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Uranium Leasing Program Final Programmatic Environmental Assessment

July 2007

U.S. Department of Energy

Office of Legacy Management

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Final
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Abbreviations and Acronyms

AEC	U.S. Atomic Energy Commission
AQCC	[State of Colorado] Air Quality Control Commission
AUM	animal unit month
BLM	U.S. Bureau of Land Management
CDOT	Colorado Department of Transportation
CDRMS	Colorado Division of Reclamation, Mining, and Safety
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
dB	decibel
dBA	A-weighted sound level
DHV	Design Hour Volume
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ERMA	Extensive Recreation Management Area
FONSI	Finding of No Significant Impact
ft	feet (foot)
Hz	hertz
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
LHDs	load/haul/dumps
LM	Office of Legacy Management
µg/L	micrograms per liter
mg/L	milligrams per liter
mrem/yr	millirem per year
MSHA	Mine Safety and Health Administration
NEPA	National Environmental Policy Act
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NOI	Notice of Intent
NRC	U.S. Nuclear Regulatory Commission
PCA	Potential Conservation Area
pCi/g	picocuries per gram
PSD	Prevention of Significant Deterioration
rem	roentgen equivalent man (a unit of radioactive dose equivalent)
ROW	right-of-way
SHPO	State Historic Preservation Office
SRMA	Special Recreation Management Area
TCP	traditional cultural property
TDS	total dissolved solids
ULMP	Uranium Lease Management Program

ULP	Uranium Leasing Program
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
U.S.C.	*United States Code*
V/C	volume-to-capacity ratio
WSA	Wilderness Study Area

Measurements and Conversions

Units of Measurement

Most measurements in this Environmental Assessment are presented in English units. Metric units are used for measurements that are too small to be expressed in English units or with data that were intended to be presented in metric units. The table below presents general mathematical values for conversion between measurement units.

Measurement Conversion Chart

If You Know	Multiply By	To Get	If You Know	Multiply By	To Get
Length					
inches	2.54	centimeters	centimeters	0.3937	inches
feet	0.3048	meters	meters	3.281	feet
miles	1.60934	kilometers	kilometers	0.6214	miles
Area					
square miles	2.589988	square kilometers	square kilometers	0.386102	square miles
Volume					
acre-feet	1,233.48	cubic meters	cubic meters	8.107×10^{-4}	acre-feet
	43,560	cubic feet	cubic feet	2.2957×10^{-5}	acre-feet
	325,850	gallons	gallons	3.0689×10^{-6}	acre-feet
gallons	3.7854	liters	liters	0.26417	gallons
Flow Rate					
gallons per minute	0.003785	cubic meters per minute	cubic meters per minute	264.172	gallons per minute
	0.002228	cubic feet per second	cubic feet per second	448.831	gallons per minute

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Glossary

Adit—A nearly horizontal passageway leading into a mine.

Animal Unit Month—An animal unit is generally one of the following: one cow, one cow and one calf, one horse, or five sheep. One animal unit month (AUM) is the amount of forage required to support one animal unit for 1 month. The number of acres required for an AUM (expressed as acres per AUM) varies depending on factors such as range condition, rainfall, irrigation, and topography. Because of low rainfall and steep topography, a larger number of acres is required to support an AUM in the area of the lease tracts than on most public lands.

Exposure—The total quantity of radiation at a given point, measured in air. Also, a measure of gamma or x-rays at a certain location, based on the location's ability to produce ionization in air. The unit of exposure for x-rays and gamma radiation is the roentgen.

Effective Dose Equivalent—The sum of the products of absorbed dose and appropriate factors that account for differences in biological tissue damage produced by different kinds of ionizing radiation and its distribution in the body. The unit of effective dose equivalent is the rem.

Gamma Radiation—Short wavelength electromagnetic radiation originating in the nucleus of an atom; similar to x-rays but of higher energy.

Incline/Decline—A passageway leading into a mine and sloping upward or downward at an angle from the horizontal.

Load/Haul/Dumps (LHDs)—Equipment used for moving rock and debris in mines.

Member of the Public—An individual in a controlled or unrestricted area on the lease tracts. The individual would not be involved in mining operations but could be a receiver of radiation doses. Any individual receiving an occupational dose would not be considered a member of the public.

Mine-Waste-Rock Pile—Topographic feature associated with mining operations that contains host rock and naturally occurring radioactive material and usually is not cost effective to process further.

Muck—The loading and removal of ore or mine-waste-rock from a mine.

rem (derived from **r**oentgen **e**quivalent **m**an)—The dosage of radiation that would cause the same biological effect as 1 roentgen of gamma-ray exposure.

Shaft—A near-vertical passageway leading into a mine from the surface of the ground.

Skip—The compartment(s) within a shaft used to transport personnel and/or ore and/or mine-waste-rock to the surface.

Total Effective Dose Equivalent—The sum of the deep-dose equivalent (for external exposure) and the committed effective dose equivalent (for internal exposure).

Vent—A near-vertical passage leading into a mine that provides additional ventilation.

Working Level—Any combination of short-lived radon daughters in 1 liter of air that results in the ultimate emission of 1.3×10^5 million electron volts of potential alpha particle energy.

Working Level Month—An exposure to 1 working level for 170 hours.

Summary

Pursuant to the National Environmental Policy Act (NEPA), the U.S. Department of Energy (DOE) Office of Legacy Management (LM) is evaluating its Uranium Leasing Program to determine a strategy for managing the program during the next 10 years. A key element in this determination is the assessment of environmental impacts attributable to lease tract operations and associated activities. The leasing program currently consists of 38 lease tracts, all located in southwestern Colorado; 13 leases are active and 25 are inactive. The 13 active leases are scheduled to expire in 2007.

DOE is considering three alternatives for managing the lease tracts:

- *Expanded Program alternative* (DOE's preferred alternative). The existing leasing program would be expanded to include leasing of all DOE-managed lands. The 13 active lease tracts (more than 7,000 acres) would remain active, and DOE could offer the 25 inactive lease tracts to the domestic uranium industry through a competitive bid process. Individual lease tracts could be expanded to include all withdrawn lands, potentially more than 27,000 acres.
- *Existing Program alternative*. The existing 13 leases would be extended, and future operations would be limited to those that are currently authorized on the tracts and their subsequent reclamation.
- *No Action alternative*. Current leases would expire, and the existing lease operations would be reclaimed. Following reclamation, DOE could choose to continue (indefinitely) its management of the withdrawn lands without leasing, or all 38 lease tracts could be restored to the public domain with the concurrence of and under the Bureau of Land Management's (BLM's) administrative control and DOE's leasing program would end.

The proposed alternatives would affect the environmental resources discussed in this final Programmatic Environmental Assessment (PEA) to varying degrees. The following discussions present summaries of the impacts to the resources that the alternatives would have the most effect on. Chapter 5 of the PEA presents a more detailed discussion of the effects to all applicable environmental resources.

Socioeconomics

All alternatives would create additional jobs in areas affected by lease tract operations; however, due to the distribution of the lease tracts across three counties, and the population distribution in numerous towns and cities in these and adjoining counties, no community would incur significant positive or negative socioeconomic impacts. The Expanded Program alternative would create the most jobs (up to 570) and would increase local wages. The Existing Program alternative would create fewer jobs (up to 186) and would also produce an increase in local wages. Both alternatives would bring a secondary economic benefit from local spending for goods and services. Up to 60 short-term (1 to 2 year) jobs would result from the No Action alternative, mostly from hauling stockpiled ore to the processing mills and reclaiming disturbed land.

Transportation

Ore could be hauled to two currently licensed ore-processing mills; Cotter Corporation's Mill in Cañon City, Colorado or the International Uranium Corporation's White Mesa Mill near Blanding, Utah. The final PEA analyzed a highly improbable, worst-case transportation scenario which conservatively assumed that all mines on all lease tracts were operating at capacity and concurrently. Additionally, the final PEA also evaluated the potential impacts associated with the haul-truck traffic that can reasonably be expected to occur. This realistic evaluation is based on historic operating conditions that occurred during the last upturn in the uranium market, during which mines opened and closed but under no circumstance did all mines operate simultaneously and at capacity. As summarized below and detailed in the final PEA, there would be no significant impacts on traffic or the health of workers or the public under either transportation scenario. Based on the worst-case transportation scenarios analyzed in the final PEA, an increase in truck traffic (up to 150 haul trucks per day, one way, under the Expanded Program alternative and up to 50 haul trucks per day, one way, under the Existing Program alternative) hauling ore to the mills would result in only a slight increased risk of traffic fatalities. Under worst-case scenarios for all three alternatives, the number of fatal accidents and injury accidents were estimated to be less than 1 per year. For the realistic transportation evaluation, the haul truck traffic would decrease to 45 trucks per day for the Expanded Program alternative and 31 trucks per day for the Existing Program alternative. Annual traffic-related fatal accidents and injury accidents would decrease accordingly, from those mentioned above. There would be no notable additional congestion on highway road segments related to this additional truck traffic. With the exception of one existing road segment in Grand Junction, Colorado, that is virtually at capacity, all other road segments are well below road capacity (expressed as a volume to capacity ratio) and would experience none to minor increases under all alternatives.

Based on the worst-case scenario that was analyzed in the final PEA, under the Expanded Program alternative, the annual dose to haul-truck drivers and members of the public from exposure to radioactive ore would result in an increase in cancer risk of less than 8 in 1 million and 1 in 10 million, respectively. Also based on the worst-case scenario that was analyzed in the final PEA, under the Existing Program alternative, a haul-truck driver would receive the same annual dose and risk as under the Expanded Program alternative, but because of the reduced number of total shipments, the public risk would be reduced to 1 in 100 million.

The increase in haul-truck traffic under the Expanded and Existing Program alternatives would also increase the frequency of noise along the haul routes; however, the noise from haul trucks would be similar to that of other commercial trucks using the same routes and would attenuate within the same short distances. On some routes that are designated as scenic byways, vehicle/animal accidents could increase commensurate with the increased number of haul trucks. In addition, the residents living near the lease tracts or along the collector routes would likely see an increase in the amount of dust generated by the increased haul-truck traffic.

Mining

Under the Expanded and Existing Program alternatives, uranium and vanadium ores would be immediately available, and new reserves might be discovered. Under the No Action alternative, uranium and vanadium ores could be available for extraction over the long term.

Noise, Dust, and Air Quality

The Expanded and Existing Program alternatives would produce a limited increase in localized noise and dust near mine sites and along dirt haul roads, which could affect recreational users, especially near the Dolores River Canyon. An increase in visible dust and surface disturbances would also affect visual resources. Local fugitive dust could decrease air quality slightly near the source areas, but regional air quality would not be affected under either alternative. Under the No Action alternative, noise, dust, and human activity at all lease tracts would decrease because all lease-tract operations would be reclaimed.

Agriculture and Grazing

The Expanded Program alternative would result in surface disturbance of no more than 450 additional acres (in addition to the 300 acres of existing disturbance), and if all leases were in active operation under the Existing Program alternative, an additional 110 acres would be disturbed. This acreage represents less than 2 percent of the total area (27,000 acres) of DOE lease tracts. These small, discontinuous losses in acreage would not significantly affect the volume of forage in grazing allotments that include the lease tracts. Because most mining activities occur in lands not suitable for crops, there would be no impacts to agriculture. However, there would be impacts to range management, such as increased traffic through allotments to mine sites that could include animal/vehicle accidents, disruption of normal livestock trailing/movement from mine development, and damage to or increased maintenance requirements for access roads. These potential impacts could be minimized with range improvements such as cattle guards and fences. After successful reclamation, as many as 300 additional acres could become available for grazing. Weed invasion could potentially affect this forage base, but DOE has a proactive noxious weeds control program that is coordinated with the Montrose County Weed Program and the San Miguel Basin Weed Program.

Soils

Surface disturbance under the Expanded Program and Existing Program alternatives could produce an increase in soil erosion, but storm water runoff management during operations and reclamation of disturbed areas after mining operations ceased would minimize these effects. Reclamation of the existing 300 acres of disturbed areas under the No Action alternative would decrease the potential for soil erosion. New surface-disturbing activities on the lease tracts would require review and approval of DOE and affected agencies, such as the Colorado Division of Wildlife (CDOW), U.S. Fish and Wildlife Service (USFWS), the State Historic Preservation Officer (SHPO), BLM, and the Colorado Division of Reclamation, Mining, and Safety.

Vegetation

Mining operations under the Expanded Program and Existing Program alternatives would disturb no more than an additional 450 acres and 110 acres, respectively, of land containing various amounts of upland vegetation and cryptobiotic soils. All impacts would be to small (5 to 10 acres) isolated acreages. This area of disturbance represents less than 2 percent of the total acreage in DOE's lease program. The remainder would be undisturbed by mining activities. The degree of impact would depend on the areas disturbed. Beneficial impacts may result from successful reclamation of previously degraded or species-poor areas. Negative impacts may

occur in previously diverse, healthy areas or in areas containing sensitive species, although these impacts would be offset by successful reclamation. All disturbed areas would be reclaimed with the concurrence of BLM before being restored to the public domain. After successful reclamation, as many as 300 additional acres could become available for grazing. Weed invasion would be expected to increase in disturbed areas and in areas where vehicle traffic would facilitate the spread of weed seed, particularly before reclamation is successful; however, DOE has a proactive noxious weeds control program.

Wildlife

Of the three alternatives, the Expanded Program alternative would have the most effect on wildlife that inhabits the lease tracts, as up to 450 additional acres of land would be disturbed. The Existing Program alternative would result in less effect (up to 110 additional acres). In disturbed areas, short-term habitat would be lost as a result of vegetation removal, surface disturbance, and blasting on 5 to 10 acres per lease. The remaining lands, several thousand acres, would remain undisturbed, although mining activities (e.g., noise, light, traffic, road kill, disruption of migration routes) would be expected to impact wildlife. Reopening of abandoned mine entrances and other structures could potentially result in disturbance to populations of sensitive species of bats and reptiles but would be conducted in a manner, as directed by DOE, in consultation with BLM, USFWS, and CDOW, that would avoid or minimize such impacts.

Under the No Action alternative, most area wildlife species would benefit over the long and short terms because cessation of operations would reduce or eliminate noise, traffic, and human activity from the lease tracts. Under all three alternatives, permanent mine closures could destroy potential bat habitats; however, the fabrication and installation of bat gates and grates in mine openings could greatly increase the availability of such habitats.

Cultural Resources

Under the Expanded Program alternative, approximately 22 cultural resource sites could be expected to occur within areas of new disturbance. Under the Existing Program alternative, approximately five to six sites could occur within areas of new disturbance. DOE would consult with tribal representatives to determine if any of the inventoried cultural sites were traditional cultural properties. Impacts to historic or cultural resources would be avoided or minimized in consultation with the SHPO, or tribal historic preservation officer as appropriate, to ensure that impacts would not be significant. The No Action alternative would benefit cultural resources, as cultural sites would not be disturbed.

Human Health

Risk estimates of latent cancer fatalities were calculated for the Expanded Program and Existing Program alternatives for a member of the public living near an underground uranium mine, a member of the public living near an open pit uranium mine, and workers receiving an occupational dose. Risk under the No Action alternative was calculated for a member of the public visiting a lease tract and camping for 14 days on a mine-waste-rock pile. For all risk scenarios, estimated latent cancer fatalities were less than 1 for members of the public. For workers at the lease tracts, estimates of latent cancer fatalities were less than 1 for the Existing Program and No Action alternatives. Under the Expanded Program alternative, the risk estimate

is 1 latent cancer fatality for workers, based on 570 workers each receiving an annual radiation dose of 350 millirems during a 10-year period.

This final PEA evaluates the impacts of the proposed alternatives on the environmental resources that currently exist. If any future decisions concerning the lease tracts affect additional environmental resources, DOE would prepare a more detailed NEPA analysis.

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1.0 Introduction

The U.S. Department of Energy Office of Legacy Management (DOE-LM) is evaluating the Uranium Leasing Program (ULP) to determine its management goals and objectives for the next 10 years for DOE's withdrawn lands and government-owned patented claims (referred to as DOE-managed lands) for the exploration and production of uranium and vanadium ores.

This final Programmatic Environmental Assessment (PEA) was prepared to support DOE-LM's decision making for the future of the ULP, under the regulations and guidelines for compliance with the National Environmental Policy Act (NEPA) of 1969 (Title 42 *United States Code* [U.S.C.] Section 4321 et seq.), the Council on Environmental Quality (CEQ) regulations for implementing NEPA (Title 40 *Code of Federal Regulations* [CFR] Parts 1500 through 1508 [40 CFR 1500−1508]), and DOE's implementing procedures for NEPA compliance (10 CFR 1021). DOE-LM distributed a draft PEA to interested members of the public; federal, state, and local agencies; and potentially affected tribes for review and comment and has considered all comments received on the draft prior to issuing this final PEA.

DOE is required by the National Historic Preservation Act (Title 16 U.S.C. Section 470) and Executive Orders 13007 (*Indian Sacred Sites*) and 13175 (*Consultation and Coordination with Indian Tribal Governments*) to consult with Native American tribes concerning potential effects of federal actions on traditional cultural properties (TCPs) and sacred sites. In February 2006, DOE contacted federally recognized Native American tribes that resided in or had cultural ties to ULP lands to inform them of DOE's proposed alternatives. Those tribes included the Southern Ute Tribe, Ute Mountain Ute Tribe (including the White Mesa Utes), Uintah-Ouray Ute Tribe, Hopi Tribe, and Navajo Nation. Results of these consultations are summarized in the cultural resources section (Section 4.11.3, "Traditional Cultural Properties") of this final PEA.

This PEA (as defined in DOE and CEQ regulations at 10 CFR 1021.330 and 40 CFR 1502.4[b]) supports DOE-LM's decision making on whether or not to continue the ULP and provide a level of detail commensurate with that process. It does not attempt to assess the site-specific impacts that might occur on individual lease tracts of the DOE-managed lands. As has been the practice in the past, all leaseholders would be required to submit site-specific proposed plans of operation, in the form of exploration plans and/or mining plans, to DOE for review prior to initiating any surface-disturbing activities. Upon receipt of such a plan, DOE-LM would review the plan in accordance with DOE's implementing NEPA regulations and DOE's NEPA procedures, existing environmental regulations, the lease agreement, and standard industry practices. This review process includes an on-site examination of the leaseholder's proposed activity. On the basis of this review, DOE would determine if the plan should be approved or disapproved.

This final PEA evaluates the following alternatives:

- Expanded Program alternative (DOE's preferred alternative)—continue leasing the 13 existing active lease tracts and offer leases on up to 25 more lease tracts to the domestic uranium industry.
- Existing Program alternative—continue leasing the 13 existing active lease tracts.

- No Action alternative—allow existing leases to expire, reclaim all sites, and continue to manage the lands indefinitely without leasing or return land management responsibilities to the Bureau of Land Management (BLM).

The remainder of this section provides background (Section 1.1) and history of the ULP (Section 1.2) and presents a summary of the results of the scoping process (Section 1.3) employed to solicit public and agency input to this final PEA. Section 2.0 provides a statement of the purpose and need for agency action. Section 3.0 presents the alternatives assessed in this final PEA. Section 4.0 presents characterizations of the affected environments on and adjacent to the lease tracts. Section 5.0 provides an assessment of the impacts that would result from implementing each of the alternatives and a comparison of impacts among the alternatives.

1.1 Background

The ULP began after World War II and became the responsibility of DOE in 1974. Section 1.2 presents a summary of the history of the program. DOE issued an EA in 1995 (DOE 1995a) that helped determine its management approach for the ULP through 2005. Thirteen leases awarded under that assessment are scheduled to expire later this year. As a result, and consistent with its regulations and guidelines, DOE must decide the future of this program over the next 10 years. This final PEA supports the decision-making process by providing DOE with an assessment of the environmental impacts of continuing or discontinuing the program.

1.2 History of the Uranium Leasing Program

In the post-World War II era, Congress directed DOE's predecessor agency, the U.S. Atomic Energy Commission (AEC), to develop a supply of domestic uranium that would adequately meet the nation's defense needs. That responsibility was met through the Ore Purchase Program, the Exploration Program, and the Mineral Leasing Program. Provisions of these programs gave AEC the authority to withdraw federal lands for the exploration and development of a viable domestic uranium source and were carried forward into the Atomic Energy Act of 1954.

In March 1948, BLM issued Public Land Order (PLO) 459 that stated "Subject to valid existing rights and existing withdrawals, the public lands and the minerals reserved to the United States in the patented lands in the following areas in Colorado are hereby withdrawn from all forms of appropriation under the public-land laws, including the mining laws but not the mineral-leasing laws, and reserved for the use of the United States Atomic Energy Commission." Subsequently, BLM issued a number of other PLOs (all similar to PLO 459) that increased and/or decreased the total acreages in withdrawn status. In addition, the U.S. Government, through the Unions Mines Development Corporation, acquired a substantial number of patented and unpatented mining claims, millsites, tunnel sites, and agricultural patents in February 1949, until the aggregate acreage managed by AEC totaled approximately 25,000 acres. During that time, AEC's management authority was quite broad.

The Mineral Leasing Program (circa 1949–1962) produced more than 1.2 million pounds of uranium and 6.8 million pounds of vanadium and generated $5.9 million in royalties to the federal government. When the program ended in 1962, AEC directed the leaseholders to close the mines, but little was done to reclaim the mine sites.

