction within a 75-foot right-of-way could be safely and adequately accomplished in the majority of wetlands. We feel that by using appropriate methods to temporarily stabilize the right-of-way, the majority of wetlands could be crossed while limiting right-of-way clearing to 75 feet or less.

During right-of-way clearing, woody wetland vegetation would be cut off at ground level, leaving root systems intact. Only stumps and roots directly over the trench would be removed where required for pipe installation. This would allow for a more rapid revegetation of woody plants than if root systems were pulled or the entire right-of-way were graded. In the event that site-specific construction constraints require that stumps be pulled from underneath the working area (e.g., where wetlands occur on slopes), the applicant(s) would be required to develop and implement a site-specific revegetation plan to ensure that woody vegetation is re-established on the right-of-way. In addition, in order to maximize revegetation of the area over the trench, the Procedures specify that the top one foot of topsoil from the area to be disturbed by trenching be segregated and replaced as the top layer after installation is complete, except in areas with standing water or saturated soils.

To minimize the disturbance and compaction of wetland soils, the Procedures require that the applicants limit construction equipment operating in wetlands to that needed to dig the trench, install pipe, backfill the trench, and restore the right-of-way. The intent of this recommendation is to minimize construction traffic in wetland areas and to prohibit construction equipment travel through wetlands as a means of accessing non-wetland right-of-way areas. We recognize that there may be no available off right-of-way access around long wetlands in some instances. In these cases, our recommendation allows the applicants to provide site-specific construction information for our review and approval prior to construction.

The use of fill to stabilize working areas within wetlands may permanently alter wetland characteristics. Our Procedures require that no dirt, rock, stumps, or brush be used as temporary or permanent fill within wetlands. To minimize impact on wetlands with standing water or saturated soils, the Procedures require that the applicants use wide-track or balloon-tire construction equipment, or operate normal equipment off of timber riprap or pre-fabricated equipment pads where these conditions exist. In addition, only trees within the right-of-way are to be cut for use as riprap or equipment pads, and no more than two layers of these materials are to be used to stabilize the right-of-way. These materials must be removed upon completion of construction. In the event that either crushed stone over filter cloth, or wooden equipment pads, are utilized to stabilize the right-of-way, this material must be removed following construction. In addition, any timber used as a base for the geotextile fabric must also be removed following construction.

Following construction through wetlands, no lime or fertilizer would be added to disturbed areas, unless required by the appropriate state permitting agency. In addition, where there is no standing water, the topsoil would be returned to its original horizon and then seeded with annual ryegrass. To minimize permanent alteration of wetland vegetation, the Procedures specify that the entire disturbed right-of-way be allowed to revegetate with herbaceous and woody vegetation. Because maintaining the right-of-way free of woody vegetation would be a permanent alteration of wooded wetlands, all herbaceous and woody vegetation should be allowed to reestablish itself on the rights-of-way. Maintenance of woody vegetation shall be limited to those procedures described below.

The invasion and spread of undesirable plant species in disturbed wetland areas may significantly alter the plant composition in the wetlands. The primary method of preventing the establishment of undesirable plants is through quick reestablishment of native plant species. This would be accomplished as described above. In addition, the Procedures require that each applicant develop specific measures to prevent or control the introduction of undesirable vegetation, in coordination with appropriate state agencies.

To minimize permanent alteration of forested or scrub-shrub wetlands, our Procedures recommend that no mowing or other vegetation maintenance practices occur on the right-of-way within wetlands. The only exception to this would be the selective cutting of trees greater than 15 feet in height that are located within 15 feet of the pipeline. We feel that there is little chance that root systems of 15-foot-tall trees would damage the pipeline. Considering the type of vehicles that would be used in wetlands during pipeline reconnaissance or maintenance, we believe that allowing 15-foot-high woody vegetation to regenerate may limit, but would not prohibit, access through wetlands. In addition, aerial surveillance would still be possible.

Riparian Areas. Due to the methods that we used to identify the location of wetland areas, especially along the Altamont route, many of the areas identified as wetlands are actually riparian areas. Impact on these areas would be similar to those identified above for wetlands. In order to minimize impact on riparian areas, we recommend that both PGT and Altamont implement our Procedures when crossing riparian areas, and locate all staging areas outside of riparian areas. In addition, we recommend that PGT and Altamont develop, in conjunction with the appropriate state agencies, site-specific revegetation plans for all riparian areas, and to submit these plans ~~for inclusion in the Final EIS~~ for our review prior to construction.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE PGT PROJECT

Idaho

Vegetation. Approximately 199 acres of mixed conifer forest, 146 acres of ponderosa pine forest, and 40 acres of lodgepole pine forest would be removed for construction of the project in Idaho. In most areas, forest removed would be allowed to regenerate, but recovery of forest habitat values would require several decades. These vegetation types are widespread and abundant in Idaho; therefore impacts are less than significant.

Special-Status Plant Species. Two FS-listed sensitive plant species ~~may~~ occur along the pipeline route in the Panhandle National Forest (Table 4E-2). ~~Suitable habitat for~~ One individual moonwort grape fern (*Botrychium minganense*) ~~and redwood's violet (*Viola sempervirens*)~~ occurs on a moist site~~s~~ in mixed conifer forests. ~~PGT has indicated that surveys will be conducted for these species in 1990.~~ Several Pacific rush populations (*Juncus effusus pacificus*) were observed at crossings of the Moyie River. Impact to both of these species would be less significant.

Wetlands and Riparian Habitat. The pipeline project would cross 15 wetland and riparian areas for a total distance of 5450 feet. Assuming a 75-foot-wide construction right-of-way through these areas, this would affect approximately 9.4 acres of wetlands and riparian areas in Idaho (Table 3E-1). With proper construction and restoration, herbaceous wetland communities should recover rapidly following construction. Approximately six acres of riparian scrub and forest would be removed, mostly at the numerous crossings of the Moyie River. Riparian vegetation would be allowed to regenerate, but recovery time of habitat values would be long-term.

Special Native Plant Communities. ~~No special native plant communities would be affected in Idaho.~~ PGT's implementation of its proposed native straw seeding program would ensure that impact to the fescue-dominated Rathdrum Prairie is not significant.

Special-Status Wildlife Species

Gray Wolf. The Moyie River drainage is classified as a key area for wolf conservation in northern Idaho (Hansen 1986). The pipeline right-of-way could be used as a travel corridor for wolves migrating from Canada into central Idaho. Although no wolves are known or suspected to reside near the proposed alignment (Hanna, personal communication), wolves have been reported in recent years in the vicinity of the right-of-way. No wolves or dens were observed along the right-of-way during recent surveys conducted by PGT.

Construction of the pipeline would disturb 329 acres of potential wolf habitat (Table 4E-3) and may cause wolves to avoid the right-of-way during construction. This disturbed habitat constitutes only a small percentage of the potential wolf habitat available in the

Table 4E-2

ASSESSMENT OF IMPACTS ON SPECIAL-STATUS PLANT SPECIES ALONG THE PGT ROUTE

Scientific Name Common Name	Listing Status[a/]		Comments
	Federal	State	
IDAHO			
Botrychium minganense Moonwort grape fern	FS	--	One individual found along Loop 1 right-of-way
Juncus effusus pacificus Pacific rush	FS	--	Two occurrences document at Moyie River crossings
WASHINGTON			
Lomatium laevigatum Smooth desert parsley	C2	--	Pipeline would not cross the Columbia River Gorge
OREGON			
Artemisia ludoviciana var. *estesii* Este's artemisia	C2	--	Not found during 1990 field survey
Astragalus collinus var. *laurentii* Laurence's milk vetch	C2	--	Not found during 1990 field survey
Astragalus peckii Peck's milk vetch	C2/FS	--	Four populations found near right-of-way
Calochortus longebarbatus var. *longebarbatus* Long-haired star tulip	C3c	--	Not found during 1990 field survey
Mimulus jepsonii Jepson's monkeyflower	FS	--	Not found during 1990 field survey, although suitable habitat occurs along PGT's existing route
Mimulus jungermannoides Hepatic monkeyflower	C3c	--	Occurs near Condon storage site
Penstemon glaucinus Blue-leaved penstemon	C2	--	Not found during 1990 surveys
Perideridia eythrorhiza Red root yampah	C2	--	Not found during 1990 surveys
Rorippa columbiae Columbia cress	C2	--	Not found during 1990 surveys
Silene scaposa var. *scaposa* Scapose catchfly	C3c	--	Not found during 1990 surveys

Table 4E-2
(continued)
ASSESSMENT OF IMPACTS ON SPECIAL-STATUS PLANT SPECIES ALONG THE PGT ROUTE

Scientific Name Common Name	Listing Status[a]		Comments
	Federal	State	
CALIFORNIA[b] (Federal-Listed Species Only)			
Amsinckia grandiflora Large-flowered fiddleneck	E	E	Not found during 1990 field survey.
Caulanthus californicus California jewelflower	PE	E	Not found during 1990 field survey. Not found along Stanpac No. 2 Pipeline in 1987 survey.
Cordylanthus palmatus Palmate bird's-beak	E	E	1990 surveys not yet conducted. Not found along Stanpac No. 2 Pipeline but could occur in Brentwood area
Eriastrum hooveri Hoover's woolly-star	T	--	Not found during 1990 field survey. Not found along Stanpac No. 2 Pipeline in 1987 survey.
Erysimum capitatum var. *angustatum* Contra Costa wallflower	E	E	Pipeline would not cross dune habitat
Lembertia congdonii San Joaquin woolly threads	PE	--	Not found during 1990 field survey. Not found along Stanpac No. 2 Pipeline in 1987 survey.
Oenothera deltoides var. *howellii* Antioch Dunes evening-primrose	E	E	Pipeline would not cross dune habitat
Tuctoria mucronata Crampton's tuctoria	E	E	Not found during 1990 surveys

[a] See Table 3E-3 for listing definitions.
NHP = Natural Heritage Program.

[b] PG&E's nonjurisdictional facilities.

Table 4E-3

IMPACTS ON SPECIAL-STATUS WILDLIFE SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING ALONG THE PGT ROUTE IN IDAHO

Common Name	Scientific Name	Legal Status[a/] Federal/State	Habitat Potentially Affected (acres)
Mammals			
Gray wolf	*Canis lupus*	E/--	329.0
Grizzly bear	*Ursus arctos horribilis*	T/--	329.0
Townsend's big-eared bat	*Plecotus townsendii pallescens*	C2[b]/--	0.0
Wolverine	*Gulo gulo luscus*	C2[b]/--	560.0
North American lynx	*Felis lynx canadensis*	C2/--	389.0
Birds			
Bald eagle	*Haliaeetus leucocephalus*	E[b]/--	0.0
American peregrine falcon	*Falco peregrinus*	E[b]/--	0.0
White-faced ibis	*Plegadis chihi*	C2/--	190.0
Upland sandpiper	*Bartramia longicauda*	FS/--	44.0
Harlequin duck	*Histrionicus histrionicus*	FS/--	0.15
Amphibians			
Coeur d'Alene salamander	*Plethodon idahoensis*	FS/--	0.15

a/ For an explanation of legal status classification definitions and footnotes in this colums, please see Table 3E-3.

area, and would be temporary in duration. ~~A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

PGT/PG&E proposes to conduct preconstruction surveys within 60 days of pipeline construction to verify absence of gray wolf in the Project area. If any wolves detected during these surveys are determined to be adversely affected by the project, mitigation commensurate with the level of impact will be developed in consultation with the USFWS.

In addition, PGT/PG&E proposes to develop a Worker Education Program to instruct construction crews on the basic biology and identification techniques for the gray wolf, potential occurrence of wolves in the project area, state and federal regulations for protection of the species, mitigation measures associated with the pipeline expansion project, and the possible penalties for non-compliance with all relevant regulations. Contractors will be legally bound by contract provisions to adhere to any measures designed to avoid impacts of the project to gray wolf.

The FERC staff has determined that construction of the PGT/PG&E Project, with implementation of PGT/PG&E's proposed mitigation, would not affect the gray wolf.

Grizzly Bear. Grizzly bear habitat exists along the proposed pipeline route, although the pipeline would not cross any verified areas of grizzly bear use (Harrington, Hanna, personal communications). No grizzly bears were observed during recent surveys. Construction of the pipeline would ~~disturb 329 acres of potential grizzly bear habitat~~ not affect any grizzly bear unit identified in the grizzly bear recovery zone (Table 4E-3). In addition, shooting by construction workers is potential source of grizzly bear mortality. ~~A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

No grizzly bears or their signs were observed within the study area. Idaho Department of Fish and Game reported that none of the grizzlies that are being radio-monitored in the Selkirk Mountains have ranged into the Moyie River basin. No agency biologists knew of any denning or breeding activity of grizzly bear in the project area.

Grizzly bears typically use much higher elevations than would be crossed by the pipeline route (Gore, personal communication). Denning usually occurs above 6,500 feet (USFS 1989). The entire pipeline route through northern Idaho ranges from approximately 2,500 to 3,000 feet in elevation, and therefore, would not affect denning grizzlies. According to the USFWS (Gore, personal communication), no impacts to grizzly bear denning activities as a result of pipeline construction are anticipated.

Grizzlies often move to lower elevation riverbottoms and riparian areas in spring to feed on early emerging vegetation and ungulate carrion (Madel 1982). Some pipeline construction would occur in spring along the Moyie River, an area which provides winter range for elk, moose, and white-tailed and mule deer (Hanna, personal communication; Hansen, 1986; PGT/PG&E 1990).

PGT/PG&E proposes to conduct preconstruction surveys within 60 days of pipeline construction to verify absence of grizzly bear in the Project area. If any grizzlies detected during these surveys are determined to be adversely affected by the Project, mitigation commensurate with the level of impact will be developed in consultation with the USFWS.

In addition, PGT/PG&E would develop a Worker Education Program to instruct construction crews on the basic biology and identification techniques for the grizzly bear, potential occurrence of grizzlies in the project area, state and federal regulations for protection of the species, mitigation measures associated with the pipeline expansion project, and the possible penalties for non-compliance with all relevant regulations. Contractors will be legally bound by contract provisions to adhere to any measures designed to avoid impacts of the Project to grizzly bear.

The FERC staff has determined that construction and operation of the PGT/PG&E Project, with the implementation of PGT/PG&E's proposed mitigation, would not affect the grizzly bear.

Townsend's Big-Eared Bat. This species inhabits caves, abandoned mine shafts, and cliff crevices throughout Idaho (Burt and Grossenheider, 1976). Although this species may occur in the general vicinity of the project, construction would not disturb bats because the right-of-way would not cross any Townsend's big-eared bat roosting habitat. Bats may avoid the construction area, but this would be temporary and impacts on big-eared bats are less than significant (Table 4E-3).

Wolverine. Wolverines have been sighted near the pipeline (Idaho NHP 1989). Construction activities would have little effect on wolverines because of their large home ranges (Verner and Boss 1980) and the fact that they are unlikely to occur near construction areas (Groves personal communication). Immature wolverines would not be affected because wolverines mate in summer and young are born in spring (Ingles 1965) prior to construction. These impacts are less than significant.

Construction would remove 560 acres of forest in the right-of-way in wolverine habitat (Table 4E-3). Rodent populations would increase where forest vegetation is removed, which would provide additional prey for wolverines. The beneficial impacts are less than significant because a small amount of habitat would be affected, compared to the large home range of a wolverine.

North American Lynx. Construction of the pipeline would disturb 389 acres of potential lynx habitat (Table 4E-3); however, little is known about lynx distribution in northern Idaho (Groves personal communication). Impacts on the lynx would be similar to those discussed above for wolverines. These impacts are less than significant.

Bald Eagle. The proposed route would cross approximately 21 miles of wintering habitat and potential bald eagle nesting along the Moyie River. Construction activities would not affect wintering bald eagles because the eagles would not be present during construction. No known roost or perch trees occur along the right-of-way; however, removal of potential roost and perch trees along the Moyie River may occur. In addition, no bald eagle nests are known to occur within the proposed pipeline vicinity (Idaho NHP, 1989; Hanna, L. Brown, personal communications), and none were observed during recent surveys. Please see the "California" bald eagle discussion for a determination of affect and recommended mitigation measures ~~will be developed by the FERC in our BA~~.

American Peregrine Falcon. The Idaho NHP has no records of peregrine occurrences in the project vicinity (Idaho NHP 1989, Groves personal communication). No eyries are known or suspected to occur along the proposed alignment (Grove, Hanna, L. Brown personal, communications) and none were observed during recent surveys. Suitable but unoccupied nesting habitat for peregrine falcons exists along the steep slopes bordering the Moyie River. Please see the "California" American peregrine falcon discussion for a determination of affect and recommended mitigation measures ~~will be developed by the FERC in our BA~~.

White-Faced Ibis. This species could occur as a migrant along the pipeline route in northern Idaho (Larrison 1981). Construction would disturb 190 acres of potential resting habitat and may disturb migrating ibises (Table 4E-3). The impacts are less than significant because the disturbance would be temporary and construction would not occur when most ibises are migrating.

~~**Boreal Owl.** Boreal owls are cavity-nesting species that occur at high elevations (5,000-8,000 feet) in subalpine and Engelman spruce forests (Reel, Schassberger, and Ruediger 1989; Groves personal communication) (Table 4E-3). The right-of-way would not occur at these high elevations, so no effects on nesting boreal owls are anticipated.~~

Upland Sandpiper. The right-of-way would occur within the last documented breeding and nesting site in the Pacific Northwest for this species (Gruenwald personal communication). Upland sandpipers nest between May 1 and September 1 (Gruenwald personal communication) and have been observed along the right-of-way (Idaho NHP 1989). Construction activities would disturb 44 acres of upland sandpiper nesting habitat in Idaho (Table 4E-3). Construction of the pipeline during the nesting season could result in direct and indirect mortality of a substantial portion of the upland sandpiper nesting population by crushing nests and young in the right-of-way and by causing nest avoidance or abandonment, resulting in mortality of nestlings. To minimize these significant impacts, we recommend that PGT survey this area prior to construction and not construct within this area (MP 104 to 106.8) between May 1 through September 1 if nesting upland sandpipers are found to occupy the area.

~~**Mountain Quail.** Mountain quail occur in brushy, forested habitat that would be crossed by the pipeline in Idaho. Construction of the pipeline would disturb approximately 211 acres of mountain quail habitat in northern Idaho (Table 4E-3) and could cause nest abandonment or avoidance, resulting in mortality of young quail. These impacts are less than significant because construction of the pipeline would affect only a small portion of the available habitat of the mountain quail.~~

Harlequin Duck. Construction of the pipeline would disturb potential nesting habitat for this species at Bussard and Snyder Creeks. Construction of the pipeline would disturb 0.2 acre of potential habitat (Table 4E-3); the amount of area affected would be small compared to the amount of habitat available. Construction activities would cause less-than-significant impacts on harlequin duck populations.

In addition, PGT's pipeline route would cross potential harlequin duck nesting and brood rearing habitat at the proposed Moyie River Crossing #3. At this location, PGT proposes to remove an existing beaver dam that creates a slackwater area that may be used for brood rearing. PGT also proposes to remove the end of an existing island at this location that may be used by harlequin ducks for nesting. These impacts are potentially significant. To eliminate these impacts, we recommend that PGT reduce the spacing between its existing and proposed pipelines in this location in order to avoid any disturbance to the island or the existing beaver dam.

Coeur d'Alene Salamander. Coeur d'Alene salamanders have been observed in the general vicinity of the proposed project (Idaho NHP, 1989; Groves, personal communication); however, each of these known populations is located approximately one mile from the pipeline right-of-way. No Coeur d'Alene salamander was located along tributaries of the Moyie River along US 95 from Mission Creek Divide to Moyie, Canada (Groves, 1988). Potential habitat for this species exists in steep areas of fractured rock near streams that would be crossed by the proposed pipeline route along the Moyie River. Construction would disturb approximately 0.2 acre of potential Coeur d'Alene salamander habitat at Snyder and Bussard Creeks (Table 4E-3). This impact is less than significant.

Important Habitat for Game Species

Rocky Mountain Elk. Elk reside year round along the proposed alignment. Pipeline construction would disturb approximately 331 acres of winter habitat and 725 acres of summer habitat (Table 4E-4).

Construction would require removal of 236 acres of forest habitat. This would reduce the amount of cover available to elk, but this impact is less than significant because the amount of cover that would be removed is small compared to the amount of cover available in the surrounding area. Vegetation management along the right-of-way would maintain approximately 223 acres of grasses and forbs. This management would be beneficial to elk because their diet consists of over 65 percent grasses and forbs (Bubenik, 1982).

Construction in spring and early summer could disturb elk during the calving period, which lasts from mid-May to mid-June and usually occurs between the winter and summer ranges (Thomas and Toweill 1982). Substantial portions of local populations would not be affected by construction activities because the disturbance would be temporary, calving area locations are unpredictable and are determined by numerous environmental factors (Hanna personal communication), and elk would avoid the construction areas by redistribution in the surrounding area (Lyon 1985). This is a less-than-significant impact.

Table 4E-4

IMPACTS ON GAME SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING ALONG THE PGT ROUTE IN IDAHO

Species	Seasonal Range	Habitat Affected (acres)	Direct Mortality	Permanent Habitat Loss	Temporary Habitat Loss	Avoidance of Habitat by Wildlife
Rocky Mountain elk	Summer Winter	725 331	LS NC	LS LS	LS LS	LS NC
Mule deer	Summer Winter	882 331	LS NC	LS LS	LS LS	LS NC
White-tailed deer	Summer Winter	882 331	LS NC	LS LS	LS LS	LS NC
Moose	Summer Winter	882 331	LS NC	LS LS	LS LS	LS NC
Black bear	Year round	725	LS	LS	LS	LS
Mountain lion	Year round	560	NC	LS	LS	LS
Upland game birds	Year round	880	LS	LS	LS	LS
Wild turkey	Year round	47	LS	LS	LS	LS
Waterfowl	Spring nesting	6.3	LS	LS	LS	LS

Notes: LS = less than signficant
NC = no change
S = significant

White-Tailed Deer, Mule Deer, and Moose. Construction activities would disturb vegetation on 331 acres of year-round habitat and 882 acres of summer range (Table 4E-4). The effects of construction activities on white-tailed deer, mule deer, and moose would be similar to those described above for Rocky Mountain elk, and are less than significant.

Black Bear. Black bear reside year round along the proposed alignment (Hanna personal communication). Construction of the pipeline would disturb 725 acres of potential black bear habitat (Table 4E-4); 236 acres would be forested habitat. This impact is less than significant because the affected area would be small relative to the amount of forested habitat available in the surrounding area.

Vegetation management along the right-of-way would maintain 223 acres of grasses and forbs, and rodent populations would increase. This is a beneficial impact on bears because grasses and forbs are consumed in spring and early summer and additional rodents would provide a larger prey base. The beneficial impact is not significant because the amount of additional forage and prey would not be large compared to the 1,000- to 2,500-acre home range of the black bear (Thomas, 1979).

Mountain Lion. Construction of the pipeline would affect 560 acres of mountain lion habitat (Table 4E-4). Direct impacts on mountain lions would be similar to those described above for wolverines and are less than significant. Vegetation management would maintain approximately 223 acres of grasses and forbs along the right-of-way. This would provide additional forage for deer, the primary prey species of mountain lions. This would not result in a substantial increase in local deer populations, and the beneficial impact is less than significant.

Upland Game Birds. Several species of upland game birds reside year round along the proposed alignment (Hanna, personal communication). Construction of the pipeline could result in direct and indirect game bird mortality during nesting by causing nest abandonment or avoidance, resulting in mortality of young. In addition, construction of the pipeline would disturb 880 acres of upland game bird habitat (Table 4E-4). These impacts are less than significant because populations of these species are fairly abundant (Hanna, personal communication) and substantial portions of local populations would not be affected.

Wild Turkey. Construction of the pipeline would disturb 47 acres of wild turkey habitat (Table 4E-4). Impacts on this species would be similar to those discussed above for upland game birds, and are less than significant.

Waterfowl. The right-of-way would cross and parallel two waterfowl nesting areas (Hanna, personal communication). Construction would disturb 6.3 acres of nesting habitat (Table 4E-4). Impact on waterfowl nesting habitat would be short-term in duration, and would not affect a substantial portion of a local population. Therefore, these impacts are not significant.

Washington

Vegetation. Construction of the pipeline would require the removal of approximately 33 acres of Palouse grassland and 5.5 acres of sagebrush-steppe in Washington. Palouse grasslands would recover quickly. Recovery of sagebrush-steppe vegetation would be more rapid in this wetter northern area than in Oregon, but the impact would still be long-term. These vegetation types are widespread and abundant; therefore, impacts are less than significant.

Special-Status Plant Species. ~~Two~~ One special-status plant species ~~were~~ was identified in the Washington NHP database search (Table 4E-2). Smooth desert parsley (*Lomatium laevigatum*) ~~and hepatic monkeyflower (*Mimulus jungermannioides*)~~ occurs on basaltic cliffs along the Columbia River Gorge. Suitable habitat for ~~these~~ this species does not occur along the pipeline route since the route would not cross the Columbia River Gorge. ~~These~~ This species would not be affected by the project.

Wetlands and Riparian Habitat. PGT's proposed route would cross 10 wetland areas, and require the removal of 1.7 acres of wetland and riparian habitat (Table 3E-1). The majority of these wetlands are palustrine emergent; therefore, impacts would be short-term in duration and would not be significant. However, one of these areas is located adjacent to the Walla Walla River, and is specifically managed for the production of waterfowl. Please refer to the "waterfowl" discussion below for an assessment of potential impact at this location.

Special Native Plant Communities. No special native plant communities would be affected in Washington.

Special-Status Wildlife Species

Pygmy Rabbit. The distribution of pygmy rabbits in Washington is limited to the northeastern portion of the state (Hall, 1981). Construction would disturb 7.9 acres of potential pygmy rabbit habitat, although no populations were found during PGT's 1990 survey (Table 4E-5). Clearing, grading, and trenching activities within 500 feet of occupied burrows during the breeding and rearing season May 1 to September 1 could result in the direct mortality of adults and young within the right-of-way. Pygmy rabbits are colonial, and construction could affect large numbers of local populations. These impacts may be significant. To reduce these impacts to less-than-significant levels, we recommend that PGT re-survey its construction right-of-way to assess actual use by pygmy rabbits, and avoid construction within 500 feet of any occupied pygmy rabbit burrows during the breeding and rearing season.

Townsend's Big-Eared Bat. This species roosts primarily in caves throughout Washington (Burt and Grossenheider, 1976; Cooperrider, Boyd, and Stuart, 1986). ~~Approximately eight acres of~~ No potential roosting habitat would be affected by construction of the pipeline. ~~PGT has indicated that potential habitat that would be crossed by the proposed pipeline route will be surveyed by a qualified biologist prior to construction, to search caves and to assess bat use.~~

Table 4E-5

IMPACTS ON SPECIAL-STATUS WILDLIFE SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCUR ALONG THE PGT ROUTE IN WASHINGTON

Common Name	Scientific Name	Legal Status[a/] Federal/State	Habitat Potentially Affected (acres)
MAMMALS			
Pygmy rabbit	*Brachylagus idahoensis*	--[b]/PE	7.9
Townsend's big-eared bat	*Plecotus townsendii pallescens*	C2[b]/PT	0.0
BIRDS			
Bald eagle	*Haliaeetus leucocephalus*	T[b]/T	8.0
American peregrine falcon	*Falco peregrinus*	E/E	0.0
Swainson's hawk	*Buteo swainsoni*	C2[b]/WSC	28.0
Ferruginous hawk	*Buteo regalis*	C2[b]/T	28.0
Western sage grouse	*Centrocercus urophasianus phaios*	C2/WSC	7.9
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	C2/WSC	28.0
Long-billed curlew	*Numenius americanus*	C2/WSC	110.0
Greater sandhill crane	*Grus canadensis tabida*	--[b]/E	749.0
Upland sandpiper	*Bartramia longicauda*	--[b]/E	25.2
American white pelican	*Pelecanus erythrorhynchos*	--[b]/E	8.0
Golden eagle	*Aquila chrysaetos*	Pr/WSC	4.5
Burrowing owl	*Athene cunicularia*	--[b]/WSC	28.0

[a/] For an explanation of legal status classification definitions and footnotes in this column, please see Table 3E-3.
[b/] FS listed as sensitive

~~Construction activities resulting in the destruction of winter hibernicula or destruction or disturbance of nursery colonies or roosting habitat would increase big eared bat mortality rates and lower reproductive success. The destruction of roosting caves is also a significant impact because caves with proper temperature conditions are critical habitat components for these bats (Cooperrider, Boyd, and Stuart 1986). To minimize these impacts, we recommend that the PGT realign its proposed route (as necessary) to avoid the destruction of Townsend's big eared bat roosting caves.~~

~~**Merriam's Shrew.** The Washington Department of Wildlife has no records of this species occurring within the proposed pipeline vicinity (Natural Heritage Data System [NHDS] 1989), however, Merriam's shrew does occur throughout eastern Washington (Burt and Grossenheider 1976). Approximately 28 acres of potential habitat would be disturbed by construction activities (Table 4E 5). Construction of the pipeline could result in direct mortality of individuals by unearthing occupied burrows and by trapping individuals in open trenches. Substantial portions of Merriam's shrew populations would not be affected because only those individuals inhabiting the construction area would be affected. These impacts are less than significant.~~

Bald Eagle. The pipeline right-of-way would not cross any known nesting habitat for bald eagles (NHDS, 1989); however, eight acres of potential bald eagle wintering habitat occur at the Wallula Habitat Management Unit along the Walla Walla River (Table 4E-5). No known roost or perch trees occur along the right-of-way; however, removal of potential bald eagle roost and perch trees may occur during construction. Please see the "California" bald eagle discussion for a determination of affect and recommended mitigation measures ~~will be developed by the FERC in our BA~~.

American Peregrine Falcon. Potential nesting habitat for peregrine falcons occurs in cliff crevices along the proposed pipeline route. This area was recently surveyed and no peregrine falcons or eyries were observed.

Migrating peregrines could occur anywhere along the right-of-way in Washington. Construction of the pipeline could temporarily disturb or displace wintering and migrating peregrine falcons. Although temporary disturbances to wintering and migrating falcons may cause falcons to avoid small areas for a short time, wintering and migrating activities would not be significantly affected. Please see the "California" American peregrine falcon discussion for a determination of affect and recommended mitigation measures ~~will be developed by the FERC in our BA~~.

~~**Prairie Falcon and**~~ **Golden Eagle.** Approximately five acres of ~~prairie falcon and~~ golden eagle habitat would be affected by construction of the pipeline. These areas will be surveyed by PGT prior to construction to assess raptor use. The nests of golden eagles are protected under the Bald Eagle Protection Act (16 USC 668) (USFWS 1981). Construction could affect nests and disturb nesting birds (February 15 to August 15). To minimize these impacts, we recommend that PGT survey its proposed route for all nesting raptors prior to construction, realign its route to avoid the destruction of active raptor nests, and not construct within 0.5 mile of an active raptor nest during the raptor's breeding and nesting season.

Ferruginous and Swainson's Hawks. Ferruginous and Swainson's hawk nest sites are known to occur within 0.5 mile of the proposed pipeline route (NHDS, 1989). These areas will be surveyed by PGT prior to construction to determine actual hawk use during the nesting season (March 1 to August 1). Pipeline construction could result in destruction of ferruginous or Swainson's hawk nests, and is a potentially significant impact. To minimize these impacts, we recommend that PGT survey its proposed route for all nesting raptors prior to construction, re-align its route to avoid the destruction of active raptor nests, and not construct within 0.5 mile of an active raptor nest during the raptor's breeding and nesting season.

A short-term reduction in the prey base would occur within the 757 acres of the right-of-way during construction (Table 4E-5). This is a less-than-significant impact because the affected area would be small in relation to the amount of suitable hunting habitat within the hawks' range and because the reduction would be short-term. Following construction of the pipeline, hawks would benefit from the increased vulnerability of prey species within the cleared right-of-way.

Western Sage Grouse. Potential habitat for these species exists in sagebrush-steppe that would be crossed by the right-of-way. No known leks would be traversed by the proposed alignment (Gruenwald, personal communication). Pipeline construction would result in the disturbance of 7.9 acres of foraging habitat for sage grouse within the right-of-way (Table 4E-5). This impact is less than significant.

Columbian Sharp-Tailed Grouse. Construction of the pipeline would result in the disturbance of 28 acres of potential habitat for this species (Table 4E-5). Impacts on this species would be similar to those discussed above for western sage grouse. These impacts are less than significant.

Long-Billed Curlew. The distribution of nesting habitat for long-billed curlews in the state of Washington is extremely limited (COE, 1987). Construction would disturb 110 acres of known long-billed curlew nesting habitat (Gruenwald, personal communication) (Table 4E-5). Construction would destroy eggs or young birds in nests along the right-of-way and would result in nest avoidance or abandonment, thereby increasing mortality of young curlews. These impacts are significant because a substantial portion of the long-billed curlew population could be using the nesting area and would be affected by construction activities occurring during the nesting season (May 1 to August 1). To reduce these significant impacts to less-than-significant levels, we recommend that PGT not construct within occupied long-billed curlew nesting habitat in the state of Washington during the nesting season.

Greater Sandhill Crane. Greater sandhill cranes occur as spring and fall migrants in eastern Washington (Larrison, 1981). Pipeline construction activities may disturb 749 acres of potential habitat within the distribution of cranes. This may disturb sandhill cranes that are foraging or resting in grasslands and grainfields along the alignment. This is a less-than-significant impact because the disturbance would be short-term and nesting cranes would not be affected.

Upland Sandpiper. Construction of the pipeline would disturb 25.2 acres of critical upland sandpiper nesting habitat in Washington (Table 4E-5). The last documented breeding and nesting site in the Pacific Northwest for this species occurs along the Idaho-Washington border (Gruenwald, personal communication). The effects of pipeline construction on upland sandpipers, and our recommended mitigation measure, are discussed above under "Idaho."

American White Pelican ~~and Common Loon~~. No nesting habitat for ~~these~~ this species exists in the project vicinity; however, construction of the pipeline could disturb American white pelicans ~~and common loons~~ feeding along the Walla Walla River. This impact is less than significant because the disturbance would be temporary and would affect only eight acres of habitat; similar feeding habitat exists along the river away from the construction area.

Burrowing Owl. No known burrowing owl nesting sites have been reported within the vicinity of the pipeline (Owens, personal communication); however, construction of the pipeline would disturb 28 acres of potential burrowing owl nesting and foraging habitat in Washington (Table 4E-5). Potential burrowing owl habitat will be surveyed by PGT prior to construction.

Construction of the pipeline could destroy potential burrowing owl nesting habitat, resulting in direct mortality, or cause adults to avoid or abandon nests, resulting in mortality of young. These impacts are significant because burrowing owls are colonial nesters and mortality rates would increase in a substantial portion of the nesting population. To minimize these impacts, we recommend that PGT survey its proposed route for all nesting raptors prior to construction, realign its route to avoid the destruction of active raptor nests, and not construct within 0.5 mile of an active raptor nest during the raptor's breeding and nesting season (March 15 to August 15).

Construction of the pipeline would result in the disturbance of vegetation and decreased numbers of rodents and insects in burrowing owl foraging habitat. These impacts are less than significant because the affected area would be small in relation to the amount of habitat available in the area and because the loss of prey species would be temporary.

~~**Sage Thrasher, Loggerhead Shrike, and Sage Sparrow.** Construction activities would affect 7.9 acres of habitat for each species (Table 4E-5). These impacts are similar to those described previously for the western sage grouse in Washington and are less than significant.~~

~~**Spotted Frog.** Spotted frogs occur in ponds and slow-moving permanent streams and require a minimum of one 2-acre pond per population (Thomas 1979). The pipeline would cross 1.4 acres of spotted frog habitat in Washington (Table 4E-5). Construction-related mortality and avoidance of habitat are less than significant impacts because the number of individuals affected would be small.~~

Important Habitat for Game Species

Mule Deer and White-Tailed Deer. Deer reside year round in the brushy draws that would be crossed by the pipeline route (Gruenwald, personal communication). This habitat is limited in the state of Washington (Table 4E-6), and deer concentrate in these areas during fawning (Gruenwald, personal communication). Construction of the pipeline could cause deer to avoid this habitat during fawning, resulting in lowered reproductive success. Substantial portions of local populations could be affected by construction activities. To minimize this indirect impact, we recommend that PGT not construct within active mule deer or white-tailed deer fawning areas during the fawning season (March 15 to June 15).

Upland Game Birds. A variety of upland game birds nest at the Wallula Habitat Management Unit and in the brushy draws that would be crossed by the pipeline route (Gruenwald, personal communication). ~~Cover for nesting habitat is limited in this region, and nesting game birds tend to concentrate in these areas (Gruenwald personal communication).~~ Construction of the pipeline would disturb 63 acres of nesting habitat (Table 4E-6) and would result in direct and indirect game bird mortality by causing nest abandonment or avoidance, resulting in lowered reproductive success for these species. Substantial portions of local populations would not be affected by construction activities. These impacts, therefore, are not significant.

Waterfowl. Construction of the pipeline would disturb less than one acre of waterfowl nesting habitat at the Wallula Habitat Management Unit along the Walla Walla River (Table 4E-6). This impact is less than significant because substantial portions of waterfowl populations would not be affected.

Oregon

Vegetation. Construction of the project in Oregon would require the removal of approximately 174 acres of mixed conifer forest, 559 acres of lodgepole pine forest, 385 acres of ponderosa pine forest, 855 acres of sagebrush-steppe, 240 acres of juniper woodland, and 114 acres of Palouse grassland. Except for 37 acres of sagebrush-steppe along the operational right-of-way of the John Day River Variation, all this vegetation would be allowed to regenerate. Recovery times for forest and scrub vegetation would be long-term. Recovery times for grassland vegetation would be short-term. These vegetation types are widespread and abundant in Oregon; therefore impacts are less than significant.

Special-Status Plant Species. Potential suitable habitat for 10 special-status plant species occurs along the pipeline route in Oregon (Table 4E-2). These 10 species are federal candidates for listing, and ~~two~~ three of the 10 are listed as sensitive by FS. Surveys ~~will be~~ conducted by PGT for these species in ~~spring and summer of 1991~~ 1990 did not locate any occurrences (Table 4E-2). ~~Suitable habitat does not occur along the pipeline route for five species identified as sensitive by the Idaho NHP or FWS (Table 4E-2).~~ These species would not be adversely affected by the project.

Table 4E-6

IMPACTS ON GAME SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING ALONG THE PGT ROUTE IN WASHINGTON

Species	Seasonal Range	Habitat Affected (acres)	Direct Mortality	Permanent Habitat Loss	Temporary Habitat Loss	Avoidance of Habitat by Wildlife
Mule and white-tailed deer	Fawning	55	NC	NC	LS	S
Upland game birds	Nesting	63	S	NC	LS	S
Waterfowl	Nesting	<1	LS	NC	LS	LS

Notes: LS = less than signficant
NC = no change
S = significant.

Wetlands and Riparian Habitat. PGT's proposed route would cross 39 wetland areas, resulting in the disturbance of approximately 12.4 acres of wetland vegetation (Table 3E-1). The majority of these areas are emergent wetlands, and impacts would be short-term in duration. Less than 1 acre of riparian scrub and forest would need to be removed, with the most extensive patch of riparian scrub occurring at the Williamson River crossing (MP 552.2). Recovery would be long-term for riparian forest areas.

Special Native Plant Communities. The pipeline would cross The Nature Conservancy's Lindsay ~~Grassland~~ Prairie Preserve between MP 307.1 and MP 307.6. Approximately 6.3 acres of bluebunch wheatgrass-Sandberg bluegrass prairie would be disturbed by construction in the preserve. ~~Bitterbrush-Sandberg bluegrass association on the preserve would apparently not be affected by the project.~~ It is not known to what extent these communities would be affected outside the preserve. Disturbances of 6.3 acres of bluebunch wheatgrass-Sandberg bluegrass prairie is a significant impact. To minimize this impact, we recommend that PGT develop, in coordination with The Nature Conservancy, a site-specific construction and restoration plan that would minimize disturbance to this area and ensure that these native prairie communities become re-established on the construction right-of-way.

Special-Status Wildlife Species

Wolverine. Wolverines are not known or suspected to reside in the immediate vicinity of the right-of-way (Floyd, Lockman, Hescock, Becker, personal communications). Construction of the pipeline would result in the disturbance of 1,654 acres of potential wolverine habitat in central Oregon (Table 4E-7). The effects of construction on wolverines in Oregon would be similar to those described above for wolverines in Idaho. The impacts are less than significant.

Townsend's Big-Eared Bat~~, Pallid Bat, and Brazilian Free-Tailed Bat~~. Townsend's big-eared bat~~, pallid bat, and Brazilian free-tailed bat habitats~~ occur in cliff crevices and caves that would be crossed by the right-of-way (Tout, Perkins, Mueller personal communications). Four to five Townsend's bats hibernate in the west arm of Lava River Caves ~~Park~~ immediately west of the right-of-way (Perkins, Becker personal communications). Construction activities could affect 236 acres of habitat that potentially contain the crevices and caves used by Townsend's big-eared bats~~, pallid bats, and Brazilian free-tailed bats~~ (Table 4E-7). Known and potential habitat will be surveyed by PGT using a qualified bat biologist prior to construction to assess actual bat use.

The effect of construction on bat hibernicula in Oregon, and our recommended mitigation measures, are similar to those described above for bats in Washington.

California Bighorn Sheep. California bighorn sheep were released in 1989 at the mouth of Thirtymile Creek near the John Day River. These mountain sheep occur in the vicinity of the proposed John Day Variation on the ridge above Thirtymile Creek (Ward, personal communication).

Table 4E-7

IMPACTS ON SPECIAL-STATUS WILDLIFE SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING ALONG THE PGT ROUTE IN OREGON

Common Name	Scientific Name	Legal Status[a/] Federal/State	Acres of Habitat Potentially Affected
MAMMALS			
Wolverine	*Gulo gulo luteus*	C2[b]/T	1,654
Townsend's big-eared bat	*Plecotus townsendii pallescens*	C2[b]/--	236
California bighorn sheep	*Ovis canadensis*	C2/--	31.5
Kit fox	*Vulpes velox nevadensis*	--/T	209
Pygmy rabbit	*Brachylagus idahoensis*	--[b]/OSC	1,243
Washington ground squirrel	*Spermophilus washingtoni*	--[b]/OSC	1,295
BIRDS			
Bald eagle	*Haliaeetus leucocephalus*	T[b]/T	213
American peregrine falcon	*Falco peregrinus anatum*	E/E	0
Golden eagle	*Aquila chrysaetos*	Pr/--	ND
Western snowy plower	*Charadrius alexandrinus nivosus*	C2[b]/T	0
Swainson's hawk	*Buteo swainsoni*	--/OSC	ND
Ferruginous hawk	*Buteo regalis*	C2[b]/OSC	ND
Western sage grouse	*Centrocercus urophasianus phaios*	C2[b]/OSC	1,243
Long-billed curlew	*Numenius americanus*	C2[b]/OSC	677
Tricolored blackbird	*Agelaius tricolor*	C2[b]/OSC	4.6
Greater sandhill crane	*Grus canadensis tabida*	--[b]/OSC	394
Burrowing owl	*Athene cunicularia*	--[b]/OSC	ND
REPTILES			
Southwestern pond turtle	*Clemmys marmorata*	C2[b]/OSC	10

a/ For an explanation of legal status classification definitions and footnotes in this column, please see Table 3E-3.
b/ FS listed as sensitive

Construction of the pipeline would result in the temporary loss of 31.5 acres of forage for bighorn sheep in this two-mile habitat crossing (Table 4E-7). This impact is less than significant because the loss of vegetation would be short-term and the amount of forage lost would be small relative to the total available forage in the area.

Construction of the pipeline during the lambing and rearing season would disturb these sheep and cause avoidance of the lambing area (March 1 to May 15), resulting in increased lamb mortality. To minimize this impact, we recommend that PGT avoid construct in this area during the bighorn sheep lambing season.

Kit Fox. Construction would disturb 209 acres of potential kit fox habitat (Table 4E-7). If kit foxes were to actually occur in this area, construction procedures could destroy natal dens located in the right-of-way and disturb foxes denning within 500 feet of the right-of-way. Destruction of natal dens, or substantial disturbance during pupping and the early period of rearing, could result in mortality of young pups. Additional cover provided by stored pipe and equipment may attract kit foxes into the construction zone and increase their susceptibility to mortality. No kit fox were found during PGT's 1990 survey. To minimize the potential for these impacts to occur, we recommend that PGT survey its proposed route for active kit fox dens, and not construct within 500 feet of active natal or rearing dens (April 1 to September 1).

Construction of the pipeline would also result in the reduction of prey species in the right-of-way. This impact is less than significant because the reduction would be temporary and the disturbed area would be small and would not substantially affect local populations. Following construction, kit foxes would benefit from the increased vulnerability of prey species within the cleared right-of-way.

Pygmy Rabbit. Potential habitat for pygmy rabbits occurs where the right-of-way would cross sagebrush-steppe. Construction of the pipeline would disturb 1,243 acres of potential pygmy rabbit habitat (Table 4E-7). The effects of construction on the pygmy rabbit, and our recommended mitigation measures, are similar to those described above for pygmy rabbits in Washington.

Washington Ground Squirrel. Construction of the pipeline would disturb 1,295 acres of known and potential ground squirrel habitat (Oregon NHDB, 1989) (Table 4E-7). The ground squirrel colonies known to occur in the project vicinity are more than ~~600~~ 100 feet from the right-of-way, and would not be affected by construction. Potential ground squirrel habitat within the right-of-way will be surveyed by PGT prior to construction to determine actual ground squirrel use. Construction of the pipeline could result in the direct mortality of Washington ground squirrels by unearthing occupied burrows. Estivation could also be disrupted, causing squirrels to leave their burrows prematurely and increasing mortality. Because these ground squirrels are colonial, these impacts could affect substantial portions of local populations. To reduce these significant impacts, we recommend that PGT not construct within 500 feet of colonies when ground squirrels are estivating.

~~**Pine Marten and Fisher.** Pine martens inhabit forested habitat that would be crossed by the right-of-way (Floyd, Lockman personal communications). No managed pine marten habitat areas would be crossed by the right-of-way (Lockman, Hescock, Becker personal communications). Construction of the pipeline would result in disturbance of 1,537 acres of potential pine marten habitat in central Oregon. Impacts on pine martens would be similar to those described above for wolverines in Idaho. The impacts are less than significant.~~

~~Fishers are not known or suspected to occur along the pipeline route (Floyd, Becker, Lockman, Hescock personal communications). Construction would not affect fishers in Oregon.~~

Bald Eagle. Numerous verified and potential bald eagle use areas occur in Oregon within one mile of the proposed pipeline alignment (Oregon NHDB, 1989; FS, 1989; Opp, Toman, Tout, Ferry, Concannon, personal communications). Construction would affect 213 acres of potential bald eagle nesting habitat (Table 4E-7). The effects of construction on eagles during the nesting season would be similar to those described above for bald eagles in Idaho. Please see the "California" bald eagle discussion for a determination of affect and recommended mitigation measures ~~will be developed by the FERC in our BA~~.

American Peregrine Falcon. No American peregrine falcon nests are known to occur along the proposed route in Oregon (PGT, 1988a), and none were observed during recent surveys conducted by PGT. However, potential nesting habitat occurs at several locations along the right-of-way. Please see the "California" American peregrine falcon discussion for a determination of affect and recommended mitigation measures. ~~will be developed by the FERC in our BA~~

Golden Eagles. Several known and potential golden eagle nesting areas occur within 0.5 mile of the right-of-way (Concannon, Tout, Ferry, personal communications). Approximately 208 acres of golden eagle habitat would be affected by construction activities (Table 4E-7). These areas will be surveyed by PGT prior to construction to assess raptor use. Construction activities may result in loss of nest trees and disturb nesting birds. These significant impacts, and are recommended mitigation measures, are similar to those described for golden eagles in Washington.

Ferruginous and Swainson's Hawks. No Swainson's hawk or ferruginous hawk nests are known to occur in the right-of-way. However, the right-of-way would cross several miles of potential nesting and foraging habitat for these species (FS, 1989; Black, personal communication). Several Swainson's hawk nests are located within one-half mile of the right-of-way. Construction activities could destroy nests, disturb nesting birds, and temporarily reduce prey species. Impacts, and recommended mitigation, are similar to those described above for ferruginous and Swainson's hawks in Washington.

Western Snowy Plover. This species inhabits alkali flats and lakeshores in arid climates, although its occurrence in interior Oregon is rare (Larrison, 1981). The Oregon NHDB has no record of a snowy plover occurrence within one mile of the right-of-way (Oregon NHDB 1989). The nearest potential habitat occurs near Alkali Lake, more than 0.5 mile west of the proposed pipeline.

Western Sage Grouse. Construction of the pipeline in Oregon would disturb approximately 1,243 acres of sage grouse habitat (Table 4E-7). No known leks would be traversed by the proposed pipeline route. Construction would reduce the amount of cover and forage available for sage grouse; however this impact is less than significant because the reduction would be temporary and minimal compared to available habitat.

Long-Billed Curlew. Construction of the pipeline would disturb 277 acres of known long-billed curlew nesting habitat (Black, Ward, personal communications). Additionally, potential nesting habitat occurs on the Crooked River National Grasslands where long-billed curlews are present (FS, 1989). This habitat will be surveyed by PGT prior to construction to assess actual long-billed curlew use.

Construction activities could increase mortality of young birds. Impacts, and recommended mitigation, are similar to those described above for long-billed curlews in Washington.

Tricolored Blackbird. This species could nest and winter in marsh habitat that would be crossed by the pipeline in southern Klamath County. Pipeline construction would result in the temporary loss of 4.6 acres of potential tricolored blackbird habitat. This impact is less than significant because the habitat would be restored and the loss would be short-term.

A large tricolored blackbird nesting colony occurs west of the alignment (Oregon NHDB, 1989). This colony is more than 500 feet from the right-of-way and would not be affected by construction activities.

Construction activities in fall could disturb wintering blackbirds. This impact is less than significant because alternative habitat is available in the area and the disturbance would be short-term.

~~**American White Pelican.** American white pelicans have been observed in two locations along the proposed pipeline alignment (Oregon NHDB 1989). These areas are more than 0.5 mile from the right of way and would not be affected by construction activities.~~

~~Sixteen acres of potential nesting habitat would be disturbed by the project (Table 4E-7). If pelicans nest in this habitat, construction of the pipeline during the nesting season could cause nest avoidance or abandonment and result in mortality of young. This impact is less than significant because it would not affect a substantial number of birds.~~

~~**Least Bittern.** This species occurs as a migrant along the pipeline route in central and southern Oregon (Larrison 1981). Pipeline construction activities would occur within 378 acres of least bittern migration habitat (Table 4E-7). Construction activities may disturb migrating bitterns; however, the disturbance would be temporary and would not result in mortality of substantial numbers of birds. The impact is less than significant.~~

~~**Bufflehead.** Buffleheads have been observed along the pipeline during the migration and winter seasons (Ferry personal communication). Construction of the pipeline~~

~~could disturb 11 acres of potential habitat where buffleheads might occur. Impacts are less than significant because they would be short term disturbances that would not affect substantial numbers of buffleheads.~~

Greater Sandhill Crane. Known and potential sandhill crane nesting, resting, and foraging habitat occur along the pipeline alignment (FS, 1989; Oregon NHDB, 1989; Ferry, personal communication). Construction of the pipeline would affect 394 acres of greater sandhill crane habitat (Table 4E-7). Construction during the nesting season could cause nest avoidance or abandonment and result in increased mortality of young cranes. In addition, construction of the pipeline in this habitat and in grainfields that would be crossed by the right-of-way in fall could disturb wintering and migrating cranes. These impacts would be short-term in duration, and would not be significant.