In 1974, AEC initiated a second leasing program under the Domestic Uranium Program regulations (10 CFR 760.1) that was markedly different from the previous leasing program. The new program, the Uranium Lease Management Program (ULMP), was designed to address the lack of production capacity of uranium- and vanadium-bearing ores for U.S. Government defense needs and emphasized the need for uranium in the expanding commercial nuclear energy market. Two main goals of the ULMP were to recover the resources that had been developed initially by AEC and to improve the prospects for continued mill operations, thereby encouraging further exploration and development on privately held land. In preparation for the ULMP, AEC prepared the *Environmental Statement, Leasing of AEC Controlled Uranium Bearing Lands* (AEC 1972) that presented assessments of the various environmental and economic aspects of the leasing program. That document recognized the multiple-use aspects of the public lands, including those managed by AEC, and deferred the authority for multiple-use activities to BLM. The document also acknowledged that the lands associated with the lease tracts accounted for less than 5 percent of the acreage within the Uravan Mineral Belt that would likely have exploration and mining activities. The bulk of those activities were expected to occur on public lands associated with new or existing mining claims (556,000 acres) and other private and state lands (21,000 acres). Accordingly, the level of activities expected to occur on other lands was identified as independent of AEC's leasing program.

AEC and its successor agencies, the U.S. Energy Research and Development Administration and DOE, administered the ULMP. Forty-four lease tracts (38 in Colorado, 5 in Utah, and 1 in New Mexico) were included in the program. In 1974, 43 lease tracts were offered for lease through a competitive bid process; 1 lease tract (located in Utah) was excluded from the leasing process in 1974 and was never leased. The 38 lease tracts in Colorado are located in an area known as the Uravan Mineral Belt, which includes a significant, if not dominant, portion of the known domestic uranium ore reserves.

During the ULMP, DOE controlled and administered the 43 lease tracts for the exploration and development of viable uranium and vanadium resources. As part of its administrative duties, DOE incorporated language into each lease agreement that required leaseholders to conduct operations in a manner that would minimize adverse environmental effects and would comply with state and federal statutes and regulations. DOE was responsible for monitoring lease tract activities and enforcing the lease agreements. Lease language required the leaseholders, at their expense, to comply with all applicable statutes and regulations. Noncompliance could result in lease termination. To ensure that lease sites were adequately reclaimed, DOE required the leaseholders to secure a reclamation performance bond for each lease tract, payable to DOE upon default. These bonds were adjusted periodically to reflect the actual conditions present on each lease tract.

During the ULMP, DOE and BLM acknowledged that each agency had defined jurisdictional authority over the various activities that could be conducted on the lease tracts. DOE maintained jurisdiction and authority over all activities on withdrawn lands associated with uranium and vanadium mining, including exploration, development, extraction (mining), and transportation. BLM maintained jurisdiction and authority over all other surface uses. This acknowledgment of the agencies' jurisdiction continues today.

In 1984, lease agreements were renewed (for a second 10-year term) for 33 of the original 43 lease tracts. The renewed lease agreements were identical to the original agreements signed in 1974 except for a separate renewal clause and amendments that modified the methods for calculating royalties. The leaseholders of the other 10 lease tracts completed the full reclamation of their respective operations.

Between 1984 and 1994, three additional lease agreements were relinquished to or terminated by DOE, and the leaseholders of these three lease tracts completed the full reclamation of their respective sites. Between 1974 and 1994, the ULMP leaseholders produced approximately 6.5 million pounds of uranium and 33.4 million pounds of vanadium. That production generated $53 million in royalties to the federal government.

By comparison, domestic annual uranium production peaked in 1980 at 43.7 million pounds, of which production from the DOE lease tracts (at 1.1 million pounds) represented about 2.5 percent of the total.

In 1994, the remaining 30 leases were allowed to expire, and DOE prepared a programmatic EA to determine if the leasing program should continue. During the EA process, the former leaseholders were allowed to continue maintenance, security, and reclamation activities at the lease tracts to ensure that the mines and associated facilities did not incur damage. Eight of the 30 leaseholders notified DOE that they did not want to continue with the program and initiated final reclamation activities at their sites. Once these lease tracts were fully reclaimed, they were relinquished to DOE. Accordingly, the programmatic EA focused on the ultimate disposition of only 22 lease tracts. DOE's preferred alternative in the EA was the continued leasing of these 22 lease tracts for an additional 10-year period. The *Final Environmental Assessment for the Uranium Lease Management Program* (DOE 1995a) was approved in July 1995, and DOE issued the *Finding of No Significant Impact, Uranium Lease Management Program* (DOE 1995b) on August 22, 1995. The 21 reclaimed lease tracts were excluded indefinitely from further leasing activities.

The single lease tract located in New Mexico was restored to the public domain by BLM in November 1994. The five lease tracts located in Utah were restored to the public domain by BLM in July 1999.

Subsequent to the FONSI, DOE prepared new lease agreements and entered into negotiations with the 22 previous leaseholders. Seven of the 22 leaseholders immediately notified DOE that they did not want to continue with the program and began final reclamation activities at their lease tracts. Once reclamation was completed, these seven leaseholders relinquished their lease tracts to DOE. Following negotiations, new lease agreements were executed for 12 lease tracts (effective March 20, 1996) and 3 additional lease tracts (effective January 27, 1997). This current leasing program is identified as the DOE ULP. In October 2000, the leaseholders of two lease tracts requested relinquishment of their respective tracts and initiated final reclamation activities. Once these sites were fully reclaimed, DOE approved the relinquishment.

In October 1994, DOE initiated a significant mine-site reconnaissance and reclamation project on the lease tracts. Each lease tract was thoroughly inspected to identify all the abandoned mine sites that resulted from pre-1974 leasing activities. Subsequent to this identification process, all the mining-related features associated with each site were quantified and assessed for their

historic importance. In 1995, in the absence of specific guidance pursuant to the reclamation of abandoned uranium mine sites, DOE initiated discussions with BLM officials (state and local) that culminated in the establishment of a guidance document, *Uranium Closure/Reclamation Guidelines (BLM 1995)* for such sites. DOE's objective in establishing this guidance document was to ensure that DOE's lease tracts were reclaimed in a manner that was acceptable to BLM so that the lands could be restored to the public domain under BLM's jurisdictional authority. Subsequently, DOE's "legacy" mine sites were prioritized and systematically reclaimed. DOE consistently applied the aforementioned guidance document to its reclamation activities; in many cases, DOE exceeded the objectives that were used to establish those specific guidelines. Reclamation at the final legacy site was completed in May 2001. DOE reclaimed a total of 161 separate mine sites on 22 lease tracts at a total cost of $1.25 million.

Currently, 13 lease tracts are still active and 25 lease tracts are inactive; all are located in southwestern Colorado (see Table 1–1, Figure 1–1, and Plate 1). Ore production on the active lease tracts resumed in May 2003 and continued into early November 2005, when production operations were suspended at the four lease tracts with active mining operations. During that time frame, those four operations produced approximately 65,500 tons of ore and generated $4.0 million in royalties to the government. Similar mining operations were being developed on three other lease tracts and, pending the resumption of operations, could be in production within 6 months. If such levels of production continue into the foreseeable future, and the market prices for uranium and vanadium continue at or near current levels, it is anticipated that royalties generated from the existing program could total $10 million annually.

To put the DOE ULP into perspective in today's world market, production from the DOE lease tracts may approach 2.0 million pounds of uranium annually in a world market that produces approximately 100 million pounds of uranium annually and consumes nearly twice that amount.

1.3 Scope of the Environmental Assessment

DOE has focused this PEA on its authority to manage the leasing of known uranium resources withdrawn by Congress under the Atomic Energy Act of 1954. Although the extracted ore would be processed at existing mills, converted, enriched, and fabricated into nuclear fuel, used in commercial reactors, possibly reprocessed, but ultimately generating various radioactive wastes requiring specialized disposal, this PEA does not include the impacts of those actions for two principal reasons. First, as part of our national energy strategy, all components of the nuclear fuel cycle are independent actions that have been and will continue to be addressed by action- and site-specific NEPA documentation by the federal agencies having jurisdictional authority. And second, uranium is now a worldwide mineral commodity that reacts to worldwide supply and demand economics. The quantity of ore available on DOE's lease tracts (currently estimated to be 13.5 million pounds) represents approximately 1.5 percent of the available domestic uranium reserves (purported to be nearly 900 million pounds), which in turn represent approximately 7 percent of the world's known uranium reserves. Uranium mining on DOE's lease tract has little to no effect on the nuclear fuel cycle because this small percentage would not dictate whether or not processing continues.

Table 1–1. Cross Reference Numbers for DOE Lease Tracts and Withdrawn Lands

Lease Tract Designation	Reference Number Used in Final PEA	Lease Tract Designation	Reference Number Used in Final PEA
C–JD–5	5	C–SR–16A	16A
C–JD–5A	5A	C–WM–17	17
C–JD–6	6	C–WM–17A	17A
C–JD–7	7	C–SM–18	18
C–JD–7A	7A	C–AM–19	19
C–JD–8	8	C–AM–19A	19A
C–JD–8A	8A	C–AM–20	20
C–JD–9	9	C–LP–21	21
C–SR–10	10	C–LP–22	22
C–SR–11	11	C–LP–22A	22A
C–SR–11A	11A	C–LP–23	23
C–SR–12	12	C–BL–23A	23A
C–SR–13	13	C–BL–23B	23B
C–SR–13A	13A	C–CM–24	24
C–SR–14	14	C–CM–25	25
C–SR–14A	14A	C–G–26	26
C–SR–15	15	C–G–26A	26A
C–SR–15A	15A	C–G–27	27
C–SR–16	16	C–G–27A	27A

C = Colorado; JD = Jo Dandy; SR = Slick Rock; WM = Wedding Bell Mountain; SM = Spring Creek Mesa; AM = Atkinson Mesa; LP = Long Park; BL = Bitter Creek/Long Park; CM = Club Mesa; G = Gateway.

1.3.1 Proposed Actions

This PEA addresses the potential environmental concerns related to a policy decision that DOE is considering for the ULP. The three alternatives being considered are the Expanded Program alternative, the Existing Program alternative, and the No Action alternative.

Under the Expanded Program alternative, which is DOE's preferred alternative, the existing leasing program would be expanded to include the leasing of all DOE-managed lands. Operations on the 13 active lease tracts would continue as they are presently authorized, and DOE could offer the 25 inactive lease tracts to the domestic uranium industry through a competitive bid process. Also, individual lease tracts could be expanded to include all withdrawn lands. The new lease agreements would require the leaseholders to comply with all applicable statutes and regulations and would allow the leaseholders to (1) conduct operations consistent with the exploration, development, and extraction (mining/production) of uranium and associated minerals; (2) transport ores from the lease tracts to ore-processing facilities; and (3) perform all activities required to satisfactorily reclaim the environmental disturbances on the lease tracts resulting from their operations.

Under the Existing Program alternative, the existing 13 leases would be extended, and future lease activities would be limited to operations that are presently authorized on those lease tracts and their subsequent reclamation. In addition, DOE would retain the 25 inactive lease tracts in their current status until all DOE-managed lands could be restored to the public domain with the concurrence of BLM and under BLM's administrative control.

Under the No Action alternative, the current leases would expire, and the existing lease operations would be reclaimed. Following reclamation, DOE could choose to continue (indefinitely) its management of the withdrawn lands without leasing, or all 38 lease tracts could be restored to the public domain with the concurrence of BLM and under BLM's administrative control, and DOE's leasing program would end.

The 38 lease tracts discussed in this final PEA are distributed over four geographical areas located within Mesa, Montrose, and San Miguel Counties of southwestern Colorado. They are referred to as the Gateway lease tracts, the Uravan lease tracts, the Paradox Valley lease tracts, and the Slick Rock lease tracts. A discussion of the geographical features of these lease tract areas is presented in Section 4.1, "Environmental Setting."

1.3.2 Scoping Comments

In accordance with DOE and the CEQ NEPA regulations (10 CFR 1021 and 40 CFR 1500−1508), the public and agencies were afforded 30 days (August 1−30, 2005) to comment on the scope of the issues that should be evaluated in this final PEA. DOE placed advertisements in nine local papers and in other newspapers and sent 70 press releases to federal, state, and local agencies, tribes, elected officials, and libraries. This notification made information available to the readership of potentially affected towns and members of the public near the proposed uranium lease tracts and along all reasonable transportation routes between the lease tracts and the existing ore-processing mill in Cañon City, Colorado, and the White Mesa Mill in Utah, between Blanding and White Mesa. In addition, DOE held two scoping meetings in Naturita, Colorado, and Monticello, Utah, which were attended by 16 people. DOE received comments consisting of phone messages, letters, and e-mails from 15 entities during the scoping period. Commentors spoke both in favor of continuing and expanding the lease program as well as against its continuation or expansion. This section presents an overview of the issues raised in the comments; Appendix A presents a detailed summary of the comments and DOE's responses to each issue raised during scoping.

Effects to Human Health

About a third of the comments indicated that effects to human health should be addressed in the EA. Health-related concerns included the following issues:

- An increase in traffic accidents that could result from an increase in truck traffic on the highways.
- Public exposure to ores being transported to processing facilities.
- Windblown radioparticulates from the mines.
- Radon emissions.

- Adequate health and safety standards to protect workers and the public from radioactive contamination.
- Increased demand on emergency services.

Effects to the Environment

About a third of the comments indicated that ecological and environmental effects should be addressed in the EA. These concerns included the following issues:

- The need for successful reclamation of the lease tracts at the end of operations.
- Visual impact of waste rock excavated from the mines.
- The need for storm water management.
- Control of noxious weeds that may proliferate on disturbed ground.
- The potential for adverse effects to the Dolores River Canyon where lease tracts are near the river.

Economic Effects

Several commentors asked about the effects of uranium mining and milling on the regional economy, especially in the counties where the mines are located. Some residents of the potentially affected areas have experienced past "boom-and-bust" cycles of the uranium industry and are wary of actions that could cause those conditions to return. The main concerns included the following issues:

- The number of jobs that would be created under the lease program.
- Job security and what the mining industry would give back to the communities.
- Effects on the tax base in affected areas.
- The costs to taxpayers for cleanup after operations at the lease tracts have finished.

Need for an Environmental Impact Statement

A few commentors felt that an EA was inadequate to address the full scope of the proposed action and that an environmental impact statement (EIS) should be prepared instead.

Public Participation

Some commentors had concerns that the public would not be given adequate opportunity to comment on the proposed action. Concerns included the following issues:

- The 30-day period provided for comments was not enough time.
- Information about DOE's proposed action and the public comments should be made available in public libraries.
- All potentially affected parties need to be notified of DOE's proposed action.

1.4 Comments on the Draft PEA

DOE distributed over 100 copies of the draft PEA to interested parties and agencies and provided a 45-day comment period from July 12 to August 25, 2006. DOE also advertised and held three public meetings during the comment period in Blanding, Utah, and Norwood and Montrose, Colorado. Approximately 100 comment submittals were received via e-mail, US post, fax, and phone. DOE reviewed all comments individually and compiled them into summary comments by grouping comments of similar content. The summary comments and DOE's responses are included in Appendix D of this final PEA. Commentors were both against continuation of the program and in support of the program. Comment topics and DOE's responses in Appendix D include:

- Preparation of an EIS instead of an EA
- Connected actions that should be considered
- Mine-site-specific impact analyses
- Indirect impacts resulting from the proposed action
- Cumulative impact analyses
- Range of alternatives that should be analyzed
- Cooperating Agencies
- Consequences of terrorism
- Tiering of future decisions
- Mitigation of impacts
- Public participation
- Scope of the analyses
- Ore truck traffic through populated areas
- Impacts to surface waters
- Impacts to sensitive transportation corridors
- Socioeconomic impacts
- Purpose and Need statement
- Economics
- Environmental Justice

While not all comments required changes in this final PEA in order to respond, DOE has: (1) revised the Purpose and Need statement and No Action alternative; (2) provided a more realistic estimate of ore production and resulting truck traffic based on historical experience; (3) added a section identifying stipulations that might be incorporated into future lease agreement; (4) provided a quantitative discussion of uranium toxicity in an aquatic environment; (5) added the location the Black Canyon of the Gunnison National Park and the Curecanti National Recreation Area to the text and figures; (6) incorporated other responses into this final PEA as appropriate; (7) consulted with Cooperating Agencies, tribes, and other agencies with relevant authority or interest in the program; and (8) finalized this PEA.

2.0 Purpose and Need for Action

In support of the Energy Policy Act of 2005 (Public Law 109-58), which emphasizes the reestablishment of nuclear power (Sections 601 through 657), DOE-LM must evaluate the ULP to determine whether to continue leasing some or all of DOE's withdrawn lands and government-owned patented claims (referred to as DOE-managed lands) for the exploration and production of uranium and vanadium ores for up to 10 more years. Current leases are scheduled to expire later this year.

The DOE-managed lands are limited to the 38 lease tracts encompassing 27,000 acres across southwestern Colorado as shown on Plate 1. DOE's proposed actions are strictly limited to the lands under its administrative control. DOE has no authority over mineral development activities on other public or private lands.

The Domestic Uranium Program regulation, codified at 10 CFR 760.1, gives DOE the flexibility to continue leasing these lands via a competitive bidding process to solicit the highest returns for the government. A key element in this determination is the assessment of environmental impacts attributable to lease tract operations and associated activities. Therefore, DOE-LM has prepared this final PEA to provide such information to decision makers as well as the public.

End of current text

3.0 Description of Alternatives

In the preparation of this final PEA, DOE considered various alternative actions that would support the stated purpose and need, as well as actions that could be initiated if leasing of the DOE-managed lands were terminated. This section presents an overview of the selection process and a description of the alternatives considered.

3.1 Elimination of Alternative Actions

The following alternative actions were considered but eliminated:

- Developing and maintaining uranium mines at other domestic geographic locations outside the Uravan Mineral Belt. This alternative was eliminated because DOE only controls the ore reserves of the 38 lease tracts referenced in this final PEA.
- Transferring the withdrawn lands and lease management responsibilities to BLM. This alternative was eliminated because DOE is the only government agency that has the legislative authority to ***lease*** lands for the development and production of uranium and vanadium ores and collect royalties based on that production. If, as described under the No Action alternative, DOE's lease tracts were transferred to BLM, they could be subjected to claims under applicable mining laws, which collect fees but do not allow lands to be leased. As a result, the return to the Federal Government would be considerably less.
- Identifying and withdrawing from public domain additional uranium-bearing lands. This alternative was eliminated because neither BLM nor DOE have the authority to withdraw additional lands without Congressional approval.

3.2 Expanded Program Alternative—Preferred Alternative

Under the Expanded Program alternative, DOE would continue the existing ULP and expand it as warranted. DOE would extend the 13 existing leases for an additional period of time, likely to be 10 years. DOE would then expand the program to include the competitive offering of up to 25 additional lease tracts to the domestic uranium industry (Tract 2 of lease tract 14 would not be offered for lease). This alternative is DOE's preferred alternative because it is consistent with the Energy Policy Act of 2005 that is supportive of new nuclear power generation. As shown in Table 3–1, DOE would consider expanding the individual lease tracts to encompass all DOE-managed lands (more than 27,000 acres that includes withdrawn lands and government-owned mining claims).

This alternative would allow leaseholders to explore for, develop, and extract uranium and vanadium ore reserves on as many as 38 lease tracts for a 10-year period. Mining activities authorized under this alternative would include conventional surface (small open-pit, defined herein as limited to a few acres) and underground mining operations and techniques similar to those previously conducted on the lease tracts. No new, large (defined herein as 10 acres or more) open-pit mining operations or in situ mining operations would be allowed without a detailed site-specific environmental analysis.

Table 3–1. Status of the Lease Tracts Under the Expanded, Existing, and No Action Alternatives

Lease Tract No.	Expanded Program		Existing Program		No Action	
	Existing Leases Extended	New Leases Offered	Existing Leases Extended	Lands Retained but not Leased	Existing Leases Expire, Lands Reclaimed and Restored to Public Domain	Lands Restored to Public Domain
					or Administered by DOE Without Leasing	
5	X		X		X	
5A		X		X		X
6	X		X		X	
7	X		X		X	
7A	X		X		X	
8	X		X		X	
8A		X		X		X
9	X		X		X	
10		X		X		X
11	X		X		X	
11A		X		X		X
12		X		X		X
13	X		X		X	
13A	X		X		X	
14		X[a]		X		X
14A		X		X		X
15	X		X		X	
15A		X		X		X
16		X		X		X
16A		X		X		X
17		X		X		X
17A		X		X		X
18	X		X		X	
19		X		X		X
19A		X		X		X
20		X		X		X
21	X		X		X	
22		X		X		X
22A		X		X		X
23		X		X		X
23A		X		X		X
23B		X		X		X
24		X		X		X
25	X		X		X	
26		X		X		X
26A		X		X		X
27		X		X		X
27A		X		X		X

[a]Tract 2 of lease tract 14 will not be leased.

Near the end of 10 years, DOE would reevaluate the program to determine if leasing activities should continue. Under this alternative, it is assumed that all 38 lease tracts could be brought into production (not necessarily operating simultaneously) and that five of the 38 lease tracts could have two separate and distinct mining operations. Mining operations are grouped by size into three categories (small, large, and very large). Small mining operations are typical of a small-business, single-shift operation that disturbs less then 10 acres of land, employs a minimal (5- to 8-person) workforce, operates a single fleet of mining equipment, and produces less than 1,000 tons of ore per month. Large mining operations are generally two-shift operations that disturb 15 acres of land, employ a 10- to 20-person workforce, operate two or three fleets of mining equipment, and produce between 2,000 and 3,000 tons of ore per month. Very large mining operations are defined as two- or three-shift operations that disturb more than 25 acres of land, employ a 25-person or greater workforce, operate five or more fleets of mining equipment, and consistently produce more than 5,000 tons of ore per month. Under this alternative, it is assumed that there could be 20 small mining operations (each operation employing six people and disturbing 10 acres), 20 large mining operations (each operation employing 18 people and disturbing 15 acres), and 3 very large mining operations, including the lease tract 7 open-pit mine (each operation employing 30 people and disturbing 25 acres generally, plus the 200-acre open-pit mine). Accordingly, under this alternative, the leaseholders could be expected to disturb a total of 750 acres and employ up to 570 people for an extended period of time (up to 10 years) before ramping down to a reclamation workforce of approximately 60 people for an additional 2-year period.

3.3 Existing Program Alternative

Under the Existing Program alternative, DOE would continue the ULP as it currently exists. As shown in Table 3–1, DOE would extend the existing 13 leases for an additional period of time, likely to be 10 years. DOE would retain the other 25 lease tracts in inactive status until the program ended, at which time all lands would be restored to the public domain with the concurrence of BLM and under BLM's administrative control. Retaining leases in inactive status would make them unavailable for leasing activities or the filing of mining claims. This alternative would allow the current leaseholders to explore for, develop, and extract uranium and vanadium ore reserves on their respective lease tracts for a 10-year period. Mining activities authorized under this alternative would include conventional surface (small open-pit) and underground mining operations and techniques similar to those previously conducted on the lease tracts. No new, large, open-pit mining operations or in situ mining operations would be allowed without a detailed site-specific environmental analysis. Near the end of 10 years, DOE would reevaluate the program to determine if leasing activities should continue. Under this alternative, it is assumed that there would be eight small mining operations (each operation employing six people and disturbing 15 acres), six large mining operations (each operation employing 18 people and disturbing 15 acres), and one very large mining operation (the lease tract 7 open-pit mine employing 30 people and disturbing 200 acres). Accordingly, under this alternative, the leaseholders would be expected to disturb a total of 410 acres and employ a workforce of approximately 186 people for an extended period of time (up to 10 years), before ramping down to a reclamation workforce of approximately 60 people for an additional 2-year period.

3.4 No Action Alternative

As shown in Table 3–1, under the No Action alternative, DOE would allow the 13 existing leases to expire in 2007 as currently scheduled. The leaseholders would be required to reclaim their respective operations. Once final reclamation activities were completed, DOE could choose to continue (indefinitely) its management of the withdrawn lands without leasing or, all lands could be restored to the public domain with the concurrence of BLM and under BLM's administrative control and DOE's leasing program would end. Under this alternative, the leaseholders would be expected to employ a reclamation workforce of approximately 60 people for a 2-year period.

3.5 Summary of Potential Activities

Under the Expanded Program and Existing Program alternatives, DOE would enter into long-term Memorandums of Understanding with BLM and the Colorado Division of Reclamation, Mining, and Safety (CDRMS) (formerly the Division of Minerals and Geology), respectively, outlining each agencies' roles and responsibilities associated with the ULP. Historically, activities conducted on the lease tracts occurred in three phases: preoperational (exploration), operational (mining), and postoperational (reclamation). Since 1974, preoperational activities have occurred on 37 of the 38 lease tracts, including all 13 active lease tracts. Operational activities have occurred on 25 of the 38 lease tracts, including all 13 active lease tracts. Of the more than 7,000 acres that comprise the 13 active lease tracts, approximately 300 acres are currently disturbed or environmentally affected by lease operations. Two-thirds of this disturbed area (approximately 200 acres) is associated with the open-pit mining operations on lease tract 7. Table 3–2 presents summary information for the 38 lease tracts and the current operations being conducted on the 13 active lease tracts.

To resume previously approved activities at the existing mine sites (those not previously reclaimed) on the 13 active lease tracts, leaseholders would be required to notify DOE of their proposed activities. Upon such notification, DOE would review the previously approved plan and the respective approval letter, with reference to existing federal and state requirements and current environmental regulations, to determine if additional stipulations would be required. DOE would notify BLM of the individual leaseholder's proposed activities. An on-site examination would be conducted to assess site-specific conditions and environmental concerns. During the on-site examination, all reviewing parties would be expected to voice any site-specific issues or concerns that arise from the leaseholder's proposed activities. Any concerns that could be addressed by stipulations to the plans would be identified. On the basis of this review, DOE would authorize the leaseholder to resume operations, with or without additional stipulations as warranted. DOE's approval would be required before any surface-disturbing activities could be conducted. Additional site-specific environmental reviews of a proposed activity may be warranted; those reviews would be required prior to DOE's approval. Typically, unless the leaseholder proposes to enlarge the mine site beyond what was previously approved, no new surveys (for cultural resources and threatened or endangered species) would be required.

Table 3–2. Summary of Lease Tract Information

Characteristic	Lease Tract 5	Lease Tract 5A	Lease Tract 6	Lease Tract 7	Lease Tract 7A	Lease Tract 8	Lease Tract 8A	Lease Tract 9	Lease Tract 10	Lease Tract 11	Lease Tract 11A	Lease Tract 12	Lease Tract 13	Lease Tract 13A	Lease Tract 14	Lease Tract 14A	Lease Tract 15	Lease Tract 15A	Lease Tract 16	Lease Tract 16A
Location of Lease Tracts	Secs. 21, 22; T46N, R17W, NMPM	Sec. 22; T46N, R17W, NMPM	Secs. 21, 22; T46N, R17W, NMPM	Secs. 16, 21, 22; T46N, R17W, NMPM	Secs. 16, 20, 21, 22; T46N, R17W, NMPM	Secs. 17, 18, 19, 20; T46N, R17W, NMPM	Sec. 17; T46N, R17W, NMPM	Secs. 19, 29, 30; T46N, R17W, NMPM	Secs. 28, 29; T43N, R19W, NMPM	Secs. 8, 17, 18; T43N, R19W, NMPM	Sec. 19; T43N, R19W, and Secs. 23, 24, 25, 26; T43N, R20W, NMPM	Sec. 32; T43N, R18W, NMPM	Secs. 29, 30, 31, 32, 33; T44N, R18W, NMPM	Secs. 19, 30; T44N, R18W, and Secs. 24, 25; T44N, R19W, NMPM	Secs. 4, 5, 6; T43N, R18W, NMPM	Sec. 1; T43N, R19W, and Sec. 36; T44N, R19W, NMPM	Secs. 23, 26; T44N, R19W, NMPM	Secs. 22, 27; T44N, R19W, NMPM	Secs. 10, 15, 16; T43N, R19W, NMPM	Secs. 11, 14; T43N, R19W, NMPM
County	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel	San Miguel
Lease Tract Status	Active	Inactive	Active	Active	Active	Active	Inactive	Active	Inactive	Active	Inactive	Inactive	Active	Active	Inactive	Inactive	Active	Inactive	Inactive	Inactive
Leaseholder (if applicable)	Gold Eagle Mining, Inc.	N/A	Cotter Corporation	Cotter Corporation	Cotter Corporation	Cotter Corporation	N/A	Cotter Corporation	N/A	Cotter Corporation	N/A	N/A	Gold Eagle Mining, Inc.	Cotter Corporation	N/A	N/A	Gold Eagle Mining, Inc.	N/A		
Lease Tract Acreage	81	24	325	320	120	813	78	897	528	1258	1304	399	993	393	1099	21	350	171	1567	670
Primary Location of Lease Activities	NE1/4, Sec. 21	Widely spaced drilling	Mine's primary surface facility not on tract (NE 1/4, Sec. 22)	SE1/2, Sec. 16	Widely spaced drilling	Mine's primary surface facility not on tract (NE 1/4, Sec. 20)	N/A	S 1/2, Sec. 30	NW 1/4, Sec. 28 and NE 1/4, Sec. 29	NE 1/4, Sec. 18	Widely spaced drilling	NE 1/4, Sec. 32	SE 1/4, Sec. 30	NE 1/4, Sec. 25	Widely spaced drilling	Widely spaced drilling	SE 1/4, Sec. 23	SE 1/4, Sec. 22	Small operations scattered all within Sec. 16	N 1/2, Sec. 14
Existing Disturbances (acres)	5	0	10	200	0	10	0	10	0	11	0	0	15	5	0	0	0	0	0	0
Historical Lease Activities (type)	Exploration and Mining	Exploration	Exploration and Mining	Exploration and Mining	Exploration	Exploration and Mining	N/A	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration and Mining	Exploration and Mining
Site Features																				
Legacy Mine Sites (pre-1970)	Reclaimed	No	No	Reclaimed	No	No	No	No	Reclaimed	Reclaimed	Reclaimed	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed
Previous Mine Sites (post-1974)	Yes	No	Yes	Yes	No	Yes	No	Yes	Reclaimed	Yes	No	Reclaimed	Yes	Reclaimed	No	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed
Buildings/Structures	Yes	No	Yes	Yes	No	Yes	No	Yes	No	Yes	No	No	Yes	No	No	No	No	No	No	No
Mine Portals (shafts/adits/declines) and/or Open Pit Mines	Shaft	No	Adit	Large Open Pit Mine and Decline	No	Adit	No	Decline	Reclaimed	Decline	No	Reclaimed	3 Adits and 1 Decline	Reclaimed	No	No	Adit	Reclaimed	Reclaimed	Reclaimed
Ventilation Shafts	3	No	2	1	No	No	No	3	Reclaimed	1	No	Reclaimed	1	Reclaimed	No	No	No	No	No	No
Mine-Waste-Rock Dumps	Yes	No	Yes	Yes	No	Yes	No	Yes	Reclaimed	Yes	No	Reclaimed	Yes	Reclaimed	No	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed
Exploration Drill Roads	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exploration Drill Holes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Petroleum Storage Tanks	Yes	No	Yes	Yes	No	Yes	No	Yes	No	Yes	No	No	No	No	No	No	No	No	No	No
Mine-Water Treatment Systems	No	No	No	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No	No
Comments	Mine on standby status		Mine is in active production	Underground mine is being developed	Tract used to support lease tract 7 open pit mine	Mine is in active production		Mine is in active production		Mine is being developed			Mines are on standby status				Mine on standby status			

Adit—A nearly horizontal passageway leading into a mine.
Incline/Decline—A mine passageway that slopes upward or downward at an angle from the horizontal.
Shaft—A near-vertical passageway leading from ground surface into a mine.

Table 3−2 (continued). Summary of Lease Tract Information

Characteristic	Lease Tract 17	Lease Tract 17A	Lease Tract 18	Lease Tract 19	Lease Tract 19A	Lease Tract 20	Lease Tract 21	Lease Tract 22	Lease Tract 22A	Lease Tract 23	Lease Tract 23A	Lease Tract 23B	Lease Tract 24	Lease Tract 25	Lease Tract 26	Lease Tract 26A	Lease Tract 27	Lease Tract 27A
Location of Lease Tracts	Sec. 14; T45N, R18W, NMPM	Sec. 15; T45N, R18W, NMPM	Secs. 21, 22, 26, 27, 28; T48N, R17W, NMPM	Secs. 13, 24; T48N, R18W, NMPM	Secs. 18, 19; T48N, R17W, NMPM	Sec. 20; T48N, R17W, NMPM	Secs. 22, 27; T47N, R17W, NMPM	Secs. 21, 28; T47N, R17W, NMPM	Secs. 16, 17, 20, 21; T47N, R17W, NMPM	Sec. 1; T46N, R17W, and Sec. 36; T47N, R17W, NMPM	Sec. 35; T47N, R17W, NMPM	Secs. 1, 12; T46N, R17W, NMPM	Sec. 32; T48N, R17W, NMPM	Secs. 5, 6; T47N, R17W, NMPM	Secs. 2, 3, 9, 10, 11, 14; T50N, R18W, NMPM	Secs. 3, 4, 9; T50N, R18W, NMPM	Secs. 7, 18; T50N, R17W, and Secs. 12, 13; T50N, R18W, NMPM	Secs. 17, 18; T50N, R17W, NMPM
County	Montrose/ San Miguel	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Montrose	Mesa	Mesa	Mesa	Mesa
Lease Tract Status	Inactive	Inactive	Active	Inactive	Inactive	Inactive	Active	Inactive	Inactive	Inactive	Inactive	Inactive	Inactive	Active	Inactive	Inactive	Inactive	Inactive
Leaseholder (if applicable)			Cotter Corporation	N/A	N/A	N/A	Cotter Corporation	N/A	N/A	N/A	N/A	N/A	N/A	Cotter Corporation	N/A	N/A	N/A	N/A
Lease Tract Acreage	283	21	916	702	1145	579	443	168	226	339	47	116	201	573	1682	937	676	524
Primary Location of Lease Activities	Widely spaced drilling	Widely spaced drilling	Mine's primary surface facility not on tract (SW 1/4, Sec 27)	SE 1/4, Sec. 24	Widely spaced drilling	Widely spaced drilling	SW 1/4, Sec. 27	SW 1/4, Sec. 21	NW 1/4, Sec. 21	NE 1/4, Sec. 1	Widely spaced drilling	NE 1/4, Sec. 12	Widely spaced drilling	Mine's primary surface facility not on tract (NW 1/4, Sec. 4)	SW 1/4, Sec. 11 and NW 1/4, Sec. 14	NE 1/4, Sec. 9	SE 1/4, Sec. 12 and NE 1/4, Sec. 13	Widely spaced drilling
Existing Disturbances (acres)	0	0	15	0	0	0	14	0	0	0	0	0	0	5	0	0	0	0
Historical Lease Activities (type)	Exploration	Exploration	Exploration and mining	Exploration and mining	Exploration	Exploration	Exploration and mining	Exploration and mining	Exploration and mining	Exploration and mining	Exploration	Exploration and mining	Exploration	Exploration and mining	Exploration and mining	Exploration and mining	Exploration and mining	Exploration and mining
Site Features																		
Legacy Mine Sites (pre-1970)	No	No	No	Reclaimed	No	No	Yes	No	Reclaimed	No	No	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed
Previous Mine Sites (post-1974)	No	No	Yes	Reclaimed	No	No	Yes	Reclaimed	Reclaimed	Reclaimed	No	Reclaimed	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed	No
Buildings/Structures	No	No	Yes	Head frame	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No
Mine Portals (shafts/adits/ declines) and/or Open Pit Mines	No	No	Adit	Reclaimed	No	No	Decline	Reclaimed	Reclaimed	Reclaimed	No	Reclaimed	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed
Ventilation Shafts	No	No	1	Reclaimed	No	No	Yes	Reclaimed	Reclaimed	No	No	No	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed	No
Mine-Waste-Rock Dumps	No	No	Yes	Reclaimed	No	No	4	Reclaimed	Reclaimed	Reclaimed	No	Reclaimed	No	Reclaimed	Reclaimed	Reclaimed	Reclaimed	Reclaimed
Exploration Drill Roads	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Exploration Drill Holes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Petroleum Storage Tanks	No	No	Yes	No	No	No	Yes	No	No	No	No	No	No	No	No	No	No	No
Mine-Water Treatment Systems	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Comments			Mine is in active production				Mine is being developed											

Adit—A nearly horizontal passageway leading into a mine.
Incline/Decline—A mine passageway that slopes upward or downward at an angle from the horizontal.
Shaft—A near-vertical passageway leading from ground surface into a mine.

To reopen an existing mine that has been reclaimed, leaseholders would be required to submit a mining plan to DOE outlining their proposed activities. Upon receipt of such a plan, DOE would initiate a two-tiered review process of the plan (see Figure 3–1). Under its NEPA procedures, DOE would determine (1) if the proposed activities outlined in the plan would be consistent with the activities outlined and discussed in this final PEA (no further NEPA review would be required) and (2) if additional NEPA documentation is required and, if so, define those requirements. Concurrently, DOE would initiate a technical review of the plan in accordance with applicable regulations, the lease agreement, and standard industry practices to ensure compliance with all administrative and environmental requirements. A copy of the plan would be forwarded to the applicable BLM Field Office for review. An on-site examination would then be conducted to assess site-specific conditions and environmental concerns. During the on-site examination, all reviewing parties would be expected to voice any site-specific issues or concerns that arise from the leaseholder's proposed activities. Any concerns that could be addressed by stipulations to the plan would be identified. On the basis of this two-tiered review, DOE would either approve the plan (as submitted or with stipulations) or direct the leaseholder to revise the plan and resubmit it.

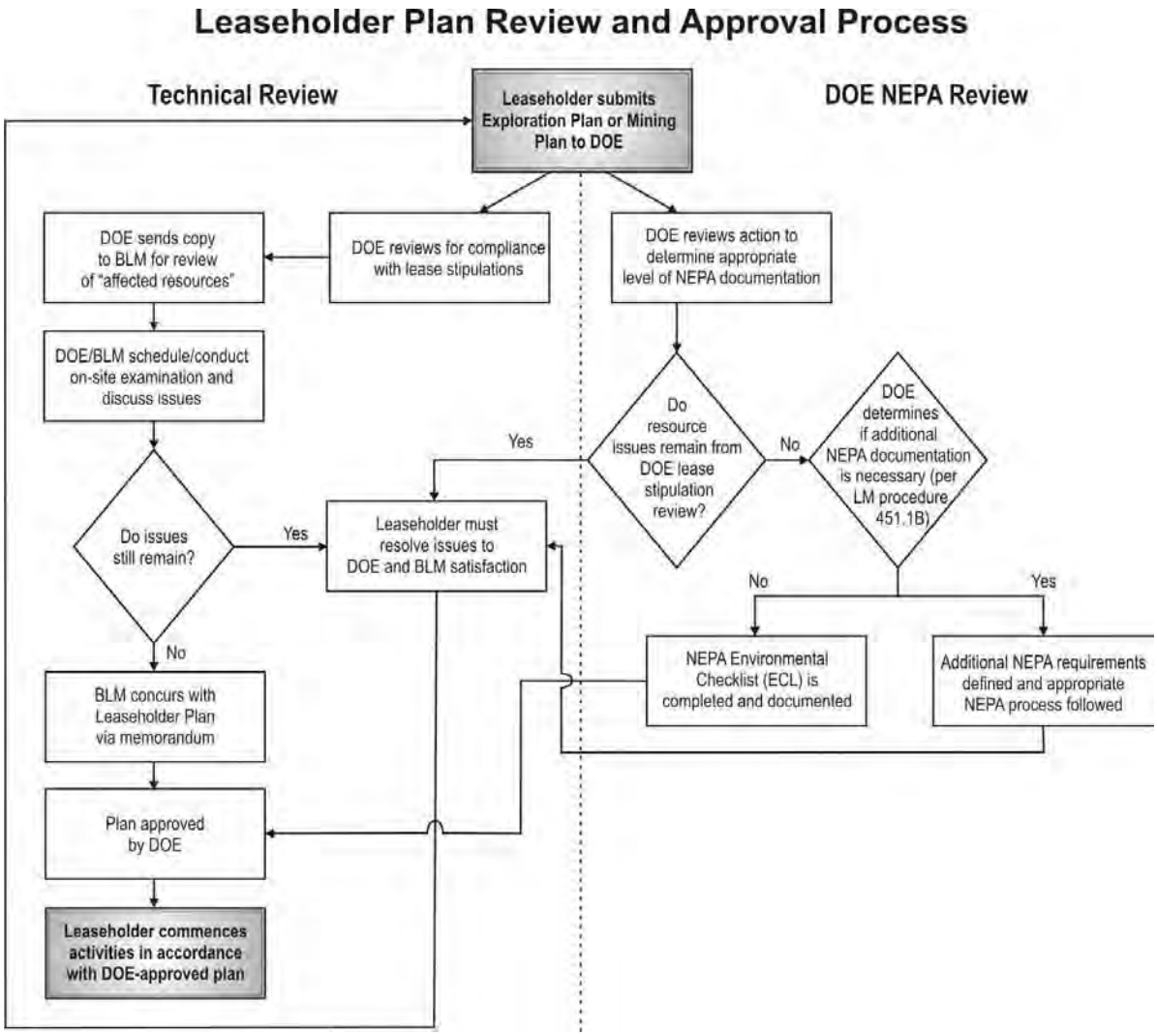

Figure 3–1. Leaseholder Plan Review and Approval Process

DOE's approval would be required before any surface-disturbing activities could be conducted. Additional site-specific environmental reviews of a proposed activity might be warranted; those reviews would be required prior to DOE's approval.

For all new activities, leaseholders would be required to submit plans (mining and/or exploration) to DOE outlining their proposed activities. Upon receipt of the plan, DOE would initiate a two-tiered review process as described above. Under its NEPA procedures DOE would determine (1) if the proposed activities outlined in the plan would be consistent with the activities outlined and discussed in this final PEA (no further NEPA review would be required) and (2) if additional NEPA documentation is required and, if so, define those requirements. Concurrently, DOE would initiate a technical review of the plan in accordance with applicable regulations, the lease agreement, and standard industry practices to ensure compliance with all administrative and environmental requirements. A copy of the plan would be forwarded to the applicable BLM Field Office for review. An on-site examination would then be conducted to assess site-specific conditions and environmental concerns. During the on-site examination, all reviewing parties would be expected to voice any site-specific issues or concerns that arise from the leaseholder's proposed activities. Any concerns that could be addressed by stipulations to the plan would be identified. On the basis of this two-tiered review, DOE would either approve the plan (as submitted or with stipulations) or direct the leaseholder to revise the plan and resubmit it. DOE's approval would be required before any surface-disturbing activities could be conducted. Additional site-specific environmental reviews of a proposed activity might be warranted; those reviews would be required prior to DOE's approval.