~~**Northern Goshawk.** Goshawks have been observed in the vicinity of the right-of-way; however, no nests are known to occur within 0.5 mile of the proposed alignment, and the right-of-way would not cross any areas managed for goshawks (Lockman, Okula, Becker personal communications). PGT has indicated that it would conduct preconstruction surveys in suitable nesting habitat to assess actual goshawk use. To minimize these impacts, we recommend that PGT survey its proposed route for all nesting raptors prior to construction, re-align its route to avoid the destruction of active raptor nests, and not construct within 0.5 mile of an active raptor nest during the raptor's breeding and nesting season.~~

~~Construction of the pipeline would disturb 1,080 acres of potential goshawk foraging habitat (Table 4E-7). Construction would remove forest vegetation from potential foraging habitat along the right-of-way. These impacts are beneficial because rodent and bird populations would increase in the managed right-of-way and provide additional prey for goshawks (McCarthy personal communication).~~

Burrowing Owl. The right-of-way would cross several miles of potential burrowing owl nesting habitat (Black, personal communication). Approximately 3,229 acres of potential burrowing owl habitat would be disturbed during construction. Potential burrowing owl habitat will be surveyed prior to construction (Table 4E-7). Construction activities could result in direct mortality of nesting owls and temporarily reduce prey along the pipeline. Impacts and recommended mitigation are similar to those described above for burrowing owls in Washington.

~~**Northern Three-Toed Woodpecker, Lewis Woodpecker, and Purple Martin.** Construction would remove forest vegetation on 1,158 acres of potential northern three toed woodpecker habitat. Impacts on northern three toed woodpeckers are less than significant because few trees suitable for these woodpeckers occur along the right-of-way. Northern three toed woodpeckers require trees greater than 30 inches dbh to construct nesting cavities (Thomas 1979). Trees within the right-of-way are less than 30 years old and are not greater than 30 inches dbh.~~

~~Lewis woodpeckers may occur along the right-of-way as migrants (Floyd personal communication). Construction impacts are less than significant because few Lewis woodpeckers would be affected by the project.~~

~~Purple martins are rare east of the Cascades, although they occur as migrants. Most purple martin nesting occurs south of Klamath Falls, several miles west of the project vicinity (Nehls personal communication). No construction impacts on purple martins are expected to occur.~~

~~**Spotted Frog.** The spotted frog occurs near permanent streams, marshes, and ponds that would be crossed by the right-of-way in Oregon (Nussbaum, Brodie, and Storm 1983). Spotted frogs require a minimum of one 2-acre pond per population (Thomas 1979). The pipeline would cross only one pond of this size. Construction of the pipeline would disturb 12.6 acres of potential spotted frog habitat (Table 4E-7). Impacts are less than significant because a small amount of habitat would be temporarily affected and a large number of frogs would not be affected.~~

~~North~~ Southwestern Pond Turtle. Potential habitat for this species exists in marshes, ponds, and in the slow-moving portions of rivers and streams that would be crossed by the proposed alignment in southern Klamath County (Nussbaum, Brodie, and Storm, 1983). Approximately 10 acres of potential habitat would be disturbed during construction (Table 4E-7).

Construction activities would disturb northwestern pond turtles that occur along the banks of rivers, streams, and irrigation ditches. Avoidance of the construction area would be temporary and would not result in mortality of a substantial portion of the population. Direct mortality would occur to turtles that did not avoid the construction area. These impacts are less than significant, however, because a substantial portion of the population would not be affected.

~~**Painted Turtle.** Painted turtles may occur in the streams and canals that would be crossed by the proposed alignment in Umatilla and Morrow Counties (Nussbaum, Brodie, and Storm 1983). Construction would disturb six acres of potential painted turtle habitat (Table 4E-7). Impacts on these turtles would be similar to those discussed above for northwestern pond turtles in Oregon. These impacts are less than significant.~~

~~**Short-Horned Lizard.** Short-horned lizards could occur along several portions of the proposed alignment in Oregon (Nussbaum, Brodie, and Storm 1983). Construction of the pipeline would disturb 3,229 acres of potential short-horned lizard habitat (Table 4E-7). Construction could result in direct mortality by crushing lizards or by trapping individuals in open trenches. These impacts are less than significant because short-horned lizards are not uniformly distributed along the right-of-way, and only those individuals using the construction corridor at the time of construction would be affected. Substantial portions of local short-horned lizard populations would not be affected.~~

~~**California Mountain Kingsnake.** The right-of-way would cross several miles of potential California mountain kingsnake habitat. Construction activities would disturb 1,543~~

~~acres of potential habitat (Table 4E-7). Impacts on this snake would be similar to those discussed above for the short horned lizard, and are less than significant.~~

Important Habitat for Game Species

Rocky Mountain Elk. Construction of the pipeline would disturb 567 acres of elk winter range (Torland, Opp, Toman, personal communications) (Table 4E-8). Construction activities would occur between April and October and would not affect wintering elk. No mitigation is required.

Construction activities would disturb 3,780 acres of vegetation on summer ranges and disturb elk during the calving period (Table 4E-8). Approximately 1,157 acres of forest would be removed that would reduce cover for elk and 508 acres of right-of-way would be managed for grasses and forbs. These impacts are less than significant and similar to those described above for elk in Idaho.

Mule Deer. Construction would disturb 2,032 acres of mule deer winter range (Opp, Toman, Torland, Concannon, personal communications) (Table 4E-8). Impacts on mule deer are less than significant because construction would occur when substantial numbers of mule deer would not be present. No mitigation is required.

Construction activities would disturb 5,071 acres of vegetation on summer ranges and disturb mule deer during the fawning period (Table 4E-8). Approximately 1,157 acres of forest would be removed that would reduce cover for deer and 508 acres of right-of-way would be managed for grasses and forbs. These impacts are less than significant and similar to those described above for mule deer in Idaho.

The right-of-way would cross 1,544 acres of mule deer migration corridors (Table 4E-8). Fall migration generally occurs from mid-October to early January; spring migration generally occurs from mid-April to early July (Elliott, personal communication). Narrow migration corridors occur between MP 412 and MP 413, MP 426 and MP 427, MP 474 and MP 475, MP 479 and MP 480, MP 482 and MP 484, and MP 485 and MP 486. Construction activities in these narrow migration corridors could disrupt migratory patterns, and open trenches could lead to serious injury and higher mortality rates for substantial numbers of deer. To minimize these significant impacts, we recommend that PGT not construct within these migration corridors during the migration seasons (April 1 to July 1 and October 15 to December 1). Construction within wider migration corridors would not affect large numbers of deer because construction activities would be confined to small areas and completed in a short time.

Pronghorn. Construction would disturb 252 acres of summer range. This would disturb pronghorn within 0.5 mile of construction activities and temporarily remove forage and cover. These impacts are less than significant because the effects would be short-term and substantial portions of pronghorn summer range would not be affected.

Construction would disturb 157 acres of pronghorn winter range (Concannon, personal communication) (Table 4E-8). Construction activities would not disturb pronghorn directly

Table 4E-8

IMPACTS ON GAME SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING ALONG THE PGT ROUTE IN OREGON

Species	Seasonal Range	Habitat Affected (acres)	Direct Mortality	Permanent Habitat Loss	Temporary Habitat Loss	Avoidance of Habitat by Wildlife
Rocky Mountain elk	Summer	3,780	NC	LS	LS	LS
	Winter	567	NC	LS	LS	LS
Mule deer	Summer	5,071.5	NC	LS	LS	LS
	Winter	2,032	NC	LS	LS	LS
	Migration	1,544	NC	LS	LS	S
Pronghorn antelope	Summer	252	NC	LS	LS	LS
	Winter	157	NC	LS	LS	LS
	Fawning	95	NC	LS	LS	S
	Migration	393	NC	LS	LS	S
Upland game birds	Spring nesting	31.5	S	NC	LS	S
Waterfowl	Spring nesting	63	S	NC	LS	S

Notes: LS = less than signficant
NC = no change
S = significant

because they would not be present during construction (Concannon personal communication); the disturbance of vegetation would be short-term and the acreage small compared with available habitat. These impacts are less than significant.

Construction would disturb 95 acres of a pronghorn fawning area (Torland, personal communication) (Table 4E-8). Construction would disturb does and cause lowered reproductive success for local pronghorn populations. These impacts may be significant. To reduce these impacts, we recommend that PGT avoid construction within known pronghorn fawning areas during the fawning season.

The right-of-way would cross 393 acres of pronghorn migration corridors (Table 4E-8). Fall migration generally occurs from early October to late November, and spring migration generally occurs from early March to late April (Concannon personal communication). The Rimrock Springs WMA migration corridor is narrow. Construction could disrupt spring migratory patterns, and open trenches could lead to serious injury and higher mortality rates for significant numbers of pronghorn. These impacts are significant. To reduce these impacts, we recommend that PGT not construct within this migration corridor during the spring and fall migration seasons (March 1 to May 1 and October 1 to December 1).

Upland Game Birds. The right-of-way would cross 31.5 acres of important riparian nesting habitat for several species of upland game birds (Elliott, Ferry personal communications) (Table 4E-8). Upland game birds concentrate in these riparian areas during nesting. Construction would cause these birds to avoid or abandon nests, resulting in reduced reproductive success. Additional mortality could occur from the destruction of eggs or young in nests within the right-of-way. Because pipeline construction would affect only a small percentage of available nesting habitat, these impacts are not significant.

Waterfowl, Stilts, and Avocets. Construction would disturb 63 acres of important waterfowl nesting habitat (Black, Elliott, Ferry personal communications) (Table 4E-8). Pipeline construction in these habitat areas during the nesting season could cause nest avoidance or abandonment and result in mortality of nestlings. These impacts are less than significant.

California - PG&E Nonjurisdictional Facilities

~~Special-Status~~ Federal-Listed Plant Species

Crampton's Tuctoria. ~~PG&E's preferred nonjurisdictional~~ The CPUC's certificated pipeline route would ~~pass between two~~ not affect any large playa pools ~~just outside~~ near the Jepson Prairie Preserve property. These large playa pools are suitable habitat for Crampton's tuctoria (*Tuctoria mucronata*), a federally listed endangered species. Pipeline construction activities could adversely alter the hydrologic regime and cause excessively turbid water conditions in these large playa pools (Stebbins 1989). ~~Vegetation removal from pipeline construction would result in increased erosion and therefore increased turbidity in the water of these two lakes. In addition, grease, oil, and other contaminants could be introduced into these waters as construction took place in the watersheds. Preservation of potential habitat should be~~

~~given high priority because of the extreme rarity of this species (Stebbins 1989).~~ Surveys conducted in 1990 did not find any individuals of this species along Alternative Route B. Therefore, this species would not be affected by construction.

~~Field surveys were conducted along Alternative Routes A and B, but not along the proposed route, in the spring and summer of 1989. Field surveys are being conducted during the preparation of this report along all alternative routes in the spring and summer of 1990. No individual plants were found along Alternatives A and B in 1989, but it should be noted that 1989 was the third year of a below average rainfall period and these annual and bulb species often do not appear in dry years (Stebbins 1989). A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

Large-Flowered Fiddleneck. The large-flowered fiddleneck (*Amsinckia grandiflora*), a federally listed endangered species, historically occurred in the foothills of the Diablo Range in Alameda, Contra Costa, and San Joaquin Counties. Currently, this species is only known to occur on two sites located on Lawrence Livermore Laboratory property. While the large-flowered fiddleneck is not known to occur along PG&E's proposed route, suitable habitat does exist for this species south of the Sacramento River delta area. Detailed surveys for this species ~~have not yet been conducted. A determination of affect and recommended mitigation measures will be developed in our BA.~~ did not locate any individuals. Therefore, construction of PG&E's nonjurisdictional facilities would not affect the large-flowered fiddleneck.

Palmate-Bracted Bird's Beak. Palmate-bracted bird's beak (*Cordylanthus palmatus*), a federally listed endangered species, once occurred at scattered locations in the northern San Joaquin and southern Sacramento Valleys in California. While this species is not known to occur along PG&E's proposed route, suitable habitat does exist for this species south of the Sacramento River delta area. Detailed surveys for this species ~~have not yet been conducted. A determination of affect and recommended mitigation measures will be developed in our BA.~~ were conducted in 1990, and no individuals were found. Therefore, construction of PG&E's nonjurisdictional facilities would not affect this species.

Contra Costa Wallflower and Antioch Dunes Evening Primrose. The Contra Costa wallflower (*Erysimum capitatum* var. *augustatum*) and the Antioch Dunes evening primrose (*Oenothera deltoides* var. *howellii*) are both federally listed endangered species that inhabit inland dunes areas located in coastal strand vegetation. These species would not be affected as no suitable habitat would be crossed by PG&E's route.

~~Special Status~~ Federal-Listed Wildlife Species

San Joaquin Kit Fox. The San Joaquin kit fox, a federally listed endangered species, occurs near PG&E's proposed right-of-way. In 1987, no San Joaquin kit foxes or active dens were observed along portions of the right-of-way (Stebbins and Smith, 1987). In 1990, 19 potential dens and five individual foxes were observed in the vicinity of the right-of-way, but no known or pupping dens were observed within the right-of-way.

Construction along PG&E's proposed route would disturb 442 acres of potential San Joaquin kit fox habitat (Table 4E-9). Construction activities could destroy natal dens located in the right-of-way or disturb foxes that were denning adjacent to the right-of-way. Construction activities would also reduce rodent populations in the right-of-way and prey species available to kit foxes.

In the Brentwood area, PG&E has developed several alternative routes for its proposed pipeline, as well as several alternative compressor station sites, in order to address local land use concerns. We have examined the effect of the proposed route (Alternative 1), the pipeline route alternatives (Alternatives 2, 3, and 4), alternative compressor station sites (Sites A, B, and C), and the Brentwood Compressor Station Expansion in order to compare potential impact on the San Joaquin kit fox.

Pipeline Route Alternatives 1 (the proposed route) and 4 would disturb the least amount of habitat for San Joaquin kit fox, while alternatives 2 and 3 each would affect substantially more habitat for this species. Alternative Site A for the Brentwood Compressor Station is on agricultural land and would not affect habitat for the San Joaquin kit fox. Expansion of the Brentwood Compressor Station and Alternative Compressor Station Sites B and C would affect potential habitat for San Joaquin kit fox. Expansion of the Brentwood Compressor Station would result in the loss of approximately 10 acres of San Joaquin kit fox habitat. Alternative Compressor Sites B and C would result in the loss of approximately 20 acres of San Joaquin kit fox habitat. ~~A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

The California Department of Fish and Game (CDFG), in its December 21, 1990 Biological Opinion, determined that construction of PG&E's facilities would affect the San Joaquin kit fox. However, the CDFG determined that construction of PG&E's facilities would not jeopardize the San Joaquin kit fox if PG&E implemented the CDFG's recommended mitigation.

PGT/PG&E has proposed to implement the following measures to mitigate the potential adverse impacts of pipeline construction and maintenance on San Joaquin kit fox and its habitat. Measures specified in the CPUC's DEIR are included, where appropriate, along with additional measures proposed by the USFWS (1989).

1. Preconstruction surveys for San Joaquin kit fox and their dens will be conducted within 45 days prior to the beginning of construction or other project activities likely to impact the kit fox. If possible, these surveys will be performed after the pipeline alignment has been staked in the field. The surveys will be conducted throughout a 500-foot-wide area on each side of the centerline, and will, in general, follow the procedures described previously under Field Survey Methodologies.

   All surveys will be conducted by a qualified biologist. If possible, kit fox surveys will be conducted between March 1 and July 31 when the animal is

Table 4E-9

IMPACTS ON FEDERALLY LISTED WILDLIFE SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING ALONG PG&E'S NONJURISDICTIONAL FACILITIES

Common Name	Scientific Name	Legal Status[a] Federal/ State	Acres of Habitat Potentially Affected
MAMMALS			
San Joaquin kit fox	*Vulpes macrotis mutica*	E/T	442
Giant kangaroo rat	*Dipodomys ingens*	E/E	70
BIRDS			
Bald eagle	*Haliaeetus leucocephalus*	E/E	35
American peregrine falcon	*Falco peregrinus anatum*	E/E	0
California condor	*Gymnogyps californianus*	E/E	0
Northern spotted owl	*Strix occidentalis caurina*	T/--	0
REPTILES			
Blunt-nosed leopard lizard	*Gambelia silus*	E/E	70
INSECTS			
Valley elderberry longhorn beetle	*Desmocerus californicus dimporphus*	T/--	--
Delta green ground beetle	*Elaphrus viridus*	T/--	--

[a] For an explanation of legal status classification definitions and footnotes in this column, please see Table 3E-3.

easiest to detect. Data to be collected will include date, time, temperature, weather, topography, habitat type, and den site. Data to be collected for each observed den site will include: (a) den type (known, potential, pupping, atypical); (b) number and dimensions of entrances; (c) position on slope; (d) aspect; (e) elevation; (f) presence or absence of fox tracks, scats, prey remains within a 20-foot radius, matted vegetation, dirt berms, and other signs of use; (g) species composition and relative cover of surrounding vegetation; and (h) presences of unusual or uncommon species. Den locations will be flagged and mapped. Occupancy of dens will be determined using such techniques as spotlighting, scent stations, and a fiber optics video probe (only on potential dens). Results of the pre-construction or pre-activity surveys will be submitted to the USFWS in writing within two to three weeks after their completion.

2. Following pre-construction surveys and before project activities begin, protective exclusion zones will be established around all known and potential San Joaquin kit fox dens. The configuration of exclusion zones will be circular, with a radius (determined in consultation with the USFWS) distance measured outward from the den entrance or cluster of entrances. Construction-related and other project activities will be prohibited or greatly restricted within these exclusion zones. Only essential vehicle operation on existing roads and simple foot traffic will be permitted.

   To ensure protection, the exclusion zones for all known San Joaquin kit fox dens will be demarcated by fencing that encircles each den at the appropriate distance. Exclusion fencing will consist of large flagged stakes (four- to five-foot metal or 1" x 1" wooden stakes) connected by heavy rope or cord. Each exclusion zone will be posted with two to three signs placed at equidistant points along the perimeter; each sign will identify the fenced zone as an environmentally sensitive area and state that no disturbance is permitted without prior authorization from appropriate project personnel of the USFWS. Exclusion zone fencing for dens will be maintained until all construction-related or operational disturbances have been terminated. At that time, all fencing and signs will be removed to avoid attracting subsequent attention to the den. For potential dens, placement of three flagged stakes of a height of four to five feet at equidistant points 10 to 15 feet from the den entrance(s), and posting of a single sign beside one stake, will be used to identify the den location and the exclusion zone will be observed.

3. If destruction of a den is considered unavoidable, the den will be excavated by hand to ensure that any animals trapped inside can be safely removed and allowed to escape. Alternatively, if vacancy of a potential den can be confirmed by using an optic fiber video probe or other method, then complete excavation of the den need not be performed prior to destruction. Destruction of potential dens may proceed without prior notification to USFWS if no current or previous use of the den by kit fox is known, as determined by a qualified biologist. However, if a suspected potential den is determined during destruction to be currently or previously used by kit fox (e.g., if kit fox sign is found inside), the USFWS will

be informed immediately of the revised status and a replacement artificial den will be installed. Den design and placement will be determined on a site-specific basis in consultation with USFWS.

Prior to destruction of any known kit fox den, the USFWS will be notified in writing of the intent to destroy the subject den(s) and the reasons why alternate courses of action are not possible. USFWS will review the proposal and will either concur or recommend alternate methods to avoid den destruction or reduce impacts. Destruction of known or suspected natal or pupping dens will be avoided during the breeding season (November 1 to July 31).

Prior to the authorized destruction of any known San Joaquin kit fox den, the den will be monitored for at least three consecutive days to determine its current status. Activity at the subject den will be monitored by placing tracking medium at its entrance(s) or by spotlighting. If no kit fox activity is observed during this period, the den will be destroyed immediately to preclude subsequent use. If kit fox activity is observed at the den during this period, the den will be monitored for at least five consecutive days from the time of observation to allow any resident animal to move to another den during its normal activities. Use of the den may be discouraged during this period by partially plugging its entrance(s) with soil in such a manner that any resident animal can escape easily. Destruction of the den may begin when, in the judgement of the conducting biologist, the animal has moved to a different den. If the animal is still present after five or more consecutive days of plugging and monitoring, the den may have to be excavated. Excavation will occur when it is temporarily vacant.

Destruction of a known den will be accomplished by careful excavation with hand tools until it is certain that no kit foxes are inside. The den will be fully excavated and then filled with dirt and compacted to ensure that kit foxes cannot reenter or use the den during the construction period. If at any point during excavation a kit fox is discovered inside the den, the excavation activity will cease immediately and monitoring of the dens will be resumed. Destruction of the den may be completed when, in the judgement of the conducting biologist, the animal has escaped from the partially destroyed den. The results of all den destructions will be conveyed to USFWS in writing within two weeks of their completion.

4. A qualified wildlife biologist will be present during construction in the vicinity of flagged kit fox dens. The biologist will ensure that no unauthorized construction impacts occur within flagged areas and will be empowered by PGT-PG&E to halt all construction activities, if necessary, to prevent unauthorized impacts to the kit fox and its habitat. In the event that unanticipated impacts occur, the USFWS will be notified immediately and construction will not proceed without USFWS authorization.

5. All construction pipes, culverts, or similar structures with a diameter of four inches or greater that are stored at a construction site for one or more overnight

periods will be thoroughly inspected for kit foxes before the pipe is subsequently buried, capped, or otherwise used or moved in any way. If during inspection a kit fox is discovered inside a pipe, that section of pipe will not be moved, or if necessary will be moved only once to remove it from the construction area, until the kit fox has escaped. In addition, excavations deeper than three feet will be covered, filled, or fenced at the end of each working day, or escape ramps will be provided to prevent entrapment of kit fox. All open trenches will be inspected for presence of kit fox prior to backfilling.

6. All vehicle traffic will be restricted to designated access roads or corridors in the immediate vicinity of construction sites and to speeds of 20 mph or less.

7. Project personnel will be instructed not to bring dogs to construction sites in order to prevent harassment or killing of kit foxes. Firearms are prohibited on the construction site.

8. Any project employee who inadvertently kills or injures a San Joaquin kit fox or who finds a dead, injured, or entrapped San Joaquin kit fox will be instructed to report the incident immediately to his or her immediate supervisor and the on-site biologist. In the case of trapped animals, escape ramps or structures will be installed immediately if possible to allow the animal(s) to escape. The USFWS will be notified in writing within three working days of the finding of any such animal. Notification will include the date, time, and location of the incident and any other permanent information. Any kit fox found dead or injured will be turned over immediately to the USFWS for care or analysis.

9. Project personnel will be instructed to deposit all food-related trash in closed containers or remove it daily from work sites.

10. Upon completion of construction, all areas subject to temporary ground disturbance, including storage and staging areas, temporary roads, pipeline corridors, etc. will be recontoured if necessary and revegetated to promote restoration of the area to pre-project conditions. To the extent possible, local plant species or California native plant species will be used. Disturbed areas should be monitored regularly and reseeded as necessary until the area has returned to pre-project conditions.

11. Rodenticides and herbicides will not be used in project areas with resident kit fox.

12. A Worker Education Program will be developed to instruct construction crews on the basic biology and identification techniques for the San Joaquin kit fox, occurrence of kit fox in the project area, state and federal regulations for protection of the species, mitigation measures associated with the pipeline expansion project, and the possible penalties for non-compliance with all relevant regulations. Contractors will be legally bound by contract provisions to adhere to all measures described in this mitigation plan for protection of the kit fox.

13. San Joaquin kit fox habitat that is permanently and unavoidably lost to construction or subject to temporary disturbance because of project-related activities, may be subject to compensation that offsets the area lost through permanent protection of an appropriate area of intact habitat. The amount of habitat required (i.e., the ratio of area protected to area disturbed) will be determined in consultation with the USFWS, utilizing formulas that have been computed and applied in similar projects. The portion of the project area subject to habitat loss compensation will include any kit fox denning or foraging habitat known to be occupied or utilized by the species prior to construction, as determined from preconstruction surveys.

The FERC staff has determined that construction and operation of the PGT/PG&E Project would affect the San Joaquin kit fox. However, the FERC staff has determined that the proposed project, if constructed and operated in accordance with PGT/PG&E's proposed mitigation and the CDFG's Biological Opinion, would not jeopardize this species. The FERC staff has entered into formal consultation with the USFWS concerning potential impact on this species, and will recommend that PGT/PG&E not construct its proposed facilities until the FERC staff receives a Biological Opinion (Opinion) from the USFWS, and PGT/PG&E agree to implement the Opinion's mandatory terms and conditions.

Giant Kangaroo Rat. Construction of the pipeline should not affect giant kangaroo rats because this species does not occur along the proposed route. Giant kangaroo rats, a federally listed endangered species, are thought to have been extirpated from Merced County; although small populations may occur in Fresno County, there is no known record of giant kangaroo rats within the right-of-way (Williams, 1980). Potential habitat for giant kangaroo rats near the pipeline is limited because giant kangaroo rats occupy only uncultivated habitat (Williams 1980) and the right-of-way would cross and would be surrounded by intensively farmed agricultural land.

Surveys for giant kangaroo rats were recently completed along the Stanpac No. 2 Pipeline (Stebbins and Smith 1987), which is approximately 0.25 mile east of the PGT/PG&E project's proposed right-of-way between MP 1014 and MP 1016 and within the same right-of-way between MP 1016.6 and MP 1021.6. Potential habitat for the giant kangaroo rat along the Stanpac No. 2 Pipeline right-of-way was determined by reviewing the literature, interpreting aerial photographs, walking the right-of-way, and trapping (Stebbins and Smith, 1987). No giant kangaroo rats were trapped at the closest potential habitat. Habitat in this area was determined to be unsuitable for giant kangaroo rats because it occurred within a small, narrow (0.1- to 0.25-mile-wide) corridor between I-15 and the California Aqueduct that has been disked and burned and because rodenticides were frequently used along the aqueduct (Smith, personal communication). In addition, giant kangaroo rats construct distinctive burrow systems that are easily recognized (Williams, 1980), and no giant kangaroo rat burrows were identified during 1990 reconnaissance surveys (Williams, personal communication).

While potential giant kangaroo habitat does occur within a discrete five mile segment of PG&E's right-of-way, no giant kangaroo rats were trapped in the area (Stebbins and Smith, 1987) and no giant kangaroo rat burrow systems were observed in 1990 (Williams, personal communication). ~~A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

No impacts are anticipated because the species does not occur in the project area. PGT/PG&E proposes to conduct preconstruction surveys within 45 days of pipeline construction to verify absence of giant kangaroo rats. If any giant kangaroo rats detected during these surveys are determined to be adversely affected by the project, mitigation commensurate with the level of impact will be developed in consultation with the USFWS. In addition, measures proposed to protect the San Joaquin kit fox and other sensitive species in the region will also serve to protect the species should any giant kangaroo rats occur in the project area.

The FERC staff has determined that construction and operation of the PGT/PG&E Project would not affect the giant kangaroo rat.

Bald Eagle. Nesting and wintering bald eagles occur near the pipeline route; however, the only known important bald eagle wintering and nesting areas within 0.5 mile of the pipeline occurs in the vicinity of Lake Britton (FS, 1986; Detrich, 1986; Detrich, personal communication). Occasional winter use by bald eagles may occur near several rivers systems as well (Detrich, personal communication). Construction activities would affect 35 acres of known nesting and foraging habitat (including essential habitat along Lake Britton) (FS, 1986), and 809 acres of potential nesting and foraging habitat (Table 4E-9). ~~A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

Bald eagle observations were common near the proposed right-of-way. Active nests were observed within the study area by field crews, and field crews also observed bald eagles roosting or as flyovers.

Two active bald eagle nesting territories (Dry Lakes nests and Two Knobs nests) occur within one mile of the right-of-way at Lake Britton (PG&E, 1985). Three nests (A, B and C) have been used in the Dry Lakes Nest Territory since it was first identified in 1975. Nest Site B lies immediately adjacent to the west edge of the right-of-way while Sites A and C are approximately 50 meters and 200 meters from the right-of-way, respectively. The Two Knobs Nest Territory contains two nests which are approximately 1.0 and 1.8 kilometers from the right-of-way.

The location and status of bald eagle nests and perch sites along the proposed route is subject to change prior to pipeline construction. Therefore, it is impossible to predict accurately the scope of project impacts on bald eagles at this time. Furthermore, many factors affect the significance of an impact on bald eagles including: 1) duration and intensity of the disturbance; 2) distance from the disturbance to the bird(s); 3) line of sight from the nest or roost to the construction site; 4) timing of disturbance relative to nesting stage; 5) variations in tolerance to disturbance among individual birds; and, 6) previous exposure of an individual bird to disturbance.

PGT/PG&E proposes to implement the following measures to mitigate the potential adverse impacts of pipeline construction and maintenance on bald eagles and their habitat:

1. Preconstruction surveys will be conducted to locate active bald eagle nests within one-half mile of the proposed right-of-way. The surveys will be conducted within 60 days prior to construction of the pipeline. In addition, agency biologists and other experts will be contacted for any information available on occurrences of bald eagle with the Project vicinity. Potential impacts will be evaluated on a case-by-case basis for each site. If any bald eagles will be adversely affected by the project, mitigation commensurate with the level of impact will be developed in consultation with the USFWS and other federal and state agencies, as appropriate.

2. The construction schedule has been revised purposely to avoid unnecessary disturbance to eagles at several priority nesting and wintering areas along the proposed route. The locations of these key use areas and the construction windows proposed for each are as follows:

   a. Moyie River (MP 0.0 to MP 20.9): July 1 to September 30.

   b. Walla Walla River (MP 252.8 to MP 255.6): July 16 to October 15.

   c. Lake Britton (MP 685 to MP 690): August 1 to December 31.

3. Specific mitigation measures will be implemented within designated <u>Essential Bald Eagle Habitat</u> at Lake Britton in accordance with the recommendations presented in the Pit River Interagency Bald Eagle Management Plan (USFWS, 1986).

   a. No mature conifers, as determined by a qualified biologist or environmental specialist/monitor, will be removed during pipeline construction in designated essential habitat areas, which are located near milepost 685.5, unless specifically exempted from this requirement by the USFWS.

   b. The construction right-of-way will be confined to the smallest possible area within essential habitat zones.

   c. A qualified wildlife biologist or environmental specialist/monitor will be present during construction within Essential Bald Eagle Habitat areas to ensure that no unauthorized construction impacts occur. The on-site monitor will be empowered by PGT/PG&E to halt all construction activities, if necessary, to prevent unauthorized impacts to bald eagles and their habitat. In the event that unanticipated impacts occur, the USFWS will be notified immediately and construction will not proceed without USFWS authorization. Contractors will be legally bound by contract provisions to adhere to all measures designed to protect the bald eagle.

4. Habitat protection guidelines similar to the Lake Britton measures will be adhered to at several key bald eagle use areas including: the Moyie River (MP 0.0-20.9),

Wallula Habitat Management Unit (MP 254.5), Rimrock Springs Wildlife Management Area (MP 421), Crooked River (MP 542), Lone Pine Area (MP 563-573), Fall River (MP 679), South Fork Cow Creek (MP 719), South Fork Bear Creek (MP 725.5), Paynes Creek (MP 744), and Salt Creek (MP 752). These measures are:

a. No known roost trees or nest trees will be destroyed or removed during construction without authorization of the USFWS. All such trees will be identified and clearly marked prior to construction.

b. Mature trees and snags will be retained at large stream and river crossings, whenever possible, to provide potential sites for bald eagle feeding perches and roosts.

5. A <u>Worker</u> <u>Education</u> <u>Program</u> will be developed to instruct construction crews on the basic biology and identification techniques for the bald eagle, state and federal regulations for protection of the species, mitigation measures associated with the pipeline expansion project, and the possible penalties for non-compliance with all relevant regulations. Contractors will be legally bound by contract provisions to adhere to all measures described in this mitigation plan for protection of the bald eagle.

The FERC staff has determined that construction and operation of the proposed PGT/PG&E Project would affect the bald eagle within the designated Lake Britton Essential Bald Eagle Habitat. However, the FERC staff has determined that implementation of PGT/PG&E's recommended mitigation measures would ensure that construction and operation of the proposed project would not jeopardize the bald eagle at this location. The FERC staff has entered into formal consultation with the USFWS concerning potential impact on this species, and will recommend that PGT/PG&E not construct its proposed facilities until the FERC staff receives a Biological Opinion (Opinion) from the USFWS, and PGT/PG&E agree to implement the Opinion's mandatory terms and conditions.

American Peregrine Falcon. There are no known nesting peregrine falcons in the vicinity of the pipeline right-of-way. During winter, peregrine falcons may occur near the pipeline right-of-way in the Klamath Basin and the Delta, where large concentrations of waterfowl and shorebirds are available as prey. Construction activities would not affect wintering peregrine falcons because they would not be present during construction. Construction activities may disturb migrating peregrine falcons, but this disturbance would be temporary. ~~A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

PGT/PG&E proposes to conduct, within 60 days prior to construction of the pipeline, preconstruction surveys to locate peregrine falcon nests within one-half mile of the proposed right-of-way. Potential impacts will be evaluated on a case-by-case basis for each site. If any peregrine falcons could be potentially adversely affected by the project, mitigation commensurate with the level of impact will be developed in consultation with the USFWS and other federal and state agencies, as appropriate.

In addition, PGT/PG&E would develop a Worker Education Program to instruct construction crews on the basic biology and identification techniques for the peregrine falcon, state and federal regulations for protection of the species, applicable mitigation measures associated with the pipeline expansion project, and the possible penalties for non-compliance with all relevant regulations. Contractors will be legally bound by contract provisions to adhere to all measures described in this mitigation plan for protection of peregrine falcons.

The FERC staff believes that most of PGT/PG&E's proposed mitigation is adequate to protect the peregrine falcon from project-related impacts. However, to ensure that construction does not affect nesting peregrine falcons, the FERC staff will recommend that PGT/PG&E not construct within 0.5 mile or "line of sight," whichever distance is greater, of an active peregrine falcon nest between February 1-July 31.

The FERC staff has determined that implementation of PGT-PG&E's proposed mitigation measures, as well as the FERC staff's recommended mitigation measure, would ensure that construction and operation of the PGT/PG&E Project would not affect the peregrine falcon.

California Condor. All California condors are currently in captive breeding programs in southern California zoos. The pipeline right-of-way is not within the recent historic range of the California condor (California Energy Commission, 1984). Condors are scheduled to be released into the wild in southern California in the early 1990s (Nichols, personal communication). In a pilot release program, Andean condors have not ventured farther than 90 miles from their release site (Jurek, personal communication). Assuming California condors behave similarly, they would not occupy the northern portion of their recent historic range during pipeline construction. ~~A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~ Therefore, construction of PG&E's facilities would not affect the California condor.

Northern Spotted Owl. The northern spotted owl, a federally listed threatened species, may occur near the pipeline northeast of the Pit River (FS, 1988). However, no suitable northern spotted owl habitat would be crossed by the right-of-way. The right-of-way would not cross any of the recently designated habitat conservation areas (Thomas et al., 1990). No spotted owl habitat areas (SOHAs) would be crossed on the Modoc National Forest, and the habitat is not considered optimum for northern spotted owls (McCarthy, personal communication).

A spotted owl did respond to calls during a FS survey in 1989 near Border Mountain (McCarthy, personal communication), approximately three miles west of PG&E's proposed route. No owls responded during recent surveys conducted by Jones & Stokes Associates in 1990. The area was dismissed as potential breeding habitat by FWS during a previous consultation with FS because of the marginal habitat conditions, the lack of repeated owl responses, and isolation from the main breeding population.

No northern spotted owl habitat would be crossed by the proposed project in the Shasta-Trinity and Lassen National Forests (Davis, personal communication). The Soldier Mountain SOHA is west of the proposed project and no owls have been observed in the SOHA for the past five years (Davis, personal communication). Assuming a two-mile radius buffer zone as the standard for protection, the pipeline would be 0.5 mile away from the protection zone at the closest point.

Potential habitat also occurs at Hambone Island, a 155-acre isolated patch of ponderosa pine and white fir forest surrounded by juniper. The area lacks the multistoried forest canopy and the snags, stumps, and down logs normally associated with spotted owl habitat. No owls ~~responded~~ were observed during recent surveys (Jones & Stokes Associates, 1990). ~~A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

PGT/PG&E proposes to conduct preconstruction surveys within 60 days of pipeline construction to verify absence of spotted owls in the project area. If any spotted owls detected during these surveys are determined to be adversely affected by the project, mitigation commensurate with the level of impact will be developed in consultation with the USFWS.

The FERC staff has determined that construction and operation of the PGT/PG&E Project would not affect the northern spotted owl.

Blunt-Nosed Leopard Lizard. The blunt-nosed leopard lizard, a federally listed endangered species, occupies sparsely vegetated plains, low foothills, and large washes and arroyos. Approximately 640 acres of habitat are required to maintain isolated populations of blunt-nosed leopard lizards (FWS, 1987). Little habitat for the blunt-nosed leopard lizard occurs on the floor of the Central Valley in Merced and Fresno Counties (FWS, 1985). PG&E's proposed pipeline route is on the western edge of the Central Valley, and is located several miles west of known habitat. However, potential habitat for this species occurs at two locations along PG&E's route.

This potential habitat was recently surveyed for the Stanpac No. 2 Pipeline, and no blunt-nosed leopard lizards were observed (Stebbins and Smith, 1987). No blunt-nosed leopard lizards were observed during additional surveys in August 1989 and May 1990 (James Smith, personal communication). The habitat at the first location was judged to be unsuitable because it was isolated between I-5 and the California Aqueduct, it was less than 300 acres in size, and it was once covered with dense annual grasses that have been disked and burned. The potential habitat at the second location is also located between I-5 and the California Aqueduct but is large enough to support an isolated population. However, the habitat was judged to be unsuitable because it was covered with dense annual grasses and because the pipeline route is immediately adjacent to the California Aqueduct, where rodenticides are used regularly. Rodenticides may inadvertently kill blunt-nosed leopard lizards that use rodent burrows for shelter (FWS, 1987). ~~A determination of affect and recommended mitigation measures will be developed in our BA.~~

No impacts to the blunt-nosed leopard lizard are anticipated because this species does not occur along the route of PG&E's facilities. PGT/PG&E propose to conduct preconstruction surveys within 45 days of pipeline construction to verify absence of blunt-nosed leopard lizards. If any leopard lizards detected during these surveys are determined to be potentially adversely affected by the project, mitigation commensurate with the level of impact will be developed in consultation with the USFWS.

In addition, many of the measures proposed to protect the San Joaquin kit fox and other sensitive species in the region will also serve to protect the blunt-nosed leopard lizard should any lizards occur in the project area.

The FERC staff has determined that construction of PG&E's facilities would not affect the blunt-nosed leopard lizard.

Valley Elderberry Longhorn Beetle. Elderberry bushes that occur along the riparian corridors of the Sacramento Valley provide habitat for Valley Elderberry Longhorn Beetles (VELBs), a federally listed threatened species. Adult beetles feed on the leaves, and the larvae develop in the pith of the stems during a two-year period and emerge, as adults, through exit holes. ~~Adult VELBs were observed within the right of way at several locations along PG&E's proposed route. A determination of affect and recommended mitigation measures will be developed in our BA.~~

Occurrences of elderberry plants, adult VELBs, and VELB exit holes were observed at eight stream crossing locations. In general, the eight crossings support a mixture of age and size classes and exhibited good regeneration, as evidenced by a large number of suckers. Based on this information, habitat conditions generally appear to be suitable to support the VELB at most of the sites where elderberries were recorded. Furthermore, elderberries are common at many other stream crossings that are near, but outside of, the project area. These elderberry locations provide additional habitat for the VELB.

PGT/PG&E proposes to implement the following measures to mitigate the potential adverse impacts of pipeline construction and maintenance on the VELB and its habitat. These measures include most of the general compensation guidelines established by the USFWS for the protection of the VELB (USFWS, 1988) as well as additional measures proposed by PGT/PG&E.

1. All elderberry plants within 100 feet of the right-of-way will be fenced or flagged prior to construction.

2. The size of the construction area within identified VELB habitat will be minimized to the greatest extent possible. This will include minor realignments of the pipeline route, where feasible, to avoid specific elderberry plants, and restrictions on vehicle and foot traffic in flagged habitat areas. Previous realignments have already resulted in avoidance of several mature elderberry plants.

3. All access roads and mainline valves will be constructed outside of VELB habitat areas.

4. A qualified environmental specialist/monitor (e.g., biologist, entomologist, botanist, etc.) with demonstrated ability to identify elderberry plants and VELB will be present during construction in all VELB habitat areas. This monitor will ensure that no unauthorized construction impacts occur in flagged habitat areas. The monitor will be empowered by PGT/PG&E to halt all construction activities, if necessary, to prevent unauthorized impacts to the VELB and its habitat. In the event that unanticipated impacts occur, the USFWS will be notified immediately and construction will not proceed without USFWS authorization. Contractors will be legally bound by contract provisions to adhere to all measures designed to protect the VELB.

5. Elderberry plants that cannot be avoided will be transplanted, where feasible and practical, to an area designated as the compensation site. In some cases, an elderberry that would be extremely difficult to remove because of access problems or one that is in such poor condition that it is unlikely to survive being transplanted, may, at the discretion of the USFWS, be exempted from this requirement.

   A horticulturist or an environmental specialist/monitor with experience in elderberry establishment will design a planting and transplanting program that considers the following USFWS guidelines (USFWS, 1988).

   a. Elderberries with stems equal to or greater than 1.5 inches in diameter should be transplanted when the plant is dormant (approximately November through mid-February) after the plants have lost their leaves and, thus, are not actively growing or transpiring. Planting during the dormant season will reduce the shock to the plant and increase transplantation success;

   b. Trees should be cut back to three to six feet from the ground or to 50 percent of its height (whichever is greater). The trunk and all stems greater than 1.5 inches in diameter (measured one to six inches from the ground surface) will be replanted;

   c. If evidence of the beetle is present, cut branches and stems will be placed in a pile next to where the elderberry will be transplanted or near elderberries not to be cut or moved. If no emergence holes or adults are observed during the survey, it is not necessary to move the cut stems. However, if during the course of trimming the trees back, the presence of galleries (i.e., tunnels excavated by beetle larvae inside the stems and trunks) are detected, then the pruned material should be moved next to the transplanted elderberries. Depending on the larval stage, some larvae may continue to develop and eventually emerge from the pruned material;

   d. Dig plant up using a Vemeer spade, backhoe, front end loader, or other suitable equipment, taking as much of the root ball as possible, and replant immediately in a hole three to four feet deep. The plant should only be moved by the root ball. If the plant is to be moved and transplanted off-site, wrap the root ball in burlap and secure with wire. Dampen the burlap with water, as necessary, to keep the root ball wet;

e. Construct a circular water retention basin from the earth excavated from the transplant hole about eight to ten feet in diameter and 12 to 14 inches high. Plant the main stem of the elderberry in the center of each basin. After removing any burlap and wire, plant the root ball level with the existing ground. Compact the soil to ensure that settlement does not occur. Other stems that have been rooted should be planted in the water basins at a rate of either six stems (non-dormant season) or three stems (dormant season) per basin with stems about three feet apart around the circumference of the basin and three to four feet from the main trunk. Transplantation during the growing season is considered to be less effective than during the dormant season and, therefore, must be approved by the USFWS;

f. Saturate the soil inside the basins with water. Do not use fertilizers or other supplements or paint the tips of stems with pruning substance as the effects of these compounds on the beetle are unknown;

g. Monitor when watering to ascertain if additional watering is necessary. Plants in sandy, well-drained soil, may need to be watered weekly or possibly twice monthly. Clayey, poorly-drained soil may not need to be watered after the initial saturation. A drip watering system and timer would be ideal. However, a water truck or other apparatus may be used where a drip system is not feasible.

6. Each stem 1.5 inches or greater in diameter that is moved or destroyed will be replaced in the area selected as the compensation site using a ratio from two-to-one to five-to-one. This replacement requirement will apply even if the trunk and associated stems are transplanted. Replacement stock may be obtained from a variety of sources such as nursery stock or material transplanted or pruned from the elderberries on site. The ratio is dependent upon the habitat quality and quantity and is determined as follows:

a. <u>No Replacement</u>.

<u>Example</u>

Total No. elderberry clumps/clusters	10
No. clumps/clusters w/evidence of VELB	0
No. stems $\geq$ to 1.5 inches	0

Compensation required: None

b. Ratio of 2:1. In situations involving clusters of elderberries (i.e., a group of stems the majority of which are less than 1.5 inches in diameter with no main trunk). Clusters represent young trees that do not have as high a potential for current beetle use as do stems with larger diameters. Usually there is no evidence of beetle use in these young stems. Clusters, however, can rapidly mature to a size where beetle use would be anticipated.

Example

Total No. elderberry clumps/clusters	5
No. clumps/clusters w/evidence of VELB	0
No. stems ≥ to 1.5 inches	15

Compensation required: Plant 30 stems

c. Ratio of 3:1. Medium sized trees with stem diameters 1.5 inches or greater. Beetles are present as evidenced by emergence holes, but occur in less than 50 percent of the clumps (i.e., a plant with one main trunk, often with a diameter more than 3 inches, with smaller or equal sized stems surrounding it) or clusters.

Example

Total No. elderberry clumps/clusters	25
Number of clumps/clusters with VELB	7
No. stems ≥ to 1.5 inches	150

Compensation required: Plant 450 stems and transplant 7 elderberries.

d. Ratio of 5:1. Good quality habitat with beetle emergence holes present in more than 50 percent of the clumps. Prime trees may be characterized as tall (i.e., 30 feet or more), with old stumps (more than 3 inches in diameter), and with about 30 to 50 percent dead limbs.

Example

Total No. elderberry clumps/clusters	20
No. clumps/clusters w/evidence of VELB	12
No. stems ≥ to 1.5 inches	100

Compensation required: Replanting with 500 stems, transplant 12 elderberries.

In situations where the ratio based on the size of the stems is at variance with the percent of the clumps occupied by beetles, the latter criterion will prevail in determining the replacement ratio.

7. All plantings will be monitored one time per year and at the end of the growing season (March - September) to ascertain survival and growth rates for a period of three years from the date of transplant. Results will be furnished to the USFWS annually, including dates of watering, growth rates, and mortality figures

as well as a map of each site with an overlay of the transplanted stems and their status.

8. Plants that die or appear stunted or otherwise nonvigorous will be replaced on a yearly basis so that the following minimum survival rates are achieved for the original plants: a) first year - 95%, b) second year - 90%, c) third and fourth years - 85%, and d) fifth year - 80%. All viable plantings will be maintained even if survival is greater than the above minimum rates. Replacement responsibilities for plants that are lost due to uncontrollable circumstances (e.g, flooding or vandalism) will be determined on a case-by-case basis by the USFWS.

9. Compensation sites for transplanting and revegetation of elderberries will be selected in consultation with the USFWS to ensure future protection of the plants. Attempts will be made to transplant and revegetate elderberries as close as possible to the impact zone to reduce habitat fragmentation and subpopulation isolation. In some situations, however, it may be necessary to purchase or acquire an easement for some off-site property to ensure long-term protection of the compensation site. The size and location of any off-site compensation area that may need to be acquired will be determined in consultation with the USFWS.

10. To avoid damage to elderberries, employ directional felling of nearby trees and hand-cutting of felled trees prior to removal.

11. Where feasible, avoid maintenance clearing of the right-of-way in VELB habitat. Avoid use of insecticides, herbicides, and other materials that are toxic to elderberries and the VELB.

12. A Worker Education Program will be developed to instruct construction crews on the basic biology of the VELB, identification of elderberry plants, state and federal regulations for protection of the VELB, mitigation measures associated with the pipeline expansion project, and the possible penalties for non-compliance with all relevant regulations. Contractors will be legally bound by contract provisions to adhere to all measures described in this mitigation plan for protection of the VELB.

The FERC staff has determined that construction and operation of the proposed PGT/PG&E Project would affect the valley elderberry longhorn beetle. However, the FERC staff has also determined that implementation of PGT/PG&E's proposed mitigation would ensure that the project would not jeopardize this species. The FERC staff has entered into formal consultation with the USFWS concerning potential impact on this species, and will recommend that PGT/PG&E not construct its proposed facilities until the FERC staff receives a Biological Opinion (Opinion) from the USFWS, and PGT/PG&E agree to implement the Opinion's mandatory terms and conditions.

Delta Green Ground Beetle. The delta green ground beetle (DGGB), a federally listed threatened species, is known to occur only in the vicinity of the Jepson Prairie Preserve.

Alternative route A would pass between two large playa pools that are 80 feet apart. DGGBs have been observed on the north side of one of these pools, but no DGGBs have been observed near the second pool (Serpa, 1985; Arnold, 1989). The right-of-way in Alternative A was not considered to be high-quality DGGB habitat because it was covered with dense grassland. DGGB most frequently occur along sandy, sparsely vegetated shorelines of large playa pools and occasionally along the edges of sparsely vegetated smaller vernal pools, and in sparsely vegetated grasslands adjacent to large playa pools and vernal pools (Arnold, 1989).

The route of Alternative B is within dense grasses and would not pass near any large playa pools or vernal pools. No DGGB has been observed along the route (Serpa, 1985; Arnold, 1989), and no suitable DGGB habitat exists (Arnold, 1989). Alternative C would pass between several large playa pools, and would also pass near several smaller vernal pools southeast of these pools. DGGBs have been observed at several of these playa pools (Serpa, 1985), and suitable DGGB habitat may occur between several of the other playa pools that occur along this alternative proposed route (Arnold, 1989). ~~A determination of affect and recommended mitigation measures will be developed in our BA.~~

No direct or indirect impacts to the DGGB are expected if construction occurs on Alternative Route B, as certificated by the CPUC. Excavated soil will be stockpiled and used to bury the pipeline as close as possible to where the soil was excavated. Access roads will be clearly marked and signed to advise drivers to stay on these roads. Access roads will be also be watered periodically to minimize dust.

Revegetation will be performed on all disturbed sensitive habitat areas using native species endemic to the vernal pool-playa lake-grassland matrix. Insecticides, herbicides, and other toxic substances that could affect the DGGB, prey items, vegetation, or water quality of the vernal pools and playa lakes will not be used in the area.

The FERC staff has determined that construction and operation of PG&E's facilities, as certificated by the CPUC, would not affect the DGGB.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE ALTAMONT PROJECT

Montana

Approximately 3.6 acres of eastern ponderosa pine forest, 709 acres of grama grass-needlegrass-wheatgrass association, 166 acres of foothill prairie (see Table 4E-10), and 267 acres of saltbush-greasewood shrub would be removed for the project in Montana. Approximately 2,416 acres of cropland would be disturbed by the project in Montana. These vegetation types are widespread and abundant in Montana; therefore, impacts are less than significant. No mitigation is required.

Special-Status Plant Species. ~~Rock tansy (*Sphaeromia capitata*)~~ Wild buckwheat is ~~threatened in Montana and~~ a federal-candidate species throughout its range. ~~A population is~~

~~known to occur within 1,000 feet of the pipeline at MP 290 (Table 4E-13).~~ No populations or suitable habitat ~~(i.e., limestone outcrops)~~ were found in 1989 field surveys on the project right-of-way in Montana ~~(Joe C. Elliot personal communication)~~. No impacts on this species would result from the project.