New surface disturbances would also require review or approval by agencies outside DOE. The following are examples of situations that would require outside-agency review or approval. DOE's approval of the proposed plan would be contingent upon the leaseholder's compliance with the requirements of these other reviewing agencies.

- For all proposed activities where new surface disturbance would occur, the leaseholder would be required to obtain an appropriate permit from the CDRMS in accordance with the *Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board* (CDNR 1995). The nature of the permit would depend on the proposed activities. During this permit process, local governments and agencies would have the opportunity to review the proposed activities and implement their requirements. Additionally, the general public would have the opportunity to review and comment on the proposed activities and the associated permit.
- For all proposed surface disturbances, the leaseholder would be required to consult with the Colorado Division of Wildlife (CDOW), U.S. Fish and Wildlife Service (USFWS), and/or BLM, as appropriate, to determine whether threatened or endangered, sensitive, or special status plant and wildlife species could occur in the area, or whether the agencies might have other plant or wildlife concerns in the area. The leaseholder might be required to provide surveys or additional documentation regarding the vegetation or wildlife of concern. DOE would not approve the proposed plan until all agency concerns were resolved.
- For all new proposed surface disturbances, the leaseholder would be required to perform a cultural and historic resource inventory of the area to be disturbed. Such inventories would be documented in accordance with the State Historic Preservation Office's (SHPO's) Class III inventory standards and provided to DOE and BLM. If cultural or historic

resources were identified in the area, BLM, DOE, and SHPO would consult to determine if the resource was eligible for inclusion in the National Register of Historic Places. As the surface managing agency, BLM would be the lead agency for this consultation (BLM 1980). If cultural resources were identified, DOE would consult with tribal entities, as appropriate, to determine if potential traditional cultural properties (TCPs) could be affected. If the leaseholder's proposed activities were expected to adversely affect an eligible cultural or historic resource, DOE, BLM, SHPO, and other affected parties would negotiate an action plan that the leaseholder would be required to implement. Surface disturbance would not be allowed until the action plan was agreed upon and implemented.

- For proposed activities on lease tracts 17 and 17A, DOE would contact BLM to review the proposed activities to ensure that the Dolores River Canyon Wilderness Study Area would not be adversely affected.
- For disturbances proposed in potential floodplain or wetland areas, the leaseholder would be required to determine, through consultation with the U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency (EPA), USFWS, and the appropriate state agency, whether a jurisdictional floodplain or wetland was present. The leaseholder might need to address various issues in an appropriate Floodplain or Wetland Assessment. DOE would review the proposed activity in accordance with 10 CFR 1022 and would approve or disapprove surface disturbance in consultation with USACE, EPA, and the appropriate state agency.

Under the Expanded Program alternative, such disturbances are expected to affect an additional 450 acres of previously undisturbed land; under the Existing Program alternative, new surface disturbances associated with the three phases of operations are expected to affect an additional 110 acres. Approximately 50 percent of this new disturbance could be associated with the placement of mine-waste-rock piles. Other new disturbances could be associated with roads, drill pads, small surface mines that consist of less than 5 acres, mine portals, or other surface-plant support facilities.

Exposure is the total quantity of radiation at a given point measured in air. It is also a measure of gamma or X radiation at a certain location, based on the location's ability to produce ionization in air. The unit of exposure for gamma and X radiation is the roentgen.

Gamma radiation is short wavelength electromagnetic radiation originating in the nucleus of an atom; similar to x-rays but of higher energy.

A **mine-waste-rock pile** is a topographic feature associated with mining operations that contains host rock and naturally occurring radioactive material and usually is not cost effective to process further.

A **working level** is any combination of short-lived radon daughters in 1 liter of air that results in the ultimate emission of 1.3×10^5 million electron volts of potential alpha particle energy.

A **working level month** is an exposure to 1 working level for 170 hours.

A **rem** (derived from **r**oentgen **e**quivalent **m**an) is a dose of radiation that will cause the same biological effect as 1 roentgen of gamma ray exposure.

During the three phases of operations, the leaseholder, in accordance with the lease agreement, would be required to protect the health and safety of mine workers through implementation of Mine Safety and Health Administration (MSHA) rules and regulations (codified at 30 CFR 57.5038, 57.5039, and 57.5047), which address protection of the worker from physical safety and radiological hazards. The leaseholder would be required to ensure that mine workers would not receive an exposure to radon daughters of more than 4 working-level months in any calendar year and that they would not be exposed to air containing concentrations of radon daughters exceeding 1.0 working level. In

addition, the leaseholder would be required to ensure that a worker's individual exposure to gamma radiation would not exceed 5 rem per year. During transport of ore, the leaseholder would be required to ensure that haul-truck drivers' exposure to radiation would not exceed MSHA or U.S. Department of Transportation (DOT) (49 CFR 173.425[c][3] and 173.441[b][4]) standards, as applicable.

The leaseholder, in accordance with the lease agreement, would be required to protect members of the public from radiation by complying with radiation standards established by the U.S. Nuclear Regulatory Commission (NRC) and EPA. NRC's standard for total effective dose equivalent is 100 millirems per year (mrem/yr) (10 CFR 20). The EPA standard states that "emissions of radon-222 to the ambient air from an underground uranium mine shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/y" (40 CFR 61.22).

Effective dose equivalent is the sum of the products of absorbed dose and appropriate factors that account for differences in biological tissue damage produced by different kinds of ionizing radiation and its distribution in the body. The unit of effective dose equivalent is the rem.

Total effective dose equivalent is the sum of the deep-dose equivalent (for external exposure) and the committed effective dose equivalent (for internal exposure).

A **member of the public** is an individual in a controlled or unrestricted area on the lease tracts. The individual would not be involved in mining operations but could be a receiver of radiation doses. Any individual receiving an occupational dose would not be considered a member of the public.

The following subsections describe the lease activities that could occur during the preoperational, operational, and postoperational phases. Depending on the lease-specific operations, a leaseholder could conduct each phase individually or conduct all three phases simultaneously.

3.5.1 Preoperational Activities

Activities that occur before mine development and ore extraction are considered preoperational activities and are grouped into two categories: surface exploration and mine-site preparation. Activities in both categories would be primarily short term and could be conducted concurrently. Surface exploration activities would include planning, obtaining access to the lease tracts, constructing roads (if required), performing exploratory drilling, and conducting other types of prospecting activities. Mine-site preparation activities would include planning, building, and improving surface-plant areas.

3.5.1.1 Surface Exploration

Before surface-disturbing activities related to exploration could be conducted, an Exploration Plan must be submitted to DOE for approval and a Notice of Intent (NOI) for prospecting must be submitted to and approved by CDRMS.

The Exploration Plan would provide descriptions of

- The areas to be explored, accompanied by maps and/or aerial photos designating existing and proposed access roads.
- The proposed exploration methods.

- Measures to be taken to ensure compliance with NEPA or other environmental requirements.
- The activities required to reclaim the drill site and associated environmental disturbances.

DOE would review the proposed activities outlined in the Exploration Plan to ensure compliance with DOE NEPA regulations, other environmental regulations, and the lease agreement. In addition to submitting the Exploration Plan to DOE, the leaseholder would submit an NOI for prospecting to CDRMS for review and approval.

Before transporting drilling equipment to the lease tracts, the leaseholder would be required to obtain authorization for access to the lease tracts. BLM typically would administer off-lease access; DOE would administer on-lease access. Both agencies would require that existing roads be used whenever possible. If existing access were unavailable or unsuitable, road construction might be necessary. The leaseholder would consult with either DOE or BLM, depending on whether on-lease or off-lease access was necessary, to ensure that natural resource concerns and sensitive environmental areas were identified in areas of potential disturbance. The leaseholder also would be required to consult with appropriate state agencies (e.g., CDOW or SHPO) for natural resource and cultural resource concerns. Rights-of-way (ROWs) stipulations would require the leaseholder to minimize adverse impacts to the environment. During the period of road use, the leaseholder would be obligated to preserve the integrity of previous improvements (e.g., fences, gates, cattle guards, trails, bridges, and water control structures) and to avoid public-land survey monuments. The leaseholder would be required to restore damaged items to their previous condition.

Exploration roads usually would be temporary and generally would be less than 20 feet (ft) in width. Surface disturbance would be limited to the minimum area required to obtain a grade and condition that would provide for the safe transportation of drilling equipment to drilling locations. In most cases, disturbance would include removing vegetation and leveling high points in the ROWs. Excavated surface soil material or subsoil would be stockpiled for future reclamation. Borrow ditches, crowning, water bars, culverts, side-slope stabilization measures, and riprap would be used to control erosion.

Once access to a drilling location was established, a site approximately 15 by 50 ft would be leveled to allow the drill rig to operate. Clearing would be accomplished with as little surface disturbance as possible. Excavation would be required only on extremely uneven terrain, and surface soil material would be stockpiled for future reclamation.

Typically, rotary drill rigs would be used to drill exploratory holes (approximately 6 inches in diameter) to as deep as 700 ft. The Salt Wash Member of the Morrison Formation would be the primary target horizon. Where the target horizon is shallow (less than 200 ft), smaller drill rigs such as track- or truck-mounted wagon drills might be used. Leaseholders would be required to comply with state requirements during the drilling and abandonment of exploratory holes. These requirements, outlined in *Mineral Rules and Regulations of the Colorado Mined Land Reclamation Board* (CDNR 1995), include procedures for protecting ground water, avoiding cross contamination between aquifers, and abandoning drill holes.

During drilling operations, the leaseholder would be required to take measures to protect natural resources. Drill sites typically would be secured from the public and inadvertent intrusion by

wildlife. The leaseholder would be required to equip bulldozers, drill rigs, and other site machinery with fire-suppression equipment and would be required to participate in fire-suppression efforts when feasible.

At the cessation of exploration, access roads and drill pads would be reclaimed unless DOE or BLM, as appropriate, directed otherwise. Reclamation would require recontouring the land to the original grade (or to a condition acceptable to the managing agency), replacing surface soil material, reseeding the disturbed areas with an approved seed mix, and employing erosion control methods.

3.5.1.2 Mine-Site Preparation

When suitable ore reserves have been located, the leaseholder would develop a Mining Plan and submit it to DOE for approval.

The Mining Plan would provide

- Detailed descriptions of roads (including existing and proposed roads), ore reserves, and areas to be affected.
- Maps or aerial photos showing the location of the proposed operations.
- Detailed descriptions of surface-plant (buildings) areas, mine entries, and operating methods and procedures.
- Detailed descriptions of measures and actions to be taken to comply with NEPA or other environmental regulations and to minimize adverse impacts to the environment.
- An estimate of the quantity of water required for conducting mine operations and the location of usable water sources.
- Detailed descriptions of the activities required to reclaim the mine site and the associated environmental disturbances.

DOE would review proposed activities outlined in the Mining Plan to ensure compliance with DOE NEPA regulations, other environmental regulations, and the lease agreement. DOE would have to approve the plan prior to conducting any surface-disturbing activities related to mine-site preparation. In addition to submitting the Mining Plan to DOE, the leaseholder would be required to obtain a permit for the proposed operation through the Colorado Mined Land Reclamation Board.

Off-lease land use is necessary to support mine operations. Off-lease activities would require prior authorization from BLM or the appropriate state agency. ROWs for haul roads and utilities (i.e., power and communications) would be common off-lease disturbances. Unlike exploration roads, ROWs used for mine operations usually would be improved to enable long-term use. ROWs granted by BLM (or the appropriate state agency) usually would be nonexclusive and would be used by recreationists, grazing permittees, and oil and gas lessees. The leaseholder's off-lease activities would be stipulated to avoid conflict with other public-land uses; the leaseholder would be required to comply with state and federal regulations to protect off-lease and natural resource values. Off-lease activities would be subject to BLM's NEPA process, and impacts would be minimized by site-specific stipulations that would be included in the authorization.

Mine-site improvements would be constructed in accordance with federal, state, and local regulations; construction activities would be accomplished in accordance with MSHA rules and regulations. Surface-plant area improvements might include

- Buildings for offices and equipment maintenance.
- Telephone and power lines.
- Compressors and compressed air lines.
- Potable water supply and sanitary facilities (sinks, toilets, and showers).
- Fuel storage areas.
- On-site domestic sewage system.
- Trucks and heavy earth-moving equipment.
- Electric generator.
- Mining equipment (including rock drilling and mine dewatering equipment).
- Explosives storage area.
- Ventilation shafts and fans.
- Residential housing for security and staff.
- Emergency response equipment (for staff safety, environmental damage, and spills).
- Ore stockpiles and loading areas.
- Mine-waste-rock piles (rock removed from mine to access ore).
- Dewatering evaporation ponds and treatment facilities.
- Surface soil material stockpile areas.
- Vegetation test plots.
- Parking lots.

Certain improvements and activities would require specific actions on behalf of the leaseholder before operations could begin. Specific actions could include, but are not limited to,

- Obtaining building permits for utilities, residential structures, offices, and maintenance sheds. Structures and utilities supporting mine operations (e.g., compressors and electrical equipment) would have to meet local and county building codes and ordinances.
- Completing a water development plan for development of a potable water supply. A state well-development permit might be required unless water was obtained from another source, such as a nearby municipal supply. Mine operations would not affect adjudicated water rights.
- Obtaining a county-approved septic permit for installation of a sewage system. If a site were unsuitable for a septic system, portable sewage facilities would be required.
- Obtaining federal or state pollution discharge permits for the control of storm water; development of dewatering and evaporation ponds; and discharge of water from ponds to on-site depressions, valleys, or intermittent streambeds.

- Obtaining state permits that might be required for mine emissions to the atmosphere.
- Responding to special or conditional use permits.
- Developing a plan for gas and diesel fuel storage in accordance with state and local regulations. This plan would include a Spill Prevention Control Plan, as required by federal and state water laws.
- Developing contingency plans for emergencies and releases of hazardous chemicals, substances, pollutants, and wastes.
- Applying fertilizers in accordance with state regulations.

3.5.2 Operational Activities

At the conclusion of preoperational activities, operational activities might be initiated. The aforementioned Mining Plan, submitted to DOE for review and approval, would also describe these proposed activities in detail. Operational activities may be grouped into two major categories: (1) surface-plant area construction and operation and (2) mine development and operation.

3.5.2.1 Surface-Plant Area Construction and Operation

Leaseholders would construct surface-plant areas to support mining operations. These areas might range in size from 1 to 25 acres but would average less than 10 acres per mine. Surface-plant areas would include the improvements identified in subsection 3.5.1.2, "Mine-Site Preparation," and the improvements described in this subsection.

Buildings/Utilities

Buildings constructed on site might vary from offices to maintenance shops and storage sheds. These buildings would be constructed in accordance with federal and state regulations and county ordinances.

The types of utilities required to service these buildings would depend on the types of operations that would be conducted. Electricity to operate mining equipment, mine lighting, and ventilation fans generally would be supplied through aboveground lines. Generators also might supply electricity to the mines. Air would be supplied to the mines by compressors and delivered through lines of various diameters. Water generally would be hauled to the mine site by truck. Sewage and wastewater would be disposed of through a septic system or at a portable facility.

Service Area

The service area would be used to service mining vehicles, bulldozers, other heavy equipment, and water trucks. Fuel storage tanks, water tanks, and 55-gallon oil barrels would be located in this area. Leaseholders routinely would conduct inspections of hoses, fuel lines, connections, tank exteriors, and equipment parts stored in the area. Berms and secondary containment for gasoline, solvent, and oil storage facilities would be installed and maintained in accordance with local, state, and federal regulations. If a petroleum spill or leak requiring notification of federal and/or state agencies were to occur, the leaseholder would be required to implement the Spill Prevention Control Plan (including containment and cleanup).

Storage

Chemicals, materials, solvents, oils, degreasers, and other substances used to maintain vehicles would be stored and disposed of in accordance with local, state, and federal hazardous substance regulations. Material Safety Data Sheets and emergency equipment (e.g., showers) would be maintained as required by MSHA. If required under federal or state law, a Contingency Plan would be submitted to the State, EPA, and DOE before the actual storage of such materials on site. The Contingency Plan would outline the types of stored materials for which spills would be reported. Some emergency equipment (e.g., first aid supplies, liquid spill-response supplies, and fire extinguishers) would be maintained on site for accidents involving injuries to employees and/or minimal environmental damages. Additional emergency equipment (e.g., mine rescue equipment) would be maintained on site or at centralized locations that would allow for reasonable response times in accordance with MSHA requirements.

On-site storage of petroleum products and subsequent disposal would comply with state and local regulations. A Spill Prevention Control Plan would be prepared in accordance with federal and state water laws. Explosives would be stored in accordance with state and federal regulations and away from areas that contain volatile substances.

Security of Potential Safety Hazard Areas

Leaseholders would be required to secure and post areas that might be considered hazardous (e.g., ore stockpile areas, loading areas, mine openings, and mine-waste-rock piles) in accordance with federal and state regulations. If required by the CDRMS permit, the leaseholder would construct fences and other barriers around safety hazard areas to minimize the potential for intrusion by humans and wildlife and to reduce exposure to radioactive materials.

Mine-Water Discharge/Treatment Ponds

The leaseholder might need to construct mine-water discharge/treatment ponds to receive discharge water from underground and open-pit mines. The leaseholder would consult with USFWS to address any concerns that the agency might have. Such ponds would then be constructed in accordance with applicable regulations. Those regulations might require that the ponds be adequately lined, fenced, and possibly netted to ensure that wildlife and livestock and the environment are not adversely affected. Water would be pumped into discharge ponds from mine sumps constructed in water accumulation areas. If necessary, mine water would be treated to meet applicable discharge standards (e.g., treated with a barium chloride flocculent, passed through a manganese dioxide filter, or treated by another suitable method). Water would then flow to a settling pond, where it would be evaporated or discharged to the environment in accordance with a state water discharge permit and National Pollutant Discharge Elimination System requirements. The location of the discharge point would be described to the Colorado Department of Public Health and Environment (CDPHE) Water Quality Control Division, which is charged with permit issuance and enforcement. Maintenance of ponds would include replacing the liners or, if required, reclaiming the ponds after removing the precipitated sediments and liners. Sediments and liners would be disposed of at a state-approved disposal site. Pond inspection would be conducted by CDPHE as part of its review of a leaseholder's discharge permit.

Mine-Waste-Rock Piles

Both underground and open-pit mining operations would require removal of barren and low-grade rock materials to allow access to the economical ore deposits. The removal process would result in large piles of mine-waste-rock. These mine-waste-rock materials typically contain limited quantities of miscellaneous mining-related debris (small remnants of mine timbers or wood lagging, drill steels, vent bags, etc.) that would be so intermingled with the mine-waste-rock materials removed from the mine that it would be impractical to separate them. Accordingly, the leaseholder would be allowed to co-dispose of these materials in a mine-waste-rock pile. The mine-waste-rock piles would contain large fractions of coarse rock, much of which would be excavated from areas of little or no ore-grade mineralization. Consequently, the concentrations of radium and uranium in mine-waste-rock would be much lower than their concentrations in ore. Rainwater percolating through the coarse rock would not leach significant amounts of radium or uranium because of the low liquid-to-solid ratio. DOE would require leaseholders to construct diversion channels and berms around the mine-waste-rock piles to prevent storm-water runoff from entering or leaving the piles.

Nonhazardous Waste

Mining operations generate various types of nonhazardous waste including empty 55-gallon petroleum barrels, timbers, domestic trash, old mining equipment, and other mining debris. DOE would direct the leaseholder to dispose of these waste materials off site at a proper disposal facility and in accordance with local, state, and federal requirements. Waste generated prior to 1974 would be managed as agreed to by DOE and the leaseholder under the terms of future lease agreements. In cases where waste might have archaeological or cultural significance, the SHPO would be consulted.

Hazardous Waste

If hazardous waste were generated during construction and operation, the leaseholder would be required to manage (store and dispose of) the waste in accordance with applicable state and federal regulations. No disposal of hazardous waste would be allowed on the lease tracts.

3.5.2.2 Mine Development and Operation

Uranium and vanadium ores would be recovered by either underground or open-pit mining methods. Activities common to both mining methods would include accessing the ore deposits, controlling possible pollutants, conducting mine maintenance, hauling ore and waste rock, and transporting ore to mills for processing.

At underground mines, rubber-tired (trackless) equipment would typically be used to transport ore and mine-waste-rock from the mine workings (stopes and drifts) to the aboveground ore storage and mine-waste-rock pile areas through adits (almost horizontal mine entrances) or inclines/declines. In some instances, ore and mine-waste-rock would be transported by similar means to the ore skip and hoisted to the surface through the main production shafts. At open-pit mines, overburden consisting of mudstone, shale, and sandstone would be removed first to expose the ore deposit. This mine-waste-rock would be removed with conventional heavy

equipment (e.g., backhoes, front-end loaders, scrapers, bulldozers, and haul trucks). Similar equipment would be used to remove the ore.