Table 4E-10

IMPACTS ON VEGETATION OF THE ALTAMONT PROJECT

Vegetation Type	Vegetation Removed for Construction and Allowed to Regenerate (acres)	Vegetation Periodically Removed for Operation (acres)	Total Vegetation Removed (acres)
Eastern ponderosa pine and mixed-coniferous forest	10.8 [a]	0	10.8 [a]
Sagebrush-steppe	1,736	434	2,170
Saltbush-greasewood shrub	1,093	273	1,364
Mixed-grass prairie	1,178	0	1,178
Cropland and developed land	2,664	0	2,664

[a] Most of the area of eastern ponderosa pine forest that would be traversed by the pipeline route is open grassland with widely scattered trees. Few trees would be removed for pipeline construction.

Wetlands and Riparian Habitat. Construction of the project would require removal of approximately ~~192~~ 149 acres of wetland and riparian vegetation in Montana (Table 3E-2). The majority of these areas are consist of emergent vegetation. The largest areas of saline-alkaline meadow that would be affected occur at ~~Flat Creek (MP 96 to 103.5),~~ Flat Creek (MP 96-99), Wolf Creek (MP 123.0), Big Coulee Creek (MP 154.2), ~~Ross Fork Creek (MP 159.0),~~ and Valley Creek (MP 250.7). ~~In addition, Altamont's proposed Rapelje Compressor Station (MP 229) would be located in an emergent wetland, and the proposed route would be located within the riparian zone of the East Fork of Roberts Creek for at least two miles (MP 172 to 174).~~

Impact on the wetlands and riparian areas present at Flat Creek, ~~Ross Fork Creek, East Fork of Roberts Creek, and the site of the proposed Rapelje Compressor Station~~ would be significant, and could easily be avoided through the use of route realignments and alternative compressor station site locations. Altamont's modifications to its proposed route, filed with the Commission on November 28, 1990, only avoid wetland areas associated with Flat Creek which are located between MP 99-104, and do not avoid the wetlands located between MP 96-99.

Therefore, we recommend that Altamont realign its route in the vicinity of Flat Creek (MP 96-99) ~~Ross Fork Creek, and East Fork of Roberts Creek~~ in a manner that minimizes disturbance of wetland and riparian areas to the maximum extent practicable, and to file these route realignments with the Commission for the review and approval of the Director of OPPR prior to construction. ~~In addition, we recommend that Altamont relocate the site of its proposed Rapelje Compressor Station in order to eliminate any disturbance of wetlands.~~

Construction of the project would require the removal of riparian scrub and forest vegetation. The most extensive areas of riparian forest that would be removed occur at the Yellowstone River (MP 257.2, 4.5 acres) and Clarks Fork of the Yellowstone River (MP 268.2, 1.9 acres). The Altamont project's proposed Missouri River crossing would have less impact on riparian forest (MP 68.5, 0.2 acres) than if the crossing were made at the BLM utility crossing window one mile upstream ~~(Otto personal communication)~~. Although impact on riparian scrub and forest would be long-term, our previously recommended mitigation measures would prevent these impacts from being significant.

Special Native Plant Communities. No special native plant communities would be affected in Montana.

Special-Status Wildlife Species

Black-Footed Ferret. All known black-footed ferrets are in captive breeding programs, and none are thought to remain in the wild (Westec, 1990). Potential habitat for black-footed ferrets includes black-tailed prairie dog colonies larger than 80 acres and white-tailed prairie dog colonies larger than 200 acres (FWS, 1989b).

Aerial searches for potential black-footed ferret habitat (i.e. black-tailed and white-tailed prairie dog colonies) along the proposed route were considerably detailed. All observed black-tailed prairie dog colonies on or within 1/2-mile of the proposed route were mapped on USGS 7-1/2 minute topographic maps. White-tailed prairie dog range was surveyed intensively during the period March 20-April 9, 1990. This part of the route (approximately 325 miles) is almost all within Wyoming, largely on public land administered by BLM, and is known to contain white-tailed prairie dog colonies.

Ground surveys were conducted only on days with favorable weather, i.e. clear-partly cloudy skies, partial or no snow cover, and air temperature above 40° F. Under these conditions, white-tailed prairie dogs spend much of the day above ground, especially during spring, and are therefore very visible. Only active prairie dog colonies were mapped on USGS 7-1/2 minute topographic maps. Colonies were considered active if prairie dogs were observed during air or ground survey or if fresh prairie dog scat was present around burrow openings.

Prior to the aerial survey, locations of known prairie dog colonies reported in BLM management documents were placed on field maps. An attempt was made to verify the locations of these colonies during the flight. In addition, all observed prairie dog colonies on or near (1/4 to 1/2-mile of the centerline) each alternative route were mapped on USGS 7-1/2 minute topographic maps. After the survey, additional colony locations were added to the maps from overlays maintained by the BLM Lander Resource Area Office, and from other published sources (BLM, 1982; BLM, 1985; BLM, 1988a; BLM, 1988b; Hayden-Wing Associates, 1990).

Black-tailed prairie dog range along the proposed route (Milepost 0-295) was covered in approximately 6-1/2 hours flight time (or about 19.5 hours observer time). Ground squirrel colonies were common in native and tame rangelands but only five distinct prairie dog colonies were identified.

Of the five colonies, two were intersected by the proposed route and two were very close. Of these four, three are greater than 80 acres and would have to be searched for black-footed ferrets under USFWS guidelines. It is possible that a colony complex, as defined by USFWS guidelines, is present in the vicinity of the first two colonies, and possibly the fifth. Further surveys should be conducted prior to black-footed ferret searches.

In white-tailed prairie dog range (Milepost 295-620), the total time spent surveying from the ground and air was 96 hours, with an additional six hours (18 observer hours) helicopter survey. Twenty white-tailed prairie dog colonies or complexes were located and mapped within or adjacent to the search corridor. As expected, no black-tailed prairie dogs were found. In Wyoming, black-tailed prairie dogs occur in the eastern counties and are known in only one location west of the Big Horn Mountains.

Five sites proved to be areas where badgers had been digging and one other was not located during ground survey. At some sites, the acreage estimate made during aerial survey was changed when the prairie dog colony was mapped from the ground.

In summary, a search for black-tailed prairie dog colonies along the proposed route in Montana (Milepost 0-295) and white-tailed prairie dog colonies in southern Montana and Wyoming (Milepost 295-620) in March and April, 1990 yielded five black-tailed prairie dog colonies and 20 white-tailed prairie dog colonies/complexes. Of these, three black-tailed prairie dog colonies and two white-tailed prairie dog colonies/complexes were large enough to warrant searches for black-footed ferrets under USFWS guidelines. It should be noted, however, that if the seven kilometer search radius described in USFWS guidelines is employed, the proposed route may cross several more white-tailed prairie dog complexes that were not identified during this survey, without actually intersecting an occupied colony.

Altamont has proposed to mitigate construction impacts to black-footed ferrets utilizing one of two methods. Depending on the size and location of the prairie dog colony, Altamont believes that it may be possible to slightly alter the pipeline route to avoid colonies or complexes that would otherwise have to be searched for black-footed ferrets. Where this method is impractical, Altamont proposes to sponsor searches for black-footed ferrets during the year prior to construction, following USFWS guidelines. If a ferret is found, Altamont proposes to notify the appropriate authorities and the pipeline route would be altered to avoid the colony or complex containing the ferret.

The FERC staff has determined that implementation of Altamont's proposed mitigation measures would ensure that construction and operation of the Altamont Project would not affect the black-footed ferret.

~~Preliminary surveys conducted in March and April 1990 identified five active black-tailed prairie dog colonies and one active white-tailed prairie dog colony along the proposed pipeline route in Montana (Westec 1990). Three of the black-tailed prairie dog colonies and the one active white-tailed prairie dog colony were large enough to warrant searches for black-footed ferrets using protocol developed by FWS (1989).~~

~~Construction activities could disturb 5.6 acres of potential black-footed ferret habitat (Table 4E-11). Additional habitat may be disturbed if any of these colonies are portions of larger complexes. Construction activities could result in direct mortality of ferrets, a loss of prey species, and avoidance of potential habitat by the ferrets during construction. A determination of affect and recommended mitigation measures will be developed in our BA.~~

Spotted Bat. Potential habitat for the spotted bat is present in southern Montana; however, the only specimens of spotted bats in Montana have come from Billings (Flath personal communication). Construction activities would not result in direct mortality of spotted bats or a loss of habitat (Table 4E-11) because no roosting habitat occurs along the proposed route (Westec, 1990). Spotted bats may avoid construction areas temporarily, but this impact is less than significant.

Preble's Shrew and Merriam's Shrew. Approximately 727 acres of potential Preble's and Merriam's shrew habitat would be disturbed by construction activities (Table 4E-11). Construction activities would result in direct mortality of shrews in these areas, a temporary loss of habitat, and avoidance of habitat in the construction area by the shrews. These impacts are less than significant because the shrews occur in low population densities (Flath personal communication), few would be affected, and the populations would recover quickly once vegetation became reestablished along the right-of-way.

Bald Eagle. Construction activities should not affect nesting bald eagles (Table 4E-11) because none occur within the vicinity of the pipeline (Montana NHP, McMaster personal communication) and no active nests were observed in a recent survey of the proposed route (Westec, 1990).

Historic nesting sites are present approximately three miles east of the proposed route on Clarks Fork of the Yellowstone River. Active nests exist along the Yellowstone River, but they are more than three miles from the proposed route. Use of the Clarks Fork of the Yellowstone River by nonbreeding, summer resident bald eagles is increasing, and there is an active territory, but nesting has not been observed. Potential nesting habitat occurs where the proposed route would cross the Yellowstone River, and bald eagles may nest there in the near future (Flath, personal communication).

Table 4E-11

IMPACTS ON SPECIAL-STATUS WILDLIFE SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING ALONG THE ALTAMONT ROUTE

Common and Scientific Names	Legal Status[a/] Federal/State	Acres of Habitat Potentially Affected
MONTANA		
Mammals		
Black-footed ferret (*Mustela nigripes*)	E/--	5.6
Spotted bat (*Euderma maculatum*)	C2/MSC	0
Preble's shrew (*Sorex preblei*)	C2/--	727
Merriam's shrew (*Sorex merriami*)	--/MSC	727
Birds		
Bald eagle (*Haliaeetus leucocephalus*)	E/--	1
American peregrine falcon (*Falco peregrinus*)	E/--	0
Ferruginous hawk (*Buteo regalis*)	C2/--	109
Mountain plover (*Charadrius montanus*)	C2/--	280
Long-billed curlew (*Numenius americanus*)	C2/--	236
WYOMING		
Mammals		
Black-footed ferret (*Mustela nigripes*)	E/--	4.1
Allen's 13-lined ground squirrel (*Spermophillus tridecemilineatus alleni*)	C2/--	303

Table 4E-11
(continued)
IMPACTS ON SPECIAL-STATUS WILDLIFE SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING ALONG THE ALTAMONT ROUTE

Common and Scientific Names	Legal Status[a] Federal/State	Acres of Habitat Potentially Affected
WYOMING (continued)		
Birds		
Bald eagle (*Haliaeetus leucocephalus*)	E/--	1
American peregrine falcon (*Falco peregrinus*)	E/--	0
Whooping crane (*Grus americana*)	E/--	0
Ferruginous hawk (*Buteo regalis*)	C2/--	3,818
Mountain plover (*Charadrius montanus*)	C2/--	40
Burrowing owl (*Athene cunicularia*)	--/WYSC	2,370

[a] Status definitions:
-- = no classification
E = endangered
T = threatened
C2 = a candidate species under review for federal listing. Category 2 includes species for which the FWS presently has some information indicated that "proposing to list them as endangered or threatened species is possibly appropriate" but for which further biological research and field study are usually needed to determine biological vulnerability and threats. Category 2 species are not necessarily less rare or less threatened than Category 1 species. The distinction relates to the amount of data available and is therefore administrative rather than biological.
State (Montana NHP 1989, Wyoming NHP 1989):
MSC = Montana species of concern
WYSC = Wyoming species of concern

Bald eagles migrate through and winter in Montana. Peak spring migration occurs in March, and peak fall migration occurs in November (BLM, 1986). Construction activities would not affect migrating bald eagles, therefore, because construction would take place between June and October.

The distribution of wintering eagles varies from year to year depending on the severity of the winter and the availability of food (primarily fish and carrion). Eagles winter along the Milk, Missouri, Musselshell, and Yellowstone Rivers and the Clarks Fork of the Yellowstone River. Wintering bald eagles may be present near open water along every large river or stream that should be crossed by the proposed pipeline route. ~~No data are available to identify known roost sites for wintering bald eagles along the proposed route. A determination of affect and recommended mitigation measures will be developed in our BA.~~

Although no bald eagles currently are known to nest or roost along Altamont's proposed and alternate routes, potential and historic nesting and roosting habitat does exist. The primary mitigation for potential impacts to nesting bald eagles would be timing constraints during the nesting season. Altamont has proposed not to construct in big game winter range from November 15-April 30, when bald eagles may be present and feeding on carrion, or to construct in known big game parturition areas from May 1-June 30, when bald eagles may be preying on fawns. In addition, Altamont has proposed to not construct at perennial stream crossings from late autumn through mid-spring, when bald eagles might be present along these drainages.

In addition, Altamont has proposed to survey its certificated route for raptor nests in the year prior to construction. There would be no construction within 0.5-1.2 miles of active nests (including bald eagles, if found) from February 1-July 31 to allow nesting/rearing to proceed.

To ensure that the Altamont Project does not affect winter roosting bald eagles, the FERC staff will recommend that Altamont implement the following additional mitigation measure:

o Altamont shall survey its certificated route for bald eagle winter roosting habitat in the year prior to construction, and shall not construct within these areas between the period of November 1 to March 31. In addition, Altamont shall restrict its construction right-of-way through bald eagle winter roosting habitat to a maximum of 75-feet in width, and shall align its pipeline in a manner that minimizes the clearing of roost trees to the maximum extent practicable.

Implementation of Altamont's proposed mitigation measures, and the FERC staff's recommended mitigation measure, would ensure that construction and operation of the Altamont Project would not affect the bald eagle.

American Peregrine Falcon. Construction activities should have no impact on nesting American peregrine falcons (Table 4E-11) because none occur along the proposed route (McMaster, personal communication). There is a historic peregrine falcon eyrie approximately six miles east of the proposed route, but no known existing or historical peregrine falcon eyries occur within five miles of the proposed pipeline route (Westec, 1990). No peregrine falcons or eyries were observed during recent surveys of the proposed pipeline route (Westec, 1990).

Potential nesting habitat does exist along the proposed route near the Yellowstone River in Montana. This habitat is located to the west of the proposed crossing, and extends for approximately 0.5 mile in length. The cliff height varies from 100 to 200 feet, and its sandstone face contains several ledges and holes suitable for falcon nesting. A peregrine falcon was observed near the cliff in April 1988 (Flath, personal communication). This site may not be suitable habitat because several sources of human disturbance are within sight of this area, including occupied homes, a highway, and a railroad. An additional potential peregrine falcon use area occurs near Lonesome Lake.

Migrating peregrine falcons could be present along any of the major river systems that would be crossed by the proposed pipeline route. Construction activities would not affect peregrine falcons during spring migration because falcons migrate in March and April (Ritter, personal communication), prior to the time planned for construction. Construction activities in late summer or fall may overlap with the peregrine falcon's autumn migration. These highly mobile birds could easily avoid areas of pipeline construction, and this short-term avoidance would not disrupt migration. ~~A determination of affect and recommended mitigation measures will be developed in our BA.~~

As indicated above, although no peregrine falcons currently are known to nest along Altamont's proposed and alternate routes, potential and historic nesting habitat does exist. The primary mitigation for potential impacts to nesting peregrine falcons would be timing constraints during the seasons that this species is nesting. Altamont has proposed to not construct within two miles of active sage grouse leks from February 1-July 31, when peregrine falcons might prey on breeding concentrations of this species. In addition, Altamont would not construct at perennial stream crossings from late autumn through mid-spring, when peregrine falcons might be present along these drainages.

In addition, Altamont proposes to survey its certificated route for raptor nests in the year prior to construction. There would be no construction within 0.5-1.2 miles of active nests (including peregrine falcons, if found) from February 1-July 31 to allow nesting/rearing to proceed.

The FERC staff has determined that implementation of Altamont's proposed mitigation measures would ensure that construction and operation of the Altamont Project would not affect the peregrine falcon.

Ferruginous Hawk. Ferruginous hawks occupy mixed-grass prairie and badlands (Reel, Schassberger, and Ruediger, 1989). Construction activities would disturb 109 acres of potential habitat (Table 4E-11). Most ferruginous hawks occur north of MP 30, but some may occur as far south as MP 145 (Flath, personal communication). Construction activities could result in direct mortality of nesting birds, a temporary loss in foraging habitat, and avoidance of nests resulting in nesting failure. These impacts are less than significant because little suitable nesting habitat occurs in the agricultural land along the pipeline route north of MP 30 and only one ferruginous hawk was observed along the route in recent surveys (Westec 1990).

Mountain Plover. Approximately 280 acres of potential nesting habitat for mountain plovers would be crossed by the pipeline route. Construction activities could result in direct mortality of nesting mountain plovers, a temporary loss of habitat, and avoidance of nesting areas. These impacts are less than significant (Table 4E-11) because few mountain plovers would be affected by the project. Moderate densities of mountain plovers nest in Phillips, Blaine, Valley, and Golden Valley Counties~~, and these are restricted to prairie dog towns~~ (Knowles, n.d.). The pipeline route would cross only Golden Valley County, and no prairie dog towns would be encountered.

Long-Billed Curlew. Approximately 236 acres of potential nesting habitat for nesting long-billed curlews would be crossed by the pipeline route. Construction activities would result in direct mortality of nesting long-billed curlews, a temporary loss of habitat, and avoidance of nesting areas (Table 4E-11). These impacts are less than significant because few long-billed curlews would be affected by the project. No curlews were observed in recent surveys along the pipeline route (Westec 1990), although one pair was observed by DNRC staff in June 1990 about 5 miles east of the proposed route north of Shamut. Construction activities would be confined to a small area compared to the available nesting habitat.

Important Habitat for Game Species

Mule Deer. Construction activities would disturb vegetation on 194 acres of mule deer winter range (Table 4E-12), which include 73 acres of mixed-grass prairie and 121 acres of agricultural land. This impact is less than significant because disturbance of vegetation would be temporary and the amount of foraging habitat disturbed would be small compared to the amount of foraging habitat available. Construction activities would not affect wintering deer because the deer would not be present when construction is scheduled to take place.

Construction would require removal of 139 acres of forest in year-round habitat (Table 4E-12). This would reduce the amount of cover available to mule deer. This impact is less than significant, however, because the amount of cover removed would be small compared to the amount available in the surrounding area. No mitigation is required.

Vegetation management along the right-of-way would involve maintaining 70 acres in grasses and forbs in the eastern ponderosa pine forest. This would be beneficial to mule deer because their diet consists of high proportions of grasses and forbs in spring and early summer. This beneficial impact is less than significant, however, because the additional forage would not benefit many deer.

Construction activities in early summer could disturb mule deer during fawning. This impact is less than significant because the disturbance would be temporary and fawning locations are unpredictable; therefore, substantial portions of local populations would not be affected by construction activities. No mitigation is required.

Table 4E-12

IMPACTS ON GAME SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING ALONG THE ALTAMONT ROUTE IN MONTANA

Species	Seasonal Range	Habitat Affected (acres)	Direct Mortality	Permanent Habitat Loss	Temporary Habitat Loss	Avoidance of Habitat by Wildlife
Mule deer	Winter Year round	194 139	NC NC	LS LS	LS LS	NC LS
White-tailed deer	Year round	41	NC	LS	LS	LS
Pronghorn	Winter	375	NC	LS	LS	NC
Sage grouse	Year round	412	LS	LS	LS	LS
Sharp-tailed grouse	Year round	666	LS	NC	LS	LS
Wild turkey	Year round	139	LS	LS	LS	LS

Notes: LS = less than signficant
NC = no change

White-Tailed Deer. Construction activities would require removal of 41 acres of cover for white-tailed deer (Table 4E-12), and 20 acres would be maintained in grasses and forbs. The effects of these activities are similar to those described previously for mule deer year-round range. These impacts are less than significant.

Pronghorn. Construction activities would disturb 375 acres of pronghorn winter range (Table 4E-12). The effects of these activities would be similar to those described previously for mule deer winter range. These impacts are less than significant.

Sage Grouse. Construction activities would disturb 412 acres of potential sage grouse habitat (Table 4E-12). These impacts are less than significant because the impacts would be temporary and the amount of habitat disturbed would be small in relation to the amount of habitat available.

During the breeding, nesting, and rearing season, construction activities could disturb sage grouse or crush eggs and young birds in their nests and thus result in lower reproductive success. These impacts are less than significant because sage grouse are not abundant along the pipeline route (Fanner, personal communication), none were observed during a recent survey (Westec, 1990), construction would be confined to a small area, and a substantial portion of the breeding population would not be affected.

Sharp-Tailed Grouse. Construction activities would disturb 666 acres of potential habitat for sharp-tailed grouse (Table 4E-12). The effects of construction would be similar to those described previously for sage grouse. The impacts are less than significant.

Wild Turkey. Construction would disturb ~~139~~ 10.8 acres of eastern ponderosa pine forest. Vegetation management would maintain 70 acres of grasses and forbs along the right-of-way. Impacts on wild turkey habitat would be similar to those described previously for year-round mule deer habitat and are less than significant.

Pipeline construction would disturb wild turkeys during the nesting season, causing them to move off nests for substantial periods of time and resulting in higher mortality rates. Additional mortality would occur from destruction of eggs in nests that were in the right-of-way. Pipeline construction would not increase mortality in a substantial portion of the population, however, because turkeys nest throughout the area and only those birds that nested in the right-of-way would be affected. These impacts are less than significant.

Waterfowl. Waterfowl in riparian areas and wetlands would be disturbed during construction, resulting in avoidance of these areas. The impact is less than significant because no important waterfowl nesting areas would be crossed by the pipeline; only small, local groups of waterfowl would be potentially affected; most nesting would be completed by the time construction began; and the disturbance would be temporary. Waterfowl are important prey for peregrine falcons.

Wyoming

Construction of the proposed project would require removal of approximately 7.2 acres of mixed-coniferous forest, 2,170 acres of sagebrush-steppe, 303 acres of wheatgrass-needlegrass shrub-steppe, and 1,097 acres of saltbush-greasewood shrub, and disturbance of approximately 248 acres of cropland land. These vegetation types are widespread and abundant in Wyoming; therefore, impacts are less than significant.

Special-Status Plant Species. ~~Nine~~ Seven special-status plant species could be adversely affected by the project in Wyoming (Table 4E-13). ~~Four~~ All of these species are candidates for federal listing ~~as threatened or endangered~~. The pipeline route would pass close to a population of meadow pussytoes (*Antennaria arcuata)*, and a population of small rockcress (*Arabis pusilla)* is known to occur within 6 miles of the pipeline route. Potentially suitable habitat exists along the pipeline route for these species and for two other species that are candidates for federal listing, William's rockcress (*Arabis williamsii*) and persistent sepal yellowcress (*Rorippa calycina*) (Table 4E-13). Construction of the Altamont Project may affect substantial portions of populations of these species, which would be a significant impact.

In addition, substantial portions of a population of Fremont's bladderpod (*Lesquerella fremontii)* on a limestone outcrop would need to be removed for construction of the project. This impact is significant. Four other plant species designated as threatened or endangered in Wyoming and throughout their range could be adversely affected by the project (Table 4E-13). Potentially suitable habitat for these species exists along the pipeline route. Impacts on substantial portions of populations of these plants would be significant.

To minimize these potentially significant impacts, we recommend that Altamont survey its proposed route for the occurrence of special-status plant in Wyoming, realign its route (as necessary) to minimize disturbance of these species to the maximum extent practicable, and file these route realignments with the Commission for the review and approval of the Director of OPPR prior to construction.

Wetlands and Riparian Habitat. Construction of the project would require removal of approximately ~~63~~ 43 acres of wetland and riparian vegetation in Wyoming (Table 3E-2). ~~Large patches of saline-alkaline wet meadow would be removed at Kirby Creek (MP 407.6 to 410.2) and Little Sandy Creek (MP 558.2). In addition,~~ Altamont's proposed route would cross approximately 2,000 feet of ephemeral emergent wetland at MP 450.2. Impact on ~~these~~ this wetland ~~and riparian~~ area~~s~~ would be significant. Therefore, we recommend that Altamont realign its route in the vicinity of ~~Kirby Creek, Little Sandy Creek, and~~ the unnamed wetland area that occurs at MP 450.2 in a manner that minimizes disturbance ~~of wetland and riparian areas~~ to the maximum extent practicable, and to file ~~these~~ this route realignment~~s~~ with the Commission for the review and approval of the Director of OPPR prior to construction.

Construction of the project would require removal of riparian scrub and forest vegetation. The largest areas of saline-alkaline shrubland would be removed at ~~Kirby Creek,~~ Beaver Creek (MP 480.9), and Twelvemile Canyon (MP 579.9). The largest patches of riparian forest would be removed along the Shoshone (MP 319.1), Greybull (MP 352.0), Bighorn (MP 374.2), and

Table 4E-13

IMPACTS ON SPECIAL-STATUS PLANT SPECIES
ALONG THE ALTAMONT ROUTE

Scientific and Common Names	Legal Status[a/]	Acres of Potential Habitat [b/]
	Federal	
MONTANA		
Erioganum brevicauda Wild buckwheat	--	0
WYOMING		
Antennaria arcuata Meadow pussytoes	C2	8
Arabis pusilla Small rockcress	C2	151
Arabis williamsii var. *williamsii* William's rockcress	C2	1,887
Cryptantha subcapitata Owl Creek miner's candle	C2	0
Lequerella fremontii Fremont's bladderpod	C2	24
Rorippa calycina Persistent sepal yellowcress	C2	<1
Phlox pungens Beaver rim phlox	C2	?

[a/] See Table 3E-3 for listing status definitions.
[b/] Acres of potential habitat given are general estimates based on known range and habitat requirements. In most cases these are overestimates.

Green Rivers (MP 593.5). Although impact on riparian scrub and forest would be long-term, our previously recommended mitigation measures would prevent these impacts from being significant.

Special Native Plant Communities. A BLM-designated unique plant community, the Kemmerer endemic cushion plant community, could be present along the pipeline route on outcrops of Green River shale between MP 550 and MP 620. Field surveys for the Kemmerer endemic cushion plant community will be conducted by Altamont prior to construction. To minimize impact, we recommend that Altamont realign its pipeline route, in coordination with the BLM, to minimize or avoid disruption of the BLM-designated Kemmerer endemic cushion plant community.

Special-Status Wildlife Species

Black-Footed Ferret. ~~Preliminary surveys conducted in March and April 1990 identified 20 active white tailed prairie dog colonies along and adjacent to the pipeline route in Wyoming (Westec 1990). Three of these colonies were over 200 acres in area. However, one of these colonies was located 1.5 miles from the proposed pipeline route. The other two colonies should be searched using protocol developed by FWS (1989).~~ Please refer to the discussion of the black-footed ferret in Montana.

~~Construction activities could disturb 4.1 acres of potential black-footed ferret habitat (Table 4E-11). Additional habitat may be disturbed if the two colonies are portions of complexes. Construction activities could result in direct mortality of ferrets, a loss of prey species, and avoidance of prairie dog colonies by ferrets during construction. A determination of affect and recommended mitigation measures will be developed in our BA.~~

Allen's 13-Lined Ground Squirrel. Allen's 13-lined ground squirrel is found in mixed-grass prairie in the Big Horn Mountains and may be found in the Bighorn Basin (Clark and Stromberg 1987). Habitat of two populations may be crossed by the proposed pipeline route, although this species may have been extirpated in Wyoming due to widespread poisoning (Clark and Stromberg 1987). Construction could disturb 303 acres of potential habitat for Allen's 13-lined ground squirrel (Table 4E-11). This could result in direct mortality, temporary loss of habitat, and avoidance of the construction area. This impact is not significant.

Bald Eagle. The proposed pipeline route would not cross bald eagle nesting habitat in Wyoming (Starkey personal communication), and no active bald eagle nests were observed during a recent survey of the proposed route. Bald eagles occur as migrants and may winter along the Greybull, Bighorn, and Green Rivers, and Nowater Creek. Eagles may occur along every large river or stream that would be crossed by the pipeline. Impacts migrating bald eagles would be similar to those described previously for Montana. Loss of winter roosts is a potentially significant impact because roosts are important habitat components for wintering eagles (Fielder and Starkey, 1986; Keister and Anthony, 1983). ~~A determination of affect and recommended mitigation measures will be developed in our BA.~~ Impacts and recommended mitigation are similar to those previously described for bald eagles in Montana.

American Peregrine Falcon. No known historical or active peregrine falcon eyries occur within five miles of the propose pipeline right-of-way. Impacts ~~on migrating~~ and recommended mitigation for peregrine falcons would be similar to those described previously for peregrine falcons in Montana. ~~A determination of affect and recommended mitigation measures will be developed in our BA.~~

Whooping Crane. The whooping crane does not nest in Wyoming but is a spring and fall migrant and a summer resident (McMaster, personal communication). The proposed pipeline route is not within the known summer range of the whooping crane and does not enter heavily used migration corridors. Whooping cranes have been observed near Farson (Westec, 1990).

Construction activities should not affect whooping cranes during spring migration because they pass through Wyoming between April 1 and May 15 (Ritter, personal communication) while construction is scheduled to begin in June. Fall migration occurs between August 21 and September 24 (Ritter, personal communication). Construction activities that take place during late summer could disturb migrating cranes that stop along the proposed pipeline route. ~~A determination of affect and recommended mitigation measures will be developed in our BA.~~

Altamont has proposed that if whooping cranes are found along its project route during construction, activity would be halted at this site until these birds left. If these birds stayed near the route or their behavior otherwise suggested breeding or occupancy along the route, construction would be halted immediately and the appropriate authorities would be contacted. The FERC staff believes that the intent, but not the specificity, of this mitigation is adequate to protect the whooping crane from potential impacts. Therefore, the FERC staff will recommend that Altamont implement the following condition during construction:

- Altamont shall have a qualified wildlife biologist present on all construction spreads that are operating in Wyoming during the whooping crane migration seasons (spring migration - April 1 to May 15; fall migration - August 21 to September 24), who shall survey the pipeline route for the occurrence of whooping cranes within 1/4 mile of the route each morning prior to the start of construction activities. In the event that whooping cranes are sighted within 1/4 mile of any construction activities, construction activities shall not commence in that location until the whooping cranes have left the area. In the event that any whooping cranes found within 1/4 mile of the pipeline route fail to leave the area within five days, or exhibit breeding or nest building behavior, Altamont shall cease all construction activities within 1/2 mile of this location and shall immediately notify the FERC staff and the appropriate FWS field office.

Implementation of Altamont's proposed mitigation, as clarified by the FERC staff's recommended mitigation measure, would ensure that construction and operation of the proposed Altamont Project would not affect the whooping crane.

Ferruginous Hawk. Ferruginous hawks are present along the proposed route (Westec, 1990), and construction activities would disturb 3,818 acres of potential habitat

(Table 4E-11). The effects of construction would be similar to those described previously for ferruginous hawks in Montana, and are not significant.

Mountain Plover. Construction activities could result in direct mortality of nesting mountain plovers, a temporary loss of habitat, and avoidance of nesting areas. These impacts are less than significant because few mountain plovers would be affected by the project. Densities of nesting mountain plovers average ~~45~~ below 40 per square mile ~~(Knowles n.d.)~~, and only 40 acres of potential nesting habitat would be disturbed; thus, it is estimated that only four nests would be disturbed.

Burrowing Owl. Construction activities would disturb 2,470 acres of potential foraging habitat for burrowing owls, but the disturbance would be temporary and the affected area would be small in relation to the amount of habitat available in the area. This is a less-than-significant impact.

Construction activities could result in direct mortality of nesting owls and cause avoidance of nests, leading to higher mortality. These impacts are potentially significant if large numbers of burrowing owls would be affected. To minimize these impacts, we recommend that Altamont survey its proposed route for all nesting raptors prior to construction, and not construct within 0.5 mile of an active raptor nest during the raptor's breeding and nesting season.

Wyoming Species of Concern

In comments submitted on the Draft EIS, the GFD indicated that the following species of special concern may occur in the vicinity of Altamont's proposed route:

a. White pelican: forages in the Green River.

b. Black-crowned night-heron: nests near Farson and forages in irrigated meadows and wetlands.

c. Snowy egret: nests near Farson and forages in irrigated meadows and wetlands.

d. White-faced ibis: nests near Farson and forages in irrigated meadows and wetlands.

e. Trumpeter swan: wintered in 1990-91 along Green River.

f. Merlin: crucial nesting habitat crossed at Green River.

g. Great blue heron: known colony near NESE Sec. 25, T21N, R114W.

Because the GFD did not provide us with specific information which would allow us to accurately evaluate the potential for significant impact to occur to these species, we will recommend that Altamont survey its proposed route for these species, develop a mitigation plan which minimizes or eliminates impact on these species, and file the survey results and mitigation plan with the Commission for the review and approval of the Director of OPPR prior to construction.

Important Habitat for Game Species

Moose. Construction activities would disturb 151 acres of winter range, 85 acres of winter and year-round range, and 24 acres of year-round range for moose (Table 4E-14). Approximately 78 acres of these winter and winter/year-round ranges were identified as crucial seasonal ranges. The majority of this habitat is sagebrush-steppe, alternating with important riparian habitat along Beaver Creek, Rock Creek, Willow Creek, Pine Creek, Fish Creek, and Sweetwater River. Construction would require removal of approximately six acres of riparian vegetation at Beaver Creek.

Disturbance of sagebrush-steppe habitat is less than significant because it would be temporary and the amount of habitat disturbed would be minimal compared to the amount of foraging habitat available. Removal of riparian vegetation on crucial seasonal ranges is significant because the ranges provide important forage and cover for moose and this habitat would not recover quickly.

No direct mortality or disturbance would occur on moose winter ranges because construction would occur during summer and early fall. Construction activities could result in higher mortality rates for moose on other seasonal ranges, but the increase would be small and the impact is less than significant. Construction activities could disturb moose, resulting in avoidance of areas, but the disturbance would be temporary and is less than significant.

Rocky Mountain Elk. Construction activities would disturb 36 acres of winter range, 91 acres of year-round range, and 157 acres of spring/summer/fall range for Rocky Mountain elk (Table 4E-14). The proposed pipeline route would cross crucial seasonal elk ranges.

Sagebrush-steppe habitat is found on all the seasonal elk ranges that would be crossed by the proposed pipeline route. The effects of construction would be similar to those described above for moose, and the impacts are less than significant.

Mule Deer. Construction activities would disturb 254 acres of winter range, 303 acres of winter and year-round range, 1,139 acres of year-round range, and 351 acres of spring/summer/fall range for mule deer (Table 4E-14). Approximately 279 acres of winter and winter/year-round range were identified as crucial seasonal mule deer ranges.

The majority of the habitat is sagebrush-steppe with small amounts of irrigated agricultural land and mixed-grass prairie. The effects of construction activities would be similar to those described above for moose, and the impacts are less than significant.

Pronghorn. Construction activities would disturb 363 acres of winter and year-round range, 836 acres of year-round range, and 242 acres of spring/summer/fall range for

Table 4E-14

IMPACTS ON GAME SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING ALONG THE ALTAMONT PROJECT ROUTE IN WYOMING

Species	Seasonal Range	Habitat Affected (acres)	Direct Mortality	Permanent Habitat Loss	Temporary Habitat Loss	Avoidance of Habitat by Wildlife
Moose	Winter	151	NC	LS	LS	NC
	Winter and year round	85	LS	LS	LS	LS
	Year round	24	LS	LS	LS	LS
Rocky Mountain elk	Winter	36	NC	LS	LS	NC
	Year round	91	LS	LS	LS	LS
	Spring, summer, and fall	157	LS	LS	LS	LS
Mule deer	Winter	254	NC	LS	LS	NC
	Winter and year round	303	LS	LS	LS	LS
	Year round	1,139	LS	LS	LS	LS
	Spring, summer, and fall	351	LS	LS	LS	LS
Pronghorn	Winter and year round	363	LS	LS	LS	LS
	Year round	836	LS	LS	LS	LS
	Spring, summer, and fall	242	LS	LS	LS	LS
Sage grouse	Lekking range	60.6	LS	LS	LS	LS

Notes: LS = less than signficant
NC = no change

pronghorn (Table 4E-14). Approximately 206 acres of winter and winter/year-round range were identified as crucial seasonal pronghorn ranges.

The majority of the habitat is sagebrush-steppe with small amounts of irrigated agricultural land and mixed-grass prairie. The effects of construction activities would be similar to those described above for moose, and the impacts are less than significant.

Sage Grouse. Approximately 61 acres of sage grouse strutting areas and nesting grounds would be disturbed during construction (Table 4E-14). Construction activities in June could result in direct mortality of young sage grouse that are still in nests. This impact is less-than-significant because most nesting has been completed by mid-June ~~(Farmer personal communication)~~ and thus few birds would be affected. Removal of vegetation would result in a loss of cover and forage, causing additional mortality of sage grouse. These impacts are less-than-significant because the loss of sagebrush-steppe habitat would be temporary and the amount of habitat lost would be minimal compared to the available habitat.

Waterfowl. The proposed pipeline route would cross no wildlife refuges but would pass within 0.5 mile of the Seedskadee NWR on the Green River. Waterfowl that are present in riparian areas and wetlands would be disturbed during construction and would avoid these areas. The impact is less than significant because no important waterfowl nesting areas would be crossed by the proposed pipeline route; only small, local groups of waterfowl would be potentially affected; most nesting would be completed by the time construction began; and the disturbance would be temporary.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE SOUTH PASS ROUTE VARIATIONS

Special-Status Plant Species. Two federal candidate status species, meadow pussytoes (status C2) and Fremont's bladderpod (status C3), may occur in the vicinity of the Jeffrey City, Alkali Butte, and Northern Utilities Variations. In addition, the Beaver Rim phlox, a federal candidate status 2 species, is known to occur along the Alkali Butte and Northern Utilities Variations. No information (beyond that presented for the proposed route) is presently available for the Route 28 Variation.

At this time, we do not have sufficient information to accurately evaluate potential impact on these species. ~~Therefore,~~ To minimize potential impact on special-status plant species if one of the South Pass Route Variations is selected, we recommend that Altamont survey these selected route variations for the occurrence of special-status plants, realign its route (as necessary) to minimize disturbance of these species to the maximum extent practicable, and file ~~these~~ any route realignments with the Commission for the review and approval of the Director of OPPR prior to construction.

Wetland and Riparian Habitat. Construction along Altamont's proposed route in the area of the South Pass Variations would disturb approximately 36.4 acres of wetland and riparian vegetation. In contrast, construction along the Jeffrey City Variation would affect

29.4 acres, while the Alkali Butte, Northern Utilities, and Route 28 Variations would affect 44.8, 45.6, and 39.2 acres of wetland and riparian vegetation, respectively.

Special Native Plant Communities. Construction along the Jeffrey City would result in the disturbance of a BLM-designated plant community dominated by Porter Sagebrush and bluebunch wheatgrass in the vicinity of Lysite. Construction along the Alkali Butte Variation would result in the disturbance to two BLM-designated unique plant communities, one dominated by Beaver Rim phlox and the other dominated by limber pine and bluebunch wheatgrass, in the Beaver Divide area. No unique plant communities are known to exist along the Northern Utilities or Route 28 Variations.

At this time, we do not have sufficient information to accurately evaluate potential impact on these species. Therefore, to minimize potential impact on special-status plant species, we recommend that Altamont survey these route variations for the occurrence of special-status plants, realign its route (as necessary) to minimize disturbance of these species to the maximum extent practicable, and file these route realignments with the Commission for the review and approval of the Director of OPPR prior to construction.

Special-Status Wildlife Species. Four federally listed wildlife species (bald eagle, American peregrine falcon, black-footed ferret, and whooping crane) potentially occur in the vicinity of all four route variations but would not be affected by construction. ~~A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

Important Habitat for Game Species. Construction along any of the four route variations would result in varying levels of disturbance to big game important habitat (see Chapter 3E). These impacts would not be significant.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

A detailed analysis of potential impact on vegetation and wildlife resources, covering a one mile wide project corridor, was completed for the Kern River and Mojave pipeline projects as part of the EOR FEIR/EIS in 1986. This document analyzed potential impact on wetlands, riparian vegetation, important wildlife habitat, unique plant communities, state-listed plant and wildlife species, and federally listed or proposed threatened or endangered species and their designated critical habitat. Site-specific mitigation measures were designed and recommended in that document to minimize or eliminate potentially significant impact. In addition, a BA was prepared to assess potential affect on both state- and federal-listed species, and formal consultation concerning potential impact on federally listed species has been initiated with the FWS.

Chapter 4F. Environmental Consequences: Fisheries

IMPACTS

Potential impact on fish habitat and populations ranges from physical or chemical changes in water quality to degradation and loss of physical habitat. Impacts were judged to be significant based on the criteria discussed below. Three categories of impact duration were considered: temporary, short term, and long term. Temporary impacts occur only during the construction period (e.g., turbidity from in-channel excavation). Short-term impacts last from the time construction ceases to three years following construction (e.g., loss of vegetation in the construction right-of-way). Long-term impacts last longer than three years following construction (e.g., permanent loss of riparian vegetation along the width of the operational right-of-way).

Section 7 of the Endangered Species Act requires that any project authorized, funded, or conducted by any federal agency (e.g., FERC) should not "...jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species which is determined to be critical..." (16 USC 1536 (a) (2) (1988)). FERC is required to consult with the FWS or the NMFS to determine if any federally listed or proposed endangered or threatened species, or their designated critical habitat, occur in the vicinity of the proposed project. If, upon review of existing data, FERC determines that these federally listed species or designated critical habitats may be affected by the proposed project, FERC is required to initiate formal consultation to identify the nature and extent of the adverse impact, as well as identify mitigation measures that would reduce potential impact to acceptable levels. If, however, FERC determines that no federally listed or proposed species or their designated critical habitat would be affected by the proposed project, then no further action would be necessary.

To comply with Section 7 requirements, FERC (as lead federal agency for this NEPA process) and the project applicants have consulted informally with the appropriate FWS and the NMFS threatened and endangered species experts regarding the presence of federally listed or proposed species in the project area. In accordance with our responsibilities under the ESA, the FERC ~~is currently preparing a Biological Assessment (BA)~~ staff prepared a BA to determine if either project would affect a federally listed or proposed threatened or endangered species. The BA process ~~will~~ was also ~~be~~ utilized by the FERC to develop site-specific mitigation recommendations to minimize or eliminate impact on federally listed or proposed species. Based on the determinations reached in the BA, the FERC ~~will~~ entered into formal consultation (as necessary) with the appropriate regional office(s) of the FWS and NMFS, and will secure a Biological Opinion for the project(s) prior to the commencement of any proposed construction activities. Additional information developed ~~during this process will be~~ in the BA's is included, as appropriate, in ~~our~~ this Final EIS.

Criteria for Determining Significance

Significant Impacts. Adverse impacts on individuals of species federally listed or proposed for listing as threatened or endangered were considered significant if any of the following criteria were met. Impacts on substantial portions of local populations of federal status 1 or 2 candidate species; FS- or BLM-designated sensitive species; state-listed endangered, threatened, rare, or special-concern species; or game species were also considered significant if any of the following criteria were met:

- o direct mortality;
- o long-term loss of existing habitat;
- o temporary or short-term loss of habitat that may result in increased mortality or lowered reproductive success; or
- o avoidance by fish of biologically important habitat for substantial periods of time, which may increase mortality or lower reproductive success.

IMPACTS AND MITIGATION MEASURES COMMON TO THE PGT AND ALTAMONT PROJECTS

Impact on fishery resources, such as sedimentation and turbidity, acoustic shock, loss of stream cover, introduction of water pollutants, or entrainment of fish, could result from construction activities. The applicants would be required to comply with FERC's Stream and Wetland Construction and Mitigation Procedures we developed (see Chapter 4C "Hydrology") in order to minimize or eliminate the majority of these impacts (see Appendix C-3). In addition to our requirements, federal, state, and local land management agencies may require the applicants to follow more stringent procedures and to prepare site-specific stream- and river-crossing plans. No activities that violate existing state or federal water quality standards would be allowed.

Sediment and Turbidity. Increased sedimentation and turbidity from construction would have the greatest potential to adversely affect fishery resources. However, impact from construction-related sedimentation and turbidity would be reduced to a temporary disturbance if our Procedures, which are summarized below, are followed.

Construction of stream crossings would be limited to the low-flow period between June 1 and September 30 (unless otherwise expressly permitted or restricted by state agencies) in order to minimize sedimentation and turbidity induced by high water flow. In addition, limiting construction to this period would reduce impact on salmonid spawning areas that may be present at or downstream of the proposed crossings. Trench spoils should be stored above the streambank and protected with silt fences, hay bales, or other facilities that would reduce sediment runoff into the stream. Additionally, all staging areas would be located at least 50 feet back from the stream to reduce loss of riparian vegetation and limit the probability that these additional cleared areas would contribute to sediment runoff.

Permits would be required from state agencies for the proposed stream crossings to ensure proper construction methods are used relative to the fishery resource quality. Following the procedures outlined in Appendix C-3, minor streams (less than 10 feet wide) containing coldwater or warmwater fisheries considered to be significant by the state fish management agency would be flumed prior to instream construction activities. Construction equipment would cross major streams (10 to 100 feet wide) and minor streams containing coldwater and average quality warmwater fisheries, on equipment bridges to minimize stream disturbance. Most in-stream work would occur in less than 48 hours or within a maximum of 72 hours. Large rivers would have site-specific criteria for in-stream work submitted to FERC for review and approval prior to construction. Where possible, in-stream and shoreline vegetation would be left in place. After construction, all stream shoreline areas would be mulched and reseeded with appropriate vegetation. Revegetation with native herbaceous and woody plant species is recommended for long-term soil stabilization.

During construction of the proposed stream crossings where open trenching is required, the suspended solids concentration would be high for a relatively short period of time (24 - 48 hours following completion of construction), and for a limited distance downstream of the crossing. The highest suspended sediment levels would occur only during actual construction activity in the channel.

Mitigation methods outlined in our Procedures would be employed at all stream crossings to minimize suspended sediment levels. All crossings, except those of major rivers (greater than 100 feet wide), would be constructed in less than three days unless otherwise permitted by state agencies. Increased suspended sediment levels could increase invertebrate drift and reduce fish feeding for brief periods. Following our recommended stream crossing procedures, this impact would be temporary and suspended solid levels would return to background levels soon after construction in the river would be completed.

If the stream crossing area contains spawning habitat, instream construction would directly disturb the substrate for a maximum width of 75 feet, except at river crossings where this width would be greater. Spawning areas directly downstream of these proposed crossing sites could receive increased fines in the substrate. Much of these fines would be washed away during subsequent fall and spring high flows, unless drought conditions exist, reducing impact on the following season's spawning success.

Acoustic Shock. Some stream crossings would require blasting of bedrock, which, due to acoustic shock, could be harmful to fish that are in the immediate vicinity of the explosion. The degree of blasting impact on fish would depend on the type of explosive, blasting technique, fish species, and timing. Teleki and Chamberlain (1978) conducted experiments on the survival of various species following detonation of charges placed in bedrock or mud of a lake bottom. These experiments revealed that laterally compressed fish species (e.g., pumpkinseed, crappies) were most sensitive to blast-related acoustic shock, while those with more rounded body forms (e.g., rainbow trout, white sucker) were least affected.

Based on several assumptions, we can estimate the distance to which fish would suffer mortalities in the stream from underwater detonation. Robbins (1988) described techniques and quantity of blasting material used for a major gas pipeline crossing on the Susquehanna River in Pennsylvania. Assuming similar techniques would be utilized by PGT and Altamont for major stream crossings allows us to estimate distances to which fish mortality would occur. Based on Robbins' described methods, a double row of drill holes, with the holes spaced five feet apart, and 60 pounds of explosive placed in each hole could be used. This method would use 2,400 pounds of explosive per 100 feet of excavation. Most streams that would be crossed are much less than 100 feet wide, so we will assume a 50-foot-wide crossing area would be detonated at one time, which equals 1,200 pounds of explosive detonated. Based on the data presented by Teleki and Chamberlain (1978), the most sensitive laterally compressed fish (e.g., crappie) would suffer 95 percent mortality within 213 feet of the detonation, and 10 percent mortality within 472 feet of detonation. The least sensitive rounded fish (e.g., rainbow trout) would suffer 95 percent mortality within 174 feet of the blast, dropping rapidly to 10 percent mortality at 194 feet.

Effects of these explosions would be mitigated by several factors. Teleki and Chamberlain (1978) suggest that active construction in the stream area would scare most fish out of the area prior to detonation. We recommend detonation be done in such a manner (e.g., utilizing delayed detonation, air bubble curtains) as to reduce the total acoustic shockwave intensity to the greatest extent possible, based on site-specific conditions. Additionally, we recommend that prior to each detonation in rivers (greater than 100 feet wide), a disturbance such as a scare charge be used to scare fish out of the area.

In the worst case scenario described above, laterally compressed fish could be affected as far away as 490 feet from the detonation, and rounded fish as far away as 197 feet. These effects would be short term and could result in some fish mortality, but we do not believe the impact would be significant because most fish would be scared away from the immediate area during initial drilling, there would be a reduction in shockwave intensity by blasting delays, and only a small portion of each river would be impacted.

Cover Loss. Some instream and shoreline cover would be altered or lost at the proposed stream crossings. Streambank vegetation, instream logs, rocks, and undercut banks provide important cover for fish. Fish that normally reside in these areas could be displaced. Our Procedures recommend that mitigation include long-term revegetation of shoreline areas with native herbaceous and woody plant species, and where stream flow rates preempt vegetative stabilization of streambanks, that large riprap should be used for stabilization and to add cover to the area. Effects on fish from cover loss would be minor because of the small area affected on each stream (a maximum of 100 feet wide).

Other Impact. Other potential impact includes interruption of fish spawning migration, fish entrainment, and fish mortality from toxic substance (fuel) spills. Some fish, such as trout and anadromous fish, migrate during spawning runs and could be briefly interrupted during installation of pipelines across water bodies. Most fish migrate over several days or weeks in small streams. Consequently, migration would only be briefly interrupted, since installation across streams less than 100 feet wide would take less than three days, and is scheduled to occur during nonmigrating periods (i.e., summer).

Both the PGT and Altamont projects would cross numerous waterbodies in areas where streamflow rates are highly variable and instream gradients are steep. The beds of many of these streams are naturally armored with cobble and/or gravel deposits, which protect the stream against downcutting erosion. The failure to replace this armor after construction may contribute to an increased incident of downcutting erosion, which would be a significant impact if coldwater fish populations were affected. Our Procedures require the applicants to backfill the top one foot of the pipeline trench with gravel or crushed stone in all streams that contain coldwater fisheries. Implementation of this procedure would ensure that all disturbed bottoms in coldwater streams are sufficiently re-armored to prevent the occurrence of downcutting erosion.

Entrainment of fish would not likely occur from water withdrawal for hydrostatic testing, since intakes would be screened. Because water would only be taken from large streams for the hydrostatic testing the quantity of water would not significantly reduce instream flow (see Chapter 4C). However, in order to ensure that hydrostatic test water withdrawals do not significantly affect beneficial downstream uses or impede the passage of migratory and/or anadromous fish, we recommend that both PGT and Altamont regulate the withdrawal rates to ensure that no more than ten percent of the actual stream flow is removed for hydrostatic testing purposes.