Contaminants from mining operations that could be discharged inadvertently to an underground or surface water source would be controlled to minimize the potential for their release. Only three lease tracts (13, 13A, and 14) are located near perennial water sources (the Dolores River), and only one of those lease tracts (13) has existing mining activities close to the river. Diversion dams, berms, water bars, silt dams, dikes, and mine-waste-rock pile covers would be constructed to divert surface runoff from active areas of mine operations. Historically, water seepage into mine workings has been minor and would be expected to remain minor; however, a few mines (both underground and open pit) might require the leaseholder to pump water into treatment ponds. Methods of controlling water from these mines were discussed previously in the Mine-Water Discharge/Treatment Ponds discussion of this subsection. Limited rainfall throughout this region would have minimal potential to transport contaminants into water sources.

Materials used to support mining activities could include bulk explosives, dynamite, and ammonium nitrate. These materials would be stored in approved areas within the underground mine or in an approved shed or building on the surface.

Underground Mines

As an underground mine is developed and mined, the safety of mine workers and protection of the environment would be of primary concern. The leaseholder would be required to routinely monitor the mine for air quality and noise level. If the air quality were inadequate to ensure the safety of workers, ventilation shafts to the surface or other ventilation systems would be constructed. To protect workers from cave-ins, mine walls, backs (ceilings), and other surfaces would be braced with steel or timber sets and other cribbing materials.

Only authorized individuals would be allowed to enter mines. Mine entrances would be secured during periods of temporary shutdown and during periods of daily inactivity. The public and wildlife would be discouraged from entry by means of fences, gates, posting, and other barriers.

Mining typically would be accomplished by a random room-and-pillar method, which involves leaving random pillars of ore and waste-rock in place to support the backs and removing ore material. Two different techniques could be used to mine the ore: the conventional drill/blast/muck technique (“muck” refers to the loading and removal of ore or mine-waste-rock from a mine) and the continuous-miner technique.

The conventional technique might include the use of jackleg drills or similar devices to drill 2-inch diameter, 6- to 10-ft-deep holes in the rock face. The holes would then be filled with explosives, and the explosives would be detonated. The broken material would be removed with shuttle equipment such as load/haul/dumps (commonly referred to as LHDs) and multi-ton haul-trucks or buggies. Split-shooting also might be used in areas with narrow ore seams. In this technique, waste rock would be drilled, blasted, and mucked. The same process would then be used to remove the ore seam. After the ore seam was removed, shotcreting, rockbolting, timbering, or other methods would be used to support the mined-out areas.

The continuous-miner technique would use a machine referred to as a “miner,” which removes ore and waste-rock without disturbing the surrounding host rock. The miner would deliver the

ore and waste-rock directly to haul trucks for removal. As in the conventional technique, shotcreting, rockbolting, netting, timbering, or other methods would then be used to support the mined-out areas.

Ore removed from the mine would be stockpiled outside the mine for transport to the milling facilities by traditional over-the-road haul trucks.

During the course of underground mining, water would be needed to perform mining activities. Water would be required for underground drilling to prevent dust from becoming airborne and to remove cuttings from drill bits. Leaseholders could obtain water from a variety of sources, depending on the particular mine and its geographic location. Most underground mines are relatively dry; however, some mines receive seepage from nearby shallow aquifers. This water could be considered as a possible source for several of the mine operations. Other sources might include nearby municipal water supplies, springs, rivers, small ponds, and reservoirs. If water were not available on site, it would be obtained from the closest available source and hauled to the mine by water trucks. The amount of water needed would depend on the level of mining operation and the number of people working at the site. Permits and/or water right augmentations, if required, would be obtained from the appropriate local, state, or federal agencies.

The following operating conditions are considered appropriate for full production of ore on each of the 38 lease tracts; quantities of water for domestic use and surface drilling are not included.

- 120 drilling machines in operation
- 35 gallons of water per drilling machine per day
- 26 days of operation per month
- Multiple shift operations

Assuming historical amounts of ore would be produced under the Expanded Program alternative, about 10,000 gallons of water would be used monthly by each mining operation, which would be equivalent to the average amount consumed by 1.5 households. More than 90 percent of the water needed would be obtained from commercial sources. Continued use of this quantity of water would not have a noticeable impact on available water resources and would not affect adjudicated water rights. Under the Existing Program alternative, the quantities of water needed would remain at 10,000 gallons per month for each mining operation.

Surface/Open-Pit Mines

Small surface mining operations generally would use a trenching method, which involves the removal of only a small amount of waste rock to expose the ore. The ore would then be removed by conventional techniques. Once the ore was removed, reclamation would consist of backfilling the trench with waste rock materials and regrading and recontouring the immediate areas of disturbance.

Larger operations generally would opt for a traditional, benched open pit in which the depth and size of the ore deposit would dictate the surface dimensions of the pit and benches. Underground mines, which would be used to access ore deposits around the periphery of the main deposit, might be associated with larger open-pit operations. The maintenance required for open-pit mine

operations basically would be limited to maintaining the side walls of the pit, which would be subject to slope failure and to erosion from storm-water runoff. DOE's estimate of future disturbance assumes no new open-pit mines would be proposed. However, acreage of current disturbance includes the existing 200-acre open-pit mine at lease tract 7.

Transportation

Uranium and vanadium ores produced on the lease tracts would be transported to an existing mill or receiving facility for processing. Currently, two mills might be available for processing lease tract ores: the White Mesa Mill near Blanding, Utah, and the Cañon City Mill near Cañon City, Colorado. A third mill, the Shootaring Canyon Mill near Ticaboo, Utah, is currently amending its license to become operational and might be available in the future for processing ores. Use of this milling facility by the leaseholders for processing lease tract ores is unlikely because of the additional transportation costs that would be incurred by bypassing the White Mesa Mill. However, efforts to license a new mill within Paradox Valley have recently been reported in the local and regional press. If such a mill were licensed, built, and operated in the vicinity of DOE's lease tracts it would likely result in large decreases in shipments to the existing mills due to the reduced cost of transportation. Because no formal proposal has been either received or acted upon by the State of Colorado as the regulator, a new mill site is too speculative at this time to include in quantitative or qualitative analyses of this final PEA.

Before transporting ore to the processing mills, the leaseholder would be required to comply with DOT hazardous materials regulations codified at 49 CFR 170−180. These regulations require the leaseholder to identify the actions that would be taken in case of an emergency or spill. Ore could be transported to the mills by covered truck, covered truck and pup (trailer), train, or a combination of truck and train. However, the train and truck-and-train methods would not be economical during the next 10 years because a railroad loading facility no longer exists in the lease tract areas. In this final PEA, only the covered truck and covered truck-and-pup methods are assessed.

Typically, the collector routes, leading from the lease tracts to the various paved highways discussed herein, are county roads that were used extensively for ore-transportation activities in the past, particularly during the last uranium boom in the late 1970s and early 1980s. Other undeveloped roadways might need to be upgraded in the future, and those would be identified and dealt with as the need arises through the county's conditional use permit process.

For the purpose of analyzing alternatives in this final PEA, the potential increased haul-truck traffic on various Colorado and Utah highway segments has been evaluated. That evaluation was based on a conservative or "worst-case" transportation scenario which included the simultaneous and immediate development of all potential DOE lease tracts and the transport of all ore materials to each mill. In reality, lease tracts would be developed over time and at levels commensurate with available capital for development, desirability and quality of the ore for mining, as well as other factors that may include availability of workforce and national and international uranium and vanadium prices. It is also likely that ore would be transported to more than one mill or even that a new processing plant could be constructed in the area; both of these situations would reduce the estimated haul-truck traffic on area highways.

Accordingly, in this final PEA, DOE has also evaluated the potential impacts associated with the haul-truck traffic that can reasonably be expected to occur.

Expanded Program Alternative—DOE's Preferred Alternative

For the Expanded Program alternative, the number of haul trucks transporting ore to the mills is expected to increase compared to the number of trucks in the recent past. The average haul rate during periods of production between 1974 and 1994 was 30 haul trucks per day for all the DOE lease tracts combined; this number is assumed to be the worst-case scenario for the Existing Program alternative. In 1980, when ore production from the lease tracts was at its peak, the haul rate never exceeded 40 haul trucks per day. For the Expanded Program alternative, the worst-case scenario haul rate is based on the estimated number and sizes of the mining operations (as discussed in Section 3.2), the capacity of the haul trucks (25 tons), and the number of days per month (30). Accordingly, the estimated peak production rate for the 38 lease tracts under the expanded alternative could be as high as 90,000 tons of ore per month, which equates to 3,600 haul trucks per month, or an average of 120 haul trucks per day, one way. Therefore, for the worst-case transportation analysis in this final PEA, it has been assumed that the maximum number of haul trucks would be 150 haul trucks per day, one way.

For this final PEA, a more realistic ore production and transportation evaluation that depicts the level of activities that are likely to be seen during the next 10 years, based on historical production data and current market trends, has also been included. For this realistic evaluation, it is assumed that lease tract production would be similar to that seen in the late 1970s and early 1980s. During that time, which was economically equivalent to today's uranium market, only 25 of the 38 lease tracts (approximately two thirds) were ever brought into production, and total ore production from the lease tracts averaged less than 25,000 tons per month (see Table 3–3). Under the Expanded Program alternative, it is assumed that lease tract activities would likely continue in phases; new mines would be brought into production, and other mines would shut down as their ore reserves were depleted. The maximum number of haul trucks for this realistic evaluation would then decrease dramatically (from the worst-case scenario discussed above) to 57 haul trucks per day, or 72 haul trucks per day if the lease tract 7 open-pit mine were brought into production. Furthermore, based on transportation costs (all other costs being equitable), DOE has assumed that most ore produced from the lease tracts (excluding the ore produced from Cotter's seven northernmost lease tracts) would be shipped south to the White Mesa Mill. Based on this realistic evaluation, a maximum of 18 trucks per day (one way) would travel from the DOE lease tracts eastward to the Cañon City Mill, and a maximum of 39 haul trucks per day (one way), or 54 haul trucks per day (one way) if the lease tract 7 open-pit mine were operational, would travel from the DOE lease tracts southward to the White Mesa Mill. As shown in Table 3–3, the projected number of haul trucks entering the state's highway system from specific county roads identified as the "collector routes" from the various lease tract areas (see Plate 1) would typically be one or two haul trucks per hour, with a maximum of five haul trucks per hour from County Road DD19 if the lease tract 7 open-pit mine were operational.

Figure 3–2 shows the potential haul routes for the Expanded Program alternative. To support the discussions of impacts in Section 5.2.1 and Table 5–1, highway segments have been alphabetically labeled on Figure 3–2 from "A" to "MM." Two primary routes access the Cañon City Mill, and three primary routes access the White Mesa Mill.

Table 3–3. DOE Uranium Leasing Program Realistic Ore Production and Transportation Evaluation for the Expanded Program Alternative

Lease Tract	Historical Ore Production[a]	Ore Shipments				Lease Tract Access/Collector Routes—Intersections of County Roads with the State Highway System														
		Frequency[b]	Frequency[c]	Trucks/Day to Likely Mill[d]		P12 Road	S17 Road	U18 Road	EE22 Road	EE22 Road	EE21 Road	DD19 Road	25.R Road	S8 Road	Unknown Rd 1	Unknown Rd 2	Unknown Rd 3	Unknown Rd 4	7N Road	K8 Road	UCOLO Road
	Tons/ Month	Trucks/Month	Trucks/Day	Cotter	IUC	CO 141 (1)	CO 141 (2)	CO 141 (3)	CO 141 (4)	CO 90 (5)	CO 90 (6)	CO 90 (7)	CO 141 (8)	CO 141 (9)	CO 141 (10)	CO 141 (11)	CO 141 (12)	CO 141 (13)	CO 141 (14)	CO 141 (15)	US 491 (16)
C-JD-5	2,700	108	5		5							5									
C-JD-5A	N/A	N/A	N/A									2									
C-JD-6	800	32	2	2								2									
C-JD-7 (UG)	700	28	2	2								2									
C-JD-7 (OP)[e]	8,100	324	15		15							15									
C-JD-7A																					
C-JD-8	2,000	80	4	4								4									
C-JD-8A																					
C-JD-9	600	24	2	2							2										
C-SR-10	700	28	2		2														2		
C-SR-11	700	28	2		2																2
C-SR-11A	N/A	N/A	N/A																		2
C-SR-12	250	10	1		1															1	
C-SR-13	1,000	40	2		2									2							
C-SR-13A	800	32	2		2									2							
C-SR-14	N/A	N/A	N/A												2						
C-SR-14A	N/A	N/A	N/A													2					
C-SR-15	300	12	1		1									1							
C-SR-15A	500	20	1		1									1							
C-SR-16	200	8	1		1													1	1		
C-SR-16A	100	4	1		1												1				
C-WM-17	N/A	N/A	N/A										2								
C-WM-17A	N/A	N/A	N/A										2								
C-SM-18	2,000	80	4	4				4													
C-AM-19	7,000	280	13		13		13														
C-AM-19A	N/A	N/A	N/A				5														
C-AM-20	N/A	N/A	N/A				5														
C-LP-21	1,500	60	3	3						3											
C-LP-22	150	6	1		1					1											
C-LP-22A	600	24	2		2					2											
C-LP-23	300	12	1		1					1											
C-BL-23A	N/A	N/A	N/A							2											
C-BL-23B	300	12	1		1					1											
C-CM-24	N/A	N/A	N/A						2												
C-CM-25	500	20	1	1					1												
C-G-26	300	12	1		1	1															
C-G-26A	150	6	1		1	1															
C-G-27	200	8	1		1	1															
C-G-27A	N/A	N/A	N/A			0															
Total[f]	**24,350**	**974**	**57**	**18**	**39**	**3**	**23**	**4**	**3**	**10**	**2**	**15**	**4**	**6**	**2**	**2**	**1**	**1**	**3**	**1**	**4**
Total[g]	**32,450**	**1,298**	**72**	**18**	**54**	**3**	**23**	**4**	**3**	**10**	**2**	**30**	**4**	**6**	**2**	**2**	**1**	**1**	**3**	**1**	**4**

Table 3−3 (continued). DOE Uranium Leasing Program Realistic Ore Production and Transportation Evaluation for the Expanded Program Alternative

Lease Tract	Historical Ore Production[a]	Ore Shipments				Lease Tract Access/Collector Routes—Intersections of County Roads with the State Highway System														
		Frequency[b]	Frequency[c]	Trucks/Day to Likely Mill[d]		P12 Road	S17 Road	U18 Road	EE22 Road	EE22 Road	EE21 Road	DD19 Road	25.R Road	S8 Road	Unknown Rd 1	Unknown Rd 2	Unknown Rd 3	Unknown Rd 4	7N Road	K8 Road	UCOLO Road
	Tons/ Month	Trucks/Month	Trucks/Day	Cotter	IUC	CO 141 (1)	CO 141 (2)	CO 141 (3)	CO 141 (4)	CO 90 (5)	CO 90 (6)	CO 90 (7)	CO 141 (8)	CO 141 (9)	CO 141 (10)	CO 141 (11)	CO 141 (12)	CO 141 (13)	CO 141 (14)	CO 141 (15)	US 491 (16)
Maximum Number of Trucks per Hour[h]				2	5	1	2	1	1	1	1	3	1	1	1	1	1	1	1	1	1
Maximum Number of Trucks per Day (round trip)				36	108	6	46	8	6	20	4	60	8	12	4	4	2	2	6	2	8
Maximum Number of Trucks per Hour (round trip)				3	9	1	4	1	1	2	1	5	1	1	1	1	1	1	1	1	1

[a]For the Expanded Program alternative, DOE assumes that future levels of ore production activities will be consistent with those seen during the most recent production operations combined with those seen during the late 1970s and early 1980s.
[b]The number of trucks per month is based on the use of 25-ton, over-the-road (OTR) haul trucks.
[c]The number of trucks per day is based on 22.5 days per month (rounded up).
[d]For ore shipments, DOE assumes that, all things being economically equal, Cotter will elect to ship the ore produced from its northern lease tracts (excluding the C-JD-7 OP) to its mill in Cañon City; all other ores produced from the DOE lease tracts will go south to IUC's Mill at White Mesa.
[e]Lease Tracts C-JD-7 (open pit) has never been in production; however, Cotter Corporation has estimated that it would likely operate at 300 tons per day, 6 days a week (8,100 tons per month).
[f]Totals excluding C-JD-7 (OP)
[g]Totals including C-JD-7 (OP)
[h]The total number of trucks per hour is based on 12 hours per day (rounded up), recognizing that Department of Transportation regulations allow OTR truck drivers to be on duty for 14 hours per day, but actually drive for only 11 of those hours.

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For the Expanded Program alternative, it is assumed that the northernmost routes to either mill would be used only by haul trucks traveling from tracts near the Gateway area; this route would be more indirect for other lease tracts. Additionally, based on the realistic evaluation, the northernmost route to either mill would be eliminated from use because any ore produced from the lease tracts near Gateway would likely be shipped south to the White Mesa Mill via a more direct route that would lower the associated ore-transportation costs.

Hauling ore along the northernmost route to the Cañon City Mill would require transport through Mesa, Delta, Montrose, Ouray, Gunnison, Chaffee, and Fremont Counties, Colorado. BLM roads, county roads, and State Highway 141 would serve as collector routes from the lease tracts. Haul trucks traveling along State Highway 141 would meet with U.S. Highway 50 at Whitewater, southeast of Grand Junction. Haul trucks would travel through Delta, Olathe, Montrose, Gunnison, Salida, and Cañon City to the Cañon City Mill. The total distance along this route to the Cañon City Mill would be approximately 280 miles. More than 90 percent of these routes are paved and have at least two lanes; four-lane roads exist from Grand Junction to Montrose and near the cities of Gunnison and Cañon City.

Hauling ore to the Cañon City Mill along the southern route would require transport through Mesa, San Miguel, Montrose, Ouray, Gunnison, Chaffee, and Fremont Counties, Colorado. BLM roads, county roads, and State Highways 90 and 141 would serve as collector routes from the lease tracts. These collector routes meet with State Highway 145 about 5 miles east of Naturita. Haul trucks would proceed southeast along State Highway 145 through Norwood to Placerville, then northeast to Ridgway along State Highway 62. At Ridgway, the haul trucks would proceed north to Montrose along U.S. Highway 550, then east onto U.S. Highway 50 through Gunnison, Salida, and Cañon City to the Cañon City Mill. The maximum total distance from the most distant lease tracts to the Cañon City Mill is approximately 320 miles.

Hauling ore along the northernmost route to the White Mesa Mill (however unlikely) would include transport through Mesa County, Colorado, and Grand and San Juan Counties, Utah. Collector routes from the lease tracts would include BLM roads, county roads, and State Highway 141. At Whitewater, haul trucks would travel on U.S. Highway 50 until it joined with the U.S. Interstate 70 business route in Grand Junction, then west along U.S. Interstate 70 into Utah. At the Crescent Junction exit, haul trucks would travel south on U.S. Highway 191 through Moab, Monticello, and Blanding to the White Mesa Mill. The mill is approximately 6 miles south of Blanding. Depending on point of origin, the total distance is approximately 270 miles. With the exception of BLM roads and county roads, all roads are paved and have at least two lanes. U.S. Interstate 70 and a portion of U.S. 191 have four lanes.

Hauling ore along the middle route to the White Mesa Mill would include transport through Montrose and San Miguel Counties, Colorado, and San Juan County, Utah. Collector routes from the lease tracts would include BLM roads, county roads, and State Highways 141 and 90. At the Utah-Colorado border, State Highway 90 changes to Utah State Highway 46. Haul trucks would proceed west along Utah State Highway 46 through La Sal to the intersection with U.S. Highway 191, then south through Monticello and Blanding to the White Mesa Mill. The mill is approximately 6 miles south of Blanding. The total distance from the lease tracts to the White Mesa Mill varies between 100 and 160 miles, depending on point of origin. More than 90 percent of the route consists of paved, two-lane roads; four-lane roads exist in Monticello and Blanding.

Hauling ore along the southern route to the White Mesa Mill would require transport through Montrose, San Miguel, and Dolores Counties, Colorado, and San Juan County, Utah. The collector routes would be the same as those used for the northern route. At the intersection of State Highway 141 and U.S. Highway 491 near Dove Creek, the haul trucks would proceed west along U.S. Highway 491 to Monticello, Utah, then south on U.S. Highway 191 through Blanding to the White Mesa Mill. The total distance from the lease tracts to the White Mesa Mill varies between 70 and 170 miles, depending on point of origin.

Most leaseholders would prefer to transport ore to the White Mesa Mill because of its proximity to the lease tracts. However, depending on mill-feed requirements, leaseholders would retain the right to transport ore to the Cañon City Mill when mill feed and economic conditions warrant.

Existing Program Alternative

As stated previously, the worst-case scenario for the Existing Program alternative is an average of 30 haul trucks per day and a maximum of 50 haul trucks per day. For the realistic evaluation, lease tract production would be similar to that of the late 1970s and early 1980s. During that time, 12 of the 13 active lease tracts were brought into production, and total ore production from the lease tracts averaged less than 14,000 tons per month (see Table 3–4). Under the Existing Program alternative, it is assumed that this scenario would likely continue as described previously. The maximum number of haul trucks for the realistic evaluation would remain at 30 haul trucks per day, with a maximum of 45 haul trucks per day if the lease tract 7 open-pit mine were brought into production. Furthermore, based on transportation costs (all other costs being equitable), DOE has assumed that most ore produced from the lease tracts (excluding the ore produced from Cotter's seven northernmost lease tracts) would be shipped south to the White Mesa Mill. Based on the realistic evaluation, a maximum of 18 trucks per day (one way) would travel from the DOE lease tracts eastward to the Cañon City Mill, and a maximum of 12 haul trucks per day (one way), or 27 haul trucks per day (one way) if the lease tract 7 open-pit mine were operational, would travel from the DOE lease tracts southward to the White Mesa Mill. As shown in Table 3–4, the projected number of haul trucks entering the state's highway system from specific county roads identified as the collector routes from the various lease tract areas (see Plate 1) would typically be one haul truck per hour, with a maximum of five haul trucks per hour from County Road DD19 if the lease tract 7 open-pit mine were operational.