Direct spills into streams could be toxic to fish, depending on the quantity of spill and concentration. To reduce the potential for surface-water contamination, our Procedures recommend that fuel and other potentially toxic materials be stored away from streams (at least 100 feet), minimizing the chance of direct stream spills. FERC's recommended SPCCP (see Chapter 4C) would act to prevent these spills and would provide a mechanism for immediate response and cleanup of accidental leaks/spills from operating equipment.

Because of the narrow width of shoreline vegetation that would be removed during the proposed construction (100 feet maximum), temperature increases from increased solar isolation would be insignificant.

Special Status Species. Both the PGT and Altamont projects have the potential to affect impact federally listed or proposed species, as well as state-listed species or species of special concern. Potential impact on these species is discussed below for each project. To the extent that the detailed surveys have been completed for ~~an~~ any species, preliminary results have been included in the project discussions below.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE PGT PROJECT

Idaho - Moyie River

Multiple Crossings. PGT's proposed pipeline route crosses the Moyie River at eight different sites (MP 0.3, 1.0, 5.0, 5.8, 7.8, 10.0, 10.7, and 13.6). The Moyie River is subject to ice flows, and the streambed is naturally armored with cobble. Construction of Loop 1 along the proposed route would significantly increase the risk of long-term erosion and significantly affect fish habitat in the Moyie River. To reduce these significant impacts to less-than-significant levels, we have recommended in the Draft EIS that PGT develop an alternate alignment for Loop 1 that would eliminate or reduce the number of crossings of the Moyie River (see Chapter 4C and Chapter 6: "Conclusions and Recommendations"). We ~~have~~ also recommended that PGT develop a site-specific construction plan for replacing any cobble armor disturbed by construction (see Chapter 4C). In addition, we recommended that PGT prepare a site-specific construction, restoration, mitigation,and monitoring plan for each of the proposed Moyie River crossings, which takes into account impacts on water quality, fisheries, wildlife, and wetlands~~, and file the plan with the Secretary of the Commission for the review and approval of the Director of OPPR prior to construction~~. The requested information is discussed in Chapter 6, and a copy of PGT's "Plan" is contained in Appendix F.

Idaho - Bussard and Snyder Creeks

Erosion Potential. Construction across Bussard and Snyder Creeks would require in-channel construction in a high-gradient reach of both waterbodies. Because of the steep terrain, the altered stream channels and streambanks would be at risk from degradation and erosion. Downcutting or lateral channel migration could cause significant impacts on fish habitat in both Bussard and Snyder Creeks, as well as the Moyie River. To reduce these impacts to less-than-significant levels, we have recommended that PGT replace the streambed armoring substrate after construction, and perform long-term monitoring to ensure that downcutting erosion is controlled (see Chapter 4C).

Washington - Walla Walla River

Anadromous Fish Passage. The PGT Project route crosses the Walla Walla River at a location that provides transportation water and rearing habitat for anadromous populations of fall-run chinook salmon and steelhead trout. In order to ensure that construction does not significantly affect the migration of anadromous fish, we recommend that PGT develop, in coordination with the applicable Washington state agencies, and include as part of its site-specific construction plan, a timing schedule for the proposed river crossing that would eliminate interference with anadromous fish passage. In addition, we have also recommended that PGT limit hydrostatic test water withdrawal rates to less than ten percent of actual streamflow.

Oregon - John Day River

Erosion Potential. Construction along the John Day Canyon Variation would result in the right-of-way crossing steep terrain on both sides of the John Day River, and running parallel to the east bank of the river for approximately 2,000 feet. There is a high probability that long-term erosion would occur along both sides of the canyon and along the east bank, as the reclamation potential in this area is low. Uncontrolled erosion in this area could significantly impact fish populations in the John Day River, as well as other beneficial uses. Therefore, in our Draft EIS we recommended that PGT develop a detailed site-specific construction and restoration plan for the John Day Canyon Variation that addresses erosion control, river crossing techniques, exact crossing location, right-of-way restoration, and provisions for avoiding impact on anadramous fish populations, and to provide this plan to the staff for analysis in the Final EIS.

PGT's proposed "Construction and Restoration Plan - John Day Variation" contains an extensive description of the existing environment along the John Day Variation. PGT has agreed to adopt the FERC staff's Erosion Control, Revegetation, and Maintenance Plan and its Stream and Wetland Construction and Mitigation Procedures, and has formulated additional measures (such as timing constraints, special construction procedures, and revegetation mixtures) to ensure that adverse impacts would be minimized. However, PGT's proposed Plan is written in generic terms and lacks the degree of specificity required to convince the staff that potentially significant adverse impacts would be minimized to the maximum extent practicable. Therefore, the staff will recommend that PGT develop and file with the Secretary of the Commission a detailed and site-specific construction and restoration plan for its construction of the John Day Variation, including alignment sheets which show the location and manner in which PGT's proposed construction, restoration, and revegetation procedures would be implemented, for staff review prior to construction.

Special Status Species

Shortnose Sucker. The shortnose sucker, a federally listed endangered species, is native to the Upper Klamath Lake and its principle tributaries, the Lost and Williamson Rivers. Consultation with biologists from FWS and Oregon Department of Fish and Wildlife revealed that this species has not been documented in either river near the pipeline crossing sites. The nearest confirmed occurrence of the shortnose sucker is in the Clear Lake Reservoir, approximately 40 miles upstream of the Lost River crossing site in the state of California. Therefore, construction of the PGT Project ~~should~~ would not affect the shortnose sucker. ~~A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

Lost River Sucker. The Lost River sucker, a federally listed endangered species, is native to Upper Klamath Lake, the Lost River system, and Sheepy Lake. The nearest confirmed occurrence of the Lost River sucker to PGT's route is the Williamson River at its confluence with the Sprague River, approximately 10 miles downstream of the crossing site, where these fish enter the Sprague River on their upstream migration. Therefore, the Lost River sucker is not expected to occur in the vicinity of the pipeline route, ~~A determination of affect~~

~~and recommended mitigation measures will be developed by the FERC in our BA.~~ and would not be affected by construction.

Warner Sucker. The Warner sucker, a federally listed threatened species, occurs in the Warner Basin in southeastern Oregon, which is located over 100 miles from the PGT project. Therefore, it would not be affected by construction of the PGT project.

Klamath Largescale Sucker. The Klamath largescale sucker is a federal candidate status 2 species whose distribution includes the Williamson and Lost Rivers. Informal consultation with the FWS revealed that no critical habitat exists in the vicinity of the proposed crossings, and that no impact on this species is expected to occur.

Redband Trout. Implementation of the procedures contained in Appendix C-3 would ensure that impact on this species is not significant.

California - PG&E Nonjurisdictional Facilities

~~Special Status~~ Federal-Listed Species

Modoc Sucker. The Modoc sucker, a federally listed endangered species, is known to occur in three small tributaries of the Pit River upstream of the proposed crossing. All three of these tributaries are located above a major waterfall from the proposed crossing site. There are no confirmed occurrences of the Modoc sucker in the vicinity of PG&E's facilities, and no suitable habitat (apparent requirement for small, isolated streams) is present. ~~A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~ Therefore, construction of PG&E's facilities would not affect the Modoc Sucker.

Shasta Crayfish. The Shasta crayfish, a federally listed endangered species, is known to occur in the vicinity of the proposed Fall River crossing. Most populations, however, are found at or near a spring source where they are associated with rubble substrate and little or no aquatic vegetation. The main Fall River channel within the reach that would be affected by the crossing lacks habitat that would be considered suitable. ~~At this time, additional surveys for potential habitat are being performed. A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

A field study was conducted during the week of August 13, 1990. Scuba-equipped biologists surveyed the Fall River for several miles upstream and downstream of the proposed crossing of the Expansion Project. Shasta crayfish are primarily found at or near the springs that feed Fall River and Hat Creek rather than in the main channels where the habitat appears less suitable. However, a population of Shasta crayfish was located about one mile upstream of the crossing in a patch of rubble substrate. No Shasta crayfish were observed at or downstream of the crossing site although other patches of rubble substrate were found above and below the crossing site. Only one other injured Shasta crayfish was found, also upstream of the crossing site.

An open trench crossing of the Fall River could cause the direct loss of a few Shasta crayfish during construction. Increased turbidity during trenching could cause the displacement or loss of Shasta crayfish downstream of the crossing. Both of these possibilities depend on the presence of Shasta crayfish in the vicinity of the proposed crossing during construction. Sedimentation of potential or existing crayfish habitat (rubble) could occur when fine substrate, suspended during trenching, settles to the river bottom.

PGT/PG&E is currently investigating the feasibility of boring the Fall River crossing. If boring is not feasible, PGT/PG&E has proposed to construct an aerial crossing of the Fall River. The FERC staff has determined that construction and operation of the PGT/PG&E Project, with the implementation of PGT/PG&E's proposed mitigation measures, would not affect the Shasta crayfish.

Winter-run Chinook Salmon. The winter-run chinook salmon, a federally emergency-listed threatened species, occurs at several locations along PG&E's route. This species occurs at the first crossing of the Sacramento River (MP 755), and utilizes the area primarily as a path during the upstream migration of adults between December through June, and the downstream migration of juveniles between August through November. An unknown fraction of the juvenile population may use the river near the crossing for rearing. Winter-run chinook salmon also occur in the Sacramento-San Joaquin Delta during their upstream migration as adults and downstream migration as juveniles or smolts. An unknown fraction of the juvenile population may use the Delta for rearing in wet years. Specific areas of occurrence include the second Sacramento River crossing (MP 906.1), the San Joaquin River crossing (MP 910.2), and the Dutch Slough crossing (MP 913.6). ~~A determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

The first crossing of the Sacramento River is located approximately 4 miles downstream of Red Bluff Diversion Dam (RBDD) and is therefore downstream of the reach designated as critical habitat for winter-run chinook salmon (Sacramento River from RBDD to Keswick Reservoir). PG&E's proposed pipeline crossing of the upper Sacramento River is located completely within a major spawning riffle for the winter-run chinook salmon. In its biological opinion, the CDFG determined that construction of PG&E's proposed crossing of the upper Sacramento River may jeopardize the winter-run chinook salmon.

The second crossing of the Sacramento River (MP 906.1), the San Joaquin River crossing (MP 910.2), and the Dutch Slough crossing (MP 913.6) are located in the western Sacramento-San Joaquin Delta. Winter-run chinook salmon occur in the vicinity of these crossings as adults from November through June during their upstream migration to spawning areas in the Sacramento River, and as juveniles or smolts between January and April during their downstream migration to the ocean. Winter-run fry may appear in the Delta by November and December, especially when fall storms cause high Sacramento River discharge.

PGT/PG&E proposes that mitigation would be in the form of construction windows to avoid or minimize impacts. The northern Sacramento River crossing would be constructed between July 15 to September 15 to avoid the primary migration periods for both adult and juvenile salmon. PGT/PG&E is investigating the feasibility of boring the southern Sacramento

River crossing. If the directional drilling option is not feasible and the trenching method is necessary, the crossing would be constructed between October 15 to January 15, prior to the arrival of juveniles migrating downstream and adults migrating upstream.

The CDFG identified five alternative crossing methods that would avoid "jeopardy" to the winter-run chinook salmon due to the proposed crossing of the upper Sacramento River, and recommended that PGT-PG&E implement one or more of these alternative techniques (see appendix 5.2). Therefore, the FERC staff will recommend that PGT ensure that PG&E implements at least one of the alternative crossing techniques for the Sacramento River contained in the CDFG's biological opinion.

The FERC staff has determined that construction of PG&E's facilities across the upper and lower Sacramento River would affect the winter-run chinook salmon. However, implementation of PGT/PG&E's proposed mitigation, along with the FERC staff's recommended mitigation measure, would ensure that construction of PG&E's facilities would not "jeopardize" the winter-run chinook salmon. The FERC staff has entered into formal consultation with the NMFS concerning potential impact on this species, and will recommend that PGT/PG&E not construct its proposed facilities until the FERC staff receives a Biological Opinion (Opinion) from the NMFS, and PGT/PG&E agree to implement the Opinion's mandatory terms and conditions.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE ALTAMONT PROJECT

Montana - Missouri River

Recreational Fisheries and Special Status Species. The Missouri River is classified by the ~~state of Montana~~ DFWP as a Class I fishery at the proposed crossing location, and supports a high quality recreational warmwater fishery. In addition, the pallid sturgeon, a federally endangered species, and the paddlefish, a federal status 3c candidate species currently under a full-status review, also occur in the Missouri River. The spatial and temporal patterns of use by these species in the vicinity of the proposed crossing are not well understood. In order to avoid potentially significant impact on these special status species, as well as the resident warmwater fishery, we recommend that Altamont install its pipeline across the Missouri River through the use of directional drilling techniques. Directional drilling is a technique used by the pipeline construction industry for facilities of this size where standard trenching or horizontal boring is infeasible, inadequate, or inappropriate for the protection of sensitive resources. The 750-foot width of the Missouri River is well within the range of distances capable of being spanned using the directional drilling method. Depending on geologic conditions, crossings can generally be completed in a matter of days, with very little additional disturbance outside of the standard right-of-way. Use of this technique would also satisfy Montana's floodplain development requirement that the pipeline be buried at twice the maximum scour depth. ~~In addition, a determination of affect and recommended mitigation measures will be developed by the FERC in our BA.~~

The habitat present at Altamont's proposed crossing of the Missouri River may be utilized for spawning and/or rearing by the pallid sturgeon (Gardner, personal communication). Open trench construction of the pipeline crossing at the Missouri River would result in the disturbance of bottom substrate in a narrow band across the river, as well as short-term elevated levels of turbidity and sedimentation for some distance downstream of the crossing location. The following impacts could occur at the proposed crossing site:

- o If construction occurs during the spawning period, adult sturgeon could be disturbed thereby causing a decrease in spawning success and direct mortality to incubating eggs from disturbance and/or siltation;

- o Direct mortality of juvenile pallid sturgeon could occur during excavation and filling of the trench; and

- o If unscreened water is drafted from the Missouri River for hydrostatic testing of the pipeline, mortality of juvenile sturgeon could occur.

Altamont proposes to construct the crossing of the Missouri River in late summer or fall during low flow periods, well after any potential spawning activities would have been completed. However, Altamont's proposed mitigation does not address potential impact on juvenile pallid sturgeon that may occur in the area, nor does its mitigation discuss potential impact on pallid sturgeon spawning habitat. Therefore, to ensure that Altamont's proposed crossing of the Missouri River does not affect the pallid sturgeon, the FERC staff will recommend that Altamont implement the following mitigation measures:

- o Altamont shall install its proposed pipeline across the Missouri River through the use of directional drilling techniques; and

- o Altamont shall screen its hydrostatic test water intake hose to prevent the entrainment of fish.

Implementation of the FERC staff's recommended mitigation measures would ensure that construction and operation of the proposed Altamont Project would not affect the pallid sturgeon.

~~Montana—Ross Fork Creek~~

~~**Decreased Fish Habitat due to Multiple Crossings.** Ross Fork Creek supports a high-quality coldwater fishery composed of rainbow and brown trout. Altamont's proposed route crosses Ross Fork Creek at least six times between MP 154.8 to 166.0. The majority of these crossings occur between MP 159.0 to 166.0. These multiple crossings would result in cumulative significant impact on the fish populations in Ross Fork Creek, as well as the Judith River downstream, due to increased turbidity levels during construction, resultant downstream sedimentation, and a reduction in water quality due to potential long-term erosion caused by the removal of riparian vegetation. To reduce this impact to a less than significant level, we recommend that the number of crossings of Ross Fork Creek between MP 154.8 to 166.0 be reduced. However, at this time, we do not have sufficient environmental and engineering~~

~~information to recommend a specific alternative alignment in this area. Therefore, we recommend that Altamont develop an alternative alignment between MP 154.8 to 166.0 which reduces the number of crossings of Ross Fork Creek. This alternative alignment should be developed in close coordination with the appropriate federal and state agencies, affected landowners, and other interested parties, and must be submitted for inclusion in the Final EIS.~~

Montana - Yellowstone River

Impact on Fish Populations. Open trench construction at this location may require blasting to comply with the State of Montana's floodplain development permit scour depth requirements. Turbidity generated by construction during the spawning season may inhibit brown trout from reaching their spawning grounds upstream in the tributaries. Trenching during a low-flow time of year would mean that no flushing flows would be available to clear out the sediment. Sediment deposited downstream could clog interstices and smother fish eggs and macroinvertebrates. These impacts may be significant.

The Montana Department of State Lands would require feasibility studies on directional drilling before issuing the right-of-way deed for crossing the Yellowstone River. A description of the open trench construction method tailored to the river's particular characteristics would also be required. The description would include the depth of the trench, width at the top of the trench, method of excavation, projected time for completion, a discussion of reclamation options, relative costs, and other pertinent information. The study would include an analysis of a crossing realignment slightly downstream to avoid the steep south slope. This information would be used to determine whether the Department of State Lands would require a particular construction method as a condition to the right-of-way deed.

Wyoming - Bighorn River

Impact on Spawning Gravels. Implementation of the project at the Bighorn River crossing (MP 374.2) would result in suspension and deposition of fine sediments during the period of construction. This could have a potentially significant short-term impact on critical channel catfish and sauger spawning habitat downstream of the crossing. To reduce this impact to a less-than-significant level, we recommend that construction across the Bighorn River be further restricted to the period between July 15-September 15.

Wyoming - Green River

Impact on Coldwater Fish Populations. The Green River is classified by the state of Wyoming as a Class I river, and supports an excellent coldwater fishery primarily composed of rainbow, brown, and cutthroat trout. Construction of the Altamont Project would result in a significant impact on this coldwater fishery. In order to minimize these impacts, we recommend that Altamont develop its site-specific construction plan in close coordination with the Wyoming Game and Fish Department, and specifically address the issues of timing constraints, site-specific mitigation, and habitat restoration.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE SOUTH PASS ROUTE VARIATIONS

Impact on Coldwater Fish Populations. Impact associated with construction along any of the South Pass Variations would result in impacts to coldwater fish populations that are similar to those found along the proposed route, including those identified above for the Green River. In the event that one of these variations is found to be environmentally superior, the recommendation developed above for the proposed crossing of the Green River would also apply to any of the Variations.

IMPACTS SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

Construction of the Kern River downstream facilities would not result in impact on fishery resources, as no perennial waterbodies which contain fish populations would be affected.

Chapter 4G. Environmental Consequences: Socioeconomics

IMPACTS

Socioeconomic impacts would result from the temporary increase in population associated with pipeline construction. Temporary impacts from population increases are estimated to last between one and three months in the counties that would be crossed by the proposed pipelines. In a small number of cases, minor temporary impacts may last as long as seven months; however, it is unlikely that entire construction crews would be located within one county for more than three months.

The construction of the proposed projects would result in some beneficial economic impact on the area crossed by the projects. The hiring of local workers, contractor purchases of materials and supplies, and spending of nonlocal workers would result in a short-term increase in local personal income. The projects would have a long-term beneficial effect on local property tax revenues. Altamont has estimated that its proposed pipeline would generate approximately ~~\$7~~ 9 million annually in ~~state and local~~ ad valorem taxes, \$6 million in Montana and \$3 million in Wyoming. The amounts of annual ad valorem taxes that would be received by each county crossed by the pipeline would be directly proportional to the length of pipeline installed in each county. See Table 2-9 for a list of counties and the corresponding length of pipeline. PGT has not estimated their future tax payments related to the proposed project.

Construction impacts also include the temporary and permanent removal of agricultural land and forestland from production. It is estimated that temporary impacts on agricultural production would occur over the period needed to return disturbed areas to production. In most cases, it is estimated that pipeline construction would preclude agricultural production on disturbed land for one growing season. Permanent impacts would result because trees and deep-rooted crops, such as those grown in orchards and vineyards, would not be allowed to grow on the permanent right-of-way.

Operational Impacts. All socioeconomic impacts would be generated by construction of the proposed pipeline. No additional socioeconomic impacts related to operation of the pipeline are expected.

Criteria for Determining Significance

Adverse impacts were considered significant if the following criteria were met:

- o Population. The total population of the counties that would be crossed by a construction spread would increase by 10 percent or more.

- Housing. The project-related demand would cause the vacancy rate for temporary housing to fall to less than 5 percent.

- Public Services. The estimated demand for public services from the project-related population would exceed the existing capacities of affected public services.

- Agricultural Land Resources. The construction of the proposed project would result in the temporary or permanent loss of one percent or more of the agricultural land in a county or a loss of one percent or more of the acreage planted to a county's most valuable crop.

- Forest Resources. The proposed project would result in the permanent conversion of timberland that would cumulatively cause at least a one percent decrease in the volume of commercial timber produced in a state.

Assumptions and Limitations of Analysis

Population Increases and Associated Impacts. Because of the complex nature of both the PGT and the Altamont projects, certain assumptions were required to assist in the identification of significant socioeconomic impacts. Population impacts were analyzed by treating the group of counties crossed by each construction spread as a single unit, adding the individual county statistics together. Data on population, housing, public services, employment, and income levels reported by federal and state agencies are typically available on a county-by-county basis. Counties that would not be directly affected by pipeline construction were not included in the analysis. Excluding these counties may, in some cases, overstate the impacts of the project on individual counties.

The analysis of temporary housing supplies was limited to examining housing stocks that were quantifiable. Other housing stocks, such as rooms in private homes and boarding houses, were not quantifiable and were therefore not included in the analysis. Because we could not accurately project seasonal variation in vacancy rates, our analysis assumes that all housing units would be available for use by construction personnel. It can be expected that during peak seasons, the combined demand for temporary housing from tourists, recreationists, and construction personnel would at times exceed the supply. While this would benefit the proprietors of the local motels and RV camps, it could result in the displacement of some tourists or recreationists and could detract from the quality of the recreational experience. The opportunity for this conflict in a specific area, however, would exist for only one summer season.

Agricultural Resource Impacts. All agricultural impacts were identified on a county-by-county basis because data are published on a county-by-county basis by the U. S. Department of Commerce, as well as by state agricultural departments. This method allowed for a consistent comparison between impacts on each county that would be crossed by the pipeline projects.

The analysis of the potential impacts on agricultural production used a worst-case approach. Data on the actual crop types grown in the permanent and temporary rights-of-way are not available; therefore, general assumptions of crop types were made by examining the agricultural land use designations within each county. Agricultural land use designations include rangeland, pasture, dry cropland, broadcast irrigation, row crops, vineyards, and orchards. The total acreage of the most valuable crop in each county was then compared with the total acreage of the agricultural land use designation in which that crop could be grown.

Forest Resources. Losses to timber production were analyzed on a state-by-state basis because of available data. Additionally, it is not uncommon for timber to be transported great distances to centralized processing facilities. These processing facilities may be located in counties that would not be crossed by the proposed pipelines. ~~A loss of timber production within a pipeline county may have a greater impact on a county that would not be crossed by the pipeline.~~ The volume of timber that has regrown in the area cleared for the existing PGT pipeline was not analyzed. This regrowth was not analyzed because it is young (20-30 years old) and has not yet reached marketable age.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE PGT PROJECT

Population Impacts. Construction of the PGT project would temporarily increase the population of areas the pipeline would cross as workers with the specialized skills needed for pipeline construction, who are not readily available from local labor pools, move into the area. Increases in permanent population levels have not been analyzed because few workers would be needed to operate the completed pipeline.

For purposes of analysis, the increases in population are limited to the estimated number of nonlocal construction workers and management personnel needed for the construction of each spread. These numbers of workers were calculated from local union labor availability data provided by PGT. It was assumed that 15 percent of the nonlocal workers would be accompanied by their families and that each family has three members. Construction of the PGT project would proceed at a rate of approximately one mile per day. It was also assumed that all construction workers and management personnel for each loop would be located within the same area. As the project progresses, the construction personnel working on different phases of the project would gradually disperse through the area covered by each spread.

Total population for each loop includes the population of counties that would be crossed by that loop. In cases where a spread would start or end in the middle of a county, the total population of the county was allocated.

All estimated increases of population within each loop are below the 10-percent threshold of significance (Table 4G-1). Spread 1 would cause the smallest population increase at 0.08 percent. Spread 4 would cause the greatest population increase at 1.02 percent.

Table 4G-1

ESTIMATED TEMPORARY POPULATION IMPACTS
FOR THE PGT PROJECT

Construction Spread	Counties Crossed	Population	Temporary Population Increase	Percent of Population Increase
1	**IDAHO**			
	Boundary	7,600		
	Bonner	25,900		
	Kootenai	67,500		
	WASHINGTON			
	Spokane	356,900		
	Whitman	40,700		
	Walla Walla	48,000		
Total Spread		546,600	458	0.084
2	**OREGON**			
	Umatilla	60,200		
	Morrow	8,100		
	Gilliam	1,800		
	Sherman	2,100		
	Wasco	21,300		
	Jefferson	12,300		
Total Spread		105,800	706	0.67
3	**OREGON**			
	Jefferson	12,300		
	Crook	13,200		
	Deschutes	68,700		
	Klamath	57,500		
Total Spread		151,700	616	0.41
4	**OREGON**			
	Klamath	57,500	589	1.02

Housing Impacts. Construction of the PGT project would increase the demand for local housing. The increase in the demand for housing would correspond to the number of nonlocal workers hired for each loop. It is assumed that nonlocal workers would choose temporary housing instead of renting apartments or houses. Temporary housing included in the analysis is limited to campsites, RV sites, and motel/hotel units. Local workers are not expected to move from their current residences.

Demand for housing was calculated by assuming that single construction workers would not share housing units and that workers with families would share a single unit. It was also assumed that workers have no preference over campsites, RV sites, or motel/hotel units. The supply of housing units was calculated for each construction spread by totaling the estimated number of units in the counties that would be crossed by a respective spread. ~~Because we could not accurately project seasonal variation in vacancy rates, our analysis assumes that all housing units would be available for use by construction personnel.~~

The greatest impact on the temporary housing market would be expected along Spread 4 which would cause an estimated vacancy rate of 75.4 percent. The least impact would be expected along Spread 1 which would create an estimated vacancy rate of 95.6 percent. In all cases the vacancy rates were estimated to remain well above the 5 percent threshold of the significance criteria.

Along Spread 1, the estimated supply of temporary housing units is 7,303 while the demand would be for 316. On Spread 2 the supply is 2,279 and the demand would be for 487 units. The temporary housing supply on Spread 3 is 6,129 units while the demand would be for 425. On Spread 4 the supply is 1,650 and the demand would be for 406 units.

It should be pointed out that the workers would be concentrated in a portion of each spread for short periods of time. In cases where the project demand for temporary housing units exceeds the supply, longer commuting distances would be required to ameliorate these shortfalls. Also, a substantial number of additional temporary housing units are located in counties not crossed by the project route but are within convenient driving distances (see Table 3G-3).

Public Service Impacts. The temporary increase in population associated with the construction of the PGT project may adversely affect certain public services (e.g., medical, water and sewer facilities, waste disposal). The degree of impact would vary from community to community depending upon the number of nonlocal workers (and any accompanying family members) that temporarily reside in each community, how long they stay, and the size of the community. Although these factors are too variable to accurately predict the severity of the impact, the effects would be short-term and are therefore not expected to be significant.

Agricultural Land Resources Impacts. Project implementation would result in the short-term (usually one year) loss of agricultural production value from lands that would be cleared for the pipeline right-of-way. It is assumed that all land temporarily taken out of production would be returned to preconstruction levels of production. Measures necessary to ensure that soils are returned to preconstruction levels of productivity are discussed in Chapter 4B, "Soils."

The scale of the PGT project makes an acre-by-acre analysis of the crop types that would be affected by construction infeasible. This difficulty is compounded because cropping patterns may change from year to year. A county-by-county agricultural resource analysis was completed that focused on six agricultural land use designations: rangeland, pastureland, irrigated land, row crops, orchards, and vineyards.

To compute the loss of livestock production from rangeland along the route, the total number of acres categorized as rangeland in each county was divided by the production value for livestock in that county. This figure was then multiplied by the number of acres that would be temporarily taken out of production by pipeline construction. Factors such as the purchase cost of the livestock to the landowner and the productivity of affected rangeland were not considered. The resulting value is the potential value of production that would be lost during construction.

Table 4G-2 presents the results of our assessment of impacts on agricultural land resources. Of the counties along the PGT project route, none would temporarily lose more than one percent of their total agricultural land because of pipeline construction. No county would lose more than one percent of the acreage planted to its most important crop, which is the threshold established in the significance criteria.

Forest Resources Impacts. Construction of the proposed pipeline would result in both the ~~long-term~~ temporary and permanent loss of commercial forestland along the right-of-way. The PGT project would require the clearing of approximately ~~2,557~~ 1,503 acres of land classified as commercial merchantable timber. This accounts for approximately ~~598~~ 385 acres in Idaho and ~~1,959~~ 1,118 acres in Oregon. Commercial forest types found on these lands include mixed conifer, lodgepole pine, and ponderosa pine. The pipeline would not cross any commercial forestland in Washington.

To determine the impact associated with the loss of timber, the volume of timber that would be removed from the right-of-way was compared with the volume of timber sold on public land, and with the volume of timber harvested from public and private lands in Idaho and Oregon. It was assumed that it would be uneconomical to harvest and transport the timber cleared from the pipeline right-of-way to processing facilities because, in general, the narrow width of the right-of-way is believed to make commercial recovery of felled trees impractical. Since the PGT route utilizes existing right-of-way through forested areas, the amount of mature timber cleared for the project would be less than that required for a new right-of-way. On NFS lands merchantable timber cleared from the right-of-way would be valued and sold to PGT by the FS and would be required to be removed from the right-of-way.

Table 4G-3 presents the results of our assessment of affected commercial forestland acreage and volume.

The volume of the timber cleared from the right-of-way in Idaho and Oregon would be less than one percent of the volume of timber sold on public lands in each of those states. When compared with the volume of timber harvested in the two states, the amount of timber that would be removed because of pipeline construction is also less than one percent.

Table 4G-2

IMPACTS ON AGRICULTURAL LAND RESOURCES FROM THE PGT PROJECT

County	Total Agricultural Land (acres)	Land to be Temporarily Removed from Production (acres)[a]	Percent of County Agricultural Land Affected	Most Valuable Crop (1987)				
				Type	Value (in thousands of dollars)	Amount (acres)	Potential Land Affected (acres)	Percent of Total Crop Acreage
IDAHO								
Boundary	79,281	14	<1	Grains	3,380	41,829	7	<1
Bonner	136,833	54	<1	Grain/hay	718	25,556	48	<1
Kootenai	170,739	188	<1	Grain/hay	13,422	39,092	144	<1
WASHINGTON								
Spokane	613,055	24	<1	Grains	24,252	141,396	5	<1
Whitman	675,524	316	<1	Grains	106,510	571,452	311	<1
Walla Walla	1,405,412	405	<1	Cattle	39,202	48,397	11	<1
OREGON								
Umatilla	1,451,108	253	<1	Grains	46,678	262,609	81	<1
Morrow	1,115,683	580	<1	Cattle	53,422	592,264	117	<1
Gilliam	763,613	461	<1	Grains	12,191	103,734	329	<1
Sherman	462,424	84	<1	Grains	21,906	110,131	64	<1
Wasco	1,172,745	122	<1	Fruits	20,475	7,368	0	<1
Jefferson	506,590	505	<1	Hay/seeds	7,953	12,308	58	<1
Crook	860,738	97	<1	Cattle	16,430	697,861	22	<1
Deschutes	152,152	168	<1	Cattle	5,020	121,582	159	<1
Klamath	717,793	495	<1	Cattle	29,612	513,907	274	<1

Note: Acreage totals have been rounded
Source: U.S. Department of Commerce, 1989, a, b, c, d
[a] Includes temporary and permanent rights-of-way

Table 4G-3

COMMERCIAL FORESTLAND ACREAGE AND VOLUME
THAT WOULD BE AFFECTED BY THE PGT PROJECT

	Idaho[a]	Oregon[a]
Commercial Merchantable Land (acres)	385	1,118
Volume of Commercial Timber to be Removed from ROW (Tbf)	1,405	4,983
Estimated Annual Loss in Timber Production for ROW (Tbf)	0	0
Volume of [b] Timber Sold on Public Land (Tbf)	933,023	1,405,429
Volume Harvested [c] from Public and Private Land (Mbf)	1,699	8,020
Timber Harvested from Public and Private Land (Mbf)	<1	<1
Timber Cleared from ROW as a Percentage of Volume Sold from Public Land	<1	<1
Timber Cleared from ROW as a Percentage of Volume Sold from Public and Private Land	<1	<1
Loss in Timber Production from ROW as a Percentage of Volume Sold from Public and Private Land	<1	<1

Notes: Public lands are those managed by FS; BLM; BIA; and Idaho and Oregon State total for volume of timber sold on public land in Oregon represents only the eastern portion of the state.
Tbf = thousand board feet.
Mbf = million board feet.
ROW = right-of-way.

[a] Counties that would be crossed by the pipeline with commercial forestland include: Idaho - Boundary, Bonner, and Kootenai and Oregon - Deschutes and Klamath.

[b] Five-year average, 1984-1988.

[c] Five-year average, 1983-1987.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE ALTAMONT PROJECT

Population Impacts. Construction of the Altamont project would temporarily increase the population of areas the pipeline would cross. Increases in temporary population levels would occur as workers with the specialized skills needed for pipeline construction, who are not readily available from local labor pools, move into the area. These increases would exist only during the five-month construction period.

Altamont plans to maintain three permanent field offices along the route, ~~including a central office in Billings, Montana~~ although the locations have not yet been determined. A total of no more than 30 employees would be permanently placed for the operation of these offices. Impacts due to increases in permanent population levels would be less than significant because so few workers would be needed to operate the completed pipeline.

For purposes of analysis, the temporary increases in population are based on to the total number of construction workers and management personnel Altamont has estimated would be needed for each construction spread. Although Altamont has indicated they plan to hire a portion of the necessary workforce locally, no estimate of the number of local workers was provided. All workers were considered nonlocal for our analysis of Altamont's project. Additionally, it was assumed that 15 percent of the nonlocal workers would be accompanied by their families, and that each family would have three members.

Construction of the Altamont project would proceed at a rate of approximately 1.5 miles per day. It was assumed that all construction workers and management personnel for a construction spread would be located within the same area. As the project progresses, the construction personnel working on different phases of the project would gradually disperse through the area covered by each spread.

Total population for each construction spread includes the counties that would be crossed by the spread. In cases where a construction spread would start or end in the middle of a county, the total population of the county was allocated.

The estimated increases in population within the counties crossed by each pipeline spread are all below the 10-percent threshold of significance. Spread 3, in southern Montana, would cause the greatest increase at more than 3.6 percent. Spread 6, in southern Wyoming, would produce the smallest increase at less than 1 percent (Table 4G-4).

Housing Impacts. Construction of the Altamont project would increase the demand for local housing. The increase in demand for housing would correspond to the number of nonlocal workers hired for each construction spread. It was assumed that nonlocal workers would choose temporary housing instead of renting apartments or houses. Temporary housing analyzed was limited to campsites, RV sites, and motel/hotel units. Local workers are not expected to move from their current residences.

Table 4G-4

ESTIMATED TEMPORARY POPULATION IMPACTS
FOR THE ALTAMONT PROJECT

Construction Spread	Counties Crossed	Population	Temporary Population Increase	Percent of Population Increase
1	**MONTANA**			
	Hill	18,000		
	Chouteau	5,900		
	Fergus	12,500		
Total Spread		36,400	540	1.48
2	**MONTANA**			
	Fergus	12,500		
	Judith Basin	2,600		
	Wheatland	2,200		
	Golden Valley	1,100		
	Stillwater	6,200		
Total Spread		24,600	532	2.16
3	**MONTANA**			
	Stillwater	6,200		
	Carbon	8,500		
Total Spread		14,700	530	3.60
4	**WYOMING**			
	Big Horn	12,300		
	Washakie	10,000		
	Hot Springs	6,100		
Total Spread		28,400	538	1.89
5	**WYOMING**			
	Fremont	35,300		
Total Spread		35,300	532	1.50
6	**WYOMING**			
	Fremont	35,300		
	Sublette	6,300		
	Sweetwater	47,000		
	Lincoln	15,600		
Total Spread		104,200	538	0.51

The demand for temporary housing and the supply of available housing units were calculated for the Altamont project using the same method as was used for the PGT project. The greatest impact on the temporary housing market would be expected along Spread 3 which would create an estimated vacancy rate of 37.9 percent. The least impact would be expected along Spread 6 which would cause a vacancy rate of 86.39 percent. In no case does the resultant vacancy rate fall below the 5 percent threshold of the significance criteria.

Along Spread 1, the estimated supply of temporary housing units is 1,564 while the demand would be for 470. On Spread 2 the supply is 945 and the demand would be for 463 units. The temporary housing supply on Spread 3 is 743 housing units while the demand would be for 461. On Spread 4 the supply is 2,279 and the demand would be for 468 units. The estimated supply on Spread 5 is 1,280 units and the demand would be for 463. For Spread 6 the supply is 3,440 while the demand would be for 468 temporary housing units.

As the project progresses, workers would be concentrated in a portion of each spread for short periods of time. In cases where the project demand for temporary housing units exceeds the supply, longer commuting distances would be required to ameliorate these shortfalls. This is most likely to occur during the summer months when the number of tourists and visiting recreationists is at its highest. There are a substantial number of additional temporary housing units located in counties not crossed by the project route but are within convenient driving distances (see Table 3G-5). As an alternative to long commuting distances for the workers, construction camps could be established in remote areas. However, at this time, Altamont does not propose to use any construction camps.

Public Service Impacts. The temporary increase in population associated with the construction of the Altamont project may adversely affect certain public services (e.g., medical, water and sewer facilities, waste disposal). The degree of impact would vary from community to community depending upon the number of nonlocal workers (and any accompanying family members) that temporarily reside in each community, how long they stay, and the size of the community. Although these factors are too variable to accurately predict the severity of the impact, the effects would be short-term and are therefore not expected to be significant. Altamont could help ameliorate increased demand for public services by working with affected communities or counties to anticipate and meet increased demands whenever possible.

Agricultural Land Resources Impacts. Project implementation would cause the short-term (usually one year) loss of agricultural production from lands that would be crossed by the pipeline as annual crops are cleared from the pipeline right-of-way prior to construction. It is assumed that all land temporarily cleared for the right-of-way would be returned to preconstruction levels of production. Measures necessary to ensure that disturbed soils are returned to preconstruction levels of productivity are discussed in Chapter 4B, "Soils."

To compute the loss of livestock production from rangeland along the route, the total number of acres categorized as rangeland in each county was divided by the production value for livestock in that county. This figure was then multiplied by the number of acres that would be temporarily taken out of production by pipeline construction. Factors such as the purchase cost of the livestock to the landowner and the productivity of affected rangeland were not considered. The resulting value is the potential value of production that would be lost during construction.

Table 4G-5 presents the results of our assessment of impact on agricultural land resources. Of the counties along the pipeline route, none would lose more than 1 percent of their total agricultural land during pipeline construction. No county would lose more than 1 percent of its acreage planted to its most important crop, which is the threshold established in the significance criteria.

Forest Resources Impacts. Construction of the Altamont project would result in no impact on commercial forestland.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE SOUTH PASS ROUTE VARIATIONS

The South Pass Variations do not differ markedly from the proposed route in terms of socioeconomic impact. The increase in length of the route would extend the time required for construction and any associated adverse effects by three to five weeks. There might be a slight difference in the location of temporary housing demand, but this would not alter the impacts presented for the proposed route. The additional pipeline length would also increase the local property tax revenues in proportion to the increased assessed value.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

The additional facilities required downstream on Kern River's system would be constructed within the pipeline corridor analyzed in the EOR FEIR/EIS. The construction of these compressor stations would result in substantially less population related impacts than construction of the Kern River system itself. If this demand would exceed the local supply of temporary housing units, nonlocal workers would need to increase their commuting distance for a short period of time. No long-term socioeconomic impacts are expected since no additional permanent workers would be required to operate these facilities.

Table 4G-5

IMPACTS ON AGRICULTURAL LAND RESOURCES BY THE ALTAMONT PROJECT

County	Total Agricultural Land in 1987 (acres)	Land to be Temporarily Removed from Production (acres)	Percent of County Agricultural Land Affected	Most Valuable Crop (1987)				
				Type	Value (in thousands of dollars)	Amount (acres)	Potential Acreage Affected	Percent of Total Crop Acreage
MONTANA								
Hill	1,722,206	585	<1	Grain	43,911	545,429	552	<1
Chouteau	2,228,089	704	<1	Grain	53,008	663,132	597	<1
Fergus	2,143,210	278	<1	Cattle	25,555	1,370,263	58	<1
Judith Basin	870,945	330	<1	Cattle	15,326	549,383	40	<1
Wheatland	823,195	452	<1	Cattle	8,942	676,687	252	<1
Golden Valley	625,754	103	<1	Cattle	5,888	494,834	103	<1
Stillwater	842,673	525	<1	Cattle	17,631	587,862a/	241	<1
Carbon	536,553	572	<1	Cattle	22,430	336,020	462	<1
WYOMING								
Big Horn	467,739	816	<1	Cattle	13,062	297,244	748	<1
Washakie	391,069	383	<1	Cattle	10,400	317,664	284	<1
Hot Springs	981,476	219	<1	Cattle	7,819	958,789b/	219	<1
Fremont	2,464,688	1,337	<1	Cattle	24,888	2,010,538	1,337	<1
Sublette	582,941	36	<1	Cattle	19,209	422,458	36	<1
Sweetwater	1,682,608	640	<1	Cattle	3,649	1,634,576	573	<1
Lincoln	591,951	304	<1	Cattle	10,274	430,274	304	<1

Note: All acreage for cattle represents pastureland and rangeland acreage. Totals have been rounded. Acreage removed from production includes land cleared for permanent and temporary rights-of-way.

a/ 1982 acreage

b/ Includes pastureland of all types; acreage on pastureland and rangeland not reported.

Source: U.S. Department of Commerce, 1989e, 1989f.

Chapter 4H. Environmental Consequences: Air Quality

IMPACTS

Construction of the proposed projects would cause a temporary reduction in local ambient air quality as a result of fugitive dust and emissions generated by construction equipment. The extent of dust generation would depend on the level of construction activity and on soil composition and dryness. If proper dust suppression techniques were not employed, dry and windy weather could create a nuisance for nearby residents. The emissions from construction vehicles and equipment should have an insignificant impact on the air quality of the region. However, under certain meteorological conditions, there might be high concentrations of pollutants in the vicinity of construction.

During operation, the compressor stations would emit varying amounts of NO_x, CO, sulfur dioxide (SO_2), and hydrocarbons (HC). The EPA has established NAAQS for the regulation of these pollutants. Of these, the pollutant of concern would be NO_x. Emissions of CO and HC would be well below the significant federal impact levels established by the EPA. Emissions of SO_2 would be proportional to the amount of sulfur in the fuel. Since the fuel would be natural gas containing very little sulfur, the amount of SO_2 in the emissions would be low.

Criteria for Determining Significance

Air impacts are considered significant if NO_x emissions from station facilities qualify the station as a major source of air pollution or a major modification to an existing source (as defined by the EPA), and:

- o NO_x emissions contributed to a violation of either the state or federal ambient NO_x, or
- o NO_x emissions exceed PSD increments in Class I or II areas.

REGULATORY REQUIREMENTS

The federal New Source Performance Standards (40 CFR Part 60, Subpart GG,(C)) limit NO_x emissions from stationary gas turbines with a heat input greater than 10 million Btu per hour (approximately 1,000 horsepower) to 150 parts per million by volume (ppmv) based on 15 percent oxygen in the exhaust gas on a dry basis and a turbine heat-rate of 14.4 kilojoules per watt-hour. Proportional increases in the 150 ppmv are permitted with higher efficiencies.

The federal PSD regulations (40 CFR 52.21) require that any proposed facility that would emit more than 250 tons per year (tpy) of NO_x be classified as a "major emission source" and be subject to PSD regulations and review. If an existing facility is already classified as a "major emission source", then an increase in NO_x emissions greater 40 tpy would be classified as a "major modification" and require PSD review. PSD regulations for "major emissions sources" include a review of existing air quality, the use of a modeling analysis to demonstrate compliance with the NAAQS and applicable ambient increments, the application of BACT, and an analysis of the general impact on the environment.

BACT requires the applicant to use a "top-down" approach to demonstrate the use of the best available technology in controlling emissions from major stationary sources and major modifications. This approach requires that the applicant first consider the most stringent controls available and either use this technology or demonstrate why it is not feasible to do so. The process is then repeated for the second most stringent controls, then the third, etc., until a feasible solution is reached. This process is required even though a less-stringent method of control may meet other air quality regulations.

Dispersion modeling analysis is required to demonstrate that the emissions from a major source or major modification would not exceed the PSD increments and would comply with the NAAQS. Assessment of the impact of the proposed emissions is required to ensure the health and welfare of the general public.

Compliance with the above regulations is administered by the state air pollution control agencies. Altamont, PGT and Kern River would also have to acquire permits to modify or to construct each of the proposed compressor facilities from the appropriate state agencies.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE PGT PROJECT

Compressor Station No. 3 consists of a 12,500-hp Cooper-Rolls gas-turbine unit. PGT's supplemental environmental report on air quality emissions indicates that the unit has an existing NO_x emission of 194 tons per year, which does not qualify this station as a major source (see Table 4H-1). PGT proposes to add a ~~25,000~~ 30,000-hp gas-turbine unit which would emit ~~247~~ approximately 381 tons of NO_x per year based on EPA's AP-42 emission rate of 0.0029 pound per hp-hour for gas-turbine units. Because the proposed unit would have a maximum potential emission rate ~~marginally below~~ above 250 tons of NO_x per year, it would ~~not~~ be subject to PSD review. ~~However, the proposed unit would emit 450 tons per year and be subject to PSD review.~~ The applicability of PSD requirements would ~~318~~ be determined when PGT selects the actual turbine and files its construction application with Idaho.

Compressor Station No. 5 consists of a 9,100-hp General Electric Frame 3 and a 12,500-hp Cooper-Rolls gas-turbine unit. PGT's supplemental environmental report on air quality emissions indicates that the units have an existing NO_x emission of 524 tons per year, which qualifies this station as an existing major source. PGT proposes to replace the 9,100-hp unit with a ~~25,000~~ 30,000-hp gas-turbine unit which would emit ~~338~~ 318 tons of NO_x per year based

Table 4H-1

EXISTING AND PROPOSED COMPRESSOR STATION AIR EMISSIONS

Compressor Station	Location		Existing Compression		Proposed Compression		Total NO_x Emissions (tons/year)
	County	State	Existing hp	NO_x Emissions (tons/year)	Proposed hp	NO_x Emissions (tons/year)	
PGT							
C.S. No. 3	Boundary	ID	12,500	194	30,000	381	575
C.S. No. 5	Kootenai	ID	21,600	524	20,900[a/]	92[b/]	616
C.S. No. 7	Walla Walla	WA	21,600	540	20,900[a/]	75[b/]	615
Altamont[c/]							
C.S. No. 1	Hill	MT	-	-	50,400	929	929
C.S. No. 2	Fergus	MT	-	-	12,600	227	227
C.S. No. 3	Stillwater	MT	-	-	12,600	222	222
C.S. No. 4	Big Horn	WY	-	-	12,600	221	221
C.S. No. 5	Fremont	WY	-	-	12,600	208	208
C.S. No. 6	Sweetwater	WY	-	-	12,600	200	200
Kern River[d/]							
C.S. No. 2	Morgan	UT	-	-	20,000	254	254
C.S. No. 3	Utah	UT	-	-	30,000	381	381
C.S. No. 4	Millard	UT	9,200	117	10,000	127	244
C.S. No. 5	Iron	UT	-	-	30,000	381	381
C.S. No. 6	Clark	NV	-	-	20,000	254	254
C.S. No. 7	Clark	NV	9,400	119	20,000	254	373
C.S. No. 8	San Bernardino	CA	-	-	10,000	127	127

a/ Horseposwer increase due to replacement of a 9,100-hp unit with a 30,000-hp unit (30,000 hp - 9,100 hp = 20,900 hp).

b/ Emissions from one replacement 30,000-hp turbine unit minus emissions of the existing 9,100-hp unit.

c/ NO_x emissions based on site-rated horsepower, i.e., 11,954 hp at C.S. No.1; 11, 534 hp at C.S. No. 2; 11,304 hp at C.S. No. 3; 11,265 hp at C.S. No. 4; 10,851 hp at C.S. No. 5; 10,294 hp at C.S. No. 6. NO_x emissions include 9.65 tpy from a standby auxiliary engine unit (500 hp rated) at each compressor station. NO_x emissions at C.S. No. 6 also include 8.5 tpy from a full time auxiliary engine unit (80 hp rated).

d/ Site-rated horsepower based on preliminary information from Kern River. NO_x emissions based on EPA's AP-42 (1976) rate of 0.0029 pounds per hp-hour for a turbine unit.

Table 4H-2

NO_2 AIR QUALITY IMPACT OF MAJOR EMISSION SOURCES

Compressor Station	Valley		ISCST	
	Maximum NO_2 Increment ($\mu g/m^3$)	Total NO_2 ($\mu g/m^3$)	Maximum NO_2 Increment ($\mu g/m^3$)	Total NO_2 ($\mu g/m^3$)
PGT				
C.S. No. 3	25.1	41.5	1.2	2.1
C.S. No. 5	2.3	6.5	1.1	2.7
C.S. No. 7	6.1	21.6	1.5	2.7
Altamont				
C.S. No. 1	a/	a/	a/	a/
Kern River				
C.S. No. 2	b/	b/	b/	b/
C.S. No. 3	b/	b/	b/	b/
C.S. No. 5	b/	b/	b/	b/
C.S. No. 6	b/	b/	b/	b/
C.S. No. 7	b/	b/	b/	b/
C.S. No. 8	b/	b/	b/	b/

a/ Altamont has not provided modeling data and would be required to perform modeling analysis for C.S. No. 1, as part of its PSD application.

b/ Kern River has not filed an application for the required compression facilities. Modeling analysis would be required for the compressor stations which would be major emission sources.

on EPA's AP-42 emission rate of 0.0029 pound per hp-hour for gas-turbine units. The existing and proposed units would thus have a maximum potential emission rate of ~~573~~ 616 tons of NO_x per year, an increase of ~~49~~ 92 tons of NO_x per year. The proposed facilities would thus be considered a major modification and would be subject to PSD review. Table 4H-2, which summarizes the modeling results, shows that estimated NO_2 levels would not exceed the NAAQS or PSD increment.

Compressor Station No. 7 consists of a 9,100-hp General Electric Frame 3 and a 12,500-hp Cooper-Rolls gas-turbine unit. PGT's supplemental environmental report on air quality emissions indicates that the existing units have a maximum potential NO_x emission of 540 tons per year and a historical NO_x emission of 257 tons per year,which qualifies this station as an existing major source. PGT proposes to replace the 9,100-hp unit with a ~~25,000~~ 30,000-hp turbine unit which would emit ~~344~~ approximately 381 tons of NO_x per year. The existing and proposed units would thus have a maximum potential emission rate of ~~578~~ 615 tons of NO_x per year, an increase of ~~38~~ 78 tons of NO_x per year over the maximum potential rate for the existing units, and ~~321~~ 358 tons of NO_x per year over historical emissions. The applicability of PSD requirements would be determined when PGT selects the actual turbine units to be used, and files its construction application in Washington.

PGT conducted modeling analyses of the three compressor stations using the ISCST and VALLEY models to assess the impact of the NO_2 emissions from the proposed engine units. One-hour maximum concentrations were multiplied by 0.15 to yield maximum annual concentrations (see Table 4H-2). The models simulated two cases: (a) future NO_2 concentrations based on maximum future capacity of the compressor units; and (b) the PSD NO_2 increment based on the differences between maximum capacity and current historical use. For Compressor Station No. 3, the VALLEY results, which were higher than those predicted by ISCST, show that estimated NO_2 levels would not exceed the NAAQS, but would be 0.1 microgram per cubic meter ($\mu g/m^3$) above the Class II increment.

Because the facilities proposed for installation at Compressor Station No. 5 (and possibly Nos. 3 and 7) would require PSD review, this federally enforced program would ensure that operation of these facilities would not prevent attainment or maintenance of any applicable ambient air quality standard. As a part of its PSD application, PGT would be required to conduct a modeling analysis to assess the impact of NO_2 on ambient air quality and to demonstrate that PSD increments and NAAQS would not be exceeded. Therefore, no significant impact to ambient air quality would result from operation of PGT's proposed facilities.

No additional compression is proposed at any of the existing compressor stations located in Oregon. Therefore, there would be no additional impact on the ambient air quality in Oregon as a result of the operation of these compressor stations. Any burning of woody slash generated during clearing of the right-of-way would be performed in accordance with federal and state regulations.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE ALTAMONT PROJECT

Altamont proposes to construct six new compressor stations. Three stations would be constructed in Montana and three stations would be constructed in Wyoming. Four 12,600-hp gas-turbine units would be installed at Compressor Station No. 1 and one 12,600-hp gas-turbine unit would be installed at each of the five other sites. Altamont provided NO_x emission data from Solar Turbines Incorporated which indicated an NO_x concentration of 148 ppmv at 15 percent oxygen, sea level, and full load conditions. The NO_x emissions identified in Table 4H-1 represent annual emissions at site-rated conditions. Each station would also be equipped with a standby auxiliary engine unit rated at 500 hp, having an NO_x emission rate of 9.65 tons per year (based on an emission rate of 2 grams of NO_x per hp-hour and 8,760 annual hours of operation).

Compressor Station No. 1 would emit approximately 929 tons of NO_x per year. This site would be considered a major emission source since NO_x emissions would exceed 250 tons per year and would be subject to PSD review. As part of its PSD application, Altamont would be required to conduct a modeling analysis to assess the impact of NO_2 on ambient air quality and demonstrate that PSD increments and NAAQS would not be exceeded. This federally enforced program would insure that operation of the proposed facilities would not prevent attainment or maintenance of any applicable ambient air quality standard. Therefore, no significant impact to ambient air quality would result from operation of the proposed facilities.

Compressor Station Nos. 2, 3, 4, and 5 would emit approximately 227, 222, 221, and 208 tons, respectively, of NO_x per year. These sites would therefore not qualify as major sources and would not be subject to PSD review. As a result, ambient air quality would not be significantly affected.

In addition to the turbine unit and the standby auxiliary engine, Compressor Station No. 6 would also be equipped with a full time auxiliary engine unit rated at 80 hp. This unit would have an NO_x emission rate of 8.5 tons per year, based on 11 grams per hp-hour and 8,760 annual hours of operation. The turbine would emit approximately 200 tons of NO_x per year. This site would not be a major source and would not be subject to PSD review. As a result, ambient air quality would not be significantly affected.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE SOUTH PASS ROUTE VARIATIONS

The Lysite Compressor Station would be an alternative to Compressor Station No. 5. The Bastard Butte and Stratton Lakes Compressor Stations are alternatives to Compressor Station No. 6. The Skunk Canyon Compressor Station (additional Compressor Station No. 7) may also be required if one of the alternative routes is selected. Air quality impacts associated with operation of compression facilities at these alternative sites would be identical to those described above for Compressor Station Nos. 5 and 6.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

In order to transport up to 700 MMcfd for the Altamont Project, Kern River's system would require approximately ~~180,000~~ 140,000 hp of compression at seven compressor stations. This additional compression would be installed at two certificated compressor stations (which have not yet been constructed) and five new compressor stations. Kern River has not yet filed an application with the Commission nor provided any air emission data for the required facilities. Gas-turbine units are anticipated to be installed at these compressor stations. Table 4H-1 presents the estimated annual NO_x emissions resulting from operation of the Kern River compressor stations, based on EPA's AP-42 emission rate of 0.0029 pound per hp-hour for gas-turbine units.

Compressor Station Nos. 2 and 3 would require 20,000 and 30,000 hp of compression, and would have a potential to emit approximately 254 tons and 381 tons, respectively, of NO_x per year. These sites would be considered major sources and subject to PSD review.

Compressor Station No. 4 is currently certificated for 9,200 hp of compression and will have an NO_x emission of 117 tons per year. Kern River would require an additional 10,000 hp of compression at this site with an NO_x emission of approximately 127 tons per year. The combined annual NO_x emission would therefore be approximately 244 tons. This site would not be considered a major source and would not be subject to PSD review. As a result, ambient air quality would not be significantly affected.

Compressor Station Nos. 5 ~~and 6~~ would ~~each~~ require 30,000 hp of compression and ~~each~~ would have a potential to emit approximately 381 tons of NO_x per year. ~~Each~~ This site would be considered a major source and subject to PSD review.

Compressor Station No. 6 would require 20,000 hp of compression and would have a potential to emit approximately 254 tons of NOx per year. This site would be considered a major source and subject to PSD review.

Compressor Station No. 7 is currently certificated for 9,400 hp of compression which will have a NO_x emission of 119 tons per year. Kern River would add 20,000 hp of compression at this site with a NO_x emission of approximately 254 tons per year. The total annual NO_x emission rate would be approximately 373 tons. This site would be considered a major source and subject to PSD review.

Compressor Station No. 8 would consist of ~~40,000~~ 10,000 hp of compression and would have a potential to emit approximately ~~508~~ 127 tons of NO_x per year. This site would not be considered a major source and would not be subject to PSD review. As a result, ambient air quality would not be significantly affected.

Because the facilities needed at Compressor Stations Nos. 2, 3, 5, 6, and 7~~, and 8~~ would require PSD review, this federally enforced program would ensure that operation of these facilities would not prevent attainment or maintenance of any applicable ambient air quality standard. As a part of its PSD application, Kern River would be required to conduct a modeling analysis to assess the impact of NO_2 on ambient air quality and to demonstrate that PSD increments and NAAQS would not be exceeded. Therefore, no significant impact to ambient air quality would result from operation of the Kern River downstream facilities.

Chapter 4I. Environmental Consequences: Noise

IMPACTS

Impact on the local noise environment would occur both during construction and operation of the proposed projects. Pipeline construction would proceed at rates from several hundred feet up to one and one-half mile per day. Construction activities would occur progressively down the right-of-way, with the open-trench phase of construction in rural areas lasting approximately 3 to 5 weeks. Construction equipment would be operated on a random, as-needed basis during this period. Although individuals in the immediate vicinity of the work could experience temporary annoyance, the duration of the impact on the noise environment at any specific location along the route would be short term. Nighttime noise levels normally would be unaffected, since most construction would be limited to daylight hours.

During the operational phase of the project, the impact on the noise environment would be limited to the vicinity of the compressor stations. Principal noise sources at the compressor stations would include the air inlet, exhaust, and casing of the engine or turbine. Secondary noise sources would include cooling fans and yard piping valves. Noise from the vents, blowdown stacks and emergency electrical generation equipment would be infrequent. The amount of silencing required for the equipment and piping depends on the station's location, size, and proximity to NSAs. The basis for evaluating compressor noise impact is a L_{dn} of 55 dBA--the level which protects the public from indoor and outdoor activity interference in residential areas. In addition, noise regulations for the state of Washington would govern noise levels from PGT's proposed addition at Compressor Station No. 7.

Criteria for Determining Significance

Noise impacts are considered significant if:

- o noise attributable to the operation of a proposed compressor facility exceeds an L_{dn} of 55 dBA at nearby NSAs such as residences or other occupied dwellings, or

- o applicable state noise regulations are exceeded.

Noise levels of 55 dBA (L_{dn}) or less would protect the public from outdoor activity interference and annoyance in residential areas.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE PGT PROJECT

PGT proposes additional compression at two existing compressor stations in Idaho and one existing compressor station in Washington. Table 4I-1 presents the existing noise levels and the projected noise level components at the NSAs due to operation of the proposed horsepower addition at each compressor station. PGT has not yet selected its turbines, and has no far-field sound level data for the proposed units. PGT has also not selected the manufacturer and model of the noise control equipment which it proposes to use, although control equipment identified for use include intake and exhaust silencers, acoustical insulation, acoustic lagging of gas piping, and acoustical treatment of auxiliary equipment such as coolers, pumps and motors. The proposed compressor building at Compressor Station No. 3 would be constructed of metal and acoustically treated, but PGT has not selected the insulation specifications. Nevertheless, PGT proposes to design its facilities such that the noise generated from the new equipment would not exceed the noise level associated with the existing units. To ensure that PGT's noise design criteria would be achieved, we recommend that PGT file noise analyses with the Commission for its proposed compressor additions prior to ~~the issuance of the final EIS~~ construction. Such analyses must be based on far-field sound level data (from either the manufacturer or a similar unit in service elsewhere) for the actual gas-turbine compressor unit proposed for each site with the final noise control design, and include the proposed gas cooling equipment at Compressor Station No. 3.

Compressor Station No. 3 is an existing station consisting of a 12,500-hp Cooper-Rolls gas-turbine unit. The nearest NSA is a residence located approximately 850 feet east of the compressor building. In July 1990, a background sound survey was conducted by PGT's consultant, Technical and Ecological Services (TES), at the compressor station site. The survey measured short-term 1/3 octave band measurements of the nearby residences and noise sources inside the station, and continuous hourly noise samples at the nearest residence, when the station was operating at full load. The noise from all sources at the front yard of the NSA was calculated to be a L_{dn} of 56.7 dBA. The L_{dn} from the operation of the compressor station alone was calculated to be ~~52.9~~ 52.5 dBA (assuming that the hourly L_{50} and L_{eq} are equal for a steady state noise). Although this level is below a L_{dn} of 55 dBA, the nearest resident has repeatedly complained about noise from operation of the existing compressor station. TES' data identify the major contributor to existing noise levels to be high-frequency air intake noise. Therefore, we recommend that PGT install an improved intake silencer to reduce this noise component.

PGT proposes to add a ~~25,000~~ 30,000-hp gas-turbine unit adjacent to the existing compressor building, and a twelve-fan gas cooling unit southeast of the proposed compressor building. We estimated the noise increase from the proposed compressor based on the assumption that the increase in sound energy is proportional to the increase in horsepower. Based on this theoretical horsepower/sound relationship, the L_{dn} would increase by ~~4.8~~ 5.3 dBA to a total L_{dn} of ~~57.7~~ 57.8 dBA at the nearby residence. This level would have a significant impact on the quality of the existing noise environment. Therefore, we recommend that PGT design the noise controls for the proposed turbine compressor and gas cooling equipment such

Table 4I-1

EXISTING AND PROPOSED COMPRESSOR STATION NOISE AT NEAREST NOISE-SENSITIVE AREAS

Station	Location		Nearest NSA (feet)	Existing Noise L_{dn} (dBA)	Proposed Compression L_{dn} (dBA)	Total L_{dn} (dBA)	Increase (dBA)
	County	State					
PGT							
C.S. No. 3	Boundary	ID	850 E	52.5	[1/]	57.8	5.3
C.S. No. 5	Kootenai	ID	3,200 NW	41.4	[1/]	44.3	2.9
C.S. No. 7	Walla Walla	WA	4,800SE	39.8	[1/]	42.7	2.9
Altamont							
C.S. No. 1	Hill	MT	5,000 SW	40	47	48	8[2/]
C.S. No. 2	Fergus	MT	8,500 SE	40-45	37	46	1[2/]
C.S. No. 3	Stillwater	MT	2,500 NE	40	47	48	8[2/]
C.S. No. 4	Big Horn	WY	7,000 E	40-45	39	46	1[2/]
C.S. No. 5	Fremont	WY	>5,280	35	<41	<42	7[2/]
C.S. No. 6	Sweetwater	WY	>5,280	35	<41	<42	<7[2/]
Alternative Sites for Altamont South Pass Variations							
Lysite	Fremont	WY	2,900 SE	40-45	46	49	4[2/]
Stratton Lakes	Sweetwater	WY	>5,280	35	<41	<42	<7[2/]
Bastard Butte	Sweetwater	WY	>5,280	35	<41	<42	<7[2/]
Skunk Canyon	Sweetwater	WY	>5,280	35	<41	<42	<7[2/]
Kern River							
C.S. No. 2	Morgan	UT	1,500 W	40	52	52	12[2/]
C.S. No. 3	Utah	UT	6,200 E	40	41	44	3[2/]
C.S. No. 4	Millard	UT	4,000 E	44	42	46	2
C.S. No. 5	Iron	UT	4,500 W	40	46	47	7[2/]
C.S. No. 6	Clark	NV	2,000 E	45	49	50	5[2/]
C.S. No. 7	Clark	NV	5,000 NW	42	41	44	2
C.S. No. 8	San Bernardino	CA	3,000 NW	50	43	51	1[2/]

1/ Noise levels for proposed compressor not available. Total noise estimated from theoretical sound energy/horsepower relationship.
2/ Approximate increase over estimated existing L_{dn}.

that the total L_{dn} of the existing and proposed units would not exceed a L_{dn} of 55 dBA at the nearest NSA when operating at full load.

Compressor Station No. 5 is an existing station consisting of a 9,100-hp General Electric Frame 3 gas-turbine and a 12,500-hp Cooper-Rolls gas-turbine unit. The nearest NSA is a residence located approximately 3,200 feet northwest of the compressor building. In early 1990, an existing noise level of 35 dBA (L_{eq}) was measured at the residence which is equivalent to an L_{dn} of 41.4 dBA for continuous operation. PGT proposes to replace the existing 9,100-hp turbine with a ~~25,000~~ 30,000-hp gas-turbine unit. Based on the theoretical horsepower/sound relationship, the estimated total L_{dn} would increase by ~~2.4~~ 2.9 dBA to ~~43.8~~ 44.3 dBA at the residence. The total L_{dn} would be significantly less than 55 dBA and would therefore have no significant effect on the ambient noise environment at the nearest NSA.

Compressor Station No. 7 is an existing station consisting of a 9,100-hp General Electric Frame 3 gas-turbine and a 12,500-hp Cooper-Rolls gas-turbine unit. The nearest NSA is a residence located approximately 4,800 feet southeast of the compressor building. In early 1990, an existing noise level of 39 dBA (L_{eq}) was measured at a distance of 2,500 feet from the compressor building. At the residence, this corresponds to a L_{dn} of 39.8 dBA. PGT proposes to replace the existing 9,100-hp turbine with a ~~25,000~~ 30,000-hp gas-turbine unit. Based on the theoretical horsepower/sound relationship, the estimated total L_{dn} would increase by ~~2.4~~ 2.9 dBA to ~~42.2~~ 42.7 dBA at the residence. The total L_{dn} would be significantly less than 55 dBA and would not have a significant effect on the ambient noise environment at the nearest NSA.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE ALTAMONT PROJECT

Altamont proposes to install approximately 113,400 hp of compression at three new compressor stations in Montana and three new compressor stations in Wyoming. Altamont has provided noise data from the manufacturer for an unenclosed Solar Mars gas-turbine unit with air inlet and exhaust silencer installed; the noise level generated from each proposed unit is estimated to be less than 75 dBA (L_{eq}) at 50 feet. Although the proposed units would be equipped with intake and exhaust silencers and housed in a compressor building, Altamont has not identified the manufacturer and model of the noise control equipment or other design specifications which it proposes to use. In order to verify that the final noise controls conform with this level, we recommend that Altamont file noise analyses with the Commission for its proposed compressor stations prior to ~~the issuance of the Final EIS~~ construction. Such analyses must be based on far-field sound level data (from either the manufacturer or a similar unit in service elsewhere) for the actual gas-turbine compressor unit proposed for each site with the final noise control design. Table 4I-1 presents the total noise levels estimated at the nearest NSA for each proposed compressor station.

Compressor Station No. 1 would consist of four 12,600-hp Solar Mars gas-turbine units. An existing L_{dn} of 40 dBA is estimated at the nearest NSA, a farmhouse, located approximately 5,000 feet southwest of the proposed compressor building. Based on Altamont's noise data, the four turbines would attenuate to a L_{dn} of 47 dBA at the farmhouse. The total L_{dn} would be approximately 48 dBA. The location of the nearest NSA should provide sufficient distance for noise attenuation from the proposed compressor station. The noise impact would be significantly less than 55 dBA and would not have a significant effect on the ambient noise environment at the nearest NSA.

Compressor Station No. 2 would consist of one 12,600-hp Solar Mars gas-turbine unit. An existing L_{dn} ranging from 40 dBA to 45 dBA is estimated at the nearest NSA, a farmhouse, located approximately 8,500 southeast of the proposed compressor building. Based on Altamont's noise data, the turbine would attenuate to a L_{dn} of 37 dBA at the farmhouse. The total L_{dn} would be approximately 46 dBA. The location of the nearest NSA should provide sufficient distance for noise attenuation from the proposed compressor station. The noise impact would be significantly less than 55 dBA and would not have a significant effect on the ambient noise environment at the nearest NSA.

Compressor Station No. 3 would consist of one 12,600-hp Solar Mars gas-turbine unit. An existing L_{dn} of 40 dBA is estimated at the nearest NSA, a farmhouse, located approximately 2,500 ~~south south~~ northeast of the proposed compressor building. Based on Altamont's noise data, the turbine would attenuate to a L_{dn} of 47 dBA at the farmhouse. The total L_{dn} would be approximately 48 dBA. The location of the nearest NSA should provide sufficient distance for noise attenuation from the proposed compressor station. The noise impact would be significantly less than 55 dBA and would not have a significant effect on the ambient noise environment at the NSA.

Compressor Station No. 4 would consist of one 12,600-hp Solar Mars gas-turbine unit. An existing L_{dn} ranging from 40 dBA to 45 dBA is estimated at the nearest NSA, ~~an unidentified building,~~ approximately ~~2,400~~ 7,000 ~~southeast~~ of the proposed compressor building. Based on Altamont's noise data, the turbine would attenuate to a L_{dn} of ~~48~~ 39 dBA at the ~~unidentified building~~ NSA. The total L_{dn} would be approximately ~~50~~ 46 dBA. The location of the nearest NSA should provide sufficient distance for noise attenuation from the proposed compressor station. The noise impact would be significantly less than 55 dBA and would not have a significant effect on the ambient noise environment at the NSA.

Compressor Station Nos. 5 and 6 would each consist of one 12,600-hp Solar Mars gas-turbine unit. There are no known NSAs within 1 mile of either proposed site. An existing L_{dn} of 35 dBA is estimated for the ambient noise levels. Based on Altamont's noise data, each of the turbines would attenuate to a L_{dn} of 41 dBA at a distance of 5,280 feet. The total L_{dn} would be approximately 42 dBA. The location of any NSAs should provide sufficient distance for noise attenuation from the proposed compressor station sites. The noise impact would be significantly less than 55 dBA and would not have a significant effect on the ambient noise environment at any NSAs.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE SOUTH PASS ROUTE VARIATIONS

The Lysite Compressor Station would be an alternative to Compressor Station No. 5. This site is located about 0.5 miles northwest of the town of Lysite in Fremont County, Wyoming. An existing L_{dn} ranging from 40 dBA to 45 dBA is estimated at the nearest NSA, a residence, located approximately 2,900 southeast of the compressor building site. Based on Altamont's noise data, the single 12,000-hp turbine would attenuate to a L_{dn} of 46 dBA at the residence. The total L_{dn} would be approximately 49 dBA. The location of the nearest NSA should provide sufficient distance for noise attenuation from this alternative site. The noise impact would be significantly less than 55 dBA and would not have a significant effect on the ambient noise environment at the NSA.

The Bastard Butte and Stratton Lakes Compressor Stations are alternatives to Compressor Station No. 6 (associated with the South Pass Route Alternatives). The Skunk Canyon Compressor Station (additional Compressor Station No. 7) may also be required if one of the alternative routes is selected. There are no known NSAs within one mile of any of these sites. An existing L_{dn} of 35 dBA is estimated for the ambient noise levels. Based on Altamont's noise data, the single 12,000-hp turbine at each site would attenuate to a L_{dn} of 41 dBA at a distance of 5,280 feet. The total L_{dn} would be approximately 42 dBA. The location of any NSAs in the vicinity of each site should provide sufficient distance for noise attenuation from the alternative sites. The noise impact would be significantly less than 55 dBA and would not have a significant effect on the ambient noise environment at any NSAs.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

In order to transport up to 700 MMcfd for the Altamont Project, Kern River's system would require approximately ~~180,000~~ 140,000 hp of compression at seven compressor stations. This additional compression would be installed at two certificated compressor stations (which have not yet been constructed) and five new compressor stations. Kern River has not yet filed an application with the Commission nor provided any noise data. ~~Therefore, we recommend that~~ However, Kern River would be required to include noise analyses in ~~its~~ any application to the Commission for ~~its proposed~~ these compressor additions. Such analyses must be based on far-field sound level data (from either the manufacturer or a similar unit in service elsewhere) for the actual equipment proposed for each site with the final noise control design.

Kern River has not yet constructed the two certificated Compressor Station Nos. 4 and 7, authorized for 9,200-hp and 9,400-hp capacity, respectively. Solar Mars gas-turbine units are expected to be installed at these two compressor station sites. The L_{dn} noise levels for the certificated horsepower capacity at Compressor Station Nos. 4 and 7 are based on a L_{eq} of 55 dBA at 500 feet for a Solar Mars turbine unit operating at full load. Previous analysis at these two sites was predicated on the assumption that each turbine unit would be equipped with the following noise abatement equipment: (a) standard self-cleaning barrier type air cleaner; (b) standard one meter inlet silencer, and (c) standard two meter exhaust silencer. The projected noise levels for the proposed horsepower component required at each site are also based on the noise characteristic of a Solar Mars turbine unit. Table 4H-1 presents the estimated noise levels at the compressor station sites.

Compressor Station No. 2 would require two units totaling 20,000-hp capacity. An existing L_{dn} of 40 dBA is estimated at the nearest NSA, a residence, located approximately 1,500 feet west of the compressor building. A L_{dn} of 52 dBA is estimated to result from operation of the two units at the nearby residence. This would result in a total L_{dn} of 52 dBA at the nearest NSA. The noise impact would be slightly below 55 dBA and would therefore have no significant effect on the quality of the existing noise environment.

Compressor Station No. 3 would require three units totaling 30,000 hp. An existing L_{dn} of 40 dBA is estimated at the nearest NSA, a residence, located approximately 6,200 feet east of the compressor building. A L_{dn} of 41 dBA is estimated to result from operation of the three units at the residence. This would result in a total L_{dn} of 44 dBA at the nearest NSA, and would not have a significant effect on the quality of the existing noise environment.

Compressor Station No. 4 is currently certificated for 9,200 hp of compression. Kern River would require one additional 10,000-hp compressor. The nearest NSA is a commercial shop, located approximately 4,000 feet east of the compressor building. A L_{dn} of 44 dBA is estimated for the certificated 9,200-hp engine unit, which includes an estimated ambient L_{dn} of 40 dBA. A L_{dn} of 42 dBA is estimated to result from the operation of the additional unit at the shop. This would result in a total L_{dn} of 46 dBA at the nearest NSA, and would not have a significant effect on the quality of the existing noise environment.

Compressor Station No. 5 would require ~~three units totaling 30,000~~ 20,000 hp of compression. An existing L_{dn} of 40 dBA is estimated at the nearest NSA, a residence, located approximately 4,500 feet west of the compressor building. A L_{dn} of 46 dBA is estimated to result from the operation of the three units at the residence. This would result in a total L_{dn} of 47 dBA at the nearest NSA, and would not have a significant effect on the quality of the existing noise environment.

Compressor Station No. 6 would require three units totaling 30,000 hp. Existing noise sources near the site include a rail siding within 1 mile to the west at Moapa and a small landing strip, electrical generating station, and I-15 within 2 miles to the east at Glendale. An existing L_{dn} of 45 dBA is estimated at the nearest NSA, a residence, located approximately ~~2,500~~ 2,000 feet east of the compressor building. A L_{dn} of ~~51~~ 49 dBA is estimated to result from operation of the ~~three~~ compressor units at the NSA. This would result in a total L_{dn} of ~~52~~ 50 dBA at the nearest NSA and would not have a significant effect on the quality of the existing noise environment.

Compressor Station No. 7 is currently certificated for 9,400 hp of compression. Kern River would require two additional units totaling 20,000 hp. The nearest NSA, a residence, is located approximately ~~1,500~~ 5,000 feet northwest of the compressor building. A L_{dn} of 42 dBA is estimated at the residence for the certificated 9,400-hp engine unit, which includes an estimated ambient L_{dn} of 40 dBA. A L_{dn} of 41 dBA is estimated to result from the operation of the additional two units at the residence. This would result in a total L_{dn} of 44 dBA at the nearest NSA, and would not have a significant effect on the quality of the existing noise environment.

Compressor Station No. 8 would require ~~four units totaling 40,000~~ 10,000 hp of compression. Existing noise sources near the site include vehicular traffic on Highway I-40 to the south, and a railway and electrical generating station to the north. An existing L_{dn} of 50 dBA is estimated at the nearest NSA, a residence, located approximately 3,000 feet northwest of the compressor building. A L_{dn} of ~~49~~ 43 dBA is estimated to result from the operation of the ~~four~~ compressor units at the residence. This would result in a total L_{dn} of ~~53~~ 51 dBA at the nearest NSA, which is slightly below an L_{dn} of 55 dBA, and would not have a significant effect on the quality of the existing noise environment.

This preliminary evaluation of the noise impact attributable to Kern River's downstream compression facilities will be finalized when Kern River files an application to construct the required facilities with the Commission.

Chapter 4J. Environmental Consequences: Transportation

IMPACTS

Construction would have temporary, short-term impacts on existing transportation systems including the increased use of roadways to transport construction materials and crews to the work areas, and the open-cut crossing of county and local roads by pipeline construction. Railroad and state and federal highway crossings would be bored and therefore would not be affected. No operational impacts on transportation would be associated with the proposed projects.

Criteria for Determining Significance

Significant Impacts. Adverse impacts on ~~access roads~~ existing roadways used to haul construction material and transport workers were considered significant if they would result in an increase in traffic that is substantial in relation to the existing traffic load of the road system. Proposed recommended practices prepared by the Institute of Transportation Engineers indicate that a complete traffic impact analysis should be prepared whenever a proposed project would generate 100 or more additional peak-hour trips in the peak direction. Trucks are larger than passenger vehicles and have longer starting and stopping periods at intersections. One truck, therefore, adds more congestion than one passenger vehicle. Based on passenger car equivalents for unsignalized intersections, one truck is counted as the equivalent of two passenger vehicles. An increase of 50 trucks, 100 passenger vehicles, or an equivalent combination of vehicles per hour during the peak hour was used as the threshold for determining significance of impacts. An increase in traffic volumes greater than this threshold was considered a significant impact.

IMPACTS AND MITIGATION MEASURES COMMON TO THE PGT AND ALTAMONT PROJECTS

Roadways. Construction of the pipeline would result in increased vehicle traffic on roads between the railheads and the work site, primarily attributable to transportation of construction crews and materials to the sites. Although these impacts would be temporary, vehicle and equipment weights may well exceed the design capabilities of rural roads and bridges. Serious damage to the rural infrastructure may result. Both applicants could mitigate these problems by consulting with state and local transportation officials once railhead locations and transit routes for pipe delivery are identified.

Both applicants would use existing road crossings to access the rights-of-way. The right-of-way itself would be used to access the job site. Where construction of new access roads would be required to facilitate the delivery of construction materials and workers to the jobsite, additional impact to environmental resources (including possible entry into previously unroaded/inaccessible areas) would occur. These impacts could be significant. Altamont indicates that except at its Compressor Station No. 1, no new roads would be required to access the proposed right-of-way or any aboveground facilities. Information on the locations of new access roads for the PGT Project is not presently available. However, we have requested that PGT provide us with this data for inclusion in the Final EIS. We will perform site-specific analysis, and develop appropriate mitigating recommendations, at such time as PGT provides this data.

Construction Material Transportation. Approximately four to six trucks per hour during the peak hour would be required to supply the construction spreads with pipe, considerably less than the threshold of 50 trucks per hour. This would be a less-than-significant impact.

Construction Crew Transportation. Several hundred vehicles would be added to local traffic loads if each worker used a personal vehicle to travel to the work site. If travel coincided with local rush hours, this impact could be significant. Pipeline construction workers typically begin work as early as possible each day. Consequently, workers commuting from motels to the work site are expected to precede much of the 7 to 9 a.m. and 3 to 5 p.m. traffic. Further, by its very nature a construction spread disperses workers along its length. This would tend to reduce the impact on traffic at any one location. If construction worker commuting coincides with local roadway peak traffic hours, it is possible that the threshold of significance could be exceeded. To the extent that this would occur, we recommend that the applicants sponsor/coordinate the use of buses or car/van pools to reduce personal vehicle use between worker accommodations and central staging/marshaling areas to the maximum degree practicable.

Both applicants would use existing road crossings to access the rights-of-way. The use of each worker's personal vehicle to access the "moving" job site via the right-of-way could cause substantial additional damage to environmental resources such as soils, hydrology, vegetation and wildlife, and cultural resources. In order to avoid this transportation-related impact, we recommend that PGT and Altamont use buses, vans, or other appropriate vehicles to ferry workers from a central staging or access area to the daily job site. This measure should be implemented to the maximum extent practicable.

State and Federal Highway Crossings. All state and federal highways would be crossed by boring and would not be affected. The applicant would need to obtain from the appropriate state highway departments, utility crossing permits for each federal and state highway crossed. Construction of the pipeline would not result in the disruption of transportation on state and federal highways.

County and Local Road Crossings. The open-cut method of road crossing would be used where permitted. Federal land management agencies and local jurisdictions, such as county and city governments, have the authority to determine whether the road crossing would be open-cut or bored. The applicant would need to obtain a right-of way encroachment permit from the proper agency for each road crossing. If the road is bored, no disruption of normal transportation flow would occur.

An open-cut road crossing would generally require approximately one day or less to complete, during which time the operation would minimally interrupt the normal transportation flow. This interruption would not be significant, as traffic flows would be maintained through the use of on-site detours.

Railroad Crossings. All railroad crossings would be bored. Construction of the pipeline would not result in the disruption of railroad transportation.

IMPACTS SPECIFIC TO THE SOUTH PASS ROUTE VARIATIONS

Transportation impacts for the South Pass Variations would be similar to those described for the proposed route. No significant impacts would be expected.

IMPACTS SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

Transportation impacts associated with construction of the Kern River system were addressed in the EOR FEIR/EIS, sections 4.2.8.2, 4.4.1.8.2, and 4.4.4.8.2 of Volume II and sections 4.2.8.2 and 4.3.2.8.2 of Volume I. While that analysis identified several areas of concern, it concluded that transportation impacts would not be significant. Construction of the additional compressor facilities would take place within the same corridor analyzed in the EOR FEIR/EIS, and would therefore result in no significant impacts on transportation.

Chapter 4K. Environmental Consequences: Public Safety

IMPACTS

Public safety concerns during construction include compliance with minimum safety requirements regarding material selection, minimum design requirements, protection from corrosion, and blasting. Despite all safety precautions, the transportation of natural gas by pipeline involves some risk to the public in the event of an accident and subsequent release of gas. The greatest hazard is a fire or explosion following a major pipeline rupture.

Methane, the primary component of natural gas, is colorless, odorless, and tasteless. It is not toxic, but is classified as a simple asphyxiant, possessing a slight inhalation hazard. If breathed in high concentration, oxygen deficiency can result in serious injury or death.

Methane has an ignition temperature of 1,000 degrees Fahrenheit and is flammable at concentrations between 5.0 percent and 15.0 percent in air. ~~Unconfirmed~~ Unconfined mixtures of methane in air are not explosive. However, a flammable concentration within an enclosed space in the presence of an ignition source can explode. The specific gravity of methane is 0.55 and, therefore, it is buoyant at atmospheric temperatures and disperses rapidly in air.

Pipeline Accident Data. Since February 9, 1970, 49 CFR Part 191 has required ~~all~~ operators of transmission and non-rural gathering systems to notify DOT of any reportable incident and to submit a report on form F7100.2 within 30 days. Reportable incidents are defined as any leaks that:

- caused a death or personal injury requiring hospitalization;
- required taking any segment of transmission line out of service;
- resulted in gas ignition;
- cause estimated damage to the property of the operator, or others, or both a total of $5,000 or more;
- required immediate repair on a transmission line;
- occurred while testing with gas or another test medium; or
- in the judgement of the operator was significant, even though it did not meet the above criteria.

DOT changed reporting requirements after June 1984 to reduce the amount of data collected. Since that date, operators must only report incidents that involve property damage of more than $50,000, injury, death, release of gas, or that are otherwise considered significant by the operator. To avoid, combining dissimilar data sets, only incidents reported during the 14.5-year period form 1970 through June 1984 are used in this analysis.

During the 14.5-year period, 5,862 service incidents were reported over the approximately 300,000 total miles of natural gas transmission and gathering systems nationwide. Service incidents defined as failures that occur during pipeline operation, have remained fairly constant over this period with no clear upward or downward trend in annual totals. In addition, 2,013 test failures were reported. Correction of test failures removed defects from the pipeline prior to operation.

Additional insight into the nature of service incidents may be found by examining the primary factors that caused the failures. Table 4K-1 provides a percentage distribution of the causal factors as well as the annual frequency of each factor per 1,000 miles of pipeline in service.

Table 4K-1
SERVICE INCIDENTS BY CAUSE

Cause	Percentage	Incidents/ 1000 mi-yr
Outside forces	53.5	0.70
Corrosion	16.6	0.22
Material defect	16.9	0.21
Construction defect	4.8	0.06
Other	8.2	0.11
Total	100.0	1.30

The dominant incident cause is outside forces, constituting 53.5 percent of all service incidents. Outside forces incidents result from the encroachment of mechanical equipment such as bulldozers and backhoes; from earth movements due to soil settlement, washouts, or geologic hazards; from weather effects such as wind, storms, and thermal strains; and from willful damage. The breakdown of outside forces incidents in Table 4K-2 shows that human error in equipment usage was responsible for approximately 75 percent of outside forces incidents. Since April 1982, operators have been required to participate in "One Call" public utility programs in populated areas to minimize unauthorized excavation activities in the vicinity of pipelines. The "One Call" program is a service utilized by public utilities and some private sector companies (e.g., oil pipelines and cable television) to provide preconstruction information to contractors or other maintenance workers on the underground location of pipes, cables, and culverts.

Table 4K-2

OUTSIDE FORCES INCIDENTS BY CAUSE

Cause	Percent
Equipment operated by outside party	67.1
Equipment operated by or for operator	7.3
Earth movement	13.3
Weather	10.8
Other	10.8

Table 4K-1 identified an average annual service incident frequency of 1.30 failures per 1,000 miles per year for all natural gas transmission and gathering lines. The pipelines included in the data set vary widely in terms of age, pipe diameter, and level of corrosion control. Each variable influences the incident frequency that may be expected for a specific segment of pipeline.

The frequency of service incidents is strongly dependent on pipeline age. While pipelines installed since 1950 exhibit a fairly constant level of service incident frequency, pipelines installed prior to that time have a significantly higher rate, partially due to corrosion. Older pipelines have a higher frequency of corrosion incidents, since corrosion is a time-dependent process. Further, new pipe generally uses more advanced coatings and cathodic protection to reduce corrosion potential.

Older pipelines have a higher frequency of outside forces incidents partly because their location may be less well-known and less well-marked than newer lines. In addition, the older pipelines contain a disproportionate number of smaller diameter pipelines, which have a greater rate of outside forces incidents. Small diameter pipelines are more easily crushed or broken by mechanical equipment or earth movements.

Table 4K-3 clearly demonstrates the effectiveness of corrosion control in reducing the incidence of failures caused by external corrosion. The use of both an external protective coating and a cathodic protection system, required on all pipelines installed after July 1971, significantly reduces the rate of failure compared to unprotected or partially protected pipe. The data shows that bare, cathodically protected pipe actually has a higher corrosion rate than unprotected pipe. This anomaly reflects the retrofitting of cathodic protection to actively corroding spots on pipes.

Table 4K-3

EXTERNAL CORROSION BY LEVEL OF CONTROL

Corrosion Control	Incidents/ 1,000 mi-yr
None - bare pipe	0.42
Cathodic protection only	0.97
Coated only	0.40
Coated and cathodic protection	0.11

Impact on Public Safety. The service incident data summarized in Table 4K-1 include pipeline failures of all magnitudes with widely varying consequences. Approximately two-thirds of the incidents were classified as leaks, and the remaining third classified as ruptures, implying a more serious failure. Fatalities or injuries occurred in 4 percent of the service incidents reported in the 14.5-year period.

Table 4K-4 presents the annual fatalities that occurred on natural gas transmission and gathering lines from 1970 to 1987. Fatalities between 1970 and June 1984 have been separated into employees and nonemployees, to better identify a fatality rate experienced by the general public. Fatalities among the public average 2.5 per year nationwide over this period. The simplified reporting requirements in effect after June 1984 do not differentiate between employees and nonemployees.

The nationwide totals of accidental fatalities due to various manmade and natural hazards are listed in Table 4K-5 in order to provide a relative measure of the industry-wide safety of natural gas pipelines. Direct comparisons between accident categories should be made cautiously since individual exposures to hazards are not uniform among all categories. Nevertheless, the average 2.5 public fatalities per year is relatively small considering the more than 300,000 miles of transmission and gathering lines in service nationwide. Furthermore, the fatality rate is approximately two orders of magnitude lower than the fatalities from natural hazards such as lightning, tornadoes, floods, earthquakes, etc.

Based on approximately 311,000 miles in service, the rate of public fatalities for the nationwide mix of transmission and gathering lines in service of 0.008 per 1,000 miles per year. Application of the industry-wide average to PGT's proposed 430 miles of pipeline looping and Altamont's proposed 620 miles of new pipeline yields a recurrence interval of one fatality over 290 and 201 years, respectively. The proposed pipeline projects would therefore cause only a slight increase in risk to the nearby public.

Table 4K-4

GAS TRANSMISSION AND
GATHERING SYSTEM FATALITIES [a], [b]

Year	Employees	Nonemployees	Total
1970	1	0	1
1971	2	1	3
1972	3	3	6
1973	1	1	2
1974	1	3	4
1975	5	2	7
1976	1	6	7
1977	5	3	8
1978	1	0	1
1979	4	8	12
1980	0	1	1
1981	5	1	6
1982	4	6	10
1983	1	1	2
1984[c]	-	-	9
1985[c]	-	-	6
1986[c]	-	-	4
1987[c]	-	-	0
Annual Average	2.5	2.5	5

[a] 1970 through June 1984 - American Gas Association, 1986
[b] U.S. DOT Harzardous Materials Information System
[c] Employee/nonemployee breakdown not available for years 1984 through 1987

Table 4K-5

NATIONWIDE ACCIDENTAL DEATHS [a]

Type of Accident	Fatalities
All accidents	92,000
Motor vehicles	46,000
Falls	11,600
Drowning	5,700
Poisoning	5,200
Fires and burns	4,800
Suffocation by ingested object	3,100
Tornado, flood, earthquake, etc. (1980-82 average)	132
Lightning (1980-82 avg.)	94
All liquid and gas pipelines (1978-87 average) [b]	27
Gas transmission and gathering lines Nonemployees (1970-84 average)[c]	2.5

a/ All data unless otherwise noted, reflects 1984 statistics from the National Safety Council, "Accident Facts - 1985 Editions," Chicago, Illinois.

b/ U.S. Department of Transportation, Annual Report on Pipeline Safety - Calendar Year 1987".

c/ American Gas Association, 1986.

Chapter 4L. Environmental Consequences: Visual Resources

IMPACTS

Both pipeline routes would cause construction-related visual impacts. Visual impacts would be caused by vegetation removal, earthwork and grading scars, staging and laydown areas, heavy equipment tracks, trenching, blasting, rock formation alteration or removal, temporary support machinery and tool storage, and related waste materials and tailings.

The degree of impacts from vegetation clearing would depend on the type of vegetation that would be affected. In annual grasslands and agricultural croplands, restoration of the vegetation may occur within three growing seasons, which would limit the visual impact to a short time. Where the pipeline would cross shrub vegetation, the visual impact may persist for many years. In forested areas and areas with low revegetation potential, visual impacts could persist for up to 30 years or longer. Landform and vegetation changes would introduce contrasts in visual scale; spatial characteristics; and form, line, color, and texture. Where the pipeline is constructed along an existing right-of-way the impacts of construction would be less severe.

Operational and maintenance impacts would be similar for both pipeline routes. Where needed, the right-of-way would be periodically cleared of vegetation that is hazardous to ongoing pipeline operation. This periodic clearing of the right-of-way would create the greatest visual impacts in the forested areas of the proposed route. In nonforested areas, the pipeline would not be noticeable to the casual observer once vegetation was restored to its original condition. New or expanded compressor stations, meter stations, mainline valves, and pipeline markers would be permanent introductions to the landscape.

Access roads leading to facilities may be constructed and kept clear of vegetation. At new compressor station facilities, electrical power lines would increase manipulation of the landscape character. New structures on the landscape would affect spatial characteristics and form, line, color, and texture.

Criteria for Determining Significance

Visual impacts were evaluated for thresholds of context and intensity. The context includes the visual character of the site, its rehabilitation potential, and the jurisdictional context of the affected area. The project setting or existing features of the project site are sometimes subject to federal, state, or local laws and regulations, such as the Wild and Scenic Rivers Act.

Intensity includes both sensitivity and duration. Sensitivity is evaluated in terms of viewer sensitivity and proximity to resources, such as park lands, Wild and Scenic Rivers, or historic or cultural resources. The duration of impacts is divided into permanent, long-term, and short-term. Permanent impacts are those changes to the visual resource that involve aboveground structures or areas where vegetation would not recover for the life of the project. Long-term impacts are those changes to the visual resource that would take longer than three years to blend with the surrounding native environment. Short-term impacts are those changes to the visual resource where the native vegetation would recover to its original condition, concealing the pipeline scar, within three years after construction.

Minimum recovery time would vary with the location of construction. For example, the FS in Oregon regards short-term as recovery from the impact in one year for an area with a VQO of Retention and in 2-3 years for an area with a VQO of Partial Retention. In Wyoming, however, the recovery period would be longer because of the weather and soil conditions in that region.

To adequately assess the proposed PGT and Altamont projects, terminology and methodology for determining short-term and long-term impacts needed to be similar for both areas. For this analysis, the three-year threshold for short-term impacts is based on the naturally occurring revegetation potential for a representative portion of the pipeline routes. Long-term impacts are impacts lasting more than three years. Adverse soil or weather was not taken into account.

The FS and BLM have indicated that they may place stipulations in their right-of-way grants to mitigate the visual impact the projects would have on other areas along the proposed routes considered visually sensitive to the land managing agencies although they have not been assigned a VQO of Preservation or Retention or a VRM of Class I or II.

Significant Impacts. Significant or less-than-significant visual impacts were determined according to the identified visual management objectives, whether the area had been modified previously, the duration of the impact, and the degree of visibility. Table 4L-1 displays the ranking of high, moderate, or low visual impacts according to visual management objective and duration of the impact. Most high and moderate visual impacts were determined to be significant; all low visual impacts were determined to be less than significant.

Table 4L-1

VISUAL IMPACT ASSESSMENT CRITERIA FOR THE PGT AND ALTAMONT PROJECTS

Quality Assessment	Duration of Impact					
	Lands without Previous Modifications			Lands with Previous Modifications		
	Permanent	Long-Term	Short-Term	Permanent	Long-Term	Short-Term
FS Visual Quality Objective						
Preservation	H	H	H	H	H	H
Retention	H	M	L	M	M	L
BLM Visual Resource Management						
Class I	H	H	H	H	H	H
Class II	H	M	L	M	M	L

Notes: H = high visual impact
M = moderate visual impact
L = low visual impact

IMPACTS AND MITIGATION MEASURES COMMON TO THE PGT AND ALTAMONT PROJECTS

New structures, such as compressor stations, mainline valves, and signs, would become a part of the landscape on both proposed routes. Overhead powerlines may connect to each station. Mainline valves typically consist of a vertical loop of the pipeline that extends approximately 4 feet out of the ground with the valve at the top of the loop. Altamont proposes to bury all mainline valves such that only the blowdowns and valve operators would be above ground level. Chainlink fence would surround each valve. All aboveground structures would affect the character of their existing landscape. These structures would create permanent visual impacts. These impacts would be significant.

We recommend that the applicants prepare a visual resource mitigation plan that minimizes visual impact of aboveground structures and submit them to FERC. ~~On federal land,~~ For facilities located on federally administered property, the applicants must submit ~~obtain BLM or FS approval of the~~ visual resource plans to the appropriate federal land managing agency for their approval before beginning construction.

All semipermanent and permanent facilities should be located, designed, and painted to blend with the natural surroundings. It is desirable that as many facilities as possible be painted a uniform, noncontrasting color. Semipermanent and permanent structures are those facilities that are onsite more than 90 days after completion of the project. The color at each site should be chosen from the BLM 10 Standard Environment Color System. BLM selection criteria for colors should be followed.

If technically feasible, electrical lines should be buried. Otherwise power lines should be located at the base of slopes to provide a background of topography or natural cover. Materials used to construct towers or poles should harmonize with the natural surroundings. Where natural wood poles are appropriate, the color range should be limited to present a unified series of poles. Choice of conductor material should be carefully considered to avoid a strong silhouette and to provide blending of the conductors into their setting. When lines are adjacent to roads, guyed towers should be avoided to limit the visual impact.

For the belowground facilities, mitigation measures include three generic types of mitigation techniques: strategic location, minimization of disturbance, and restoration of basic landscape elements (form, line, color, and texture). The mitigation measures described in detail below, based on these techniques, would reduce visual impacts. Where some of these measures are recommended on a site specific basis in the discussion of impact, they are described only by the following titles that appear in bold print.

Minimize Clearing. An onsite inspector should monitor clearing. Clearing should be minimized as much as possible at stream and road crossings. Trees should be left as close to the downhill side of the pipeline as possible. Landings and turnouts should be located on exposed slopes or on crests of ridges if topographic conditions permit.

Clearing in forested lands should not leave abrupt, straight lines. Clearing should create curvilinear boundaries instead of straight lines, and minimize scarring of the landscape. Grading should be done to minimize erosion and to conform to the natural topography. The right-of-way should be cleared by scalping vegetation rather than scraping and grading, wherever possible. The planting of large-balled conifers should be part of the visual resource plan where the facilities would be located on FS-administered land.

Minimize the Area Affected by Road Crossings. Staging areas and additional rights-of-way should be located at least 50 feet from the roadside if trees exist at the crossing. A screen of trees should be left in place ~~or planted across the right-of-way at road crossings in forested areas.~~ at these road crossings.

Minimize Stream Crossing Impact. Staging areas and additional rights-of-way should be located ~~at least~~ 100 feet from the streambank or beyond the riparian vegetation zone whichever is nearer to the streambank. However, at no time are the staging areas to be located closer than 50 feet to the streambank (see Appendix C-3). Stream, river, and other water shorelines should be restored to their original condition and contour. ~~Rocks~~ Boulders should be returned to their original locations and set to the original soil line. A screen of trees should be left in place or planted across the right-of-way at stream crossings in forested areas.

Reduce Surface Contrast. Surface soil material should be replaced with the same color material where existing soil surface and backfill colors contrast. The original surface material may be stockpiled and respread.

Restore Earthforms. All disturbed land should be restored to the original contours. An inspection should occur between one and two years after construction completion to document all areas where settling and other defects have occurred. The contours should then be restored within one year of inspection. Cut and blasted slopes should be rounded at the top to blend the cut and provide a transition. Boulders that have been displaced and stored to one side of the right-of-way should be redistributed over the area in a random manner. No rows or boundaries of newly placed boulders should remain.

Retain Rock Outcroppings. To avoid disturbance, the pipeline route should be rerouted around rock outcroppings. Rock outcroppings that cannot be avoided should be documented and replaced. Outcroppings should be reconstructed to as close to their original condition as possible. Rocks should be set to their original soil line.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE PGT PROJECT

Idaho

MP 0.2-~~13.6~~ 19.2, VQO: Retention. This segment of the proposed route would have a moderate visual impact. Because the proposed pipeline would be located within an existing pipeline corridor through mostly forested land, the effects would be less severe than those associated with a new right-of-way. The expanded right-of-way of the proposed route would temporarily redefine the existing line through the forest, which would be more visible than at present to the recreationists and residents of the Moyie River valley and travelers on the Eileen and Moyie River Roads. Shoreline manipulation at stream and river crossings, and clearing for staging areas, would affect the visual character of the shorelines and banks. The pipeline would cross the access road to the Meadow Creek Campground. These impacts would be significant. To reduce these impacts to less-than-significant levels, we recommend that the area affected by road crossings, clearing and stream crossing impacts be minimized.

MP 7.0, VQO: Retention: This segment of the proposed route would have a low visual impact on Buzzard Lake. Because the lake is separated from the right-of-way by dense forest, users of the lake would be unable to see the right-of-way. This low visual impact would be less than significant.

Washington

No FS or BLM designated areas with high or visually sensitive scenic qualities would be affected by the PGT project in the State of Washington.

Oregon

MP 350-367, VRM: Class II. This segment of the proposed route would have a low visual impact, except for the crossing of the John Day River which would have a moderate visual impact. The proposed pipeline would be located within an entirely new right-of-way as it traverses the John Day Canyon area. The impacts on vegetation would be short-term for most of this segment because much of the route would be in cultivated fields. Construction of the pipeline within view of the federally designated Wild and Scenic John Day River crossing, at MP 358, would leave a long-term scar on the landscape because steep canyon walls and dry climate would delay recovery time. Although this crossing location was identified by the BLM as having the least adverse visual impact in the ANGST Final EIS, these impacts would still be considered significant. To reduce these impacts to less-than-significant levels, we recommend that earthforms be restored, rock outcroppings be retained, and surface contrast be reduced between MP 357.5 and 358.5.

MP 404-429, VQO: Retention, Partial Retention. This segment of the proposed route would have a low visual impact. The proposed pipeline would be located within an existing pipeline corridor that crosses the Crooked River National Grassland. The impacts on vegetation would be short-term. Construction of the proposed pipeline would temporarily scar the landscape. These low visual impacts would be less than significant.

MP 432.7-433.0, VQO: Partial Retention, VRM: Class II. This segment of the proposed route would have a low visual impact. The proposed pipeline would cross the Crooked River within an existing pipeline corridor in an area of mostly agricultural land. The impacts on vegetation are short-term. Construction of the pipeline would temporarily scar the landscape. These impacts would be less than significant.

MP 465.0-511.2, VQO: Retention. This segment of the proposed route would have a moderate visual impact. The proposed pipeline would be located in an existing pipeline corridor that crosses forested areas of the Deschutes National Forest. The expanded right-of-way of the proposed route would redefine the existing line through the forest. This would be more visible to the surrounding areas than the current line. Travelers to Lava Butte, Lava River Cave, Newberry National Volcanic Monument, and other destinations on US 97 and SR 58 would be affected because these highways would be crossed by the proposed pipeline. These impacts would be significant. To reduce these impacts to less-than-significant levels, we recommend that clearing and road crossing impacts by minimized.

Although only a portion of the route is visible from the top of Lava Butte, it is more noticeable because it occurs at a ridgeline. The project would have a moderate visual impact on visitors atop Lava Butte since restoring the ridgeline would take more than three years, the threshold for determining long-term impacts. The mitigation measures recommended above for this interval would reduce this moderate visual impact to less-than-significant levels.