Figure 3–3 shows the haul routes to the processing mills for the Existing Program alternative. One primary route accesses the Cañon City Mill, and two primary routes access the White Mesa Mill. To support the discussions of impacts in Section 5.2.2 and Table 5–2, highway segments have been alphabetically labeled on Figure 3–3 from "A" to "Z."

Under the Existing Program alternative, hauling ore to the Cañon City Mill would require transport through San Miguel, Montrose, Ouray, Gunnison, Chaffee, and Fremont Counties, Colorado. BLM roads, county roads, and State Highways 90 and 141 would serve as collector routes from the lease tracts. These collector routes meet with State Highway 145 about 5 miles east of Naturita. Haul trucks would proceed southeast along State Highway 145 through Norwood to Placerville, then northeast to Ridgway along State Highway 62. At Ridgway, the haul trucks would proceed north to Montrose along U.S. Highway 550, then east onto

Table 3–4. DOE Uranium Leasing Program Realistic Ore Production and Transportation Evaluation for the Existing Program Alternative

Lease Tract	Historical Ore Production [a]	Ore Shipments				Lease Tract Access/Collector Routes—Intersections of County Roads with the State Highway System															
		Frequency [b]	Frequency [c]	Trucks/Day to Likely Mill [d]		P12 Road	S17 Road	U18 Road	EE22 Road	EE22 Road	EE21 Road	DD19 Road	25.R Road	S8 Road	Unknown Rd 1	Unknown Rd 2	Unknown Rd 3	Unknown Rd 4	7N Road	K8 Road	UCOLO Road
	Tons/Month	Trucks/Month	Trucks/Day	Cotter	IUC	CO 141 (1)	CO 141 (2)	CO 141 (3)	CO 141 (4)	CO 90 (5)	CO 90 (6)	CO 90 (7)	CO 141 (8)	CO 141 (9)	CO 141 (10)	CO 141 (11)	CO 141 (12)	CO 141 (13)	CO 141 (14)	CO 141 (15)	US 491 (16)
C-JD-5	2,700	108	5		5							5									
C-JD-6	800	32	2	2								2									
C-JD-7 (UG)	700	28	2	2								2									
C-JD-7 (OP) [e]	8,100	324	15		15							15									
C-JD-7A												0									
C-JD-8	2,000	80	4	4								4									
C-JD-9	600	24	2	2							2										
C-SR-11	700	28	2		2																2
C-SR-13	1,000	40	2		2									2							
C-SR-13A	800	32	2		2									2							
C-SR-15	300	12	1		1									1							
C-SM-18	2,000	80	4	4				4													
C-LP-21	1,500	60	3	3						3											
C-CM-25	500	20	1	1					1												
Total [f]	**13,600**	**544**	**30**	**18**	**12**	**0**	**0**	**4**	**1**	**3**	**2**	**13**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
Total [g]	**21,700**	**868**	**45**	**18**	**27**	**0**	**0**	**4**	**1**	**3**	**2**	**28**	**0**	**5**	**0**	**0**	**0**	**0**	**0**	**0**	**2**
Total Number of Trucks per Hour [h]				**2**	**3**	**0**	**0**	**1**	**1**	**1**	**1**	**3**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**
Maximum Number of Trucks per Day (round trip)				**36**	**54**	**0**	**0**	**8**	**2**	**6**	**4**	**56**	**0**	**10**	**0**	**0**	**0**	**0**	**0**	**0**	**4**
Maximum Number of Trucks per Hour (round trip)				**3**	**5**	**0**	**0**	**1**	**1**	**1**	**1**	**5**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**

[a] For the Existing Program alternative, DOE assumes that future levels of ore production activities will be consistent with those seen during the most recent production operations combined with those seen during the late 1970s and early 1980s.
[b] The number of trucks per month is based on the use of 25-ton, over-the-road (OTR) haul trucks.
[c] The number of trucks per week is based on 4.5 weeks per month (rounded up).
[d] For ore shipments, DOE assumes that, all things being economically equal, Cotter will elect to ship the ore produced from its northern lease tracts (excluding the C-JD-7 OP) to its mill in Cañon City; all other ores produced from the DOE lease tracts will go south to IUC's Mill at White Mesa.
[e] Lease Tracts C-JD-7 (open pit) has never been in production; however, Cotter Corporation has estimated that it would likely operate at 300 tons per day, 6 days a week (8,100 tons per month).
[f] Totals excluding C-JD-7 (OP)
[g] Totals including C-JD-7 (OP)
[h] The total number of trucks per hour is based on 12 hours per day (rounded up), recognizing that Department of Transportation regulations allow OTR truck drivers to be on duty for 14 hours per day, but actually drive for only 11 of those hours.

U.S. Highway 50 through Gunnison, Salida, and Cañon City to the Cañon City Mill. The maximum total distance from the most distant lease tracts to the Cañon City Mill is approximately 320 miles.

Hauling ore along the northern route to the White Mesa Mill under the Existing Program alternative would include transport through Montrose and San Miguel Counties, Colorado, and San Juan County, Utah. Collector routes from the lease tracts would include BLM roads, county roads, and State Highways 90 and 141. At the Utah-Colorado border, State Highway 90 changes to Utah State Highway 46. Haul trucks would proceed west along Utah State Highway 46 through La Sal to the intersection with U.S. Highway 191, then south through Monticello and Blanding to the White Mesa Mill. The mill is approximately 6 miles south of Blanding. The total distance from the lease tracts to the White Mesa Mill varies between 100 and 120 miles. More than 90 percent of the route is paved, two-lane roads; four-lane roads exist in Monticello and Blanding.

Hauling ore along the southern route to the White Mesa Mill would require transport through Montrose, San Miguel, and Dolores Counties, Colorado, and San Juan County, Utah. The collector routes would be the same as those used for the northern route. At the intersection of State Highway 141 and U.S. Highway 491 near Dove Creek, the haul trucks would travel west along U.S. Highway 491 to Monticello, Utah, and then south on U.S. Highway 191 through Blanding to the White Mesa Mill. The total distance from the lease tracts to the White Mesa Mill varies between 70 and 130 miles.

3.5.3 Postoperational Activities

3.5.3.1 Interim Shutdown Activities

Temporary shutdown of mine operations or an interim period of curtailed operations might be necessary as a result of unforeseen circumstances, such as a decrease in market demand for processed uranium or vanadium. However, maintenance to prevent deterioration of facilities would still be required. In this case, DOE, state permitting agencies, and local and county officials would be notified, as appropriate, to determine actions necessary to temporarily secure plant facilities and equipment. Securing plant facilities would include measures necessary to demonstrate due diligence in ensuring preservation of human health, safety, and environmental resources. Interim shutdown activities could include the following activities:

- Establishing barriers to physical, chemical, and radiological hazards. Conditions hazardous to human health, safety, or the environment (including ore stockpiles, waste piles, open pits, mine portals, subsidence holes, and excavated surface depressions) would be fenced and posted or closed (filled) if they were not an integral part of the lease operation and would not be used in the foreseeable future. Mine openings, vents (near-vertical passages into mines that provide additional ventilation), fans, electric lines, and other support facilities would be maintained to prevent safety hazards.
- Continuing underground mine maintenance. Mines might be actively dewatered and walls might be shored, as necessary, to prevent collapse of the host sedimentary formations inside portals. Air and electrical systems would be maintained in operating condition.

- Controlling fugitive dust. This activity might include seeding disturbed areas with annual and/or perennial vegetation, watering, or applying commercially available dust suppressants.
- Controlling erosion and storm-water runoff. This activity might include constructing water bars, berms, ditches, or silt fences to control erosion and storm-water runoff.

Temporary closure might be required for access roads that could be needed at a later date. Roads would be reclaimed sufficiently to control dust and storm-water runoff, and barriers would be constructed to prevent access by other land users.

Immediately following temporary closure, those disturbed areas identified by the leaseholder as not being needed for future operations would be promptly reclaimed (1) in accordance with the reclamation provisions included in the approved Mining Plan and (2) in a manner consistent with the reclamation guidance document *Uranium Closure/Reclamation Guidelines* (BLM 1995). In addition, inventory items that might deteriorate or that have the potential for creating environmental damage (e.g., first-aid supplies, explosives, batteries, oil, and gas) would be moved off site. Hardware such as nails, pipes, and compressors that were left on site would be secured in place. Liquid or solid materials that were not approved for on-site disposal would be removed from the lease tract and disposed of at permitted facilities.

3.5.3.2 Permanent Shutdown Activities

When mining activities are completed at a location where there are no future intended lease activities, the leaseholder would be required to initiate reclamation activities (1) in accordance with the reclamation provisions included in the approved Mining Plan and (2) in a manner consistent with BLM's reclamation closure guidelines (BLM 1995).

At mine sites, surface-plant improvements would be removed in accordance with DOE and other agency requirements. Debris and waste (hazardous and nonhazardous but excluding mine-waste-rock) would be managed and transported to a permitted landfill for disposal. Pond liners and precipitated sediments would be removed from discharge/treatment ponds, transported, and disposed of at a state-approved facility. Leaseholders would be required to comply fully with applicable DOT requirements (49 CFR 100−180). Hazardous waste would be removed from the lease tracts and transported to a Resource Conservation and Recovery Act-permitted facility. Hazardous materials (those that do not qualify as a waste) would be removed from the lease tracts and disposed of in accordance with applicable state and federal regulations. Consideration would be given to recycling or returning the materials to the manufacturers.

CDOW, USFWS, and/or BLM, as appropriate, would be contacted before reclamation to ensure that wildlife species that might have taken up residence (e.g., bat or bird species listed as sensitive) would not be adversely affected by permanent shutdown activities. Ecosystem concerns associated with wetland areas would be addressed if a determination was made that wetlands were created as a result of mining operations.

Pond sediments and associated soils containing contaminants inherent in the ore would be managed as radioactive material. Pollutants, contaminants, wastes, or contaminated media that are not inherent to site geology would be removed from the site and managed as waste under state or federal regulations.

Reclamation would include recontouring the land to restore the original topography as nearly as practicable, replacing surface soil, implementing erosion-control measures, and revegetating disturbed areas with appropriate native and adapted species. Open shafts, adits, and inclines would be closed. Mine-waste-rock piles, residual ores, and other radioactive materials inherent to the site would be placed in the mine or would be graded to 3:1 slopes or less, contoured, covered with surface soil, and seeded in accordance with an approved Reclamation Plan. In areas where stockpiled surface soil material was insufficient, surface soil might be borrowed from other areas of the lease tract or from areas pre-approved by BLM. DOE would monitor reclamation success annually and would require the leaseholder to correct problems until the reclamation met DOE requirements.

End of current text

4.0 Affected Environment

This section describes the environmental setting on and near DOE's lease tracts and elements of the environment that the alternatives described in Section 3.0 may affect. Most of the land disturbances associated with the lease tracts occurred in the 1970s and 1980s during the most recent uranium boom. This section describes the lease tracts as they exist today. In this final PEA, most of the descriptions are not lease-specific but pertain to general site conditions on the DOE-managed lands. Where there are known sensitive resources, however, lease-specific issues are addressed. Table 3–2 lists site features pertaining to mining activities that are currently present on the 38 lease tracts.

4.1 Environmental Setting

DOE's lease tracts are located in the western portions of Mesa, Montrose, and San Miguel Counties in southwestern Colorado (see Figure 1−1 and Plate 1). This semiarid area is characterized by low precipitation and humidity, high evaporation, sunny days, clear nights, and extreme daily temperature changes. Annual precipitation averages 7 to 12 inches, and monthly precipitation may range from zero to several inches. Elevations of the mesas and valleys throughout the area vary from 5,500 ft above sea level in the valleys to approximately 8,000 ft above sea level on top of the higher mesas. Prevailing winds are from the southwest at speeds of 3 to 4 miles per hour; however, wind direction and velocity may vary depending on local topographic features. The lease tracts are located in four geographical areas within Mesa, Montrose, and San Miguel Counties and are referred to as the Gateway, Uravan, Paradox Valley, and Slick Rock lease tracts.

The Gateway lease tracts (26, 26A, 27, and 27A) are remote; access is via county roads from State Highway 141, and the tracts are located on the tops and side slopes of Outlaw and Calamity Mesas (Plate 1). Elevations of these tracts range from 5,700 to 7,000 ft above sea level. Surface runoff from these areas travels through Maverick and Calamity Creeks, both tributaries of the Dolores River.

Relatively resistant sandstones and conglomerates of the Burro Canyon Formation cap Calamity and Outlaw Mesas. Side slopes below the rims are formed by the mudstones, shales, and sandstones of the Brushy Basin Member and the underlying Salt Wash Member of the Morrison Formation. The primary ore-bearing zones occur in prominent sandstone units of the Salt Wash Member, where uranium and vanadium are concentrated in organic-rich regions of the sandstones. These ore-bearing units have been mined extensively for nearly 100 years. Below the Morrison Formation, in descending order, are the sandstones, siltstones, and shales of the Wanakah Formation (formerly called the Summerville Formation) and the Entrada Sandstone, Kayenta, Wingate Sandstone, and Chinle Formations. The canyon bottoms that incise these mesas and lowest slopes along the Dolores River generally consist of Pleistocene to Holocene (formerly known as Recent) stream sediments.

The Uravan lease tracts (18, 19, 19A, 20, 24, and 25) are adjacent to State Highway 141 in Montrose County, near the historical community of Uravan that has only two remaining buildings, and are located on the tops and side slopes of Spring Creek, Atkinson, and Club Mesas (Plate 1). Elevations of these tracts range from 5,700 to 6,200 ft above sea level. Two major

rivers flow in the valley bottoms below the lease tracts in this region: the Dolores River and its main tributary, the San Miguel River.

In general, the mesas are rimmed and capped by the relatively resistant Dakota Sandstone and Burro Canyon Formations. Side slopes below the rim are formed by the mudstones, shale, and sandstones of the Brushy Basin and Salt Wash Members of the Morrison Formation. The primary ore-bearing unit is the Salt Wash Member, which is composed of fluvial sandstone interbedded with mudstone. This ore-bearing member has been mined extensively. The canyon bottom and lower slopes along the Dolores and San Miguel Rivers are formed by unconsolidated fluvial deposits, the Wanakah Formation (formerly the Summerville Formation), and the Entrada Sandstone. Below the Entrada Sandstone are sandstones, siltstones, and shales of the Kayenta, Wingate, and Chinle Formations.

The Paradox Valley lease tracts (Plate 1) are in Montrose and San Miguel Counties. Paradox Valley is a broad valley that is flanked on either side by the high plateaus of Monogram Mesa and Long Park. Elevation of the valley floor is 5,500 to 5,600 ft above sea level, which is about 1,000 ft lower than the tops of the adjacent mesas. Lease tracts 5, 5A, 6, 7, 7A, and a portion of lease tracts 8 and 8A are on the steep northeast aspect of Monogram Mesa on the southwest flank of the valley. The remainder of lease tract 8 and all of lease tract 9 are located on the top of Monogram Mesa. Lease tracts 17 and 17A are located farther to the southwest on top of Radium Mountain and Wedding Bell Mountain, respectively. Lease tracts 21, 22, 22A, 23, 23A, and 23B are on the northeast flank of Paradox Valley on the Long Park plateau.

The steep northeast aspect of Monogram Mesa is formed by a series of structurally complex, faulted slump blocks composed mainly of mudstones, shale, and sandstones of the Brushy Basin and Salt Wash Members of the Morrison Formation. The Burro Canyon and Dakota Sandstone Formations form the caprock of Monogram Mesa and overlie the Morrison Formation. Geology of the Long Park plateau is similar to that of Monogram Mesa, except that the formations dip to the northeast. The lease tracts on the Long Park plateau overlie the Brushy Basin Member of the Morrison Formation.

The Slick Rock lease tracts are located near the historical community of Slick Rock in San Miguel County (Plate 1). In this area, the land surface is deeply incised by the north-flowing Dolores River and its tributaries. The Dolores River Canyon is approximately 500 ft wide at the bottom and is characterized by steep slopes and sheer cliffs. Lease tracts 13, 13A, 14, and 14A lie within the canyon or on adjacent ridges. Lease tracts 15 and 15A are located west of and above the Dolores River on the first topographic bench. Lease tracts 11 and 11A lie southwest of Slick Rock on the western flank of Summit Canyon, near the top of Summit Point. Lease tracts 10, 12, 16, and 16A lie on both sides of State Highway 141, just south of the top of Slick Rock Hill. Slick Rock lease tract elevations range from 5,700 ft above sea level along the Dolores River to nearly 8,000 ft above sea level on the mesa top east and north of Egnar, Colorado.

The floor and lower slopes of the Dolores River Canyon consist of unconsolidated fluvial deposits and alluvial/colluvial deposits, respectively. Sediments on the canyon floor are underlain by the Entrada Sandstone. Bedrock formations that form the canyon walls and adjoining mesas include, in ascending order, the Salt Wash and Brushy Basin Members of the Morrison Formation, the Burro Canyon Formation, and the Dakota Sandstone.

4.2 Socioeconomics

4.2.1 Population

As shown on Plate 1, the uranium lease tracts are located in western Colorado in remote parts of Mesa, Montrose, and San Miguel Counties. Only 17 residences exist within 1 mile of the 38 lease tracts; seven of the 17 residences are adjacent to the 13 existing leases. Except for the cities of Montrose and Grand Junction, which are each more than 50 miles from the nearest lease tract, the region is sparsely populated and has few towns. Table 4–1 presents the 2000 census population of the counties and towns in the region within a 1- to 1.5-hour commute to a lease tract.

Table 4–1. Population in the Region of the Uranium Lease Tracts

County	City/Town	Population[a]
Mesa		116,255
	Grand Junction	41,986
Montrose		33,432
	Montrose	12,344
	Naturita	635
	Nucla	734
San Miguel		6,594
	Norwood	438
Dolores		1,844
	Dove Creek	698
Ouray		3,742
	Ridgway	713

[a]Census Bureau 2004.

Cañon City, Colorado, and Blanding, Utah, the cities nearest the two ore-processing mills, have populations of approximately 15,431 and 3,162, respectively. Cañon City is the largest city in Fremont County, which has a population of approximately 46,145. Blanding is the largest town in San Juan County, which has a population of approximately 14,413.

4.2.2 Housing

Table 4–2 shows total housing units and vacancy rates for the counties and towns within the region of the uranium lease tracts.

Table 4–2. Housing Availability in the Region of the Uranium Lease Tracts

County	City/Town	Housing Units			Percent Vacancy		
		2000[a]	2003[b]	Percent Increase	2000[a]	2003[b]	Difference in Percentage Points
Mesa		48,427	53,437	10.4	5.4	7.6	+2.2
	Grand Junction	18,784	21,633	13.2	4.9	8.2	+3.3
Montrose		14,202	15,191	7.0	8.2	7.1	−1.1
	Montrose	5,581	6,476	16.0	6.0	4.2	−1.8
	Naturita	314	323	2.9	18.2	18.0	−0.2
	Nucla	369	369	0	15.7	15.7	0
San Miguel		5,197	5,575	7.3	42.0	41.1	−0.9
	Norwood	258	278	7.8	24.4	23.4	−1.0
Dolores		1,193	1,217	2.0	34.2	35.3	+1.1
	Dove Creek	326	326	0	12.6	13.8	+0.8
Ouray		2,146	2,415	12.5	26.6	30.0	+4.0
	Ridgway	318	352	10.7	10.4	13.7	+3.3

[a]U.S. Census Bureau 2004.
[b]CDO 2005.

From 2000 to 2003, the available housing units increased in the more populated counties and cities, while little- to-no increase in housing units occurred in the smaller counties and towns of the region. The highest vacancy rates occurred in the rural counties and rural towns nearest the uranium lease tracts, and the vacancy rates changed only slightly between 2000 and 2003 with the exception of Mesa and Montrose Counties.

4.2.3 Employment and Economic Structure

As shown on Table 4–3, unemployment in Mesa, Montrose, and San Miguel Counties in which the uranium lease tracts are located was slightly below the Colorado average of 5.2 percent in June 2005. The unemployment rates in Fremont and San Juan counties, where the ore-processing mills are located, were higher than the state averages. Except for San Miguel County, family and individual incomes in 2000 were lower than the state averages in these rural counties; the higher income in San Miguel County is attributable to the higher incomes of residents in the resort town of Telluride.

Table 4–3. Unemployment and Income Characteristics in the Region of the Uranium Lease Tracts

State	County	Percent Unemployment (June 2005)	Median Family Income[d] (dollars)	Per Capita Income[d] (dollars)
Colorado[a]		5.2	55,883	24,049
	Mesa	4.9	43,009	18,715
	Montrose	4.5	40,849	17,158
	San Miguel	3.9	60,417	35,329
	Dolores	5.8	38,000	17,106
	Ouray	2.9	49,776	24,335
	Fremont	6.2	42,303	17,420
Utah[b]		4.7	51,022	18,185
	San Juan	11.4[c]	31,673	10,229

[a]CDLE 2005.
[b]Utah Department of Workforce Services.
[c]Most recent county data June 2004.
[d]U.S. Census Bureau 2004.