MP 467, VQO: Retention: The route is located approximately 0.125 miles from the entrance to Lava River Cave and is obscured from view by the dense Ponderosa Pine Forest. Therefore, the project would have a low visual impact on visitors to the cave. This impact would be less than significant.

MP 519.5, VQO: Retention. This segment of the pipeline route would have a low visual impact at the crossing of Miller Lake Road. The crossing location is adjacent to an existing cleared corridor which contains a powerline and a pipeline. The only additional clearing of trees at this location would be for temporary workspace. Therefore, the visual impact would be short-term and considered less than significant.

Table 4L-2

VISUAL IMPACTS ALONG THE PGT ROUTE

Milepost	Location	VRM	VQO	Level of Impact			Level of Significance
				High	Moderate	Low	
IDAHO							
0.3	Moyie River		R		X		S
1.0	Moyie River		R		X		S
5.0	Moyie River		R		X		S
5.8	Moyie River		R		X		S
7.0	Buzzard Lake		R		X		S
7.3	Buzzard Creek		R		X		LS
7.8	Moyie River		R		X		S
9.6	Snyder Creek		R		X		S
10.0	Moyie River		R		X		S
10.7	Moyie River		R		X		S
13.6	Moyie River		R		X		S
13.8-19.2	Eileen Road		R		X		S
OREGON							
350.0-367.0	John Day Canyon Area	II				X	LS
358.0	John Day River	II			X		S
404.0-429.0	Crooked River National Grasslands		R,PR			X	LS
422.9	SR 26		R			X	LS
432.7	Crooked River	II				X	LS
433.0	SR 26	II				X	LS
465.0	Lava Butte		R		X		S
465.5-468.0	Newberry National Volcanic Monument		R		X		S
467.0	Lava River Cave		R			X	LS
505.9	US 97		R		X		S
511.2	SR 58		R		X		S
519.5	Miller Lake Road viewshed		R			X	LS

Notes: VRM = BLM Visual Resource Managment class; VQO = FS Visual Quality Objective

VRM/VQO definitions:
- PR = Partial Retention VQO
- R = Retention VQO
- II = Class II VRM

Level of signficance definitions:
- LS = less than significant impacts
- S = signficant impact

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE ALTAMONT PROJECT

Montana

MP 69, VRM: Class II. This segment of the pipeline route would have a moderate visual impact. The pipeline would cross the Missouri River in an area designated as Wild and Scenic. The impacts on vegetation in the riparian forest riverbanks would be long-term. The pipeline route would scar the shores and banks of the river. Manipulation of the contours would affect the visual character of the river. These impacts would be significant. ~~To reduce these impacts to less-than-significant levels, we recommend that Altamont directionally drill the crossings as previously recommended for the protection of water quality and fisheries in Chapter 4F "Fisheries".~~ These significant impacts would not occur if Altamont crosses the river by the directional drilling technique as we have recommended in Chapters 4C "Hydrology and Water Quality" and 4F "Fisheries". In the event the Missouri River is crossed using the open-cut technique, we recommend the following measures be implemented to reduce these impacts to less-than-significant levels: restore earthforms, minimize stream crossing impacts, and replant trees on both river banks. The trees should be species native to the area.

MP 257.4, VRM: Class II. This segment of the pipeline route would have a moderate visual impact where the pipeline would cross the Yellowstone River. The impacts on riparian forest vegetation on the riverbanks would be long-term. The pipeline route would scar the shores and banks of the river. Manipulation of these contours would affect the visual character of the river. These impacts would be significant. To reduce impacts to less-than-significant levels, we recommend that earthforms be restored, stream crossing impacts be minimized, and trees be replanted on both river banks. The trees should be species native to the area.

~~**MP 266.6-266.9, VRM: Class II.** This segment of the proposed pipeline route would have a low visual impact. The pipeline would be located in primarily agricultural land. The impacts on vegetation are short-term. Construction of the pipeline would temporarily scar the landscape. These impacts would be less than significant.~~

MP 268.1, VRM: Class II. This segment of the proposed pipeline route would have a moderate visual impact where the pipeline would cross the Clarks Fork of the Yellowstone River. The impacts on riparian forest vegetation on the riverbanks would be long-term. The pipeline construction would create a scar on the banks of the river. Manipulation of the contours would affect the visual character of the river. These impacts would be significant. To reduce impacts to less-than-significant levels, we recommend that earthforms be restored, stream crossing impacts be minimized, and trees be replanted on both riverbanks. The trees should be species native to the area.

Wyoming

MP 352.2, VRM: Class II. This segment of the proposed route would have a moderate visual impact where the pipeline would cross the Greybull River. The impact on riparian

Table 4L-3

VISUAL IMPACTS ALONG THE ALTAMONT ROUTE

Milepost	Location	VRM[a]	Level of Impact			Level of Significance
			High	Moderate	Low	
MONTANA						
69.0	Missouri River	II		X		S
257.4	Yellowstone River	II		X		S
268.1	Clarks Fork Yellowstone River	II		X		S
WYOMING						
352.2	Greybull River	II		X		S
423.9	West Bridger Creek	II		X		LS
425.4	Old Bridger Trail Road	II		X		LS
508.2	Beaver Creek	II		X		LS
510.9	Little Beaver Creek	II		X		LS
525.6	Fish Creek	II		X		S
526.8	Sweetwater River	II		X		S
532.0-555.0	SR 28	II		X		LS
537.7	Oregon-Mormon Trail	I	X			LS
593.5	Green River	II		X		S
612.6	US 30N	II		X		LS
613.3	Hams Fork	II		X		S
SOUTH PASS ROUTE VARIATIONS						
AB 489.4	Beaver Divide Rim	II		X		LS
JC 495.5	Sweetwater River	II		X		S
JC 496.2	Oregon-Mormon Trail	II			X	LS
AB 498.2	Sweetwater River	II		X		S
AB 500.3	Oregon-Mormon Trail	II			X	LS
RT 504.5-529.5	South Pass ACEC	II		X		S
JC 618.7	Green River	II		X		S
JC 637.9	Oregon-Mormon Trail	II			X	LS

Notes: The Route 28 Variation would also cross these sites listed under the proposed route between MP 529 and 620.

[a] VRM = BLM visual resource management classification

Level of signficance definitions:

LS = less than significant impacts

S = signficant impact

vegetation on the riverbanks would be long-term. The pipeline construction would also create a scar by manipulating the contours of the banks of the river. These impacts would be significant. To reduce impacts to less-than-significant levels, we recommend that Altamont minimize stream crossing impacts and replant native woody vegetation on the riverbanks.

MP 423.9, 425.4, 508.2, and 510.9, VRM: Class II. ~~This segment of the proposed pipeline route~~ The proposed crossing of West Bridger Creek, Old Bridger Trail Road, Beaver Creek, and Little Beaver Creek at these locations would have a moderate visual impact. The impacts on vegetation are long-term because the climate is dry and some steep terrain would be crossed by the proposed route. Most of this segment would be located in isolated areas and open rangeland not visible to travelers. ~~Although motorists on US 287 would see the right-of-way, the point of intersection with the highway occurs adjacent to an existing pipeline.~~ Because of the lack of visibility, these moderate visual impacts would be less-than-significant.

MP 511-541, VRM: Class II, III, and IV. This area is one of very high public interest and contains a number of historic trails. Although it includes VRM class designations of III and IV, it is considered visually sensitive. Construction along this segment of the proposed route would have a moderate visual impact. It is sparsely vegetated and in many places has only a thin veneer of soil over bedrock. The proposed route would cross lands that presently have few human-made features. Those that are there are mostly two-track roads and fences which blend in fairly well with the natural landscape. Although construction of the pipeline would result in a long-term visual impact (more than 3 years), it would be similar in appearance to the many existing unimproved and two-track roads throughout the area until restoration is complete. The right-of-way would not be visible from the South Pass ACEC, however, it would be visible at certain locations to travelers in its vicinity.

Altamont's South Pass Plan details the specific mitigative techniques that would be used during construction and right-of-way rehabilitation to reduce project-related visual impacts between MPs 511 and 540.8 on the proposed route. This Plan incorporates the mitigation measures recommended in the Draft EIS and describes both the construction design and revegetative techniques Altamont would use to minimize the long-term visual effects in this interval and to reduce the visual impacts to less-than-significant-levels. (The South Pass Plan is summarized in chapter 4B and has been included as Appendix B-5.)

Site-specific designs for the two block valve assemblies planned for this project interval were also provided by Altamont in this plan. One valve would be located at MP 515.5 in an underground vault, with a hinged metal security cover that would extend 8 inches above grade. The vault cover would be painted to blend with the surrounding landscape.

The other block valve assembly would be located at MP 532.7 near some corrals against an area of badlands on the north side of Highway 28. The facility would consist of pipe blowdowns and valve operators that protrude approximately 2 feet above grade, and a 6-7 feet high security fence. The blowdowns, operators, and fence would be painted to blend with the surrounding ground cover.

Altamont's location selections and design plans for these block valve assemblies would reduce their visual impact on the area to less-than-significant levels. However, to further minimize visual impact in this interval, we recommend that Altamont also paint all other project related aboveground facilities and appurtenances to blend with the surrounding ground cover. This would include line markers and test lead posts.

In November 1990, Altamont realigned a portion of its proposed route through the South Pass area. The realignment crosses to the north side of SR 28 near MP 529 and parallels the highway until recrossing it near MP 537.7 at the intersection point of SR 28 and the Oregon-Mormon Trail. This alignment avoids the South Pass NHL and locates the proposed bored crossing of the Oregon-Mormon Trail at the previously disturbed highway crossing site. The present route, in conjunction with the visual resource mitigation measures proposed by Altamont in their Construction and Rehabilitation Plan for the South Pass area, would result in a less-than-significant visual impact on both of these historical resources.

The realignment places the route adjacent to the existing highway right-of-way between approximate MPs 529 and 537. Since the SR 28 right-of-way in this area is already in distinct visual contrast to the surrounding landscape, partially because of its grassy condition, the visual impact of the pipeline right-of-way on this viewshed would be incremental, and considered less than significant.

Once the pipeline route crosses SR 28 near MP 537.7 and returns to the south side of the highway, it parallels the highway at a distance of approximately 0.25 mile until crossing it again near MP 558. For the majority of this parallel segment, the route lies adjacent to the existing AT&T right-of-way. The flat terrain in this area makes it very difficult to see the AT&T right-of-way; consequently, the existence of a pipeline right-of-way on the far side of the AT&T right-of-way would have a low visual impact on motorists traveling on SR 28.

A visual resource mitigation plan for the proposed Farson Compressor Station (MP 549) would still need to be prepared and submitted to the Commission in accordance with our general recommendation for all aboveground facilities.

~~**MP 510.9-524, VRM: Class II.** This segment of the proposed pipeline route would have a moderate visual impact. Although the proposed pipeline would cross open rangeland, the impacts on vegetation would be long term. Construction of the pipeline would create a scar on the landscape. Although it would not be visible from the South Pass ACEC, the scar would be visible to some travelers in its vicinity. Therefore, these moderate visual impacts would be significant. To reduce impacts to less than significant levels, we recommend that Altamont reduce surface contrast and restore earthforms.~~

~~Any aboveground facilities placed within the area between MP 510-555 would create a permanent visual intrusion. The selection of location and design of these facilities for this area should be given more attention than usual. At this time, Altamont has identified locations for block valve assemblies at MP 515.5 and 534.2 and the Farson Compressor Station at MP 549. As we recommended earlier, Altamont should submit for our review and approval a visual resource protection plan that would minimize the visual impact of aboveground facilities.~~

~~**MP 524.0-555, VRM: Class I, Class II.** This segment of the proposed pipeline route would have high and moderate visual impacts. The proposed pipeline would be located in open rangeland, however it would cross the Oregon-Mormon Trail and a National Historic Landmark. The impacts on vegetation for this segment are long term. Construction of the pipeline would scar the landscape. Travelers on SR 28 and at scenic turnouts would be able to see the pipeline scar. These impacts would be significant. To reduce impacts to less-than-significant levels, we recommend that Altamont locate the pipeline along the reroute that is described in detail in Chapter 4M "Cultural Resources". To further reduce visual impacts to this area, we recommend that Altamont reduce surface contrast, restore earthforms, retain rock outcroppings, minimize stream crossing impacts, and replant native woody vegetation on affected streambanks.~~

MPs ~~561.0-613.3~~ 593.5 and 613.1, VRM: Class II. ~~This segment of~~ The proposed ~~pipeline route~~ crossings of the Green and Hams Fork Rivers would have a moderate visual impact. ~~The proposed pipeline would be located in open rangeland where the impacts on vegetation would be long term but not visible.~~ Modifications of the shores and banks of ~~the Big Sandy, Green, and Hams Fork Rivers~~ these rivers would affect the visual character of the landscape. These impacts would be significant. To reduce impacts to less-than-significant levels we recommend that stream crossing impacts be minimized, and native woody vegetation be replanted on the affected streambanks.

MP 612.6, VRM: Class II. This segment of the pipeline would have a low visual impact at the crossing of US 30N. The crossing location is located in a treeless area between two road intersections and an active gravel pit and railroad. Due to the disturbed condition of the area, the visual impact would be short term and considered less than significant.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE SOUTH PASS ROUTE VARIATIONS

MP 489.4 (Alkali Butte MP), VRM: Class II. The Beaver Divide Rim would be crossed by both the Alkali Butte and Northern Utilities Variations at this location. This would have a moderate visual impact. The routes cross the rim adjacent to an existing unpaved road. Although pipeline construction would create a scar on the cliff face of the rim, it would be indistinguishable from the existing road scar when viewed from a distance. The existing road crossing is not visible from the scenic turnout/overlook on SR 135 east of the rim crossing location. Due to the lack of visibility, this moderate visual impact would be less than significant.

MP 495.5 (Jeffrey City MP), VRM: Class II. The Jeffrey City Variation crossing of the Sweetwater River at this location would have a moderate visual impact. The pipeline construction would create a scar on the riverbanks visible to recreational users of the river. These moderate visual impacts are, therefore, significant. To reduce impacts to a less-than-significant level, we recommend that stream crossing impacts be minimized and that native woody vegetation be replanted on the riverbanks.

MP 496.2 (Jeffrey City MP), VRM: Class II. The Jeffrey City Variation crossing of the Oregon-Mormon Pioneer Trail at this location would have a low visual impact. Although the historic value of the trail makes it visually sensitive, the crossing location occurs in a cultivated field. This would, therefore, be a less-than-significant impact.

MP 498.2 (Alkali Butte MP), VRM: Class II. Both the Alkali Butte and Northern Utilities Variations would cross the Sweetwater River at this location. The pipeline construction would create a scar on the riverbanks visible to recreational users. These moderate visual impacts are, therefore, significant. To reduce impacts to less-than-significant levels, we recommend that stream crossing impacts be minimized and that native woody vegetation be replanted on the riverbanks.

MP 500.3 (Alkali Butte MP), VRM: Class II. Both the Alkali Butte and Northern Utilities Variations crossings of the Oregon-Mormon Pioneer Trail at this location would have a low visual impact. Although the trail is considered visually sensitive due to its historic value, the crossing location is in a previously disturbed area. This would be a less-than-significant impact.

MP 504.5-529.5 (Route 28 MP), VRM: Class II. Pipeline construction on this large segment of the Route 28 Variation would have a moderate visual impact. The riparian vegetation removed at stream crossings and the clearing of forested area would be a long-term impact. The right-of-way would be visible from the proposed South Pass Historic Mining District and from SR 28. These impacts are, therefore, significant. To reduce impacts to less-than-significant levels, we recommend that clearing be minimized, stream crossing impacts be minimized, native woody vegetation be replanted on streambanks, earthforms be restored, surface contrast be reduced, and that no aboveground facilities be placed between Route 28 MPs 514 and 529.5.

MP 618.7 (Jeffrey City MP), VRM: Class II. The Jeffrey City, Alkali Butte, and Northern Utilities Variations would all cross the Green River at this location. The river receives moderate recreation use in this area. Construction of the pipeline would scar the riverbanks. These moderate impacts would, therefore, be significant. To reduce impacts to less-than-significant levels, we recommend that stream crossing impacts be minimized and native woody vegetation be replanted on the riverbanks.

MP 637.9 (Jeffrey City MP), VRM: Class II. The Jeffrey City, Alkali Butte, and Northern Utilities Variations would all cross the Oregon-Mormon Pioneer Trail at this location. Although the trail has historic value, this crossing location would occur in a cultivated field. This ~~would have a~~ low visual impact would be less than significant ~~visual impact~~.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

The additional facilities required downstream on Kern River's system would all be aboveground structures. These structures would create a permanent visual impact. Although none of the station sites are located in an area designated visually sensitive, the permanent impacts are significant. To reduce these impacts to less-than-significant levels, we recommend that the stations be designed and painted to blend with the natural surroundings.

Chapter 4M. Environmental Consequences: Cultural Resources and Paleontology

CULTURAL RESOURCES IMPACTS

Construction and operation of the proposed PGT and Altamont projects could affect historic, archeological, architectural and/or traditional cultural properties on or eligible for inclusion on the NRHP. Project impacts could include the physical disturbance during construction of archeological sites located within the proposed project right-of-ways; the demolition, removal or alteration of historically or architecturally significant structures; and the introduction of visual elements (compression or metering stations; right-of-way cuts through sensitive areas) that could alter the settings, integrity of location, or feeling associated with historic properties or historically sensitive areas. Mitigative measures will include rerouting the project right-of-way to avoid historic properties; data recovery (scientific excavation of archeological sites, photographic and architectural recording of standing structures); and/or use of buffer zones or vegetative screens, or other landscaping techniques that would reduce or eliminate adverse visual effects.

The potential effects of the projects may be either direct or indirect. Direct effects or impacts result from the destruction of historic properties or impairment of the values that make them significant. Bulldozing an archeological site is an example of a direct effect or impact. Indirect impacts on the character or setting of these resources may also occur. Indirect impacts may be caused by erosion resulting from slope regrading, or increased vandalism or looting, made possible by new access roads into previously remote areas.

It is possible that landscapes and historically or architecturally significant standing structures located outside the proposed project right-of-way but within the project viewshed would be affected. Potentially adverse effects could result from the creation of right-of-way cuts through sensitive historic areas. These changes could alter the visual context associated with standing structures that may be eligible for the NRHP, or historic areas listed in, or eligible for, the NRHP.

Criteria for Determining Significance

A project is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Within the context of the proposed projects, adverse effects on historic properties may include, but are not limited to:

- physical destruction, damage, or alteration of all or part of the property;

- isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register; or

- introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting.

In accordance with the ACHP procedures for implementing Section 106 of the NHPA, the FERC, in consultation with the ~~appropriate~~ SHPOs and appropriate federal agencies, will determine ~~for each~~ NRHP ~~listed or eligible~~ eligibility for each property that lies within the project area, if the property would be affected and if the effect would be adverse. In accordance with the FERC's general policy, every effort would be made to avoid adverse effects by rerouting or by implementing other mitigation measures.

The American Indian Religious Freedom Act of 1978 requires the consideration of effects on traditional religious and cultural values and practices. The implementing regulations for the NHPA (36 CFR 800) emphasize the consideration of the concerns of interested parties, such as Native American groups, in the evaluation of cultural resources. Significant impacts would occur if areas with contemporary or sacred values to the Native American community or other interested parties would be directly or indirectly affected by project-related activities.

At present, a Phase 1 archeological field survey of the APE for the proposed PGT project has been completed. Two hundred and twenty-three cultural resources were identified, 206 of which were recommended as potentially eligible for the NRHP~~, requiring further study to verify eligibility status. This testing is currently underway.~~ Altamont has conducted a background literature search. We have requested that Altamont conduct a field survey for the proposed project. A work plan has been produced and is presently under review by the FERC, the SHPOs, the BLM and the BOR. A formal determination of eligibility for listing on the NRHP (per Title 36 CFR Part 60.4) of most resources identified by the PGT field study and the Altamont background search has not been completed.

In order to ensure that FERC's responsibilities under Section 106 of the NHPA, and implementing regulations, are met, we recommend that all applicants shall not commence ~~defer~~ construction of the proposed facilities (and the use of any staging and storage areas) until (a) the FERC staff, SHPOs, and appropriate land managing agencies have reviewed and approved all Phase 1 and 2 cultural resource survey plans and reports and mitigation plans and reports, if required, and have considered any comments of the respective SHPOs and ACHP; and (b) the Director of OPPR has informed the applicants, in writing, that construction may begin.

Traditional Cultural Values

Both direct and indirect impacts to historic and archeological properties of traditional cultural value, as identified during the consultation process in accordance with 36 CFR 800.4(a)(1)(iii) and 800.1(c)(2)(iii), will be considered. The FERC, in accordance with its planning processes and the ACHP regulations, will treat those with traditional cultural concerns as interested parties.

Thus, if FERC is notified by designated tribal representatives, identified interested Indian groups, and/or identified individuals, the Commission will inform these parties of the determinations regarding existence of culturally significant properties within the project's APE. The FERC will also notify these parties of any determination of effect.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE PGT PROJECT

The ~~entire~~ majority of the APE of the proposed PGT project route has been inventoried for cultural resources. The APE of the project encompasses the pipeline right-of-way plus all other areas where project development work might affect historic properties. This includes lands to be cleared, trenched, and restored for the pipeline itself, temporary working strips, ~~access roads,~~ borrow and spoils disposal sites, locations of compressor stations, and areas to be used for temporary storage of equipment, pipe, and excavated materials. Some of the laydown areas, temporary work areas, and access roads have not yet been identified. These areas will be surveyed upon their identification. The project will be constructed almost entirely within existing right-of-way. Therefore, much of the APE consists of previously disturbed ground.

Eligibility for listing in the NRHP, for most of the resources identified for the PGT Project, and the related PG&E facilities, has not been determined. However, the destruction, damage, or alteration of all or part of these sites could be significant impacts because the resources have not been formally determined to be ineligible for listing in the NRHP. ~~The FERC, SHPOs and other appropriate agencies are presently reviewing the report, which includes recommendations for eligibility and further testing.~~ A plan, detailing the next phase of fieldwork, including eligibility recommendations and possible treatment, is currently being prepared by PGT, to be submitted to the FERC, the SHPOS and the appropriate agencies for review and comment prior to implementation. Mitigation for eligible sites may include avoidance, data recovery, the use of buffer zones or vegetative screening, or boring when ground conditions permit. Data recovery plans would be implemented in consultation with the SHPOs, the ACHP, and the appropriate federal agencies.

Idaho

The Phase 1 Cultural Resource Survey identified ~~thirteen~~ 16 sites (~~one~~ 4 prehistoric, 12 historic) within the APE in Idaho. The historic sites include debris scatters, a trail, and sites with structural remains. The prehistoric sites consisted of lithic scatters and a scatter of fire altered rocks. The Meadow Creek Townsite, considered for use as a pipe laydown area, has been identified as NRHP-eligible by the Idaho SHPO. ~~No ethnographic sites were identified and no tribal lands would be crossed, though~~ The Kootenai have identified the Moyie River as historically significant and currently sensitive. They as well as the other ~~numerous~~ tribes contacted voiced concern over archeological sites and burials. At least one Kootenai and two Pend Oreille ethnographic sites were identified.

Washington

Eight sites (one prehistoric/historic and seven historic) were identified within the APE in Washington. The historic sites included debris scatters, a windmill, and railroad grades. The prehistoric component consisted of a small lithic scatter. No NRHP-listed or -eligible sites have been identified. ~~No~~ At least five ethnographic sites were identified and no ~~tribal~~ reservation lands would be crossed. ~~, though~~ Numerous tribes contacted voiced concern over the management of cultural resources, burial grounds, and gathering areas.

Oregon

A total of 131 sites were identified within the project APE in Oregon. These consisted of 97 prehistoric sites, 12 prehistoric/historic sites, and 22 historic sites. The historic sites included trails, dumps, railroad grades, and a logging camp. The prehistoric sites included lithic scatters, middens, and a quarry. The prehistoric components consisted of various sized lithic scatters, while the historic components included debris scatters, structural remains and a stone wall. No presently NRHP-listed or -eligible sites have been identified. There was no visible evidence of the Oregon Pioneer Trail, portions of which are listed in the NRHP, where it crossed the project route. Two ethnographic locations of potential concern were identified, as well as a mapped "Old Indian Reservation Boundary". Concerns over site protection and burial grounds were voiced by various tribal groups contacted.

California - PG&E's Nonjurisdictional Facilities

The entire APE of the proposed PG&E project route, with the exception of the CPUC's "Contra Costa" and "Shasta County-West", reroutes, has been inventoried for cultural resources. The survey resulted in the identification of 68 sites. These consisted of 55 prehistoric sites, 6 prehistoric/historic sites, and 7 historic sites. The historic sites included debris scatters, a stone wall, and an historic canal. The prehistoric sites included lithic scatters, middens, and a bedrock milling station. The prehistoric components consisted of various sized lithic scatters and middens, while the historic components included debris scatters and structural remains. At least two prehistoric sites within the Lake Britton National Register District are located within the APE. The Noble's Emigrant Trail is listed in the NRHP, but no evidence of this resource was noted within the APE. The Jepson Prairie Preserve Alternatives A and B each contained one prehistoric site. At least ~~six~~ nine ethnographic locations, including village sites, were identified. Numerous tribes contacted voiced concerns over archeological sites, burials, and monitoring.

~~The Brentwood Pipeline Route Alternatives and~~ The Brentwood Compressor Station Site C ~~Expansion and Alternative Compressor Station Sites have~~ has not been surveyed ~~as the right-of-way alignment has not yet been defined.~~ Two prehistoric mounds and one historic refuse scatter have been identified within the Brentwood Alternative Route 4 APE.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE ALTAMONT PROJECT

To date, Altamont has completed a ~~background~~ Class I literature search that deals with identifying previously recorded cultural resources within 1000 feet of the proposed route. An updated SHPO file search for the proposed route and the South Pass Route Variations in Wyoming has also been completed. The Class I search ~~study of historic maps and other published resources~~ identified ~~240~~ 242 cultural resources. (This number reflects multiple crossings of the route by linear features. It is uncertain whether identifiable remnants of some of these, such as old roads and trails, exist). Of the ~~240~~ 242 cultural resources, ~~142~~ 144 are historic and 98 are prehistoric. A total of ~~193~~ 194 (~~139~~ 140 historic and 54 prehistoric) would be within 100 feet of the centerline. The updated SHPO file search identified 296 cultural resources (251 prehistoric and 45 historic) within a mile of the proposed route in Wyoming. The identification and evaluation of previously unknown resources is not yet underway. Altamont has prepared a work plan for this phase, which we are currently reviewing along with the SHPOs and other appropriate agencies. ~~A site specific evaluation of proposed project impacts to cultural resources is therefore not possible.~~

Both the Wyoming and Montana SHPOs have commented on the potential for the proposed project to impact cultural resources and have recommended that a cultural resource field survey be undertaken. We have requested, and Altamont has agreed to conduct, the necessary field investigations to assure that all significant sites within the right-of-way have been located and evaluated.

The historic Sidon Canal, ~~portions of~~ the Oregon-Mormon Trail, the historic mining towns of Miners Delight, South Pass City, Fort Stambaugh and the Atlantic City area, are all listed on the NRHP. ~~(The Oregon Trail and the Mormon Trail followed basically the same route in this area. For that reason, "Oregon Mormon" is used in this discussion).~~ The proposed project would cross the Sidon Canal as well as portions of the Oregon-Mormon Trail, and pass within approximately 4.0 miles of South Pass City, 3.3 miles of Atlantic City, 3.8 miles of Miners Delight, and 2.0 miles of Fort Stambaugh. A portion of the South Pass, ~~the confluence of~~ where numerous historic trails (including the Oregon and Mormon Trails) converge, is a NHL. ~~As such, it~~ NHLs merits special consideration by federal agencies as stipulated by 36 CFR 800.10, and Section 110(f) of the Annotated Guidelines for federal Agency Responsibilities under Section 110 of the NHPA (53 FR 4727-46). ~~At this time, the NRHP does not have confirmed boundaries for the NHL. Original boundaries were proposed in 1966 when the area was designated a NHL. However, an update of the NHL in 1984/1985 called for a reassessment of the boundaries, requiring further research. It is unclear, at this point, whether the original boundaries have been formalized. We are presently awaiting data from the NRHP regarding this boundary issue. In lieu of additional data, our analysis is based on the boundaries established in 1966. On this basis, the proposed route crosses the northwest extremity of the NHL boundary. As a result, realignment of this section is recommended.~~

In order to obtain additional information and the status of any updates conducted by the National Park Service (NPS) regarding boundary issues for the South Pass NHL, several discussions have taken place with the NRHP History Division in Washington, D.C. and the Rocky Mountain Regional Office of the NPS (the office which conducted the actual study determining the boundaries for the NHL) since release of the Draft EIS. Information received indicates that the boundaries identified in the NRHP Inventory-Nomination Form (dated August, 1985) used in preparation of this EIS, remain the most current. We have been advised that due to a land dispute with a private land owner, the NRHP and NPS anticipate that there will be no opportunity to enlarge or change the boundaries until such time as the land ownership changes or is transferred. It was further recommended by the NPS that, as boundaries concurred on by the NPS and the State of Wyoming, the boundaries identified in the NRHP form are currently official and should be used as a base line for any proposed project planning purposes.

South Pass served as the primary passageway to the West for emigrants traveling the Oregon-Mormon Trail during the nineteenth century, and is considered one of the most significant historic sites in the state of Wyoming. Additionally, as a NHL designated as possessing "exceptional value as commemorating or illustrating the history of the United States" (Historic Sites Act of 1935), its significance is of national scope. Numerous comments by interested parties regarding the proposed project and its potential effect on the area have been received. The importance of and controversy surrounding the routing of a pipeline near this area is clear.

We conducted an aerial/ground inspection of the South Pass area ~~was conducted~~ in September 1990, which included an assessment of the potential visual impact on the NHL viewshed. During the inspection, all of the routes under review in Fremont, Sublette, and northern Sweetwater County were subject to helicopter overflights with ground stops at areas of concern. Additionally, ground inspection (vehicular, with stops for surface inspection and visual assessments) was performed for the proposed route and Route 28 Variation, including the areas of and surrounding Atlantic City, Miners Delight, South Pass City and Willie's Handcart. This type of inspection was also performed for the NHL and the surrounding area, including the Oregon-Mormon Trail, Pacific Springs, the Halter and Flick Ranch, and designated tourist stops (i.e., historic markers, scenic overlooks, etc.), between MP 526 and MP 540.

The NHL is currently traversed by an overhead electrical transmission line and an abandoned (tracks removed) railroad grade constructed in the mid-1960's to service the U.S. Steel facility 2 miles north of Atlantic City. Additionally, a clearly visible 75 foot wide right-of-way, remnants of the 1969 installation of an AT&T ~~fiber optic~~ cable, also crosses the NHL. The visibility of the right-of-way is not due to the lack of vegetative regrowth, however. It appears to have been caused by reseeding the right-of-way with an improper vegetative/plant species, which resulted in regrowth which contrasts with the native species present in the area. From the southwest, the proposed route follows the AT&T right-of-way to MP 538 ~~529.1 (on the NHL)~~, where the two routes diverge as the proposed pipeline ~~AT&T~~ trends northward across SR 28 ~~eastward. The two routes diverge at this location.~~ Due to the slightly rolling topography present at the South Pass, from a ground aspect the AT&T right-of-way is visible only intermittently when viewed from SR 28 (the major transportation route in the area, as well as the only paved road from which the NHL may be viewed). This is also the case when viewing the NHL in a northeasterly direction from a scenic/historic overlook on SR 28 (approximately 0.3 miles north of MP 533), viewing westward across the NHL to SR 28 from the

Oregon-Mormon Trail, and viewing southwest from the high ground of the summit. The abandoned railroad grade is most prominent when viewing northeast from the SR 28 scenic overlook and westward from the Oregon-Mormon Trail.

The Oregon Trail and the Mormon Trail were both designated as National Historic Trails in 1978. The proposed route would cross the Oregon-Mormon Trail ~~just~~ southwest of South Pass ~~at~~ near MP 538 where it would coincide with the trails crossing of SR 28. This crossing would be bored, leaving the highway and the trail undisturbed. ~~536.3. Numerous parties have voiced concern over this crossing, and have identified the trail here as "pristine" and "original". The BLM has identified this crossing as the "least desirable" of the three crossings under review (see the South Pass Route Variations, below), and rates the area as a Class I visual resource.~~ The archeological field study to be conducted will further evaluate the condition of the trail and its surroundings. ~~Possible mitigation options include a bored or directionally drilled crossing of the Trail, realigning of the proposed route to a less sensitive crossing in the immediate area, or using an alternate route. In this instance, realignment of the route to avoid the MP 536.3 crossing of the Trail is recommended.~~

The Oregon-Mormon Trail in the South Pass area continues to serve as a transportation route for residents and tourists alike. There has been considerable impact to the Trail and the area in general, due to apparent uncontrolled vehicular traffic. Physical reminders of the Trail in the form of swales spaced some 30 feet apart (on either side of the existing dirt road) are still evident, however, both in the NHL, and south near the "Parting of the Ways" historical markers ~~at~~ near MP 538.2.

The proposed project would potentially affect three major Cutoffs of the Oregon Trail; the Lander Cutoff, the Slate Creek Cutoff and the Kinney Cutoff. These effects would be reduced to not adverse by using various mitigation measures which could include crossing the various segments at points where the integrity is already compromised, boring underneath the segment, and implementing appropriate restoration and revegetation to reduce visual impact.

~~In view of the above, realigning the proposed route to avoid the NHL and the proposed crossing of the Oregon Mormon Trail at MP 536.3 is recommended. This could be accomplished by rerouting the pipeline to the west side of SR 28 in the interval where the proposed route would cross both of these features. We recommend that the realignment diverge from the proposed route near MP 526, bending westward immediately north of the Sweetwater River. The route would cross the river about 0.6 mile upstream of the proposed crossing and proceed up the gentle slope, roughly paralleling the south side of SR 28. On the slope, the right of way would be shielded by rock outcroppings and the view angle from SR 28. Upon reaching an existing dirt road immediately north of the Continental Divide (Lander Road), the route would proceed northwest to a crossing of SR 28, using the same bench as the road. Our September 1990 field investigation supports our determination that this realignment would be nearly invisible to the untrained observer from the South Pass Rest Area center, (which is located approximately one half mile north of the river on SR 28), or from SR 28 itself between the Rest Area and the highway crossing. The realignment would cross SR 28 (by boring) at the SR 28/Lander Road intersection and proceed southwest, continuing down the west side of the highway, avoiding the northwest corner of the NHL by approximately 0.35 mile, and creating~~

~~no visual barrier between the NHL and the highway. Construction would abut the west side of the previously disturbed highway right of way, or, once well south of the Continental Divide, would follow an existing trail which parallels SR 28 to the west. With proper rehabilitation efforts, disturbed areas could be appropriately restored in order to assure vegetative blending and limited visual impact. The realignment would continue on the west side of the highway, past the proposed crossing of the Oregon Mormon Trail at MP 536.3, until MP 538.2, where it would cross back to the east side in order to join with the AT&T right-of-way. The crossing of the Oregon Mormon Trail would occur at MP 538.2, and coincide with the crossing of the Trail by SR 28. The highway crossing would be bored, resulting in an undisturbed interval of at least 300 feet. Our September 1990 field investigation leads us to believe that this realignment of the proposed route between MPs 526 and 538.4 would reduce impact to known historical features in the South Pass Area to less than significant levels, assuming that appropriate construction and rehabilitation measures were implemented by or imposed on Altamont.~~

Based on our September 1990 field inspection, a realignment of Altamont's originally-proposed route to avoid the NHL was recommended. On November 28, 1990, Altamont filed modifications to its proposed route which incorporated this recommendation. The route now bends westward just south of the Sweetwater River at approximate MP 527 and crosses to the north side of SR 28. The proposed route then continues down the western side of the highway until MP 538.2, where it would cross to the south side of SR 28 and join the AT&T right-of-way. The proposed route now avoids the northwest corner of the NHL by approximately 0.35 mile, and would cross the Oregon-Mormon Trail (by boring) at an already disturbed location (where the Trail is crossed by SR 28). Additionally, it would follow existing landforms and contours to shield the pipeline from view in order to mitigate visual impacts. With proper rehabilitation efforts (see below), disturbed areas could be appropriately restored in order to assure vegetative blending and limited visual impact.

Due to the hilly terrain, no visual impact would occur for South Pass City, Miners Delight, Atlantic City or Fort Stambaugh, from either the proposed route or the Route 28 Variation, as determined by the field inspection.

No present Indian reservations are traversed by the proposed project, although it passes near the Rocky Boys Reservation in northern Montana, close to the southwest corner of the Crow Reservation in southern Montana, and just southeast of the Wind River Reservation in Wyoming. It does, however, cross the aboriginal and historic territories of the Blackfeet, Assiniboine, Gros Ventre, Chippewa-Cree, Crow, Shoshone and Arapaho. Contact has been initiated with these groups in order to elicit areas of concern regarding the proposed project. Communication through letters, phone consultations, and personal meetings, is on-going. The Northern Arapaho have voiced specific concerns regarding cultural sites and traditional lands in the area of the Wind River Reservation.

The literature review identified the Bear Paw Mountains and the Pryor Mountains in Montana, as areas of possible sensitivity to the Hidatsa, Blackfeet and Assiniboine Indians, and the Crow Indians, respectively. Additional sensitive areas include the Nowood-Lost Cabin region and the Bridger Mountains in Wyoming.

Eligibility for listing in the NRHP, for most of the resources identified within the project APE by the background search, has not been determined. However, the destruction, damage, or alteration of all or part of these sites could be significant impacts because the resources have not been formally determined to be ineligible for listing in the NRHP. The FERC, SHPOs and other appropriate agencies have received a cultural resource field survey work plan submitted by Altamont, to be reviewed and approved by said parties prior to implementation.

Mitigation for eligible sites may include avoidance, data recovery, the use of buffer zones or vegetative screening, or boring when ground conditions permit. Boring or directional drilling may be especially useful in the case of linear features such as trails. Altamont is prepared to cross trails listed on or eligible for the NRHP by boring, if ground conditions permit. Data recovery plans ~~will~~ would be implemented in consultation with the SHPOs, the ACHP, and the appropriate federal agencies. In addition, Altamont has prepared a detailed Construction and Rehabilitation Plan for that portion of the project from MP 511 to MP 540.8, implementation of which would mitigate the visual impact of the project in the South Pass area. This plan is summarized in Chapter 4B and included in the EIS as Appendix B-5.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE SOUTH PASS ROUTE VARIATIONS

~~Due to the lack of complete and comparable information for the proposed and alternative routes, it is not be possible to perform an objective/equitable empirical comparison at this time. The information below is not intended as a comprehensive listing of the existing cultural resources, but is presented as incomplete information currently available. We have requested that a file search be performed for these variations. Because of the time required to perform the search, this information was not available for inclusion in the Draft EIS.~~

An updated file search was undertaken in October, 1990 for the South Pass Route Variations. This search revealed that within a mile, 370 sites were present along the Jeffrey City Variation, 284 sites were present along the Alkali Butte Variation, 368 sites were present along the Northern Utilities Variation and 313 sites were present along the Route 28 Variation.

Eligibility for listing in the NRHP, for most of the resources identified by the SHPO search for the South Pass Route Variations, will be determined by FERC in consultation with the SHPO and appropriate federal agencies. The destruction, damage, or alteration of all or part of these sites could be significant if not mitigated or avoided. Mitigation for eligible sites may include avoidance, data recovery, the use of buffer zones or vegetative screening, or boring when ground conditions permit. Data recovery plans, as required, would be implemented in consultation with the SHPOs, the ACHP, and the appropriate federal agencies.

No present Indian reservations would be crossed by any of the South Pass Route Variations. Portions of the variations may cross the aboriginal and historic territories of the Shoshone and Arapaho. Contact with these groups has been initiated. The Northern Arapaho have voiced concerns regarding cultural and traditional ground and sites in the area of the Wind River Reservation and the Nowood-Lost Cabin region.

Jeffrey City

~~A study of GLO maps for the entire route identified at least 81 historic roads or trails that would be crossed. These include the Bridger, Oregon, and Oregon Mormom Trails. Approximately 80 prehistoric sites were identified by the Bairoil survey for the final 130 (56 percent) miles of the route.~~

An updated SHPO file search for the entire variation identified 311 prehistoric sites within a mile of the variation route. These included lithic scatters, hearth features, habitation/occupation sites, burials, quarries, tepee rings, and house pit sites. The search also identified 59 historic resources within a mile of the route. These included stage stations, bridges, historic sites, ranching/homesteading sites, and numerous historic routes and trails including the Oregon Trail and some of its various cutoffs. At Jeffrey City, the variation would cross the Oregon Trail in an irrigated hay field at JC MP 496.2. Our September 1990 field investigation revealed that the Trail is totally obscured at this location by agricultural activities. ~~The BLM considers this crossing of the Oregon Trail as the "second choice" of the three crossings under review.~~

Alkali Butte

~~A Class I literature survey of the first 43 miles (19 percent) of this route identified 10 historic roads, 1 historic gas/oil well, and seven prehistoric sites. GLO map studies of the entire route identified at least 82 historic roads or trails. These include the Emigrant, Oregon, and Oregon Mormon Trails. Approximately 80 prehistoric sites were identified by the Bairoil survey for the final 130 (57 percent) miles of the route.~~

An updated SHPO file search for the entire variation identified 242 prehistoric sites within a mile of the variation route. These included lithic scatters, hearth features, habitation/occupation sites, burials, quarries, tepee rings, house pit sites, rockshelters and trails. The search also identified 42 historic resources within a mile of the route. These included ranching/homesteading sites, historic sites, cairns, oil/gas wells, bridges, stage stations and numerous historic routes and trails including the Oregon Trail and some of its various cutoffs. The variation would cross the Oregon Trail adjacent to a light duty dirt road south of Sweetwater Station, near AB MP 500.3. The area is crisscrossed by numerous dirt roads and the Trail appears obscured by modern use. ~~The BLM considers this crossing of the Oregon Trail to be the most desirable of the crossings under review, and rates it a Class II visual resource.~~

Northern Utilities

An updated SHPO file search for the entire variation identified 309 prehistoric sites within a mile of the variation route. These included lithic scatters, hearth features, habitation/occupation sites, burials, quarries, tepee rings, house pit sites, ceramic scatters and trails. The search also identified 59 historic resources within a mile of the route. These included ranching/homesteading sites, historic sites, bridges, historic debris and numerous historic routes and trails, including the Oregon Trail and some of its various cutoffs. ~~A study of GLO maps for the entire route identified at least 82 historic roads or trails. These include the Bridger Trail, the Emigrant Trail, and the Oregon Trail, and the Oregon Mormom Trail. Approximately 80 prehistoric sites were identified by the Bairoil study for the final 130 miles (53 percent) of the route.~~ This variation would cross the Oregon Trail at the same location as the Alkali Butte Variation.

Route 28

An updated SHPO file search for the entire variation identified 269 prehistoric sites within a mile of the variation route. These included lithic scatters, hearth features, rockshelters, habitation/occupation sites, lithic procurement sites, cairns, quarries, tepee rings or stone circle sites, burials and a trail. The search also identified 44 historic resources within a mile of the route. These included trail/stage routes, historic sites, the South Pass NHL, bridges, ranching/homesteading sites, oil/gas wells, irrigation features, and numerous historic routes and trails including the Oregon Trail and some of its various cutoffs.

This ~~route~~ variation would pass substantially closer to three NRHP properties (Atlantic City, Miners Delight, and South Pass City) than the proposed route. ~~, as well as passing numerous mapped mining features~~. It also passes through a BLM-designated ACEC, as well as the proposed NRHP Historic District contained therein. While our September 1990 field investigation confirmed that terrain constraints would shield Atlantic City, Miners Delight, South Pass City, and Fort Stambaugh from direct visual impact associated with construction along this variation, the alignment would cross the three main access roads into the District. The variation rejoins the proposed route at MP 529.~~, going through the South Pass NHL and crossing the Oregon-Mormon Trail at what is considered a sensitive point. As it avoids neither the NHL nor the proposed Oregon-Mormon Trail crossing,~~ This variation~~, without modification,~~ would not offer any advantage over the proposed route other than partially following an established highway corridor/powerline right-of-way. It would also have the disadvantages of passing through an ACEC and a proposed NRHP district.

IMPACTS AND MITIGATION MEASURES SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

A cultural resource inventory for a mile wide proposed project corridor was completed for the Kern and Mojave projects in 1986. As part of the study, sites within the projects' APE (within 100 feet of the proposed centerline) were identified. The impact upon these resources, as well as those of concern to Native Americans, is discussed in the EOR FEIR/EIS, in sections

4.2.10 and 4.3.2.10 of Volume I and sections 4.2.10 and 4.4.1.10 and 4.4.4.10 of Volume II. The identification of previously unknown resources, through on-the-ground surveys, has been completed. A generalized implementation plan for addressing Native American concerns, regulatory compliance, consultation procedures and recommended mitigation measures for the Kern River and Mojave projects can be found in the EOR FEIR/EIS, section 4.7.1.10 of Volume II and section 4.10.1.10 of Volume I.

PALEONTOLOGY IMPACTS

Paleontologic resource impacts could occur from construction of either the pipeline or the compressor stations, as well as from increased public access to these areas. The evaluation of impacts on paleontologic resources is based on a preliminary review of published scientific literature and information available at institutions serving as repositories for paleontologic resources (e.g., American Museum of Natural History). A comprehensive review of paleontologic site records has not been completed. However, an intensive paleontologic resource survey has been performed for the Kern River route. Discussions with paleontologists involved in field investigations adjacent to the projects have not been completed, and the precise locations of specific paleontologic resources along the proposed routes are uncertain.

Direct physical modifications of paleontologic resources may occur during project construction through ground-disturbing activities, such as trenching. Indirect impacts during construction may result from erosion caused by slope regrading or the unauthorized collection of fossils by project personnel. In addition, maintenance of cleared pipeline rights-of-way and operation of constructed facilities (e.g., compressor stations) may result in further direct or indirect physical alterations of paleontologic resources. Increased public access to previously undisturbed areas may result from the construction of service roads and maintenance of cleared pipeline corridors. Unregulated access may create direct and indirect adverse impacts on paleontologic resources.

Criteria for Determining Significance

Impacts on paleontologic resources were considered to be significant if they would result in the physical destruction, damage, or alteration of all or part of a paleontologic site.

MITIGATION MEASURES COMMON TO THE PGT AND ALTAMONT PROJECTS

The mitigation of specific project-related impacts affecting paleontologic resources should be determined before any construction or ground disturbance activity on the project. The Antiquities Act of 1906 (16 USC 431-433) mandates protection of paleontologic resources located on federally owned or controlled lands.

To adequately consider impacts on these resources, we recommend that PGT and Altamont perform an intensive field survey on federal land where potential impacts are considered to be high. These field surveys should be designed to identify and evaluate specific paleontologic resources.

Where feasible, the pipeline should be relocated to avoid known paleontologic resources where these resources have been determined by detailed scientific investigation to be unique within a particular geologic rock unit or formation (e.g., a vertebrate faunal or paleobotanical floral quarry site). Implementation of this mitigation measure should be developed in consultation with appropriate scientific researchers and the appropriate federal agency, (e.g., FS and BLM). Avoidance would result in a less-than-significant impact at such sites.

Paleontologic resources with significant values that lie solely in the scientific data contained in the deposit may be excavated under a data recovery plan developed in consultation with qualified paleontologists and appropriate federal agency officials (e.g., FS and BLM). Completion and approval of a data recovery plan would result in a less-than-significant impact on resources of this type.

IMPACTS SPECIFIC TO THE PGT PROJECT

Idaho

No published records of paleontologic sites have been noted within 100 feet of the mapped centerline of the proposed pipeline route through Idaho. However, two geologic formations noted within Idaho may contain important paleontologic resources. The Wallace Formation, near MP 13, may contain stromatolites (calcareous algal reefs) of Precambrian age. The sedimentary glacial outwash deposits dating to the Pleistocene between MP 73 and MP 108 may contain mammalian fossil remains.

Washington

Although no published records of paleontologic sites are noted within the APE in Washington, the PGT project would intersect or pass within 0.5 mile of one geologic formation considered to have a high potential for containing significant fossil resources. Fossil mammalian remains of Pleistocene age may be found in the fine-grained loess deposits of the Palouse Formation (MP 179-198).

Oregon

No published records of known paleontologic sites have been recorded within the APE in Oregon. However, the PGT project would intersect or pass within 0.5 mile of seven geologic formations considered to have a high potential for containing significant fossil resources.

Holocene alluvial deposits near the Umatilla River and Butter Creek (MP 283-290) may contain fossil mammalian remains. The Shutler Formation would be intersected by the pipeline between MP 309 and MP 317, and a major fossil vertebrate site has been discovered in the adjacent McKay Reservoir area.

The Columbia Group is made up of the Wanapan Basalt and Yakima Basalt members and includes lacustrine sediments known to contain vertebrate fossil and paleobotanical resources. The Dalles Formation, of Pliocene age, is known to contain significant paleobotanical remains.

The John Day Formation would be intersected by the project route near MP 398-420 and has been known as an important paleontologic resource for over a century. The formation contains significant vertebrate faunal assemblages and paleobotanical resources dating between 25 and 31 million years ago.

Pleistocene- and Holocene-aged lacustrine sediments, interbedded with extrusive basaltic flows in the high plains and the Basin and Range Physiographic Province between MP 433 and MP 612, may contain vertebrate and invertebrate paleontologic resources. The Tule Lake beds spanning the Oregon-California border may also contain vertebrate and microfossil materials.

IMPACTS SPECIFIC TO THE ALTAMONT PROJECT

Montana

No published records exist of paleontologic sites within the APE in Montana. The proposed Altamont Project would, however, intersect or pass within 0.5 mile of two geologic formations considered to have a high potential for containing fossil remains.

The Judith River and Hell Creek Formations, dating to the Cretaceous Period, would be crossed by the pipeline in Hill, Chouteau, Judith Basin, Wheatland, and Carbon Counties. These rock units are particularly prevalent in the Judith River Basin and Musselshell River areas between MP 145 and MP 195. Important fossil reptilian and mammalian assemblages are known to occur in these formations. Of special concern within these formations are the isolated dinosaur skeletal remains found in bank deposits, the articulated skeletal remains encountered in channel sand deposits, and the microvertebrate faunal resources found in association with freshwater clam beds.

The second resource of interest in Montana is the Paleocene-age sediment found in Carbon County. Important fossil mammalian resources are known from these sediments.

Wyoming

Although there are no published references to particular paleontologic resources within the APE in Wyoming, the project would intersect or pass within 0.5 mile of eight geologic formations considered to have high potential for containing important fossil remains.

Significant fossil reptilian and mammalian faunal assemblages are known to occur in the early Cretaceous rocks in Big Horn County (near MP 301-375). The Willwood Formation, of Wasatchian age, encountered in Big Horn and Washakie Counties is known to contain significant mammalian assemblages. In Hot Springs County, fossil mammalian remains are noted within the Aycross Formation.

The Popo Agie Formation of late Triassic age is one of the fossiliferous rock units occurring in Fremont County (from MP 425 to MP 542). Reptilian fauna and other vertebrate assemblages are known from the Popo Agie Formation. Also in Fremont County is the Fort Union Formation (dating to the Paleocene) that contains fossil mammalian remains. The Wasatch and Wind River Formations, also encountered in Fremont County, is well documented in the scientific literature for important mammal faunas.

Fossiliferous rock units found in Sweetwater County include the Wasatch Formation noted above and the Bridger and Green River Formations. Faunas of Bridgerian age are known to occur in the latter two formations. The Teepee Trail Formation, in Sublette and Sweetwater Counties, is known to include important mammal and other vertebrate fossil remains. Many of these same fossil-bearing rock units are also found in Lincoln County, where numerous significant paleontologic sites exist.