In 2000, mining represented a small percentage of the overall workforce in and around the lease tract areas (Table 4–4). More significant percentages of the workforce in the region are represented by construction; the retail trade; education, health services, and social services; and arts, entertainment, recreation, accommodations, and food service.

Table 4–4. Workforce Characteristics in the Region of the Uranium Lease Tracts[a]

Industry	Percentages by County						
	Mesa	Montrose	San Miguel	Dolores	Ouray	Freemont	San Juan
Agriculture, forestry, fishing and hunting, and mining	3.0	6.0	2.5	12.3	6.2	3.3	7.3
Construction	10.4	15.0	16.2	17.1	18.6	10.7	10.1
Manufacturing	7.2	8.4	2.7	3.2	5.6	7.8	5.1
Wholesale trade	3.8	2.5	1.2	2.7	1.9	1.8	1.4
Retail trade	13.4	13.6	10.7	14.1	8.9	11.8	10.8
Transportation, warehousing, and utilities	5.5	5.1	4.0	4.3	2.1	4.4	3.7
Information management	2.6	1.3	2.8	1.7	2.2	2.2	1.1
Finance, insurance, real estate, and rental leasing	6.0	4.4	11.1	4.5	7.9	4.6	2.6
Professional, scientific, management, administrative, and waste management services	8.0	7.4	7.2	5.9	10.1	5.2	4.1
Educational, health, and social services	20.7	15.5	7.7	15.2	13.7	18.8	28.1
Arts, entertainment, recreation, accommodations, and food service	9.7	10.0	26.2	7.6	14.1	8.6	13.2
Other services	5.3	6.1	3.5	5.7	4.4	5.2	3.4
Public administration	4.4	4.6	4.2	5.7	4.2	15.6	9.1

[a]U.S. Census Bureau 2004.

In Cañon City, the largest employers are the Colorado Department of Corrections and the Federal Bureau of Prisons. The Cotter Corporation milling facility in Cañon City would employ approximately 140 people during full production operations for conventional uranium/vanadium ores; however, the facility only employs 34 people in its current status (standby/maintenance).

In San Juan County, Utah, the largest employers are local, state, and federal governments; the oil and gas industries; and agriculture. The International Uranium Corporation milling facility at White Mesa would employ approximately 140 people during full production operations for conventional uranium/vanadium ores; however, the facility employs less than 50 people in its current status (processing alternate feed materials).

4.3 Transportation

Numerous unimproved roads constructed on public lands exist on and around the lease tracts. Many of these roads were constructed by the mining and ranching industries before BLM developed regulations for authorizing road construction and use. However, many of these roads are currently maintained by county agencies or BLM.

Two major roadways traverse the lease tract areas: State Highway 141 and State Highway 90 (see Figures 3−2 and 3−3). State Highway 141 is the primary access to the Uravan, Slick Rock, and Gateway lease tracts, and State Highway 90 is the primary access to the Paradox Valley lease tracts. Numerous county roads serve as the collector routes from the lease tracts to these state highways. Although most of these roads pass through uninhabited public lands, 15 residences among the 38 lease tracts could be affected by ore shipments traveling these haul roads en route to the state highways and, subsequently, to the ore-processing mills. Routes that pass 13 of the 15 residences have been used in the last 10 years to haul uranium ore, and all the routes have been used to haul ore in the last 30 years.

Subsection 3.5.2.2, “Mine Development and Operation,” describes the haul routes that haul trucks would take to transport ore from the lease tracts to the processing mills. On the basis of Colorado Department of Transportation (CDOT) highway statistics for calendar year 2000 (CDOT 2000), the fatality and injury rates from accidents along all state highways were 0.015 fatality per million vehicle miles and 0.63 injury per million vehicle miles. For total rural state highways, which represent the bulk of the haul routes, the fatality rate is about the same (0.018), and the accident rate is about half that of total highways (0.36 per million vehicle miles).

Information from CDOT and Utah DOT indicate that the majority of accidents occur at intersections and on curved sections of the highways. Primary locations of accidents along the haul routes include (1) intersections on U.S. Highway 50 in Montrose, (2) curved sections of U.S. Highway 50 approximately 10 miles east of Montrose, (3) curved sections of U.S. Highway 50 on Monarch Pass, (4) intersections on U.S. Highway 50 within 5 miles of Cañon City, (5) the intersection of U.S. Highways 191 and 491 in Monticello, (6) steep, curved sections of State Highways 46 and 90 east of La Sal, and (7) the 18-mile section of U.S. Highway 191 immediately south of Monticello.

Several perennial water sources occur along the haul routes. The San Miguel River parallels State Highway 141 from Uravan to Naturita. The Dolores River parallels State Highway 141 for

approximately 1 mile at Slick Rock, and again for several miles from its confluence with the San Miguel River to Gateway. State Highway 90 crosses the Dolores River at Bedrock.

The San Miguel River parallels State Highway 145 between Norwood and Placerville. Leopard Creek parallels State Highway 62 from Placerville to the top of Dallas Divide. The Uncompahgre River parallels U.S. Highway 550 between Ridgway and Montrose, and Ridgway Reservoir parallels the highway for several miles north of Ridgway. U.S. Highway 50 passes near the Black Canyon of the Gunnison National Park just east of Montrose. Additionally, it passes through the Curecanti National Recreational Area, parallels the Blue Mesa Reservoir between Montrose and Gunnison along a portion of the West Elk Scenic & Historic Byway, and finally parallels portions of the Gunnison River further eastward into the town of Gunnison. The Arkansas River parallels U.S. Highway 50 for approximately 50 miles between Salida and Cañon City.

4.4 Land Use

Land uses on and around the lease tracts include mining, oil and gas exploration and production, timber harvesting, recreation, agriculture, and grazing. All land uses are subject to valid existing rights, which may be conveyed by title, deed, right-of-way, permit, withdrawal, or any other legally recognized instrument. DOE and BLM administer the lands within the lease tract boundaries.

Lands adjacent to and access roads through the lease tracts provide the public with multiple use opportunities. Sections of the more active lease tracts, such as lease tracts in the Paradox Valley group, have been substantially mined and are restricted from public access by means of locked gates. Other tracts are not fenced and remain open for other surface and subsurface uses. BLM has permitted access to the DOE lease tracts through BLM lands by granting rights-of-way for roads, utilities, and other surface uses such as grazing. BLM also has granted permits to allow leaseholders to use public lands adjacent to the lease tracts for activities associated with lease operations.

The public uses many of the unimproved roads on and around the lease tracts for recreational activities such as off-highway vehicles and hunting. Local residents use these roads for grazing and general ranching. In addition, roads around and near some of the lease tracts are receiving more use because of increased mineral and oil and gas exploration and development.

4.4.1 Mining

Considerable mineral exploration and development has occurred historically in the lease tract areas. Mined minerals have included coal, oil and gas, sand and gravel, radium, uranium, and vanadium. Uranium and vanadium mining and oil and gas exploration and development are the predominant mineral activities in the lease tract areas.

Uranium and vanadium mineralization occurs in the Burro Canyon, Morrison, Entrada, and Chinle Formations within the Uravan Mineral Belt, which extends from Gateway to Slick Rock, Colorado. BLM has estimated that approximately 66,000 unpatented mining claims existed historically in the vicinity of the DOE lease tracts, the majority of which are in areas of known or suspected uranium and vanadium mineralization (BLM 1984). In 2005, BLM processed more

than 2,300 new claims for uranium mining throughout Colorado. BLM estimates that as of January 2007 there were approximately 4,800 uranium claims in Mesa, Montrose, and San Miguel Counties, not including the DOE lease tracts. Whether the claims on BLM lands are active or inactive is not known. BLM also estimates that approximately 95 percent of Colorado's mined uranium comes from public lands, excluding the DOE lease tracts. The DOE lease tracts have produced approximately 6.75 million pounds of uranium and 34.2 million pounds of vanadium since 1975. Very little production occurred on DOE's lease tracts during the 1990s. As the world demand for uranium and vanadium increased during the last 3 years, the market prices for both uranium and vanadium increased substantially. During that time, mining activities were resumed on seven lease tracts. If this favorable economic trend continues, the amount of minerals mined and milled in the region will also increase accordingly.

Oil and gas production on public lands near the DOE lease tracts is concentrated in San Miguel County along the Colorado-Utah border in the Paradox Basin. Known oil and gas reserves also are located to the east and south of the Slick Rock leases. As the demand for oil and gas increases, the requests for permits on BLM lands increases accordingly.

4.4.2 Recreation

The vast majority of BLM lands near the DOE lease tracts are accessible to the public for off-highway vehicle use, mountain biking, hiking, hunting, and other recreational uses. In the vicinity of the DOE lease tracts, BLM has categorized public lands into two types of recreational management areas: Special Recreation Management Areas (SRMAs) and Extensive Recreation Management Areas (ERMAs). SRMAs are areas where recreation is recognized as the principal land-use management objective. ERMAs are areas where recreation is not the principal objective, but it is considered along with other uses under a multiple land-use management objective and, as such, ERMAs receive only custodial care.

The Dolores River Canyon is the only SRMA that is near any of the DOE lease tracts. It extends from McPhee Reservoir north of the town of Dolores 104 miles north to the town of Bedrock. Portions of DOE lease tracts 13, 13A, and 14 lie within the Dolores River Canyon SRMA. Although there are several mining operations (both currently permitted and historical) on these lease tracts, none of the currently permitted operations are being actively mined at this time. This SRMA includes one of the more popular rafting and canoeing rivers in the southwestern United States. The BLM and the U.S. Forest Service have constructed recreational sites along this SRMA. The peak period for river activity is from April 30 to June 15 during spring runoff. All other BLM lands surrounding the lease tracts are managed as ERMAs. See also Sections 4.13, "Wilderness," and Section 4.15, "Wild and Scenic Rivers."

The Gateway area and surrounding Unaweep Canyon have recently become the focus of targeted development. It is the intent of a private landowner to promote the area as a destination resort and encourage recreational activities in the area. BLM is currently in the process of conducting inventories of recreational resources to determine if an SRMA designation is warranted. As the resort and community are further developed, it is recognized that additional tourism and traffic would result. To date, no studies have been conducted, nor have projections been made to identify the magnitude of the increased activity.

4.4.3 Timber Harvesting

Commercial forests, such as those made up of ponderosa pine, Douglas fir, and Engelmann spruce, are very limited in the lease tract areas because of minimal rainfall, steep topography, and relatively low elevations. However, lease tracts and adjoining public lands provide piñon pine and juniper trees for harvesting as firewood and fence posts.

4.4.4 Agriculture and Grazing

No prime or unique farmlands as defined in 7 CFR 657 exist on the DOE lease tracts. The lease tracts provide minimal forage for domestic livestock and do not support concentrated grazing. As reported in the 1995 EA (DOE 1995a), BLM has determined that, in the areas of the DOE lease tracts, 30 to 50 acres of forage compose one animal unit month (AUM). Nearly all the lease tracts are within areas designated by BLM as Livestock Management Areas.

4.5 Air Quality

Under the Prevention of Significant Deterioration (PSD) doctrine, EPA has adopted three standards/classifications for ambient air quality: Class I standards are intended to preserve the quality of areas with pristine air quality (most restrictive); Class II permits moderate air quality deterioration, and Class III (the least restrictive) sets an absolute limit beyond which degradation is not allowed and is designed to set standards that are protective of human health. The DOE lease tracts are designated as a PSD Class II attainment area by EPA and the State of Colorado. The baseline ambient air quality on the lease tracts meets all federal air-quality standards.

4.6 Ground Water

All the lease tracts are considered to be in the alluvial Dolores River Basin, which overlies a substantial portion of the sedimentary Paradox Basin (CGS 2003). The Dolores River Basin is about 95 miles long and covers about 5,300 square miles in Montezuma, Dolores, San Miguel, Montrose, and Mesa Counties. Locally, alluvial ground water is used for domestic water, stock water, and minor irrigation (CGS 2003).

The alluvium is composed of typical Quaternary deposits of gravel, sand, silts, clays, and various mixtures of these. The mean depth of alluvial wells is 66 ft. The alluvial aquifer is capable of yielding only low to moderate quantities of water. More than 90 percent of recorded wells yield less than 50 gallons per minute, and the average yield is only 22 gallons per minute (CGS 2003).

Ground water in the Dolores Basin alluvium has concentrations of sulfate and total dissolved solids (TDS) that often exceed EPA's secondary drinking water standards established in 40 CFR 143.3 of 250 milligrams per liter (mg/L) and 500 mg/L, respectively. Discharge from the underlying Paradox Basin salt formations is thought to be the source of this lower quality water (CGS 2003). Studies by the U.S. Geological Survey have shown that the Dolores River significantly increases in TDS content as it flows through the Paradox Valley near Bedrock, Colorado (Chafin 2003).

Most bedrock wells in the area are completed in the Mesozoic Navajo Sandstone Formation. No known ground water supplies are developed in the lower Paleozoic aquifers because of their

depth and high salinity. Ground water concentrations of TDS, chloride, and sulfate generally increase with depth in bedrock units. Sulfate and TDS concentrations in ground water of the Dakota Sandstone, Burro Canyon, and Morrison Formations (which overlie the Navajo Sandstone) exceed EPA secondary drinking water standards. Water from shallower portions of the Navajo Sandstone (less than 500 ft below ground surface) meets drinking water standards and is the most frequently targeted unit for potable water in the area (CGS 2003). Water from deeper portions of the Navajo Sandstone tends to be highly saline.

No significant ground water resources are known or expected to occur on the Gateway or Uravan lease tracts. A very small amount of water was encountered in the Brushy Basin Member of the Morrison Formation during construction of the original decline at lease tract 18 on Spring Creek Mesa near Uravan, but other than the mine at that lease tract, the area mines were dry.

For the Paradox lease tracts, some ground water has been encountered in some of the lease tract mines located in the Monogram Mesa area. During periods of inactivity, this water has accumulated in the lower reaches of various mine workings; however, during periods of normal mining operations, the presence and impacts of water in these mines has been contained and controlled. In many instances, the water encountered is used for drilling activities and dust suppression. Ground water encountered in the underground mines on lease tracts 7 and 9 prompted the leaseholder to permit and install separate mine-water treatment systems for each mine. At lease tract 7, leaseholder personnel consider the ground water to be perched (White 2006). The water has elevated concentrations of radionuclides, TDS, and sulfate. This elevated radioactivity is attributed to the presence of uranium ore and uranium decay series radionuclides in the sandstone beds of the Salt Wash Member of the Morrison Formation. The high levels of TDS and sulfate suggest that local ground water does not receive any appreciable recharge from precipitation (Cotter Corporation 1979). At lease tract 9, leaseholder personnel indicate that the source of the ground water is probably the interface of the alluvium and bedrock and that the water is entering the mine workings via exploratory boreholes from the surface (White 2006). In addition, one seep occurs in the Brushy Basin Member of the Morrison Formation, and traces of water are found perched above clays in scours found in the Salt Wash Member of the Morrison Formation.

No significant ground water resources are known or expected to occur on the Slick Rock lease tracts with the exception of lease tract 13. Mines on this lease tract contain workings that lie downdip of and below the Dolores River. These workings contain water in their lower reaches; but the presence and impacts of water in these mines was contained and controlled during the most recent operation of the mines. As noted previously, in many instances, the water encountered is used for drilling activities and dust suppression.

4.7 Surface Water

In 1976, sections of the Dolores River downstream from McPhee Dam were evaluated for wild and scenic river status and were recommended for inclusion into the Wild and Scenic Rivers System. However, Congress did not take any designation action, and the proposed withdrawal associated with the river corridor expired in 1981 (BLM 1984).

The Dolores River Canyon contains unique ecosystems and historic and geologic features and is advertised nationally as a popular rafting destination that provides the solitude sought by rafters.

The 1985 Resource Management Plan (BLM 1985) for the San Juan−San Miguel Resource Area included protection for the river under the BLM Special Recreation Management Area designation. BLM continues to manage the Dolores River for recreational opportunities and as a designated wild and scenic river, even though it does not have federal status as such.

BLM also manages sections of the San Miguel River for wild and scenic values, although it also does not carry federal status.

The major rivers in the Uravan lease tract area are the Dolores River and its largest tributary, the San Miguel River. Neither river is contiguous with these lease tracts. Only ephemeral streams, which flow in response to precipitation events, occur on the lease tracts. These ephemeral drainages may contribute flow to the Dolores and San Miguel Rivers during precipitation events.

Both the Dolores and San Miguel Rivers have large seasonal fluctuations in flow, with high runoff in spring and low flow after midsummer. The flow of the Dolores River is regulated by McPhee Dam and upstream irrigation diversions. The average flow of the San Miguel River at Uravan, 4 miles above the confluence with the Dolores River, is estimated at 107,500 acre-feet annually (U.S. Bureau of Reclamation 1978).

The water quality of the rivers varies considerably on a seasonal basis because of fluctuations in runoff and in the volume of brine ground water entering the Dolores River as it passes through Paradox Valley. From 1971 to 1976, concentrations of TDS in water samples collected from the Dolores River just above the confluence with the San Miguel River were greater than 12,000 mg/L; the primary constituents included bicarbonate, calcium, chloride, magnesium, potassium, sodium, and sulfate (U.S. Bureau of Reclamation 1978). Below the confluence, salinity of the Dolores River decreases considerably during periods of low flow because of the inflow of comparatively fresh water from the San Miguel River.

The surface water system in the area of Paradox Valley lease tracts consists of several ephemeral streams that flow only during wet periods of the year and after unusually heavy rains. Runoff from the local watershed along the northeast flank of Monogram Mesa drains toward East Paradox Creek and also recharges the alluvial aquifer within Paradox Valley. Surface runoff in the Long Park plateau area flows to the northeast in existing drainages toward the San Miguel River. Surface water originating from lease tract 9, on the southwestern edge of Monogram Mesa, flows into tributaries of Bull Canyon, as does runoff from lease tracts 17 and 17A on Radium and Wedding Bell Mountains. Because of the semiarid conditions in the Paradox Valley area, significant surface water flows in ephemeral streams do not occur, and it is unlikely that flow from an ephemeral stream ever reaches an active stream.

Paradox Valley lease tracts 7 and 9 have mine-water treatment systems (ponds) to receive discharge water from the underground mines. These ponds were constructed in accordance with applicable regulations. Those regulations required that the ponds be adequately lined, fenced, and possibly netted to ensure that wildlife and livestock and the environment are not adversely affected. Water from these treatment systems is discharged to the environment in accordance with a state water discharge permit and National Pollutant Discharge Elimination System requirements.

The only significant surface water source in the vicinity of the Slick Rock lease tracts is the Dolores River, which is contiguous with lease tracts 13, 13A, and 14. The flow of the Dolores River in this area is regulated primarily by McPhee Dam, located approximately 46 miles upstream. Flow also is affected by numerous upstream irrigation diversions. Several upstream tributaries, including Disappointment Creek, contribute high volumes of snowmelt runoff to the Dolores River during late spring, resulting in maximum flow rates that can exceed 5,500 cubic feet per second (Jacobs Engineering Group Inc. 1994). The lease tracts have numerous ephemeral drainages that may contribute flow to the Dolores River during summer thunderstorms and spring snowmelt.

In the area of the Slick Rock lease tracts, the Dolores River has been classified as suitable for domestic water supply and agricultural purposes by CDPHE; however, withdrawals of water from the river for these purposes are minimal. In addition, CDPHE has rated the Dolores River as Class 1 for recreational waters (e.g., suitable for rafting) and as Class 1 for cold-water aquatic life in some portions downstream of McPhee Dam (CDPHE 2002).

The Dolores River is the only significant surface water body near the Gateway lease tracts; the river is not contiguous with the lease areas. Only ephemeral streams, which flow in response to precipitation events, occur on the lease tracts and contribute flow to the Dolores River.

4.8 Soils

Lease-specific soils information is available from the BLM Grand Junction, Uncompahgre, and San Juan Field Offices. In general, soils throughout the four DOE lease tract areas vary in relation to the underlying bedrock types. Soils on the tops of mesas underlain by sandstones are sandy and loamy; those on mesa side slopes underlain by shale, mudstones, and sandstones vary from sandy to clayey; and those along floodplains are sandy and silty. The potential for wind and water erosion of soils on mesa tops and floodplains is moderate; however, the potential for soil erosion on mesa side slopes is severe.

BLM designates the side slopes in Paradox Valley as Erosion Management Areas because of their inherently high erosion rates (BLM 1984). All the Paradox Valley lease tracts are within or border these areas, with the exception of lease tracts 17 and 17A. No Erosion Management Areas are identified in the Gateway, Uravan, or Slick Rock lease tract areas.