IMPACTS SPECIFIC TO THE SOUTH PASS ROUTE VARIATIONS

Potential impact on paleontological resources associated with construction on any of the South Pass Route Variations would be similar to that previously described for the proposed route in Fremont and Sweetwater Counties.

IMPACTS SPECIFIC TO THE KERN RIVER DOWNSTREAM FACILITIES

Based on the Paleontological Resource Assessment (see Chapter 3M), the preliminary locations of Compressor Station Nos. 2 and 5 have low potentials for paleontological remains. No significant fossils are expected. For Compressor Station No. 3, the potential for paleontological remains ranges from low to high. There is a high potential for paleontological remains to be encountered in the area of Compressor Station No. 6.

Chapter 5. Cumulative and Growth-Inducing Impacts

CUMULATIVE IMPACTS

Cumulative impacts result when impact associated with a proposed project is superimposed or added to impact associated with past, present, or reasonably foreseeable future projects within the area affected by the proposed project. Although the individual impacts of the separate projects might be minor, the additive or synergistic effects from all the projects could be significant.

The proposed projects would cross 31 counties in five states (46 counties and six states if the related nonjurisdictional facilities in California are included). We recognize that a variety of ongoing activities such as timber harvesting, agriculture, urban development, ranching, utility projects, and mining could contribute to potentially significant cumulative impacts. However, quantifying impact associated with ongoing activities in general is beyond the scope of this analysis, and drawing conclusions about cumulative impact resulting from the proposed projects and these activities would be purely speculative.

At this time, we are not aware of any other specific projects that are currently under construction or planned for construction in the reasonably foreseeable future in the project areas which would result in significant cumulative impact on environmental resources. However, our analysis has enabled us to make some general comments regarding each of the proposed projects.

Construction of a pipeline ~~along~~ adjacent to and/or within an existing utility corridor in forested areas (such as would occur on the PGT project) would result in additive impacts to vegetation, wildlife, and visual resources. Where multiple rights-of-way are adjacent to one another, the increased width of the cleared corridor would 1) create a larger gap in the protective cover for large animals, 2) increase forest diversity and provide additional habitat for some species of wildlife, and 3) cause the corridor to be more visibly noticeable. In general, since the clearing of previously undisturbed forestland would primarily consist of temporary rights-of-way that would be allowed to revegetate to a forested condition, we do not feel there would be a significant cumulative impact on these resources.

However, one area along the PGT Project were significant cumulative impacts may occur is the Moyie River Valley (MP 0.0-20.9). Cumulative impact in this area would be of an additive nature due to PGT's eight crossings of the Moyie River, and would primarily affect water quality and fisheries. However, implementation of PGT's proposed Moyie River Pipeline Crossings Plan (see Appendix F) would reduce these potential impacts to acceptable levels. In addition, implementation of PGT's proposed plan in this area would provide a long-term benefit to the area as both fish habitat and water quality would be improved as the result of the installation of PGT's proposed fishery enhancement structures.

One specific wildlife concern is the potential for cumulative impact to occur on the resident bald eagle population present at Lake Britton, due to the increased size of the existing utility corridor. ~~This issue is being analyzed in our BA and conclusions will be presented in the Final EIS.~~ The FERC staff has determined that construction of the PG&E portion of the PGT/PG&E Project would effect, but would not jeopardize, the bald eagle population at Lake Britton. In accordance with Section 7 of the ESA, the FERC staff has entered into formal consultation with the USFWS concerning this issue.

The PGT pipeline would cross the John Day River near an existing AT&T fiber optic cable right-of-way. The cumulative visual impact of two cleared strips on the canyon wall visible from the river may be significant; however, we believe that implementation of our recommended mitigation measures, and PGT's proposed mitigation, would make this impact temporary.

The PGT project would require additional compression at three existing station sites, while the Altamont project would require additional compression at two certificated compressor stations on the Kern River system. In addition, PG&E would construct compression at two compressor station sites. In both instances, this would result in increased impact to local air and noise quality. However, in neither instance would these additions result in locally significant cumulative effects. Both applicants must comply with the NSPS and PSD regulations, as well as state air permit requirements. Also, we would limit noise attributable to the new facilities to an L_{dn} of 55 dBA, the level which protects the public from activity interference and annoyance in residential areas.

Cumulative impact in the South Pass area along Altamont's proposed route is also an issue. Resources potentially sustaining significant cumulative impacts include land disturbance, vegetation, visual, and cultural. Our recommendations for this area, ~~including realignment of the pipeline,~~ would reduce cumulative impacts associated with the Altamont project to less-than-significant levels. The South Pass area already supports a network of existing rights-of-way, including an overhead electric powerline, an abandoned railroad grade, an AT&T ~~fiber optic~~ cable, SR 28, and unimproved dirt roads which crisscross the area. Although the Altamont project would follow existing rights-of-way from north of the Continental Divide to Farson, its construction between Cottonwood Divide and the Sweetwater River (a distance of approximately 25 miles) would establish a new right-of-way into and from the South Pass area. Any new transmission or utility facilities proposed in this area would involve BLM-administered lands, and therefore be subject to environmental review (including cumulative impact assessment) and the BLM plans and policy directives in effect at that time. Without specific knowledge of projects planned for this area in the reasonably foreseeable future, any attempt to analyze potential cumulative impacts would be speculative.

The Lander RMP states that "Major utility and transportation systems will be located to make use of existing corridors whenever possible, to provide for cost-efficient routes and to provide for protection of other resource values such as scenery and wildlife." (Emphasis added.)

If the BLM actively promotes the use of the Altamont route in the South Pass area by designating the route a utility corridor through its formal planning process, cumulative impact would occur when the next utility/transportation project is proposed to traverse the area. Use of the route may also occur without formal corridor designation if utilities are encouraged by the present BLM plans to follow existing rights-of-way through the area. However, the BLM could strictly control cumulative impact associated with future utility proposals to traverse the area through its planning process. Mechanisms are available which could be used to discourage further use of the Altamont route, as have been established int he Lander RMP for the nearby South Pass Management Unit. (The South Pass Management Unit encompasses South Pass City and Atlantic City.) At a minimum, the BLM exercises a major role in determining where future utilities will be routed by virtue of being the largest "landowner" in the area.

In Chapter 2, a number of system alternatives to the PGT/PG&E and Altamont proposals are described which could also potentially provide most or all of the proposed natural gas services to southern California. As stated in Chapter 2, all, some, or none of the various proposals and system alternatives may be built; therefore adding or "piggy-backing" one project's impacts with those of another would be speculative at best. For this reason the EIS will not conduct such an analysis. It does, however, present the basic facts about these system alternatives and refers the reader to existing documents where impacts associated with alternative proposals can be found. The reader then has the option of adding up the impacts associated with each individual project/alternative to come up with a hypothetical cumulative impact scenario associated with the construction and operation of two or more of the pipeline projects.

GROWTH-INDUCING IMPACTS

The operation of either the PGT/PG&E or Altamont projects could result in growth-inducing impacts. Growth-inducing impacts are those impacts associated with a proposed project than could foster economic or population growth either directly or indirectly, in the surrounding environment. Substantial economic growth may occur as a result of the production and use of natural gas that would be provided by either the PGT/PG&E or Altamont projects.

Stimulation of Natural Gas Production

The construction of either project could stimulate the expansion of existing natural gas fields, and may stimulate the development of new gas fields in gas producing areas crossed by the proposed pipeline projects. This, in turn, could cause secondary environmental impacts as production and gathering facilities, gas treatment plants, and other ancillary facilities are constructed or expanded.

Where the facilities necessary for natural gas production and gathering are in place, only limited construction would be necessary to connect them to appropriate transmission facilities. It is doubtful that such construction would result in substantial growth in the populations or economies of those areas. In areas where marketable quantities of natural gas exist in the vicinity of the proposed projects but are currently undeveloped, substantial population and economic growth could occur as these reserves are developed and placed into production.[1/]

Increased exploration and/or development could also occur in Canada as a result of the improved access to Canadian markets that would be provided by the proposed projects. An in-depth analysis of the impact of the proposed projects on Canadian gas production is beyond the scope of this EIS; however, the analysis would most likely be similar to that for domestic gas production. The amount of economic and population growth in the Canadian gas producing regions attributable to either project would depend on the extent of existing production facilities and transportation capacity, as well as the diversity of the local economies.

In areas where gas production and/or gathering facilities are absent or inadequate, secondary impacts could result from the construction and operation of drilling rigs, wellhead equipment, gathering pipelines, treatment plants, field compression units, access roads, and other ancillary facilities. However, at this stage in the projects, it is simply too early to described either the extent of any impacts associated with the construction and operation of those facilities, or their specific location. The future actions of a great number of entities (EOR and/or non-EOR operators, gas suppliers, gas distributors, federal and state regulators, gas brokers, etc.) will play the major part in making those determinations. Although the precise impacts cannot be analyzed until the extent, nature, and location of any new facilities is known (which is not expected to occur unless a FERC certificate is issued), it is felt that the mitigation measures proposed in this EIS will adequately mitigate significant impacts to the areas where such facilities would ultimately be built.

Natural Gas Use

The increase in the amount of natural gas delivered to California by the PGT/PG&E and Altamont projects may be a significant contributing factor in stimulating economic and population growth. Other factors that contribute to growth include the construction of roads and other transportation facilities, and the expansion of public services, such as sewer and water lines. Socioeconomic impacts than result from increased growth can be either positive or negative. For example, population growth may have a negative effect on water quality, biological resources, and air quality in the area where the growth occurs; however, increased use of natural gas for energy generation, as opposed to other hydrocarbon fuels, would result in an improvement in air quality. Like the analysis of increased gas production, the determination as to the location and magnitude of any environmental or socioeconomic impacts resulting from the increased gas deliveries to California are premature and speculative.

1/ In this regard, a draft and final programmatic EIS on oil and gas drilling and production was published by the State of Montana in 1989. This document, available from the DNRC's Board of Oil and Gas Conservation, provides several gas development scenarios in various areas crossed by the Altamont route in Montana.

Chapter 6. Conclusions and Recommendations

Unless specifically identified otherwise, the conclusions and recommendations presented herein are those of the staff of the FERC. This EIS evaluates the environmental impact associated with the construction of two pipeline projects - the PGT/PG&E project and the Altamont project.

The FERC can take three basic actions on an application for a Certificate of Public Convenience and Necessity. It can grant the certificate, grant the certificate with conditions, or deny the certificate. Alternatives we considered that would avoid the need to construct the PGT and/or Altamont project include no action and pipeline system alternatives. The No-Action Alternative assures that the FERC would not grant a Certificate of Public Convenience and Necessity for a proposed project. In this instance where two discrete applications are involved, the FERC could deny authorization of either one or both projects under the No-Action Alternative.

If the FERC denied authorization to PGT, then its jurisdictional portion of the PGT/PG&E project would not be constructed. It is assumed that the lack of upstream facilities would have the effect of avoiding construction of the PG&E nonjurisdictional portion of the project as well. As a result, FERC denial of PGT's authorization would not only avoid the construction and operational impacts associated with PGT's portion of the project, but also those associated with PG&E's portion.

In the case of Altamont, FERC denial of the requested authorization would prohibit construction of Altamont's proposed project. Should Kern River in the future propose to expand its system capacity to accommodate gas volumes by Altamont over the 700 MMcf/d for which it is currently certificated, denial here would effect this expansion. Construction and operational impacts associated with both of these actions would therefore not occur.

If neither of the proposed projects was constructed, the projected increased need for energy services in the Pacific Northwest and California markets that each project proposes to serve may not be met. This would result in one of the following two scenarios: either alternative projects would be implemented to meet part or all of the projected need, or no action would be taken to meet the projected need. The inability to access additional supplies of Canadian natural gas could preclude further fuel switching by industrial customers and leave LDCs without supplemental gas supply sources. The benefits of increased gas use in attaining air quality standards for California in the future could be effected if other fuels, such as oil, were used instead of gas.

The potential would also exist for energy demand to exceed available supply, thus driving up energy prices and exerting an indirect limiting effect on growth. This could result in either positive or negative impacts on resources, depending on how policy makers and end users deal with a curtailment in future natural gas availability. Indirect impacts on biological resources may be positive in that future land disturbance would be curtailed. If, on the other hand, alternative projects were implemented, each would result in its own set of specific impacts which would be greater than those associated with the current proposals. It would be purely speculative and therefore beyond the scope of this EIS to attempt to predict what actions may be taken by policy makers or end users in response to the No-Action Alternative. The assessment of impacts associated with these scenarios would also be speculative.

Our review of the environmental consequences associated with not building the PGT and/or Altamont project does not extend in this EIS to the customer's need for service and the potential need to construct potentially related pipeline facilities. These issues will be addressed by the Commission at such time as it considers the entirety of each proposal, including such areas as markets, transportation rates, adequacy of gas supply, urgency of the project, the need for competition, and environmental effects, depending on the appropriateness of these issues at that time.

At a hearing held on January 16, 1991, these non-environmental issues were considered by the Commission for both projects and preliminary determinations were issued respectively on January 17, 1991 and January 22, 1991 for the Altamont and PGT projects. In both orders, the Commission concluded that the issuance of certificates to Altamont and PGT, on the basis of all non-environmental issues, would be in the public convenience and necessity. Final orders upon completion of the FEIS will address all environmental and appropriate non-environmental aspects of the projects. Certificates will then be issued if the Commission, in accordance with Section 7(c) of the NGA and NEPA, determines that the proposed new facilities and services of each project continue to be required by the public convenience and necessity. This phased approach to consider the applications promotes administrative efficiency and ensures timely and effective consideration of potential certificates. Also, as evidenced in both preliminary determinations and this FEIS, the Commission's ultimate decision does not preclude the examination of alternatives and route variations.

System alternatives considered to the PGT/PG&E and Altamont Projects include the Mojave, Kern River, Joint Mojave/Kern River, and WyCal I and II Projects, as well as the PGT and Altamont Projects as originally proposed by the two applicants. In view of our conclusions regarding the environmental acceptability of both proposals, as modified by our recommended mitigation measures, we have determined that none of the system alternatives presented in Chapter 2 (including the original proposals by PGT and Altamont) would be preferable to the proposals developed in this FEIS.

Alternative pipeline alignments were identified and evaluated where construction of either project would result in residual significant impacts on environmental resources, even after the implementation of our conventional mitigation measures, and where reasonable alternative route alignments were available. Environmental resources which necessitated the development and evaluation of alternative route alignments and alternative site locations included geology, water resources, wetlands, wildlife, fisheries, cultural resources, and visual resources. The Draft EIS actively solicited comments and suggestions regarding the need for, and the environmental impacts associated with the construction of, these alternative route alignments. All comments were considered and assessed by the staff in this FEIS. (See Comments/Responses Volume of this Final EIS for our responses to the comments received on the Draft EIS.)

Information provided by the applicants and further developed from field investigations, literature research, alternatives analysis, and contacts with federal, state, and local agencies, public interest groups, and individual members of the public indicates that construction of the proposed PGT project and/or Altamont project would result in a limited, although in some cases significant, adverse environmental impact. Most of this impact would occur during the construction period. However, based on the information contained in this document, we have concluded that assuming that the FERC finds that the projects remain in the public convenience and necessity, both of the proposed projects would be environmentally acceptable if they are constructed and operated in accordance with our recommendations.

Alternative sites for aboveground facilities also were considered in the evaluation of both projects. We concluded that the proposed site locations for aboveground facilities with our recommended mitigation measures would be acceptable and would result in minimal impact on the surrounding area.

Several important factors were considered closely in our determination. A major consideration was the extent to which we were able to recommend modifications to the proposed pipeline alignments or develop mitigation which minimized impact on wetlands, visual resources, historic areas, threatened or endangered species, sensitive stream crossings, and other areas of concern. In addition, we have developed, in conjunction with other federal cooperating agencies, a clearly defined, standardized set of construction procedures for stream and wetland crossings that would significantly reduce the impact of pipeline construction on these valuable resources. Specific erosion control, revegetation, and right-of-way maintenance procedures have also been developed and recommended.

Our responsibility in this proceeding is to identify significant environmental impacts so that these can be considered in the Commission's decision-making process. As part of our analysis, we have developed mitigation measures, including additional studies, that we believe to be appropriate and reasonable for the construction and operation of the natural gas pipeline facilities to proceed. We believe that these measures would significantly reduce the environmental impact that would result from construction of either project as proposed. Where additional studies are recommended, significant impacts would either be avoided or mitigated to non-significant levels. Our present determination of environmental acceptability would therefore be unaffected by the outcome of the recommended studies, which typically results in further site-specific mitigation and further reduction of impacts. We are recommending that our mitigation measures be attached as conditions to any certificate(s) issued by the Commission.

SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE PGT PROJECT

The information presented below summarizes, by resource category, the environmental impact associated with the construction of the PGT project. In addition, this information is presented in tabular form in Table 6-1. Where appropriate, potentially significant impacts have been identified. In addition, due to the close interrelationship between the PGT project and PG&E's nonjurisdictional facilities, information concerning the environmental impact associated with the construction of PG&E's facilities, which was obtained from the CPUC's Final EIR, is presented below as well. However, because the criteria that the CPUC utilized to identify potentially significant impacts were different in some respects (e.g., wildlife, vegetation, land use) than the criteria utilized by the FERC staff, we have not attempted to summarize the potential significance of any environmental impact associated with the construction of PG&E's nonjurisdictional facilities.

Geology-related impacts with the greatest potential to adversely affect the PGT project included potentially active faults, areas with a high liquefaction potential, and potential landslide areas. The PGT project route would cross two potentially active surface faults, approximately 40.4 miles of soils with a high liquefaction potential, and 12.2 miles of slopes that are considered to be potential landslide areas. PG&E's nonjurisdictional facilities would cross two potentially active surface faults, approximately 46.2 miles of soils with a high liquefaction potential, and 3.5 miles of slopes that exhibit landslide potential. With the exception of potential landslide and slope stability concerns associated with the route of the John Day Variation, geologic hazards are not expected to significantly impact pipeline construction or operation as pipeline design and installation criteria would adequately mitigate potential hazards.

Adverse soil-related impacts that could occur along the PGT project routes include the disturbance or conversion of prime farmland to nonagricultural uses and the disturbance of soils with a poor or poor-to-fair rehabilitation potential. PGT's facilities would cross approximately 138.7 miles of prime farmland and 278.3 miles of soils with a poor or poor-to-fair rehabilitation potential. Meanwhile, PG&E's facilities would traverse approximately 166.1 miles of prime farmland and 34.5 miles of soil with poor or poor-to-fair rehabilitation potential. PGT and PG&E would not locate any aboveground facilities on prime farmland. Implementation of PGT's proposed mitigation measures, in conjunction with our Erosion Control, Revegetation, and Maintenance Plan and additional recommended mitigation measures, would ensure that vegetation would be reestablished on all areas disturbed by construction, and that impacts associated with wind and water erosion, soil structure damage, soil compaction, and drainage alterations would be minimized. Nevertheless, adequate revegetation on some portions of the PGT project route may take several years to become reestablished due to historically low precipitation rates in some regions.

Construction across perennial waterbodies, intermittent waterbodies, major rivers, and waterbodies with contaminated sediments have the greatest potential to result in adverse hydrologic- and water quality-related environmental impact. The PGT project route crosses 33 perennial and 110 intermittent streams, would require 13 major river crossings, and would cross

Table 6-1

SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED
WITH THE CONSTRUCTION OF THE PGT PROJECT

Resource Area/Impact	PGT's Facilities	PG&E Facilities [a]
GEOLOGY		
Potential active faults crossed	2	2
Miles of liquefaction potential	40.4	46.2
Miles of landslide potential	12.2	3.5
SOILS		
Miles of prime farmland crossed	138.7	166.1
Miles of soil disturbed with poor or poor-to-fair rehabilitation potential	278.3	34.5
WATER QUALITY		
Number of perennial stream crossings	33	37
Number of intermittent stream crossings [b]	110	95
Number of major river crossings	13	4
Number of waterbody crossings with contaminated sediments [c]	1	2
LAND USE		
Number of residential structures located within 50 feet of construction right-of-way	34	90
Total acres of land temporarily disturbed	6673	6111.7
Miles of cropland temporarily disturbed	151.3	173.4
Miles of federal land crossed	92.4	49.4
Miles of state/local land crossed	4.5	6.3
Number of land use policy/regulatory conflicts	0	0

Table 6-1
(continued)
SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE CONSTRUCTION OF THE PGT PROJECT

Resource Area/Impact	PGT's Facilities	PG&E Facilities [a]
VEGETATION AND WILDLIFE		
Acres of wetland/riparian habitat crossed	23.5	23.7 [d]
Acres of forest temporarily disturbed	1743	888
Number of federally listed or proposed threatened or endangered plant species affected[e]	0	0
Number of federally listed or proposed threatened or endangered wildlife species affected[e]	0	3
Acres of big game habitat significantly affected[f]	150	0
Acres of upland game bird habitat significantly affected	94.5	0
Acres of waterfowl habitat significantly affected	63	4
FISHERIES		
Number of federally listed or proposed threatened or endangered fish species affected[e]	0	1
Number of anadromous fisheries crossed	3	15
Number of important spawning streams crossed	9	14
Number of important recreational fisheries crossed	14	10
SOCIOECONOMICS	NSI[g]	NSI
AIR QUALITY		
Number of new compressor stations	0	1
Number of compressor station additions	3	1
Number of compressor stations requiring PSD review	3	1
NOISE QUALITY		
Number of compressor stations exceeding 55 dBA	1	0

Table 6-1
(continued)
SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE CONSTRUCTION OF THE PGT PROJECT

Resource Area/Impact	PGT's Facilities	PG&E Facilities [a]
TRANSPORTATION	NSI	NSI
PUBLIC SAFETY	NSI	NSI
CULTURAL RESOURCES		
Number of known sites within APE	155	68
Miles of significant paleontologic formations crossed	216	324
VISUAL RESOURCES		
Miles of high or moderate visual impact	66.2	UNK[h]

a Number taken from information presented in the CPUC's DEIR and FEIR.
b Includes ephemeral streams and canals. Only major intermittent streams are included.
c Only includes waterbodies with known contaminated sediments.
d Does not include vernal pool habitat.
e Numbers taken from FERC staff's Biological Assessment for the PGT/PG&E Project.
f Does not include significant beneficial impacts, or any significant impact on migration corridors.
g No significant impact.
h Unknown.

one waterbody at a location that is known to contain contaminated sediments. In addition, PG&E's facilities would cross 37 perennial streams, 95 intermittent streams, require four major river crossings, and cross two waterbodies that are known to contain contaminated sediments.

The potential impact on these waterbodies includes increased turbidity, sedimentation, decreased dissolved oxygen concentrations, releases of chemical and nutrient pollutants from sediments, and introduction of chemical contaminants, such as fuels and lubricants. By implementing the measures found in our Erosion Control, Revegetation, and Maintenance Plan, as well as our Stream and Wetland Construction and Mitigation Procedures, the majority of the above-listed impacts would be eliminated or reduced to less-than-significant levels. Where the potential exists for residual significant impacts to occur, we have recommended that additional mitigation measures be implemented. However, even with the implementation of these mitigation measures it is likely that some level of increased sediment loading would continue for a short period of time after construction was completed.

The primary adverse land use-related impact present along the PGT project route involves the presence of construction activities within 50 feet of one or more residential structures. Additional land use concerns include construction across federal or state owned or managed property; potential conflict between the project and existing or planned land use designations, or government land management plans, policies, and regulations; amount of land temporarily disturbed during construction; and the disturbance of agricultural cropland during construction.

Construction activities associated with the PGT project would be located within 50 feet of 34 residential structures. In addition, PGT's route would cross 92.4 miles of federal and 4.5 miles of state owned or administered property, and would not conflict with existing or proposed land development or management policies. Finally, the PGT project would temporarily disturb 151.3 miles of cropland during construction, and would result in the total temporary disturbance of approximately 6,673 acres of land. Implementation of our proposed mitigation measures, including our Erosion Control, Revegetation, and Maintenance Plan, would ensure that impacts associated with the temporary disturbance of land during construction are not significant.

Construction activities associated with PG&E's nonjurisdictional facilities would be located within 50 feet of 90 residential structures. In addition, PG&E's route would cross 49.4 miles of federal and 6.3 miles of state owned or administered property, and would not conflict with existing or proposed land development or management policies. Finally, PG&E's nonjurisdictional facilities would temporarily disturb 173.4 miles of cropland during construction, and would result in the total temporary disturbance of approximately 6,111.7 acres of land.

Adverse vegetation and wildlife-related impacts associated with the construction of the PGT project include impact on wetland and riparian habitat and forested areas; disturbance of federally listed threatened or endangered species or their habitat; and big game, upland bird, and waterfowl habitat that would be significantly affected. Construction of PGT's facilities would require the temporary clearing of approximately 23.5 acres of wetland and riparian habitat, and approximately 1,743 acres of forested land. In addition, PGT's facilities would significantly affect, on a temporary basis, approximately 150 acres of big game habitat, 94.5 acres of upland bird habitat, and 63 acres of waterfowl habitat. Finally, our BA determined that construction of PGT's facilities would not affect any plant or wildlife species that are federally listed, while PG&E's facilities would affect three wildlife species that are listed as federal endangered species.

Construction of PGT's facilities would not affect any federally listed fish species. In addition, PGT's facilities would cross three waterbodies that support anadromous fish populations, nine waterbodies that provide important spawning habitat for fish, and 14 waterbodies that are considered to be important recreational fisheries. Meanwhile, our BA determined that construction of PG&E's nonjurisdictional facilities would affect one federally listed threatened fish species. In addition, PG&E's nonjurisdictional facilities would cross 15 waterbodies that support anadromous fish populations, 14 waterbodies that provide important spawning habitat for fish, and 10 waterbodies that are considered to be important recreational fisheries.

Implementation of our Stream and Wetland Construction and Mitigation Procedures would ensure that the majority of wetland-related impacts are temporary and minor, and would prevent the filling or resulting loss of any wetland acreage. Where impacts to important wildlife habitat are significant, we have recommended that PGT utilize timing constraints in order to reduce these impacts to a less-than-significant level. Finally, we have prepared a Biological Assessment (BA), as required by the Endangered Species Act (ESA), to determine whether the proposed project would affect federally listed or proposed threatened or endangered species, or their designated critical habitat. This BA also included potential impacts associated with the construction of PG&E's nonjurisdictional facilities. Based on the information developed in the BA, we have formulated mitigation measures to minimize or eliminate impact on federally listed species as necessary, and have entered into Formal Consultation with the USFWS or NMFS where we determined that the proposed project would affect a federally listed species.

Construction of the PGT project would not result in significant impact on socioeconomic resources. The influx of workers associated with construction of the project would not result in temporary population increases of 10 percent or more, nor would local vacancy rates for temporary housing decrease below 5 percent. In addition, construction of the PGT project would not exceed the ability of local communities and/or county governments to provide essential public services. Finally, the amount of agricultural land and commercial forest land permanently removed from production would not exceed 1 percent of the total amount available.

PGT proposes to install additional compression facilities at three existing compressor stations. All three of these additions may be significant enough to require Prevention of Significant Deterioration of Air Quality (PSD) review. Compliance with the PSD permitting process would ensure that air quality impacts are reduced to a less-than-significant level.

The primary noise-related impact associated with the PGT project involves the construction of additional compression facilities at existing compressor stations. Compressor station operational noise caused by the construction of additional compression facilities could cause a significant impact at one station on the PGT project route. We have recommended that PGT implement several mitigation measures at this location in order to minimize this impact.

Construction of either the PGT project or PG&E's nonjurisdictional facilities would not result in adverse impact on transportation or public safety.

The potentially significant adverse impacts on cultural resources that could occur as a result of the construction of the PGT project involves the presence of NRHP listed, nominated, or eligible resources within the Area of Potential Affect (APE). Based on cultural resource surveys performed by PGT to date, 155 sites are known to exist within the APE of PGT's facilities and 68 sites are known to exist within the APE of PG&E's nonjurisdictional facilities. We are currently working with the respective SHPOs and the appropriate federal land management agencies to determine which, if any, of these sites are eligible for inclusion on the NRHP. A plan detailing the next phase of fieldwork, including recommendations of eligibility and possible treatment, was recently prepared by PGT, and in mid-April 1991 was submitted to the FERC, the SHPOs, and appropriate agencies for review and comment. As lead Federal agency for the PGT/PG&E Project, the FERC is responsible under the NHPA and its implementing regulations for compliance with Section 106.

Construction of the PGT project would result in impact to numerous significant paleontologic formations. Based on information presented in this EIS and the CPUC's Final EIR, PGT's facilities would cross or pass in close proximity to approximately 216 miles of formations that contain potentially significant paleontologic resources, while PG&E's nonjurisdictional facilities would cross or pass in close proximity to approximately 324 miles of formations which contain potentially significant paleontologic resources. We have recommended that measures be developed for the protection of significant paleontologic resources where such is required by federal law, and where the potential for impact is considered to be high.

The PGT project would result in approximately 66.2 miles of moderate to high visual impact. We have recommended that PGT implement several mitigation measures at these locations in order to reduce this impact to a less-than-significant level.

SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE ALTAMONT PROJECT

The following discussion summarizes the environmental impact associated with construction of the Altamont project. The information is presented by resource category and, where appropriate, identifies potentially significant impacts. Table 6-2 presents this summary in tabular form. Because additional compression facilities would be required on Kern River's system in order to transport the Altamont gas between southwestern Wyoming and southern California, the environmental impact associated with these incremental facilities is also presented. These downstream facilities would be constructed within a certificated pipeline corridor which was analyzed in the EOR FEIR/FEIS, and consist of installing additional compression at two stations and construction of five new compressor stations. As a result, impacts would be limited and would not occur in all resource areas. Impact parameters

Table 6-2

SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE CONSTRUCTION OF THE ALTAMONT PROJECT

Resource Area/Impact	Altamont Facilities	Kern River Facilities [a]
GEOLOGY		
Potential active faults crossed	0 [b]	0
Miles of liquefaction potential	7.8	0 [c]
Miles of landslide potential	3.2	0
SOILS		
Miles of prime farmland crossed	8 [d]	0
Miles of soil disturbed with poor or poor-to-fair rehabilitation potential	264	0 [e]
WATER QUALITY		
Number of perennial stream crossings	61	NR
Number of intermittent stream crossings [f]	127	NR
Number of major river crossings	9	NR
Number of waterbody crossings with contaminated sediments [g]	2	NR
LAND USE		
Number of residential structures located within 50 feet of construction right-of-way	0	0
Total acres of land temporarily disturbed	7515	50
Miles of cropland temporarily disturbed	205.8	NR
Miles of federal land crossed	206	0 [h]
Miles of state/local land crossed	60	0
Number of land use policy/regulatory conflicts	0	0

Table 6-2
(continued)
SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE CONSTRUCTION OF THE ALTAMONT PROJECT

Resource Area/Impact	Altamont Facilities	Kern River Facilities [a]
VEGETATION AND WILDLIFE		
Acres of wetland/riparian habitat crossed	192	0
Acres of forest temporarily disturbed	10.8	20
Number of federally listed or proposed threatened or endangered plant species affected	0 [i]	0
Number of federally listed or proposed threatened or endangered wildlife species affected	0 [i]	5
Acres of big game habitat significantly affected [j]	0	10 [k]
Acres of upland game bird habitat significantly affected	0	10 [k]
Acres of waterfowl habitat significantly affected	0	0
FISHERIES		
Number of federally listed or proposed threatened or endangered fish species affected	0 [i]	NR
Number of anadromous fisheries crossed	0	NR
Number of important spawning streams crossed	8	NR
Number of important recreational fisheries crossed	14	NR
SOCIOECONOMICS	NSI [l]	NSI
AIR QUALITY		
Number of new compressor stations	6	5
Number of compressor station additions	0	2
Number of compressor stations requiring PSD review	1	5
NOISE QUALITY		
Number of compressor stations exceeding 55 dBA	0	0

Table 6-2
(continued)
SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED
WITH THE CONSTRUCTION OF THE ALTAMONT PROJECT

Resource Area/Impact	Altamont Facilities	Kern River Facilities [a]
TRANSPORTATION	NSI	NSI
PUBLIC SAFETY	NSI	NSI
CULTURAL RESOURCES		
Number of known sites within APE	194	UNK [m]
Miles of significant paleontologic formations crossed	241	0 [n]
VISUAL RESOURCES		
Miles of high or moderate visual impact	32.0	UNK

a Kern River facilities include construction of five new compressor stations and installation of additional compression at two other stations. Because all facilities would be located at discrete sites, some parameters are not relevant and are therefore marked "NR".
b While the two fault systems that the Altamont route would cross are believed to be inactive, data is inconclusive.
c Liquefiable sediments are found at the preliminary location of Kern River Compressor Station No. 3 in Utah County, Utah.
d Potentially prime farmland in Montana (requires irrigation to be designated as "prime").
e Poor or poor-to-fair rehabilitation potential soils may be encountered at five of the preliminary Kern River compressor station sites.
f Includes ephemeral streams and canals. Only major intermittent streams are included.
g Only includes waterbodies with known contaminated sediments.
h The preliminary location of Kern River Compressor Station Nos. 6 and 8 is on land administered by the BLM.
i Number take from the FERC staff's Biological Assessment for the Altamont Project.
j Does not include significant beneficial impacts, or any significant impact on migration corridors.
k Kern River's Compressor Station No. 2 in Morgan County, Utah, appears to be situated in an area designated as high priority big game wintering range. Critical upland bird breeding habitat could also be significantly affected by construction at this preliminary site location. Twenty acres of impact are assumed.
l NSI=No significant impact
m UNK=Unknown
n Potentially significant paleontological resources may be encountered at the preliminary location of Kern River Compressor Station Nos. 3 and 6.

considered irrelevant to Kern River's incremental facilities are marked "NR" (not relevant) in Table 6-2.

Geology-related impacts posing the greatest potential hazard to Altamont's pipeline include potentially active faults, areas with high liquefaction potential, and areas of landslide potential. The proposed route crosses two faults in Fremont County, Wyoming. While neither are thought to be of Holocene age, further studies at both are recommended. If a Holocene fault is found, geotechnical information gathered during fault evaluation would be used to design the pipeline at the crossing location. Appropriate design considerations could ensure the pipeline's integrity should a significant seismic event occur. Although liquefiable sediments would be crossed by the proposed route at three small areas in Wyoming for a total of 7.8 miles, strong ground shaking at these locations is not anticipated. On Kern River's system, liquefiable sediments are found at the preliminary location of Compressor Station No. 3 in Utah County, Utah. There is a high potential for strong ground shaking at this location. Altamont's route would cross 3.2 miles of landslide-prone slopes. Studies to determine an optimal route through the landslide-prone areas are proposed by Altamont and supported by a staff recommendation. In summary, facility relocation and/or pipeline design criteria would adequately mitigate potential hazards to the Altamont pipeline. These measures would be equally applicable to any new facilities proposed by Kern River.

The potential for adverse soil-related impacts is greatest wherever construction would disturb soils rated as having poor or poor-to-fair rehabilitation potentials. Additional concerns include impact to prime farmlands and the permanent conversion of prime farmland parcels to nonagricultural uses. Altamont's route would cross 264 miles of soils rated as having poor or poor-to-fair rehabilitation potentials. On Kern River's system, one new compressor station would be located on soils having a poor rehabilitation potential, while soils at the other four new sites are rated as poor-to-fair or poor-to-good, depending upon the particular soil series encountered.

Eight miles of the proposed route in Montana is designated as "potentially" prime farmland, depending on whether or not the parcels are irrigated. No prime farmland has been designated along the proposed route in Wyoming. Neither project would site major aboveground facilities on land designated as prime farmland. Implementation of Altamont's proposed mitigation measures, as supplemented by our Erosion Control, Revegetation and Maintenance Plan and other recommendations, would ensure that all vegetated areas disturbed by construction would be revegetated, and that significant impacts associated with erosion, soil structure damage and compaction, and drainage alterations would be minimized. However, given the minimal rainfall available to most of the project area, adequate revegetation on portions of Altamont's proposed right-of-way may take years. While the same may be true at several of the new Kern River compressor station sites, actual ground disturbance at these locations would be quite limited.

Construction across perennial and intermittent streams, major rivers, and waterbodies having contaminated sediments have the greatest potential to result in adverse hydrologic and water quality-related impact. The Altamont route would involve 61 perennial and 127 intermittent stream crossings, require nine major river crossings, and cross two waterbodies at a location where contaminated sediments may be present (Rock and Willow Creeks in Fremont County, Wyoming). Potential impact associated with construction at these locations includes a decrease in dissolved oxygen levels, an increase in turbidity and subsequent sedimentation, the opportunity to transfer pollutants sorbed on the sediments to the water column, and the accidental introduction of chemicals such as fuels and lubricants used during construction. Most of these potential impacts would be eliminated or reduced to less-than-significant levels by implementing the measures found in our Erosion Control, Revegetation, and Maintenance Plan and our Stream and Wetland Construction and Mitigation Procedures. In those instances where the potential for significant impact remains, we have recommended additional site-specific mitigation, such as realignment of the proposed route. Nevertheless, it is likely that some level of increased sediment loading would continue for a period after construction is completed.

A major land use issue associated with establishment of a new pipeline right-of-way is the project's conformance or compliance with existing policies and regulations of governmental entities whose lands would be crossed. Other issues included the potential for conflict with existing or planned development policies, conflict with recreational areas, and whether construction would occur within 50 feet of any residential structure. Additional concerns focused on construction across federal or state owned or managed property, the total amount of land temporarily disturbed during construction, and construction disturbance to cropland.

Altamont's proposed route would not conflict with any existing policies or regulations, existing or proposed developments, or designated recreational areas. No construction activities would occur within 50 feet of any residence. The project would cross 206 miles of federally-administered land and 60 miles of state-owned lands in Montana and Wyoming. Of the total 7,515 acres of land temporarily disturbed during construction, 2,497 acres (205.8 miles) would be croplands, primarily located in Montana. Cropland impact would be limited to one growing season at most locations.

Because Kern River has not yet filed an application with the Commission to install the necessary additional compression, the new locations have only been identified preliminarily. No land use conflicts are apparent to any of the sites. There are no residences within 50 feet of any station boundary. All station sites appear to be privately owned land except for Compressor Station Nos. 6 and 8 which would be located on land administered by the BLM. Although Kern River would acquire between 20 and 50 acres for each compressor station, actual land disturbance would be limited to about 50 acres altogether.

Adverse vegetation- and wildlife-related impacts associated with Altamont's project involve construction impact on wetland and riparian habitat and forested areas, and disturbance of federal candidate plant species or their habitat. The proposed route would temporarily clear about 192 acres of wetland/riparian habitat distributed primarily at stream crossings along the route, and some 10.8 acres of eastern ponderosa pine and mixed conifer forest. No federally listed or proposed threatened or endangered species or their habitat would be affected by the project.

Kern River's incremental facilities have the potential to affect five federally listed or proposed threatened or endangered animal species. Additionally, Kern River's Compressor

Station No. 2 appears to be situated in an area designated as high priority big game wintering range. Critical upland bird breeding habitat could also be significantly affected by construction at this preliminary site location. No waterfowl habitat would be significantly affected by any of the incremental facilities.

Altamont's facilities would cross eight rivers that provide important spawning habitat for fish, and fourteen waterbodies that are considered to be important recreational fisheries. Six other fish species of special concern to Montana could be affected.

Implementation of our Stream and Wetland Construction and Mitigation Procedures, in conjunction with our recommendations for minor realignments at several areas, would ensure that the majority of wetland-related impacts are temporary and minor. These measures would prevent the filling or resulting loss of any wetland acreage and minimize disturbance to riparian vegetation. Where impacts to important wildlife habitat are significant, we have recommended the use of timing constraints in order to reduce these impacts to less-than-significant levels. In addition, we have prepared a BA, as required by the ESA, to determine whether the proposed project would affect federally listed or proposed threatened or endangered species, or their designated critical habitat. On April 2, 1991, the USFWS concurred with our conclusions in the BA that the construction of the Altamont Project is not likely to adversely affect the endangered bald eagle, peregrine falcon, whooping crane, pallid sturgeon, or black-footed ferret. Therefore, formal consultation with the USFWS for the Altamont Project will not be necessary. Based on the information developed in the BA, we have formulated mitigation measures to avoid impact on federally listed or proposed species as necessary.

Construction of the Altamont project would not result in significant impact on socioeconomic resources. While the Altamont workforce would make demands on available temporary housing and possibly strain local governments' capacity to provide basic public services, this impact would be temporary and limited to the construction period. The influx of workers associated with the project would not result in temporary population increases of 10 percent or more along any construction spread, nor would temporary housing vacancy rates in the project area decrease below 5 percent. And with the exception of small parcels needed to accommodate aboveground facilities (i.e., 6 compressor stations, 30 mainline valves, and the Opal Meter Station), no agricultural land would be permanently removed from production. No commercial forestland would be affected by the Altamont Project.

Altamont proposes to construct six compressor stations. Of the six, only the Wild Horse Compressor Station in northern Montana would be considered a major emission source, requiring a PSD review of its air quality impact. Compliance with the PSD permitting process would ensure that air quality impacts are reduced to a less-than-significant level. PSD review of air quality impacts would be required at four of Kern River's five new compressor stations and one of its existing stations where additional compression would be needed.

The only potentially significant noise-related impact associated with Altamont's proposal involves operation of the six new compressor stations. Although sufficient distance for noise attenuation appears to be available between all proposed station locations and the nearest NSAs, we have recommended that Altamont conduct additional analyses to verify that proposed noise controls perform as projected. We would also require Kern River to conduct appropriate noise analyses at all of its compressor stations where new or additional compression would be necessary to transport the Altamont gas volumes, and to include these analyses for review as part of any application to construct the incremental facilities.

Construction of the Altamont Project would not result in adverse impact on transportation systems or public safety.

Significant adverse impacts on cultural resources that could occur as a result of Altamont's project involve the potential for encountering NRHP-listed, -nominated, or -eligible resources within the APE. To date, Altamont has conducted a background literature search that identified previously recorded cultural and historic resources within 1000 feet of the proposed route. Within the 200-foot-wide APE, this search identified 194 historic and prehistoric sites, including multiple crossings of the proposed route by linear features. An updated SHPO file search has also been conducted for the proposed route and the South Pass Route Variations in Wyoming. This search identified 296 historic and prehistoric sites within a mile of the proposed route. However, little of the proposed route has been previously surveyed. We are currently working with the respective SHPOs and the appropriate federal land management agencies in reviewing a recently revised work plan for surveying those portions of the route which have not been previously surveyed, and for identifying and evaluating resources encountered for NRHP eligibility. As lead Federal agency for the project, we are responsible, under the NHPA and its implementing regulations, for Section 106 compliance. This process is designed to mitigate adverse effects on cultural resources.

A cultural resource inventory for a mile-wide corridor centered on the proposed Kern River route was completed in 1986. The identification and evaluation of previously unknown resources through on-the-ground surveys has been completed. A generalized implementation plan covering regulatory compliance, consultation procedures, and recommended mitigation (which has since been required in the Commission's certificates for the Kern River and Mojave Projects) is presented in the EOR FEIR/FEIS. Because the incremental facilities needed by Kern River to transport the Altamont gas would be located in this corridor, all adverse impacts on cultural resources would be mitigated.

The Altamont project would cross or pass in close proximity to approximately 241 miles of formations that contain potentially significant paleontologic resources. We have recommended that measures be developed for the protection of significant paleontologic resources where such is required by federal law, and where the potential for impact is considered to be high. A similar approach will be implemented at such time as Kern River files an application to construct its incremental facilities.

Construction of the Altamont project would involve crossing approximately 32 miles of land designated as moderate to highly sensitive to visual impact. In order to reduce visual impact to a less-than-significant level, we have recommended that Altamont implement several mitigation measures at locations sensitive to long-term effects of pipeline construction.

SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE SOUTH PASS ROUTE VARIATIONS

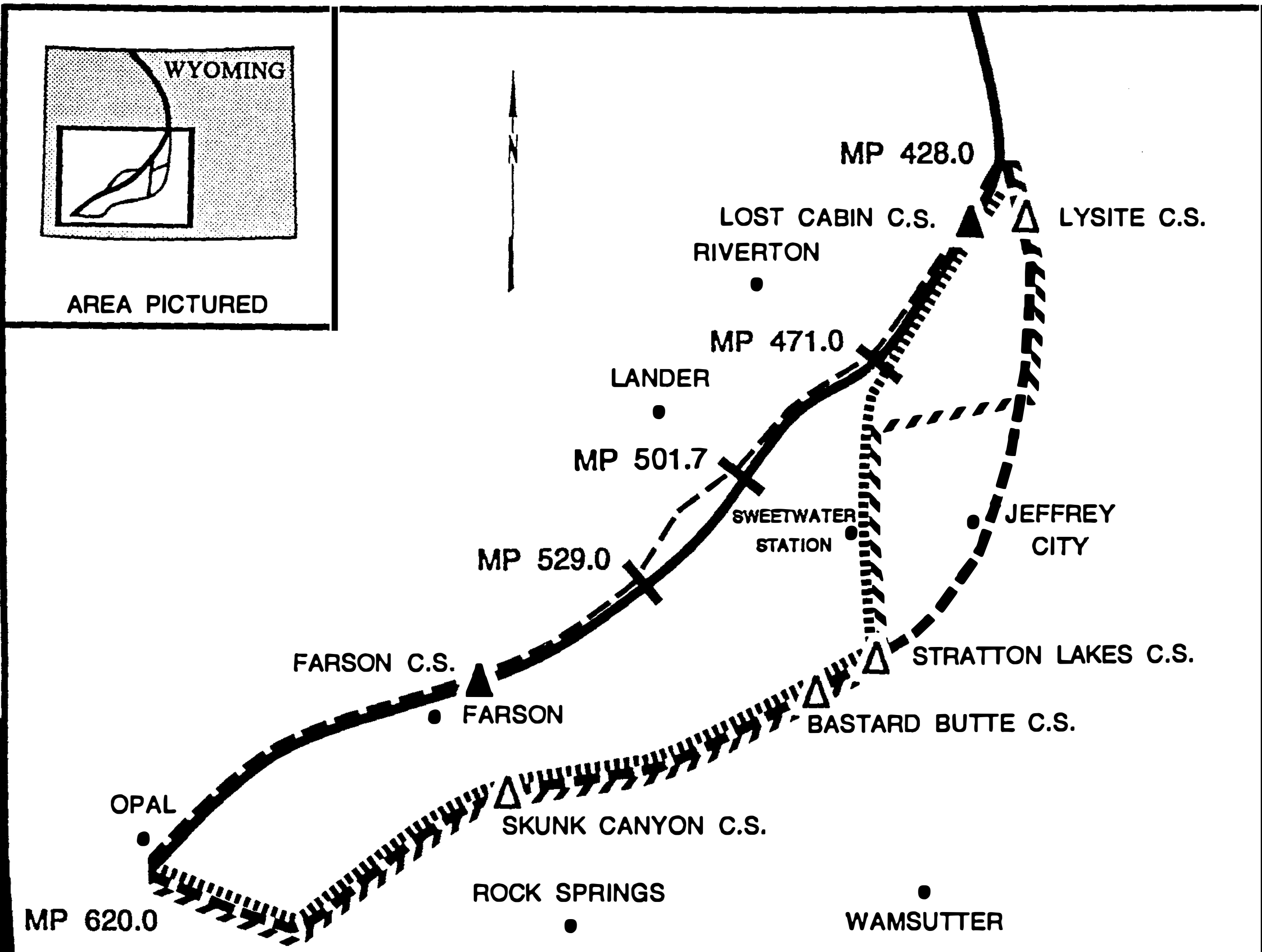
The following discussion summarizes the environmental impacts associated with construction of the Altamont project along each of the four South Pass Route Variations, and contrasts these impacts with those which would occur along the proposed route. In order to normalize the comparisons, all four variation routes are taken to begin at MP 428 (the point where the Jeffrey City and Northern Utilities Variations deviate from the proposed route) and end where the proposed route terminates at MP 620 near Opal. Figure 6-1 illustrates the relationship of the five routes reviewed. The information is presented by resource category and, where appropriate, identifies potentially significant impacts. Resource categories where no impacts are anticipated are not included in the discussion. Table 6-3 presents this summary in tabular form.

Of the four variations and the proposed route, only Route 28 would cross geologic faults thought to be active during Holocene times. Adoption of this variation would therefore pose a significant hazard to the pipeline at two locations. The Jeffrey City, Alkali Butte, and Northern Utilities Variations would cross five, six, and six fault systems, respectively, while the proposed route would cross two. While all are considered inactive, data are inconclusive and further study is recommended at the identified fault crossings if one of the route variations is ultimately adopted.

Use of the Alkali Butte, Northern Utilities, and Route 28 Variations would all involve about one mile of routing across ancient landslides or potentially unstable slopes, compared to 0.7 mile on the proposed route. No landslide-prone areas were identified along the Jeffrey City Variation. Again, further study is recommended if one of the variations is adopted.

The Jeffrey City, Alkali Butte, and Northern Utilities Variations would disturb more poor and poor-to-fair reclamation potential soils than would the proposed route, at about 139, 145 and 155 miles, respectively. Mileage of soils with these potentials for both the proposed route and the Route 28 Variation would be 107 miles. While all of the routes under review would involve disturbance to poor rehabilitation potential soils, the additional amounts associated with the Jeffrey City, Alkali Butte, and Northern Utilities Variations would be significant and is a result of the substantial increase in pipeline length required by these variations. Mitigation to restore vegetation and minimize impact has been proposed by the applicant and recommended by the staff.

The proposed route and the Route 28 Variation would require 18 and 17 perennial stream crossings, respectively, compared with 7, 7, and 6 perennial stream crossings for the Jeffrey City, Northern Utilities, and Alkali Butte Variations. This difference results from the fact that the proposed route and Route 28 Variation cross the drainage basin nearer to its headwaters, while the latter three variation routes cross the basin in an area where many of the headwater streams have been consolidated into the Sweetwater and Green Rivers. Only the proposed route and the Route 28 Variation would cross streams known to have contaminated sediments.



LEGEND

- Proposed Route
- Jeffrey City Variation
- Alkali Butte Variation
- Northern Utilities Variation
- Route No. 28 Variation
- ▲ Proposed Compressor Station
- Δ Alternative Compressor Station Sites

Miles 50 100

NOTES

(a) All variations begin at MP 428 and terminate at MP 620. MP's where the variations depart from and return to the proposed route (if different than MP 428 and MP 620, respectively) are noted.

(b) Only the Northern Utilities Variation would require construction of a compressor station at Stratton Lakes.

(c) Both the Jeffrey City and the Alkali Butte Variations would require construction of a compressor station at Bastard Butte.

FIGURE 6-1: ALTAMONT PROJECT'S SOUTH PASS ROUTE VARIATIONS

Table 6-3

SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE SOUTH PASS ROUTE VARIATIONS

Resource Area/Impact	Proposed Route	Jeffrey City	Alkali Butte	Northern Utilities	Route 28
Pipeline Length, Miles	192	231	226	243	192.5
GEOLOGY					
Potential active faults crossed [a]	0	0	0	0	2
Miles of liquefaction potential	0	0	0	0	0
Miles of landslide potential	0.7	0	1.0	1.0	1.1
SOILS					
Miles of prime farmland crossed	0	0	0	0	0
Miles percent of soil disturbed with poor or poor-to-fair rehabilitation potential	107 (56%)	139 (60%)	145 (64%)	155 (64%)	107 (56%)
WATER QUALITY					
Number of perennial stream crossings	18	7	6	7	17
Number of intermittent stream crossings [b]	42	48	31	47	40
Number of major river crossings	1	1	1	1	1
Number of waterbody crossings with contaminated sediments [c]	2	0	0	0	2
LAND USE					
Number of residential structures located within 50 feet of construction right-of-way	0	0	0	0	0
Total acres of land temporarily disturbed	2327	2803	2733	2939	2333
Miles of cropland temporarily disturbed	5.6	0	<1	<1	5.8
Miles of federal land crossed	113.1	199.8	160.3	166.0	152.3
Miles of state/local land crossed	9.7	13.5	10.6	13.0	11.1
Number of land use policy/regulatory conflicts	0	0	0	0	1

Table 6-3
(continued)
SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED WITH THE SOUTH PASS ROUTE VARIATIONS

Resource Area/Impact	Proposed Route	Jeffrey City	Alkali Butte	Northern Utilities	Route 28
Miles (percent) parallel to existing rights-of-way	66 (35%)	227 (98%)	163 (73%)	215 (89%)	73 (38%)
VEGETATION AND WILDLIFE					
Acres of wetland/riparian habitat crossed	36.4	29.4	44.8	45.6	39.2
Acres of forest temporarily disturbed	0	0	0	0	11.8
Number of federally listed or proposed threatened or endangered plant species affected	0	0	0	0	0
Number of federally listed or proposed threatened or endangered wildlife species affected	0	0	0	0	0
Acres of big game habitat significantly affected [d]	0	0	0	0	0
Acres of upland game bird habitat significantly affected	0	0	0	0	0
Acres of waterfowl habitat significantly affected	0	0	0	0	0
FISHERIES					
Number of federally listed or proposed threatened or endangered fish species affected	0	0	0	0	0
Number of anadromous fisheries crossed	0	0	0	0	0
Number of important spawning streams crossed	3	1	1	1	3
Number of important recreational fisheries crossed	6	2	2	2	6
SOCIOECONOMICS	NSI [e]	NSI	NSI	NSI	NSI

Table 6-3
(continued)
SUMMARY OF ENVIRONMENTAL IMPACT ASSOCIATED
WITH THE SOUTH PASS ROUTE VARIATIONS

Resource Area/Impact	Proposed Route	Jeffrey City	Alkali Butte	Northern Utilities	Route 28
AIR QUALITY					
Number of new compressor stations	2	3	3	3	2
Number of compressor station additions	0	0	0	0	0
Number of compressor stations requiring PSD review	0	0	0	0	0
NOISE QUALITY					
Number of compressor stations exceeding 55 dBA	0	0	0	0	0
TRANSPORTATION	NSI	NSI	NSI	NSI	NSI
PUBLIC SAFETY	NSI	NSI	NSI	NSI	NSI
CULTURAL RESOURCES					
Number of known sites within 1 mile	296	370	284	368	313
Miles of significant paleontologic formations crossed	117	117	117	117	117
VISUAL RESOURCES					
Miles of high or moderate visual impact	97.2	0.4	0.4	0.4	103.3
Estimated capitol cost increase over proposed route (million of dollars)	--	37.5	36.1	46.6	7.65

a Only the Route 28 Variation would cross faults thought to be active in Holocene times. Fault systems crossed by the remaining routes are believed to be inactive, but data is inconclusive.
b Includes ephemeral streams and canals. Only major intermittent streams are included.
c Only includes waterbodies with known contaminated sediments.
d Does not include significant beneficial impacts, or any significant impact on migration corridors.
e No significant impact (NSI).

Although testing at the crossing locations has not yet been conducted, it is recommended and would be required by state and federal authorities prior to issuance of crossing permits.

Only the Route 28 Variation would encounter a land use conflict. Between RT MPs 510.3 and 521.2, this variation would cross the South Pass ACEC in an area designated for avoidance by major utilities in the BLM's Lander RMP. None of the other routes reviewed would conflict with any existing policies or regulations, existing or proposed developments, or designated recreational areas.

All four of the route variations would parallel, within 0.25 mile, existing rights-of-way for a larger percentage of their respective total lengths than the proposed route. The Jeffrey City Variation would parallel existing right-of-way for approximately 227 miles (98 percent); Alkali Butte, 163 miles (73 percent); Northern Utilities, 215 miles (89 percent); and Route 28, 73 miles (38 percent). The proposed route would parallel existing rights-of-way for 66 miles (35 percent).

The Jeffrey City, Alkali Butte, and Northern Utilities Variations would disturb substantially more acres of land during construction than the proposed route. Use of these variations would temporarily disturb 2,803, 2,733, and 2,939 acres of land, respectively, compared with 2,327 and 2,333 acres along the proposed route and Route 28 Variation. This increased disturbance is directly proportional to the additional mileage associated with each of these variations.

The only unique vegetational impact associated with construction along any of the five routes under review involves disturbance to forested areas. In this regard, the Route 28 Variation would temporarily disturb almost 12 acres of forest, compared with essentially none along any of the other routes. This impact would be long-term. The Northern Utilities, Alkali Butte and Route 28 Variations would cross the greatest acreage of wetland/riparian habitat (at about 46, 45 and 39 acres each), while the Jeffrey City Variation would cross the least (at about 29 acres). The proposed route falls almost halfway between the extremes at about 36 acres of wetland/riparian habitat crossed.

No federally listed threatened or endangered species would be affected by construction along any of the five routes under review. All four variations and the proposed route would cross the same two streams important for fish spawning. The proposed route and Route 28 Variation would cross the largest number of recreational fishery streams at six, followed by two streams each on the Jeffrey City, Alkali Butte, and Northern Utilities Variations.

Because use of the Jeffrey City, Alkali Butte, or Northern Utilities Variations would significantly increase the length of the proposed route, all three would require that an additional compressor station be constructed to maintain the proposed delivery volumes and pipeline pressure at the Opal interconnection with the Kern River System.

In order to provide a set of comparable cultural resource data for the proposed route and the South Pass Route Variations, an updated file search was undertaken in October, 1990 and March, 1991. This information was provided by the Wyoming SHPO and was based on both a computer search and a manual search of all relevant files of known sites by Township, Range and Section. This file search revealed that within a mile, 370 sites were present along the Jeffrey City Variation, 284 sites were present along the Alkali Butte Variation, 368 sites were present along the Northern Utilities Variation and 313 sites were present along the Route 28 Variation. This compares with 296 sites present along the proposed route.

The Route 28 Variation would involve the most miles of land designated as moderate-to-highly sensitive to visual impact of any of the routes under review, totaling 36.9 miles. Based on information presently available, use of the Jeffrey City, Alkali Butte, and Northern Utilities Variations would reduce the miles of land designated moderate-to-highly sensitive impact to less than one. Between MPs 428 and 620, the proposed route would cross 30.8 miles of land considered sensitive to visual impact.

SOUTH PASS ROUTE CONCLUSIONS

The driving force for our consideration of alternatives to the proposed route between MPs 428 and 620 has been the potential for significant, long-term adverse impact to "the South Pass area." While public comments received prior to release of the Draft EIS largely focused on this area, very few commentors provided specific examples or illustrations of how construction of the pipeline would result in significant impact to specific features. Without attempting to summarize the many comments received, those most critical of the proposed route frequently cited the "pristine" nature of the Oregon-Mormon Trail in the area where it crosses the Continental Divide (the historic "South Pass") and referenced the many historical sites (e.g., Pacific Springs, South Pass and Atlantic Cities, Miners Delight, Fort Stambaugh, Willie's Handcart, and others) that would be damaged or degraded by construction through the area. As a result, four alternatives to the proposed route between MPs 428 and 620 have been reviewed.

The previous discussion and Table 6-3 indicates that three of the four alternatives (the Jeffrey City, Alkali Butte, and Northern Utilities Variations) would substantially increase the length of the Altamont route. This fact is reflected in the increased acreage of total land disturbed by construction, and by the need to construct an additional compressor station in order to maintain the proposed gas delivery pressure. These route variations would also involve disturbance to significantly more miles of soils with poor or poor-to-fair rehabilitation potentials. Proposed and recommended mitigation measures would minimize impact along whichever route was selected. However, even with the best efforts at mitigation, more land disturbance and more poor reclamation soils equate to more sediment mobilization, erosion, and water quality impact until revegetation is accomplished.

Other resource areas where differences between the proposed route and the variations are noteworthy include the number of stream crossings, number of crossings having potentially contaminated sediments and the miles of land designated high or moderately sensitive to visual impact. While perennial stream crossings are a legitimate concern, impact associated with this activity is largely controllable through proper timing and construction/restoration practices. Timing and use of specialized construction practices would also remedy the issue of contaminated sediments, if testing substantiates this concern at the proposed crossing locations.

These measures have either been proposed by Altamont or are recommended as certificate conditions. All five routes have only one major waterbody crossing, the Green River.

Both the proposed route and the Route 28 Variation cross more miles of land designated as moderate to highly sensitive to visual impact than the Jeffrey City, Alkali Butte, or Northern Utilities Variation. Our use of this parameter recognizes the sensitivity of the South Pass area and the potential to significantly alter its "feeling" through uncontrolled or poorly planned activities. From a relative standpoint, the Route 28 Variation would cross more lands sensitive to visual impact than the proposed route, while the other three variations would cross less.

As a result of our preliminary findings made during preparation of the Draft EIS and the concerns which continue to be expressed about this issue, we implemented a program to reanalyze the potential visual impacts of Altamont's proposal on the South Pass area and develop appropriate mitigation to reduce or eliminate these impacts. This program included an additional field investigation (which subsequently resulted in Altamont's November 1990 realignment of the proposed route between the Sweetwater River and the Fremont-Sublette County line in Wyoming), negotiations with Altamont to refine its proposed action and mitigation, and the development of additional mitigation which we are recommending.

This effort resulted in a substantial refinement of the construction plans outlined in Altamont's application, which includes Altamont's commitment to implement specific construction and rehabilitation measures in the South Pass area. (These measures are discussed in Chapters 4B and 4L, and presented in Appendix B-5.) It also lead to Altamont's realignment of the proposed route in the viewshed where the route would originally have descended from the Continental Divide, and crossed the South Pass National Historic Landmark (NHL) and the Oregon-Mormon Trail. Although this viewshed is presently riddled with unimproved two-track roads, a two-pole overhead electrical powerline, a buried AT&T cable right-of-way (marked by large metal poles at intervals of about 1,000 feet), an abandoned (although still quite prominent) railroad grade, and SR 28, it was nevertheless considered sensitive and the object of much public concern. We believe that the mitigation now developed would reduce visual impacts to less-than-significant levels.

We must also consider our responsibilities under the NHPA. This requires that a federal licensing agency give consideration to the effect which a proposed action would have on properties listed or eligible for listing in the NRHP. While this process is under way, it will not culminate until after the Final EIS is issued. Nevertheless, we believe that the area's cultural resources can be protected through well-defined procedural mechanisms which are underway. The vast majority of known cultural sites in the area are spatially discrete. Minor route realignments are generally quite effective in preserving the integrity of such sites. This approach is already apparent in Altamont's realignment of the proposed route to avoid the South Pass NHL. For the area's major linear feature (the Oregon-Mormon Trail), one mitigating strategy is to cross the trail in a previously disturbed location. We believe that crossing where the Trail and SR 28 intersect, coupled with a bored crossing and the implementation of other construction/restoration measures to which Altamont has committed would provide adequate protection for this resource.

The Route 28 Variation deserves an additional comment. If the impetus for this variation was concern for cultural/historic resources, then we question how routing the pipeline significantly **closer** to major historical sites and through a BLM ACEC (designated for the protection of historical resources and three NRHP-listed sites) improves on the proposed route. Further, its relative visual impact would be greater because of its proximity to SR 28 and major tourist sites served from SR 28. Although fewer perennial streams would be crossed, the crossing of Willow Creek would require development of special construction and restoration plans to mitigate impact. This variation would require a substantial amount of blasting, and almost 12 acres of forest to be cleared for construction. We therefore do not agree that the Route 28 Variation would offer any advantage over the proposed route. Public comment on the Draft EIS appears to support this conclusion.

When the Draft EIS was issued, we felt that the proposed route, as modified by our recommended mitigation measures developed in the analysis and enumerated at the end of this chapter, could be constructed and operated in an environmentally acceptable fashion. However, we wished to remain open on the issue of routing between MPs 428 and 620, as well as the adequacy of our recommendations to mitigate impact in the South Pass area. Public comment was specifically sought on these issues, among others.

Substantial public comment was received. We have carefully considered all comments (see Comments/Responses Volume of this FEIS) and made numerous changes to the EIS, including the addition of new material. At this juncture, we are confident that the Altamont proposal, as modified by this EIS, could be constructed and operated in an environmentally acceptable fashion. However, we note that some segments of the public are vehemently opposed to any consideration of routing a utility through the South Pass "area". (The "area" is often defined as a circle centered on South Pass City with a radius of almost 40 miles, which was the focus of the Wyoming Recreation Commission's January 1990 South Pass Heritage Area Master Plan.) This position is evident in a number of the comment letters received on the Draft EIS. Unresolved concerns include the proposed project's impact on visual and historic resources, and the resultant potential to adversely affect further tourism development. While our analysis found that construction between MPs 511-541 would result in long-term visual impact (more than 3 years), we believe that this impact would be similar in appearance to other existing human disturbances such as roads, rails, and existing rights-of-way in this area until restoration is completed. Altamont has proposed a sophisticated impact mitigation and right-of-way rehabilitation plan for the South Pass area. This plan will be further refined during the BLM's Plan of Development process. If the mitigation which Altamont proposes and other recommended mitigation is implemented, we feel that visual impact on the South Pass area would be reduced to less-than-significant levels. As previously stated, compliance with Section 106 of the NHPA would protect the area's historic resources. We therefore disagree with the position that the only acceptable route is one which avoids the South Pass area altogether and follows one of the route variations, as does the BLM who administers the majority of this land (see below).

In light of the analysis presented in this EIS and the mitigation which has been developed (either by Altamont, the FERC staff, or one of the other federal or state land managing agencies) and would be imposed on Altamont, we see no reason to recommend the adoption of one of the

South Pass Route Variations. We believe that the environmental impacts associated with the proposed route would not outweigh the environmental disadvantages associated with any of the four alternative routes, not to mention the significant engineering and economic penalties which adoption of the Jeffrey City, Alkali Butte, or Northern Utilities Variation would involve.

BLM CONCLUSIONS AND RECOMMENDATIONS REGARDING THE SOUTH PASS ROUTE VARIATIONS

At the request of the Rock Springs and Rawlins BLM Districts, the FERC staff analyzed three route variations to the South Pass portion of Altamont's proposed route. These variations (Jeffrey City, Alkali Butte, and Northern Utilities) were identified and assessed in the Draft EIS. While sentiment exists favoring the Jeffrey City Variation for reasons including that it avoids South Pass and parallels existing rights-of-way to a greater degree, it is the official determination of the BLM that Altamont's proposed route (with the realignments recommended by the FERC staff) represents the BLM preferred alterative. The proposed route, as modified, is not inconsistent with the current planning decisions of the affected BLM resource areas. Inclusion of the FERC staff's recommended mitigation measures in combination with any BLM right-of-way conditions and compliance with all applicable local, state, and federal laws and regulations would result in an environmentally acceptable project. Where performance standards, mitigation measures, and right-of-way grant conditions are properly employed and enforced, the proposed route would not result in environmental impacts exceeding those that would occur under any of the route variations.

If the FERC ultimately selects Altamont's proposed route, the BLM will require further analysis of the Abandoned Railroad and Opal Bench/Hams Fork River Segment Variations, which were identified, evaluated, and eliminated from further consideration by the FERC staff in Chapter 2. This shall include a comparative analysis of the identified segment variations against the proposed route (between MPs 525 and 550, and between MPs 596 and 620) before right-of-way issuance will be authorized by the BLM.

FERC STAFF RECOMMENDED MITIGATION MEASURES

To mitigate the environmental impact associated with the construction and/or operation of either proposed project, we recommend that the following measures be included as specific conditions to any certificate(s) issued by FERC. Recommendations 1 through 18 pertain to both PGT and Altamont; 19 through 48 pertain solely to PGT; and 49 through 73 pertain solely to Altamont.

1. The applicant shall adhere to the construction procedures and mitigation measures described in its application(s), as supplemented, and in its responses to the FERC staff's data requests, except as otherwise modified by these certificate conditions.

2. The applicant shall file with the Secretary of the Commission, prior to construction, detailed alignment sheets at a scale not smaller than 1:12,000. All staging areas, access roads, and other areas that would be used or disturbed shall be identified. Any alterations

to the route or aboveground facility locations shown on these alignment sheets, other than minor field realignments per landowner needs and requirements, shall be clearly identified and must be filed with the Secretary of the Commission and approved by the Director of OPPR prior to implementation.

Such alterations shall include, but not be limited to, all route changes resulting from implementation of cultural resource mitigation measures; endangered, threatened, or special concern species mitigation measures; geologic/geotechnical mitigation measures; further route modifications that may be recommended by state regulatory authorities; and those agreed to for individual landowners that also affect adjacent parcels of property.

3. Within 30 days of the issuance of a certificate, the applicants shall each file monthly progress reports with the Secretary of the Commission on the status of how the mitigating measures identified in this section of the EIS are being implemented. The plan must identify dates for 1) the completion of cultural resource requirements and other required surveys, 2) the start of construction, and 3) the start and completion of restoration.

4. The applicant shall implement the "Stream and Wetland Construction and Mitigation Procedures" contained in Appendix C-3 of the EIS when constructing across flowing streams, rivers, and wetlands; and shall implement the "Erosion Control, Revegetation, and Maintenance Plan" contained in Appendix B-1 of the EIS for all other disturbed areas. Any deviation from these procedures must be reported to and approved by the Commission environmental staff at least two weeks prior to implementation. Any deviation that the staff determines to be significant cannot be implemented without the prior written approval of the Director of OPPR.

5. The applicant shall implement the Stream and Wetland Construction and Mitigation procedures contained in Appendix C-3 of this EIS when constructing across riparian areas, and shall locate all staging areas outside of riparian areas. In addition, the applicant shall develop, in conjunction with the appropriate state and federal land managing agencies, site-specific revegetation plans for all riparian areas, and shall file these plans with the Secretary of the Commission for staff review of the Director of OPPR prior to construction.

6. Prior to commencing pipeline construction, the applicant shall prepare and file with the Secretary of the Commission for staff review a proposed groundwater monitoring plan designed to provide a program for site-specific identification of community and private water supply wells and springs located within 100 feet of the proposed pipeline. The plan shall also provide for documentation of pre- and post-construction well and spring water quality and yields, and should be of adequate detail to determine with relative certainty whether the pipeline construction was responsible for any adverse impact on the groundwater user. In the event that private wells or springs identified as a result of the groundwater monitoring program are damaged by pipeline construction activities, the applicant shall provide an emergency source of potable water and shall restore the system to its original capacity.

7. Prior to commencing construction, the applicant shall prepare and file with the Secretary of the Commission for staff review a project-specific Spill Prevention, Containment, and Control Plan which describes the preventive and mitigative measures to be employed to minimize the impact associated with such occurrences. These measures should include but not be limited to: requiring all fueling and lubrication to be done in areas designated for such purposes, with such areas to be located away from all waterbodies; requiring each construction crew to have on-hand sufficient supplies of absorbent and barrier materials to allow the rapid recovery of any spills; and development of standing procedures regarding excavation and off-site disposal of any soil materials contaminated by spillage.

8. The applicant shall not conduct refueling activities or store hazardous material within any designated well protection area(s) or within 200 feet of any private, municipal or community water supply well.

9. The applicant shall conduct chemical testing of subsurface and surficial sediments at all waterbody crossings known to be contaminated, or suspected to be contaminated, with hazardous substances. Test parameters shall include priority pollutant metals and organics. The results of such testing shall be filed with the Secretary of the Commission for staff review, with the U.S. Army Corps of Engineers (COE), and with the appropriate state water quality management agencies, prior to construction at these locations.

10. The applicant shall control its hydrostatic test water withdrawal rates to ensure that no more than 10 percent of the actual streamflow is withdrawn during hydrostatic testing.

11. The applicant shall install appropriate warning signs upstream of major river crossings and print a notice of the upcoming river crossing schedule in a local newspaper(s) for general distribution. This should be referenced in the site-specific plans required for all major river crossings by our Stream and Wetland Construction and Mitigation Procedures.

12. The applicant shall survey its proposed route for the presence of nesting raptors prior to construction, realign its proposed route as necessary to avoid the destruction of active raptor nests, and not construct within 0.5 mile of an active raptor nest during the raptor's breeding and nesting season.

13. The applicant shall file with the Secretary of the Commission, for staff review prior to construction, a visual resource protection plan that specifies detailed measures that will be implemented to minimize the visual impacts of aboveground facilities as described in Chapter 4L of the EIS. For facilities located on federally-administered property, these visual resource protection plans must be submitted to the appropriate federal land management agency for review and approval prior to construction.

14. The applicant shall sponsor/coordinate the use of buses or car/van pools to reduce personal vehicle use between worker accommodations and central staging/marshaling areas to the maximum degree practicable.

15. The applicant shall use buses, vans, or other appropriate vehicles to ferry workers from a central staging or access area to the daily job-site. This measure shall be implemented to the maximum extent practicable.

16. The applicant shall provide site-specific environmental information, for all domestic gathering and delivery facilities, at such time as the precise location of these facilities become known. This information shall be filed with the Secretary of the Commission for review and approval by the Director of OPPR prior to construction. This information shall also be submitted concurrently to the other appropriate federal and state agencies responsible for specific resource management and/or protection to ensure effective and efficient agency/applicant coordination.

17. The applicant shall perform an intensive field survey on federal land where potential impact on paleontologic resources is considered by the Land Administering Agency to be high. This field survey should be designed to identify and evaluate specific paleontologic resources. Where feasible, the pipeline shall be relocated to avoid known paleontologic resources where these resources have been determined by detailed scientific investigation to be unique within a particular geologic rock unit or formation (e.g., a vertebrate faunal or paleobotanical floral quarry site). Paleontologic resources with significant values that lie solely in the scientific data contained in the deposit may be excavated under a data recovery plan. Implementation of this mitigation measure shall be developed in consultation with appropriate scientific researchers and appropriate federal agency, (e.g., FS and BLM).

18. The applicant(s) shall consult with authorities from the appropriate federal land managing agencies to determine criteria and recommendations for construction, restoration and maintenance within federally-administered property. In the event that these recommendations differ from the criteria established in this EIS, the applicant shall implement the criteria and recommendations for restoration established by the appropriate land management agency on federally managed property.

FERC Staff Recommended Mitigation Measures for the PGT Project

19. PGT shall develop and file with the Secretary of the Commission for staff review prior to construction, a detailed, site-specific construction, restoration, and monitoring plan for its proposed construction across the landslide area present at MP 9.6 of the John Day Canyon Variation.

20. Where PGT cannot gather sufficient seed to implement its proposed native straw seeding technique, or where the native straw seeding technique will not be employed, PGT shall utilize the seeding mixes contained in Appendix B-2 of the EIS to revegetate all uncultivated, nonwetland areas disturbed by construction.

21. PGT shall consult with the appropriate Soil Conservation Service, Bureau of Land Management, or Forest Service officials depending on jurisdiction, to determine the optimal timing for planting the recommended seed mixes contained in Appendix B-2 of the EIS, and shall conduct seeding operations according to these recommendations.

22. PGT shall develop and implement, in consultation with the appropriate federal, state and/or local agencies, a plan for the control of noxious weeds on all areas disturbed by construction.

23. PGT shall develop, in coordination with the Nature Conservancy, a site-specific construction and restoration plan that would minimize disturbance to the Nature Conservancy's Lindsay Prairie Preserve (MP 307.1 to 307.6) and ensure that native prairie communities located within this area become reestablished on the construction right-of-way.

24. When conducting restoration activities in Idaho, PGT shall consult with the Soil Conservation Service and/or Forest Service to determine appropriate fertilizer mixes and application rates.

25. When conducting restoration activities in Oregon in areas which contain volcanic rock intrusions, PGT shall not dispose of rock that is displaced during pipeline installation by scattering it on the right-of-way unless the affected landowner or land-managing agency expressly grants permission to do so.

26. PGT shall identify prior to construction, in consultation with the Soil Conservation Service (SCS) and affected landowners, all lands which are part of the U.S. Department of Agriculture's Conservation Reserve Program (CRP). On CRP lands, PGT shall document the existing vegetative cover (in terms of species composition, stage of development, and percent cover) and shall be responsible for restoring all areas disturbed during construction to their pre-construction vegetative cover condition.

27. PGT shall consult with federal and state agriculture agencies, and affected landowners, to identify areas where infestations of nematodes currently threaten existing agricultural production. In these areas, PGT shall obtain detailed instructions from the parties consulted concerning accepted practices which avoid the transfer of nematodes from infested areas to non-infested areas, and shall implement these practices.

28. In its application of herbicides and other practices for the management of unwanted vegetation, or its implementation of routine right-of-way vegetation maintenance procedures, PGT shall conform to the Vegetative Management Environmental Impact Statement and the Mediated Agreement by the Regional Forester, Region 6, U.S. Forest Service, when constructing or operating on public lands administered by the Winema, Ochoco, or Deschutes National Forests.

29. PGT shall replace the streambed armoring substrate after constructing across Bussard and Snyder Creeks, and shall perform long-term monitoring at these locations to ensure that downcutting erosion is controlled.

30. PGT shall not construct within 500 feet of: a) an active pygmy rabbit burrow during the breeding and rearing season; b) an active kit fox den during the rearing season; or c) a Washington ground squirrel colony when the squirrels are estivating.

31. PGT shall not construct within occupied long-billed curlew nesting habitat in the state of Washington during the nesting season.

32. PGT shall not construct within active mule deer, pronghorn, or white-tailed deer fawning areas during the fawning season, or within the John Day Canyon during the bighorn sheep lambing season.

33. PGT shall not construct within the mule deer migration corridors located between MPs 412 to 413, 426 to 427, 474 to 475, 479 to 480, 482 to 484, and 485 to 486 during the mule deer migration season, or within the Rimrock Springs WMA pronghorn migration corridor during the pronghorn migration season.

34. PGT shall survey the upland sandpiper nesting habitat present between MP 104 to 106.8 prior to construction, and shall not construct within this area between May 1 to September 1 if nesting upland sandpipers are found to occupy the area.

35. PGT shall not construct its proposed facilities until:

    a) the Commission staff completes its Formal Consultation with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS);

    b) the Commission staff receives a Biological Opinion from both the USFWS and NMFS on the PGT/PG&E Project;

    c) PGT develops, and ensures that PG&E develops, a Threatened and Endangered Species Mitigation Plan that is acceptable to the Commission staff, USFWS, and NMFS, and which includes at a minimum any mandatory Terms and Conditions contained in the USFWS's and NMFS's Biological Opinions; and

    d) the Director of OPPR certifies in writing that construction of the PGT's facilities may commence.

36. To ensure that construction of the PGT/PG&E Project does not affect nesting peregrine falcons, PGT shall not construct, and shall ensure that PG&E does not construct, within 0.5 mile or "line of sight", whichever distance is greater, of an active peregrine falcon nest between February 1 to July 31 of any year.

37. PGT shall implement its proposed "Moyie River Pipeline Crossings: Construction, Mitigation, and Restoration Plan" (Plan) ,which is contained in Appendix F-1 of the Final EIS. In the event that a landowner refuses to grant PGT access to install a fishery enhancement structure at a location identified in the Plan, PGT shall install the structure

in an alternate location which provides an equivalent level of benefit to fish habitat in the Moyie River.

38. PGT shall develop a site-specific construction and restoration plan for its proposed crossing of Willow Creek (MP 421) that is acceptable to the Forest Service.

39. PGT shall develop as part of its site-specific construction plan for the proposed Walla Walla River crossing, in coordination with the applicable Washington state agencies, a timing schedule that would ensure that construction activities do not interfere with anadromous fish passage.

40. PGT shall develop a detailed site-specific construction and restoration plan for the John Day Canyon Variation that addresses erosion control, river crossing techniques, exact crossing location, right-of-way restoration, and provisions for avoiding impact on anadromous fish populations, and shall file the plan with the Secretary of the Commission for the review and approval of the Director of OPPR prior to construction.

41. For all locations where occupied residences are located within 50 feet of the working side of PGT's existing right-of-way, as detailed in Table 3D-4 of this EIS, PGT shall confine all construction activities to the existing right-of-way and shall not utilize any additional temporary workspace. To further mitigate disturbance, PGT shall utilize the following techniques in the vicinity of these residences:

    a) dragline or stovepipe construction to minimize the length of open trench;

    b) minimize the period of time the trench remains open; and

    c) fence any trench or bore pits left open overnight.

42. To ensure that PGT's noise design criteria would be achieved, PGT shall file with the Secretary of the Commission for review and approval by the Director of OPPR, a noise analyses with the Commission for its proposed compressor additions at each existing compressor station prior to construction. Such analyses must be based on far-field sound level data (from either the manufacturer or a similar unit in service elsewhere) for the actual gas-turbine compressor unit proposed for each site with the final noise control design, and include the gas cooling equipment proposed for Compressor Station No. 3.

43. PGT shall install an improved air intake silencer on the existing compressor unit located at Compressor Station No. 3 in order to reduce or eliminate the "pure tone" high-frequency noise emanating from this unit. The noise controls for the proposed turbine compressor and gas cooling equipment shall be designed such that the total L_{dn} of the existing and proposed units would not exceed a L_{dn} of 55 dBA at the nearest noise sensitive area when operating at full load.

44. PGT shall not utilize the historic Meadow Creek townsite, which is considered to be eligible for inclusion in the NRHP by the Idaho SHPO, as a pipeline unloading area,

laydown area, or storage yard, nor shall it conduct any earth disturbing activities at this site.

45. PGT shall design a cultural resource management plan for its jurisdictional facilities, as well as for PG&E's related nonjurisdictional facilities, in consultation with the FERC, the SHPOs, and other appropriate agencies including, on federal lands, the BLM and the Forest Service, as necessary. The management plan would outline procedures and methods to identify, evaluate, and protect (i.e., through avoidance or data recovery) National Register of Historic Places (National Register) listed and eligible properties which would be affected by the construction of either PGT's jurisdictional facilities or PG&E's related nonjurisdictional facilities. Appropriate questions shall be included in the plan, although others may develop as the field investigation studies proceed. Guidelines for mitigation of impacts to resource that are not avoidable shall be included in the cultural resource management plan.

    Prior to project construction, PGT shall design and conduct an intensive cultural resource survey, that is equivalent to a BLM Class III pedestrian survey, of both its final pipeline route and ancillary facilities and PG&E's final route and ancillary facilities. This survey shall be done in consultation with appropriate Native American groups to help identify resources of traditional Native American value.

    Upon completion of the field surveys, PGT shall identify for the FERC, the SHPOs, and other appropriate agencies all cultural properties potentially affected by the undertaking, and how each property addresses either the research questions in the management plan and the June 22, 1990 Technical Proposal, or other National Register criteria of eligibility, and the applicant's opinion of the effect of the project on any properties. Once properties are properly identified and recorded, the FERC staff, in consultation with the SHPOs and other appropriate agencies, shall identify National Register properties by applying the National Register criteria of eligibility in light of the research questions developed for the management plan and the Technical Proposal, new research questions inherent in the data, or other criteria under 36 CFR 60.4. Additional information concerning the resources shall be obtained by PGT, if required by the FERC staff, to apply those criteria.

    Cultural resources determined eligible for inclusion in the National Register by the FERC or other authorizing agencies would then be evaluated as to the impacts of the project. A determination of effect shall be made by the FERC staff in consultation with the appropriate SHPOs pursuant to 36 CFR Part 800.5. Indicators for determining the potential effect of construction on cultural resources are set forth in the ACHP regulations at 36 CFR Part 800.9.

    In all cases where cultural resources in or eligible for listing in the NRHP are found within the project area, PGT will avoid where possible, or ensure that PG&E avoids where possible, these resources. Any modifications, including route realignments by either PGT or PG&E, shall be filed with the Secretary of the Commission for review and approval by the Director of the OPPR prior to construction. When it is impossible to avoid

NRHP-listed or-eligible cultural resources, PGT will conduct data recovery prior to site disturbance and will ensure that PG&E does the same.

If it is determined that effects upon National Register or eligible properties would occur as a result of the project, a mitigation plan to reduce or eliminate these effects shall then be formulated and submitted to the FERC, the SHPOs, and other appropriate agencies. The FERC shall afford the ACHP an opportunity to comment on the effects of the project and the proposed mitigation plans. Site-specific mitigation plans shall be formulated in accordance with the appropriate provisions of the management plan and Technical Proposal. Any modification of the management plan or the Technical Proposal deemed necessary in light of discoveries made during the field surveys shall also be identified. The mitigation plans shall discuss the timetables for completion of the final report for the phases of mitigation associated with data recovery, laboratory analyses, and artifact curation. The final report shall document the method, theory, and results of implementing the mitigation plans. The final report shall be filed with the Secretary of the Commission for staff review and submitted to the SHPOs and other appropriate agencies upon completion, in accordance with identified timetables. All sensitive materials shall be marked "Privileged - Do Not Release."

PGT shall ensure that Indian tribes and identified interested groups and individuals will be consulted and provided the necessary information in order for those parties to respond to areas of historic value, including sacred areas, archaeological sites and their excavation, burials, and other ethnographic use areas, with particular reference to traditional plants, animals, and ritual areas. In general, sacred and archaeological sites shall be avoided whenever possible, burials shall be left undisturbed, and care shall be taken to avoid the destruction of traditionally used plants and animals. PGT shall provide copies of all correspondence with the above parties, and all documentation on traditional Native American concerns resulting from the consultation, in the final report. Due to the sensitive nature of this information, it shall be provided to the appropriate SHPOs marked "Sensitive" and filed with the Secretary of the Commission marked "Privileged - Do Not Release."

Consideration shall be given to a monitoring program for ground-disturbing activities in areas where the cultural resource inventory indicates a likelihood that resources not now evident on the ground surface are likely to occur as buried resources. Such an "emergency discovery" program shall be consistent with the ACHP regulations at 36 CFR Parts 800.5 and 800.11(a).

PGT shall not commence with the construction of its jurisdictional facilities until the FERC staff has 1) reviewed and approved all cultural resource plans, surveys and reports, and mitigation plans and reports, and has considered any comments by the SHPOs and the ACHP, for both PGT's jurisdictional and PG&E's nonjurisdictional facilities, 2) PGT has agreed to any modifications of the mitigation plan which the ACHP and the FERC staff have agreed upon , and 3) the Director of OPPR has reviewed and approved all required information and has informed PGT, in writing, that construction may begin.

46. Prior to construction, PGT shall file with the Secretary of the Commission for staff review, a visual resource protection plan that incorporates the specific mitigative measures recommended for each location listed below. These mitigative measures are described in detail in Chapter 4L of the Final EIS. Where federally administered lands are involved, PGT shall file this plan concurrently with the appropriate land management agency for review and approval.

    a) MP 0.2-19.2: minimize clearing and stream crossing impacts , and the area affected by road crossings;

    b) MP 357.5-358.5: restore earthforms, retain rock outcroppings, and reduce surface contrast; and

    c) MP 465-511.2: minimize clearing and road crossing impacts.

47. PGT shall coordinate its blasting schedule within the boundaries of the Newberry National Volcanic Monument with the FS, and provide the FS the opportunity to temporarily close the Lava River Cave to visitors.

48. When constructing across National Forest System lands, PGT shall comply with the Standards and Guidelines of the Land and Resource Management Plan for the appropriate National Forest.

FERC Staff Recommended Mitigation Measures for the Altamont Project

49. Altamont shall conduct appropriate geologic and geotechnical studies to fully characterize the extent and potential severity of landslide/slope stability hazards in the identified intervals at the Arrow Creek Breaks (MPs 112.9-115.0), West Kirby Creek (MPs 417.0-417.1 and MPs 417.8-418.1), and Twin Creek (MPs 495.6-496.3). This information should then be used as the basis for determining the need for route realignment, or alternatively, designing the pipeline facilities and formulating specific mitigation measures that would be undertaken during construction at each landslide-prone area. Both the results of these studies and the detailed designs and related mitigation plans shall be filed with the Secretary of the Commission for the review and approval of the Director of OPPR prior to construction. In the event that construction of the Altamont Project is authorized along one of the South Pass Route Variations, Altamont shall conduct these studies either at the ancient landslide area near AB MP 489 (for the Alkali Butte/Northern Utilities Variation), or at the unstable areas near MPs 495.6-496.3 and RT MP 508 (for the Route 28 Variation).

50. Altamont shall conduct appropriate geotechnical studies to characterize the potential for and the extent of surface offset at the Cedar Ridge/Dry Fork fault system (MP 432.4) and the Continental fault (MP 532.1) prior to commencing the detailed design phase of the pipeline. If evidence of Holocene displacement is found, this information should then be used as the

basis for designing the pipeline crossing at these locations, as well as formulating any other appropriate mitigation. Both the results of these studies and the crossing designs and related mitigation shall be filed with the Secretary of the Commission for the review and approval of the Director of OPPR prior to construction. In the event that construction of the Altamont Project is authorized along one of the South Pass Route Variations, Altamont shall conduct these studies at all fault crossings where the faults exhibit indications of Pleistocene age or younger activity.

51. Altamont shall utilize the seeding mixes contained in Appendix B of the EIS to revegetate all uncultivated, nonwetland areas disturbed by construction unless otherwise specified by landowners or land managing agencies. Where legumes are included in the seeding mixes, Altamont shall inoculate legumes with the proper rhizobium.

52. Altamont shall reseed the right-of-way in the fall as soon as possible after construction, but after the temperatures are low enough to maintain dormant seed. When seeding cool season grasses in the fall, Altamont shall ensure that the seed remains dormant and avoids germination by seeding only after the soil temperature reaches 40 °F or below and is dropping. If reseeding is necessary in the spring, Altamont shall seed no later than May 15 in Montana and May 1 in Wyoming to ensure sufficient root development by the summer warm season. Altamont shall continue to reseed disturbed areas until a successful stand is established.

53. Altamont shall not use fertilizer as part of its revegetation program except where excessively calcareous soils of the broad terraces are encountered (the Windham, Utica, and Musselshell series) north and south of Harlowtown, Montana, or if requested by landowners. Where these calcareous soils are encountered, Altamont shall apply 100 lbs. of sulfur-coated 16-20-0 per acre.

54. In consultation with the federal land managing agency or appropriate state and/or local agencies, Altamont shall develop and implement a plan for the control of noxious weeds on all areas disturbed by construction.

55. In Montana, Altamont shall develop and implement grazing deferment plans with willing landowners for the first growing season and then controlled grazing for the next to allow for establishment of vegetative cover. Development of grazing deferment plans is also encouraged in Wyoming.

56. Where exposed shale is encountered on 10 percent or greater slopes, Altamont shall apply jute mesh or implement another equally effective erosion control measure on disturbed areas immediately after seeding.

57. In the event that Altamont is required to utilize either the Jeffrey City, Alkali Butte or Northern Utilities Variation, Altamont shall relocate its Skunk Creek Compressor Station to avoid critical elk wintering range found at MP 608-611 (Jeffrey City Variation).

58. In the event that Altamont is required to utilize the Route 28 Variation, Altamont shall develop site-specific construction and restoration plans for the crossing of Willow Creek, and file the plans with the Secretary of the Commission for the review and approval of the Director of OPPR prior to construction.

59. Altamont shall realign its proposed route in the vicinity of Flat Creek (MP 96-99) and the unnamed wetland area that occurs at MP 450.2 in a manner that minimizes disturbance of wetland and riparian areas to the maximum extent practicable, and file these route realignments with the Secretary of the Commission for the review and approval of the Director of OPPR prior to construction.

60. To ensure that construction does not affect the whooping crane, Altamont shall have a qualified wildlife biologist present on all construction spreads that are operating in Wyoming during the whooping crane migration seasons (spring migration - April 1 to May 15; fall migration - August 21 to September 24), who shall survey the pipeline route for the occurrence of whooping cranes within 1/4 mile of the route each morning prior to the start of construction activities. In the event that whooping cranes are sighted within 1/4 mile of any construction activities, construction activities shall not commence in that location until the whooping cranes have left the area. In the event that any whooping cranes found within 1/4 mile of the pipeline route fail to leave the area within five days, or exhibit breeding or nest building behavior, Altamont shall cease all construction activities with 1/2 mile of this location and shall immediately contact the FERC staff and the appropriate U.S. Fish and Wildlife Service field office for further guidance.

61. To ensure that the Altamont Project does not affect winter roosting bald eagles, Altamont shall survey its certificated route for bald eagle winter roosting habitat in the year prior to construction, and shall not construct within these areas between the period of November 1 to March 31. In addition, Altamont shall restrict its construction right-of-way through bald eagle winter roosting habitat to a maximum of 75 feet in width, and shall align its pipeline in a manner that minimizes the clearing of roost trees to the maximum extent practicable.

62. Altamont shall consult with the appropriate state natural resource management and federal land management agencies to accurately determine the location of known sage grouse strutting/nesting areas, and shall not construct within 0.5 mile of these areas before July 1 of any year.

63. Altamont shall survey its certificated route in Wyoming for the white pelican, black-crowned night-heron, snowy egret, white-faced ibis, trumpeter swan, merlin, and great blue heron in the year prior to construction. Altamont shall then develop a mitigation plan which minimizes or eliminates impact on these species, and file the survey results and mitigation plan with the Secretary of the Commission for the review and approval of the Director of OPPR prior to construction.

64. Altamont shall survey its certificated route in Wyoming for the occurrence of the special-status plant species referenced in Chapter 4E of this EIS, realign its route(s) (as necessary) to minimize disturbance of these species to the maximum extent practicable, and

file these route realignments with the Secretary of the Commission for the review and approval of the Director of OPPR prior to construction.

65. Altamont shall realign its pipeline route, in coordination with the BLM, to minimize or avoid disruption of the BLM-designated Kemmerer endemic cushion plant community, and shall file the route realignment with the Secretary of the Commission for the review and approval of the Director of OPPR prior to construction.

66. To ensure that Altamont's proposed crossing of the Missouri River does not affect the pallid sturgeon, Altamont shall install its proposed pipeline across the Missouri River through the use of directional drilling techniques, and Altamont shall screen its hydrostatic test water intake hose to prevent the entrainment of fish.

    In the event that directional drilling proves to be technically infeasible to implement at the Missouri River, Altamont shall not construct this crossing using open-cut methods until:

    a) Altamont files information with the Secretary of the Commission detailing the specific reason(s) that directional drilling methodology proved to be infeasible;

    b) Altamont provides copies of the required U.S. Army Corps of Engineers' Section 10/Section 404 permit authorizing construction utilizing the open-cut method;

    c) the Commission staff initiates Formal Consultation with the U.S. Fish and Wildlife Service (USFWS) concerning impact on the pallid sturgeon and receives a Biological Opinion;

    d) Altamont formulates a pallid sturgeon mitigation plan that is acceptable to the USFWS and the Commission staff that incorporates, at a minimum, any mandatory terms and conditions contained in the USFWS's Biological Opinion; and

    e) the Director of OPPR has certified in writing that Altamont may install its proposed Missouri River crossing using open-cut methods.

67. Altamont shall limit all pipeline construction and installation activities within the Bighorn River to the period between July 15 to September 15.

68. Altamont shall develop a site-specific construction and restoration plan for the crossing of the Green River, in close coordination with the Wyoming Game and Fish Department, that specifically addresses the issues of timing constraints, site-specific mitigation, and habitat restoration.

69. For each proposed compressor station, Altamont shall file with the Secretary of the Commission far-field sound data (from either the manufacturer or a similar unit in service elsewhere) for the proposed compressors, manufacturer's specifications and attenuation data for the intake and exhaust silencers finally selected, a description and diagram of the final design of the proposed compressor building, and a revised acoustical analysis reflecting the

actual noise control equipment, for review and written approval of the Director of OPPR, before commencing construction of the compressor facilities.

70. Prior to construction, Altamont shall file with the Secretary of the Commission for staff review, a visual resource protection plan that incorporates the specific mitigative measures recommended for each location listed below. These mitigative measures are described in detail in the EIS (see Chapter 4L - "Visual Resources"). Where federally administered lands are involved, Altamont shall file this plan concurrently with the appropriate land management agency for review and approval.

    - MP 69: If open-cut techniques are used to construct the crossing of the Missouri River, restore earthforms, minimize stream crossing impacts, and replant trees on affected river banks.

    - MP 257.4: restore earthforms, minimize stream crossing impacts, and replant trees on the affected riverbanks.

    - MP 268.1: restore earthforms, minimize stream crossing impacts, and replant trees on the affected riverbanks.

    - MP 352.2: minimize stream crossing impacts and replant native woody vegetation on affected streambanks.

    - MPs 593.5 and 613.1: minimize stream crossing impacts and replant native woody vegetation on affected streambanks.

    - MP 495.5 (Jeffrey City Variation): minimize stream crossing impacts and replant native woody vegetation on the affected riverbanks.

    - MP 498.2 (Alkali Butte Variation): minimize stream crossing impacts and replant native woody vegetation on the affected riverbanks.

    - MP 504.5-529.5 (Route 28 Variation): minimize clearing and stream crossing impacts, replant native woody vegetation on affected streambanks, restore earthforms, reduce surface contrast, and place no aboveground facilities between MPs 514-529.5.

    - MP 618.7 (Jeffrey City Variation): minimize stream crossing impacts and replant native woody vegetation on the affected riverbanks.

71. Altamont shall implement its proposed <u>Construction and Rehabilitation Plan MP 511.0 to MP 540.8</u> (contained in Appendix B-5 of the Final EIS), as modified by the requirements of this EIS and/or the appropriate federal land managing agency on federally-administered property.

72. Between MPs 511 and 541, Altamont shall paint all project related aboveground facilities and appurtenances, including pipeline markers and cathodic protection test lead posts, to blend with the surrounding groundcover.

73. Based on the Class I Cultural Resource Inventory (Inventory), the regulations at 36 CFR Part 61.2, and the Advisory Council on Historic Preservation (ACHP) regulations at 36 CFR Parts 800.4(a)(ii) and 800.4(b), Altamont shall contact the appropriate State Historic Preservation Officers (SHPOs) for assistance in evaluating additional information sources which should be consulted and for their recommendations for further surveys, to enable Altamont to form an opinion as to the eligibility of those properties currently identified in the Inventory, and identify any additional properties listed on or eligible for listing on the National Register of Historic Places (National Register). Altamont shall consult these sources and furnish the results of the assessment, along with the SHPO's recommendations for field surveys, to the FERC staff. The FERC, the SHPOs, and other appropriate agencies will consult to determine the adequacy of all previous field surveys which cover portions of the certificated pipeline route and sites of appurtenant facilities, and may require further surveys on inadequately inventoried lands.

    Altamont shall design a cultural resource management plan through consultation with the FERC, the SHPOs, and other appropriate agencies including, on federal lands, the BLM and the Bureau of Reclamation, as necessary. The management plan shall outline procedures and methods to identify, evaluate, and protect (i.e., through avoidance or data recovery) National Register and eligible properties. Appropriate questions shall be included in the plan, although others may be developed as the field investigation studies proceed. Guidelines for mitigation of impacts to resources that are not avoidable shall be included in the cultural resource management plan.

    Prior to project construction, Altamont shall design and conduct an intensive cultural resource survey of the final pipeline route and ancillary facilities, that is equivalent to a BLM Class III pedestrian survey. This survey shall be done in consultation with appropriate Native American groups to help identify resources of traditional Native American value. The survey plan and subsequent report shall be filed with the Secretary of the Commission, the SHPOs, and other appropriate agencies for review prior to implementation. All sensitive materials shall be marked "<u>Privileged - Do Not Release</u>".

    Upon completion of the field surveys, Altamont shall identify for the FERC and appropriate SHPOs all cultural properties potentially affected by the undertaking, and how each property addresses either the research questions in the management plan, or other National Register criteria of eligibility, and the applicant's opinion of the effect of the project on any properties. Once properties are properly identified and recorded, the FERC staff, in consultation with appropriate federal agencies and the SHPOs, shall identify National Register properties by applying the National Register criteria of eligibility in light of the research questions developed for the management plan, new research questions inherent in the data, or other criteria under 36 CFR 60.4. Additional information concerning the resources shall be obtained by Altamont, if required by the FERC staff, to apply those criteria.

Cultural resources determined eligible for inclusion in the National Register by the FERC or other authorizing agencies would then be evaluated as to the impacts of the project. A determination of effect shall be made by the FERC staff in consultation with the appropriate federal agencies and SHPOs pursuant to 36 CFR Part 800.5. Indicators for determining the potential effect of construction on cultural resources are set forth in the ACHP regulations at 36 CFR Part 800.9.

In all cases where cultural resources in or eligible for listing in the National Register are found within the project area, Altamont shall attempt to avoid these resources. Any modifications, including route realignments, shall be filed with the Secretary of the Commission for review and approval by the Director of OPPR.

If it is determined that effects upon National Register or eligible properties would occur as a result of the project, a mitigation plan to reduce or eliminate these effects shall then be formulated and submitted to the FERC, the SHPOs, and other appropriate agencies. The FERC shall afford the ACHP an opportunity to comment on the effects of the project and the proposed mitigation plans. Site-specific mitigation plans shall be formulated in accordance with the appropriate provisions of the management plan. Any modification of the management plan deemed necessary in light of discoveries made during the field surveys shall also be identified. As part of the mitigation plan, Altamont shall consider providing interpretive services and/or facilities at an appropriate location(s) near the South Pass in Wyoming for subsequent Donation and Administration by the State of Wyoming and/or the Bureau of Land Management. The mitigation plans shall discuss the timetables for completion of the final report for the phases of mitigation associated with data recovery, laboratory analyses and artifact curation. The final report shall document the method, theory, and results of implementing the mitigation plans. The final report shall be submitted to the FERC and the SHPOs and other appropriate agencies upon completion, in accordance with identified timetables. All sensitive materials shall be marked "Privileged - Do Not Release."

Altamont shall ensure that Indian tribes and identified interested groups and individuals will be consulted and provided the necessary information in order for those parties to respond to areas of historic value, including sacred areas, archeological sites and their excavation, burials, and other ethnographic use areas, with particular reference to traditional plants, animals, and ritual areas. In general, sacred and archeological sites shall be avoided whenever possible, burials shall be left undisturbed, and care shall be taken to avoid the destruction of traditionally used plants and animals. Altamont shall provide copies of all correspondence with the above parties, and all documentation on traditional Native American concerns resulting from the consultation, in the final report. Due to the sensitive nature of this information, it shall be provided to the appropriate federal agencies and SHPOs marked "Sensitive" and filed with the Secretary of the Commission marked "Privileged - Do Not Release."

Consideration shall be given to a monitoring program for ground-disturbing activities in areas where the cultural resource inventory indicates a likelihood that resources not now evident on the ground surface are likely to occur as buried resources. Such an "emergency discovery" program shall be consistent with the ACHP regulations at 36 CFR Parts 800.5 and 800.11(a).

No construction shall begin until the FERC staff has 1) reviewed all cultural resource plans, surveys and reports, and mitigation plans and reports, and has considered any comments by the appropriate federal agencies and SHPOs and the ACHP, and 2) Altamont has agreed to any modifications of the mitigation plan which the ACHP and the FERC staff have agreed upon. The Director of OPPR will inform Altamont, in writing, that construction may begin.

If construction of the Altamont Project is authorized along one of the South Pass Route Variations, Altamont shall contact the appropriate SHPOs prior to conducting any field surveys and complete a file and records search to identify existing cultural resources present along the certificated route variation. The results of this study shall be furnished filed with the Secretary of the Commission. All sensitive material shall be marked "Privileged - Do Not Release".

Chapter 7. Bibliography

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