4.9 Vegetation

Sagebrush-grass and piñon-juniper plant communities dominate the terrain throughout the lease tract areas. Table B−1 in Appendix B lists the common and scientific names of plants that occur on or near the lease tracts. Higher elevations support species associated with the sagebrush-grass and piñon-juniper plant communities, such as single-leaf ash, fringed sagebrush, Utah serviceberry, mountain mahogany, antelope bitterbrush, mormon tea, forestiera, Gambel's oak, skunkbush sumac, grassy rockgoldenrod, needle and thread, slender wheatgrass, and saline wildrye. Lower elevations and drier sites support species such as fourwing saltbush, winterfat, bud sagebrush, saltbush, hairy goldenaster, milkvetch, hairspine pricklypear, greasewood, skeletonplant, buckwheat, Spanish bayonet, Colorado four o'clock, scarlet globemallow, primrose, Indian ricegrass, galleta grass, blue grama, alkali sacaton, Sandberg bluegrass, bottlebrush squirreltail, sand dropseed, and western wheatgrass. Lease tracts 8, 23, 23A, and 23B

have moister microclimates (niches where water is more abundant) and accommodate ponderosa pines.

Cryptobiotic soil crusts, which consist of cyanobacteria, lichens, and mosses, are an important component of the cold desert ecosystems of the Colorado Plateau. These crusts enhance soil stability, reduce water runoff, increase soil nutrient content, and enhance seed germination and the establishment of plants (Belnap 1992). Although the lease tracts have not been surveyed for cryptobiotic soil crusts, undisturbed areas throughout the lease tract areas are expected to support extensive cryptobiotic growth.

In disturbed areas, rubber rabbitbrush, green rabbitbrush, broom snakeweed, and curlycup gumweed abound; however, native species such as fourwing saltbush, big sagebrush, piñon, and Utah juniper are increasing in some of these areas. Many unreclaimed sites support weedy species, such as common sunflower, prickly lettuce, tall tumblemustard, curly dock, foxtail barley, and Colorado state noxious weeds, including cheatgrass, redstem stork's bill, herb sophia, halogeton, common kochia, Russian thistle, and saltcedar. Three "top ten" noxious weeds (as defined by the State of Colorado)—Russian knapweed, hoary cress, and field bindweed—are found throughout the area.

Two Paradox Valley lease tracts (7 and 9) have small areas of vegetation that are characteristic of a wetlands ecosystem. Discharge water from containment ponds supports vegetation that includes broadleaf cattails, Fremont cottonwoods, saltcedar, foxtail barley, annual rabbitsfoot grass, and reed canarygrass.

The Dolores River flows through Slick Rock lease tracts 13, 13A, and 14, and Calamity Creek flows across and between Gateway lease tracts 26 and 27. Although vegetation surveys have not been conducted in areas adjacent to these waterways, it is expected that these areas contain willows, saltcedar, and Russian olive. Stands of Fremont cottonwood and associated riparian and wetland vegetation also are likely to occur.

Threatened and endangered plant species are not known to exist on any of the lease tracts, but Uinta Basin hookless cactus, a federally listed threatened species, could potentially occur. Nine sensitive plant species could also potentially occur on the lease tracts. BLM-listed sensitive species include the kachina daisy, Paradox breadroot, Paradox lupine, Grand Junction milkvetch, Dolores River skeletonplant, Naturita milkvetch, San Rafael milkvetch, Eastwood monkey flower, and sandstone milkvetch. There are known occurrences of and known habitat for Naturita milkvetch and Dolores River skeletonplant on lease tract 13. The Forest Service lists helleborine and Wetherill's milkvetch as sensitive. On most of the lease tracts, sensitive species are unlikely to occur because the microhabitats that support these species are not known to exist. However, Paradox lupine is known to occur very near the lease tracts in the Paradox Valley and near Uravan. Known populations of Naturita milkvetch have been found near the Paradox valley lease tracts and may also occur near Uravan. San Rafael milkvetch occurs very near the Uravan lease tracts. Table 4–5 presents a summary of listed plant species in the lease tract areas.

The Colorado Natural Heritage Program has identified Potential Conservation Areas (PCAs), which represent a best estimate of the primary area supporting the long-term survival of threatened, endangered, and sensitive plant and animal species. PCAs are also designed to protect good condition or rare plant communities or occurrences of rare or unique animal

species. Although state regulations do not protect the habitats in a PCA, the federally listed and state-listed species that occur within a PCA are protected by federal and state laws. Active lease tracts that overlap PCAs include undisturbed portions of lease tracts 13 and 13A along the Dolores River. The expanded acreage of active lease tract 18 also overlaps a PCA. Inactive lease tracts with PCA overlap include tracts 14, 14A, 16, 16A, 19A (expanded acreage only), 20, and 24.

Table 4–5. Federally Listed and State-Listed, Endangered, Threatened, and Sensitive Plant Species Potentially Occurring on Lease Tracts

Common Name	Scientific Name	Status[a]	Occurrence on Lease Tracts
Dolores River skeletonplant	*Lygodesmia doloresensis*	Sensitive (B)	Known occurrences of habitat for this species on lease tract 13. Could potentially occur on other tracts.
Eastwood's monkeyflower	*Mimulus eastwoodiae*	Sensitive (B)	Could potentially occur.
Grand Junction milkvetch	*Astragalus linifolius*	Sensitive (B)	Could potentially occur.
Helleborine	*Epipactis gigantea*	Sensitive (U)	Could potentially occur.
Kachina daisy	*Erigeron kachinensis*	Sensitive (B)	Could potentially occur.
Naturita milkvetch	*Astragalus naturitensis*	Sensitive (B)	Known occurrences of and habitat for this species on lease tract 13 near Paradox Valley lease tracts and near Uravan.
Paradox breadroot	*Pediomelum aromaticum*	Sensitive (B)	Could potentially occur.
Paradox lupine	*Lupinus crassus*	Sensitive (B)	Occurs near Paradox Valley lease tracts and near Uravan.
San Rafael milkvetch	*Astragalus rafaelensis*	Sensitive (B)	Occurs very near Uravan lease tracts.
Sandstone milkvetch	*Astragalus sesquiflorus*	Sensitive (B)	Could potentially occur.
Uinta Basin hookless cactus	*Sclerocactus glaucus*	Threatened (F)	Not known to occur on any lease tracts but potentially could.
Wetherill's milkvetch	*Astragalus wetherillii*	Sensitive (U)	Could potentially occur.

[a]F = federally listed B = BLM sensitive species U = U.S. Forest Service sensitive species

4.10 Wildlife

Wildlife expected to inhabit the lease tracts is typical of that found in the Colorado Plateau region. Table B−2 in Appendix B lists the species that are likely to inhabit the lease tracts. General information on wildlife in the region is published in the *San Juan/San Miguel Resource Management Plan* (BLM 1984) and the *Mesa Creek Coordinated Resource Management Plan* (BLM 1993).

Table 4–6 lists threatened, endangered, and sensitive wildlife species (including candidate species) that could occur within Mesa, Montrose, and San Miguel Counties (Colorado Natural Heritage Database 2005). The table also describes the potential for occurrence on the lease tracts.

There is no designated critical habitat for endangered species within the program area. However, critical habitat does exist for threatened and endangered fish downstream from the program area.

Other species that occur on the lease tracts are also of concern because their habitat could be affected by uranium-mining activities. These species include mule deer, elk, pronghorn antelope, desert bighorn sheep, several species of bats, and migratory birds.

Table 4–6. Federally Listed and State-Listed Threatened, Endangered, and Sensitive Wildlife Species Potentially Occurring on Lease Tracts

Category	Common Name	Scientific Name	Status[a]	Occurrence on Lease Tracts
Birds	Bald eagle	*Haliaeetus leucocephalus*	Threatened (F,S)	Bald eagles winter in riparian habitat along the Dolores River and in Dry Creek Basin. A winter nocturnal roost area is located in Disappointment Valley. Eagles probably forage for carrion in deer and elk winter-concentration areas such as Atkinson Mesa (lease tracts 18, 19, 19A and 20), Disappointment Valley (lease tracts 13, 13A, and 14), Paradox Valley (lease tracts 21, 22A, and 23A), Monogram Mesa (lease tracts 5, 6, 7, 7A, 8, and 9), and Calamity Mesa (lease tracts 26, 26A, 27, and 27A).
	Gunnison sage grouse	*Centrocercus minimus*	Candidate (S) Sensitive (B,U)	Gunnison sage grouse potentially occur within Mesa, Montrose, or San Juan Counties. Occupied habitat for this species overlaps with the western portion of lease tract 9.
	Yellow-billed cuckoo	*Coccyzus americanus*	Candidate (F) Sensitive (B, U)	This species inhabits cottonwood-dominated riparian areas. There is a small chance they may occupy cottonwood-dominated stretches of the Dolores River on or near lease tracts.
	Northern goshawk	*Accipiter gentiles*	Sensitive (B,U)	Calamity and Outlaw Mesas may be a foraging area for this species, but nesting does not occur in the area.
	Peregrine falcon	*Falco peregrinus*	Candidate (S) Sensitive (U)	Peregrine falcons nest close to Paradox Valley lease tracts.
	Burrowing owl	*Athene cunicularia*	Threatened (S) Sensitive (U)	This species may occur in association with prairie dog towns on or near the Gateway tracts (26, 26A, 27, and 27A).
	Ferruginous hawk	*Buteo regalis*	Candidate (S) Sensitive (B,U)	This species may use portions of the lease tracts during winter migration.
Mammals	Black-footed ferret	*Mustela nigripes*	Endangered (F, S)	Black-footed ferrets could, but are not known to, occur on some of the lease tracts that support prairie dog towns. The lease tracts have not been surveyed for prairie dog towns that might meet criteria for ferret habitat.
	Townsend's big-eared bat	*Plecotus townsendii*	Candidate (S), Sensitive (B, U)	This species is known to use uranium mines in Colorado and may occur on any of the lease tracts.
	Spotted bat	*Euderma maculatum*	Sensitive (B, U)	This species is known to use uranium mines in Colorado. Spotted bats are likely to occur on lease tracts that contain sandstone cliffs and outcroppings. Because they are crevice-roosters rather than cave-roosters, it is unlikely that they would occupy any of the mines, but they could use other habitat on the tracts.
	Fringed myotis	*Myotis thysanodes*	Sensitive (B)	This species is known to use uranium mines in Colorado and may occur on any of the lease tracts.

Table 4–6 (continued). Federally Listed and State-Listed Threatened, Endangered, and Sensitive Wildlife Species Potentially Occurring on Lease Tracts

Category	Common Name	Scientific Name	Status[a]	Occurrence on Lease Tracts
Fish	Colorado pikeminnow	*Ptychocheilus lucius*	Endangered (F) Threatened (S)	The Colorado pikeminnow does not occur on any of the lease tracts; however, it could inhabit downstream areas, including the Dolores River, which flows through lease tracts 13A, 13, and 14.
	Razorback sucker	*Xyrauchen texanus*	Endangered (F, S)	The razorback sucker does not occur on any of the lease tracts; however, it could inhabit the Colorado River downstream from the Dolores River, which flows through lease tracts 13A, 13, and 14.
	Humpback chub	*Gila cypha*	Endangered (F) Threatened (S)	The humpback chub does not occur on any of the lease tracts; however, it could inhabit the Colorado River downstream from the Dolores River, which flows through lease tracts 13A, 13, and 14.
	Bonytail	*Gila elegans*	Endangered (F, S)	The bonytail does not occur on any of the lease tracts; however, it could inhabit the Colorado River downstream from the Dolores River, which flows through lease tracts 13A, 13, and 14.
	Roundtail chub	*Gila robusta*	Candidate (S) Sensitive (B, U)	The roundtail chub does not occur on any of the lease tracts; however, it could inhabit downstream areas, including the Dolores River, which flows through lease tracts 13A, 13, and 14.
	Flannelmouth sucker	*Catostomas latipinnis*	Sensitive (B, U)	The flannelmouth sucker does not occur on any of the lease tracts; however, it could inhabit downstream areas, including the Dolores River, which flows through lease tracts 13A, 13, and 14.
Reptiles and Amphibians	Midget faded rattlesnake	*Crotalus oreganus concolor*	Candidate (S) Sensitive (B)	This species would be expected to inhabit abandoned mines and structures in the area of the lease tracts. The range and status of this species is currently under discussion.
	Leopard lizard	*Gambelina wislizenii*	Candidate (S) Sensitive (B)	This species may occur in semi-desert areas on or near lease tracts.
	Leopard frog	*Rana pipiens*	Candidate (S) Sensitive (B, U)	This species is associated with wetland types that do not occur on the lease tracts.

[a]F = federally listed, S = state listed, B = BLM sensitive species, U = U.S. Forest Service sensitive species

Mule Deer and Elk—All lease tracts contain habitat that is used as winter range for mule deer and elk. As reported in DOE's 1995 EA (DOE 1995a), several of the lease tracts occur within important mule deer winter habitat. Atkinson and Spring Creek Mesas (lease tracts 18, 19, 19A, and 20) are one of the primary big game wintering areas for the west side of the Uncompahgre Plateau. Other major wintering areas include Disappointment Valley (lease tracts 13, 13A, and 14), Paradox Valley (lease tracts 21, 22A, and 23A), and Monogram Mesa (lease tracts 5, 6, 7, 7A, 8, and 9). Disappointment Valley, which includes lease tracts 13, 13A, and 14, is a major winter concentration area for elk populations. Although critical range does not occur on Calamity and Outlaw Mesas, access to the lease tracts may pass through critical range immediately to the north and south of the mesas for both deer and elk.

Pronghorn Antelope—A small band of pronghorn antelope remains in the Dry Creek Basin and Disappointment Valley areas after reintroduction efforts by the CDOW. These animals could occur on lease tracts 13, 13A, and 14.

Desert Bighorn Sheep—The CDOW has successfully reintroduced desert bighorn sheep along the Dolores River near Slick Rock. Lease tracts 13, 13A, and 14 are likely to be visited by these sheep. Occupied habitat mapped by CDOW for this species includes some areas in the east and west Paradox Valley and down the Dolores River well into Mesa County. There is some potential for this species to be present at least occasionally on lease tracts 19, 19A, 20, and the cliffs on the north side of Paradox Valley between lease tracts 7 and 8 and 22 and 23.

Bats—Lease tracts 5, 6, 7, 9, 11, 13, 13A, 15, 18, 26, 26A, 27, and 27A have mine shafts, adits, and inclines/declines that could provide roosting habitat for bats. Some of the DOE-reclaimed sites already have bat gate closures to protect important bat habitat. No bats are federally listed as threatened or endangered, but sensitive species (listed in Table 4–6) are likely to occur on some of the lease tracts. As reported in the 1995 EA (DOE 1995a), CDOW and BLM personnel have observed those species listed in Table 4–6, along with the long-eared myotis, long-legged myotis, small-footed myotis, and California myotis in abandoned uranium mines in Colorado. DOE has worked closely with BLM experts in this area and is aware of bat use at some of the mine workings on its lease tracts. There are no known maternity roosts on any DOE lease tracts, but state-listed species are known to use some mines in summer and winter. Because of the sensitive nature of these species, DOE and BLM are maintaining these data as confidential and will not identify specific sites in this final PEA. However, DOE and BLM will use this information in the future to minimize the impacts that lease tracts activities have on any bats that are present.

Migratory Birds—Neotropical migratory birds depend on continuous and healthy riparian vegetation for migration corridors and nesting habitats. Several of these species (including the lazuli bunting and several species of warblers, vireos, and flycatchers) are expected to occur on or near the lease tracts that support riparian vegetation. The southwestern willow flycatcher, a federally listed endangered species, is unlikely to occur on or near the lease tracts.

Three “birds of conservation concern” listed by USFWS may occur in the Calamity Mesa area: the black-throated gray warbler, Virginia’s warbler, which occurs in mountain shrub communities, and the piñon jay. Birds of conservation concern that may occur on or near the lease tracts in Montrose and San Miguel Counties include the peregrine falcon, piñon jay, prairie falcon, sage sparrow, short-eared owl, Swainson’s hawk, yellow-billed cuckoo (also a federal candidate species), black-throated gray warbler, ferruginous hawk, grey vireo, golden eagle, Lewis’ woodpecker, and northern harrier. Many species of migratory birds inhabit the piñon-juniper forests and other communities on all the lease tracts. Most of these birds actively nest for approximately 2 months (from mid-May to mid-July), but some nesting activities can begin as early as January and continue through the summer. Golden eagles, with an extended nesting period, nest close to the lease tracts in the Paradox Valley and near the Uravan tracts. Piñon jays nest from mid-March to mid-May.

4.11 Cultural Resources

4.11.1 Cultural History of Southwestern Colorado

Ten thousand to 12,000 years of human use or occupation in western Colorado's plateau country has been documented (BLM 1984). Evidence of the earliest people, the big-game (mammoth) hunters of the Paleo-Indian tradition (10,000 to 5500 B.C.), is rarely encountered in the region. The presence of the Paleo-Indian in western Colorado is inferred from archaeological finds of distinctive projectile-point styles associated with the Llano or Clovis complex (dated between 10,000 and 9000 B.C.) and the Folsom complex (dated between 9000 and 7000 B.C.) and from finds of projectile points and lithic sites associated with the Plano complex (dated between 7000 and 5500 B.C.) (Chandler et al. 1990).

Around 5500 B.C., the moderation of climatic conditions forced a change in human subsistence. The emphasis on big-game hunting gave way to the exploitation of a greater variety of animal and plant foodstuffs and the emergence of what is known as the Archaic tradition. The Archaic tradition is well represented in western Colorado. Diagnostic projectile points include large-stemmed and indented base, lanceolate, and large side- and corner-notched varieties. Other artifacts commonly found on Archaic sites are one-hand manos and slab metates. Radiocarbon data suggest three periods of this tradition: Early Archaic (5550 to 3550 B.C.), Middle Archaic (3500 to 2050 B.C.), and Late Archaic (2050 B.C. to A.D. 450) (Chandler et al. 1990).

The Archaic tradition was succeeded by the Formative stage (A.D. 1 to 1300), which is marked by the introduction of horticulture, the construction of more advanced dwellings, and the fabrication of ceramics. Four contemporaneous cultures, or "traditions," are associated with the Formative stage in western Colorado (Reed 2006). The Anasazi tradition—characterized by distinctive ceramics, highly patterned residential site layouts, pit structures, and water control structures—is represented in areas near the southernmost Slick Rock lease tracts. The Fremont tradition may be minimally represented in the Paradox Valley of western Montrose County and in areas near the Gateway lease tracts. This tradition is represented by distinct coiled pottery, one-rod-and-bundle basketry, moccasins constructed from deer or mountain sheep, and artistic renditions of trapezoidal anthropomorphic figures. In western Montrose and San Miguel counties, near the Paradox Valley and Uravan lease tracts, a third tradition, known as the Gateway tradition, has been recognized. It is characterized by lack of ceramic production, noncontiguous circular masonry structures, granaries constructed in rock shelters, and rock art that portrays both Anasazi and Fremont influence. More common than Gateway tradition sites in west-central Colorado are sites representing a fourth tradition, the Aspen tradition. These sites are associated with people who may have been full-time hunter-gatherers. Their habitation structures were similar to those of the Archaic era, when a mobile lifestyle predominated (Reed 2006).

Occupation of western Colorado during the several hundred years before colonial and subsequent European settlement was intermittent and seasonal. Ute Tribe hunters and gatherers were the primary land users (BLM 1984). With the introduction of the horse in the mid-17th century, the lifestyle of the Ute Tribe became increasingly dependent upon raiding and upon hunting bison on the plains. Ute occupation is evidenced by extensive tool-production areas, hunting camps, and processing areas. Specifically associated with the Ute occupation of west-central Colorado are

Uncompahgre Brownware ceramics, desert side-notched and Cottonwood triangular projectile points, and wickiups (brush shelters) (Chandler et al. 1990).

Ancestors of people of the modern-day Navajo Nation and Hopi Tribe may also have occupied or visited the area encompassed by the lease tracts. Although no specific evidence of their occupation has been documented (Fritz 2006), descendants of the Navajos are known to have lived in southern Colorado and eastern Utah, possibly as early as the late-16th century, and ancestors of the Hopi are believed to have occupied large parts of the American southwest as early as A.D. 1.

Spanish explorers arrived in the area in the 18th century. The Escalante-Dominguez Expedition of 1776 is the best known of the explorations. After the removal of the Utes to reservations in the 1880s, west-central Colorado was opened to Euro-American settlement. Mining, ranching, agriculture, oil and gas development, and recreation and tourism have formed the economic base of the area for more than a century. Of interest to the present study is that, as early as the 1880s, settlers were drawn to the area, particularly to the Paradox and Gypsum Valleys, by the presence of uranium ore (from which radium was extracted for medical purposes). Historically, the prosperity of the towns of Bedrock, Nucla, and Naturita can be attributed to the construction of uranium- and vanadium-ore processing plants.

4.11.2 Cultural Resource Inventories

In 2006, DOE contracted a professional archaeological consultant to conduct a Class I cultural resource inventory of the lease tract areas. Class I inventories are inventories of existing cultural resource data. Archaeologists study published and unpublished documents, records, files, and other sources to determine if previous cultural resource investigations have been conducted within an area. If cultural resources have been identified, the federal agency conducting or overseeing the action, in consultation with the SHPO and affected Native American tribes, determine whether the cultural resources are included or are eligible for inclusion in the National Register of Historic Places (National Register). DOE is required by the National Historic Preservation Act to consider the effects of its actions on any “district, site, building, structure, or object” that is included or eligible for inclusion in the National Register.

All the lease tracts are near or overlap areas of known prehistoric occupation as well as areas of early Euro-American settlement and ranching (Reed 2006). Many of the lease tracts contain structures and artifacts associated with the early uranium mining boom in the United States; some of these features are considered historic and eligible for inclusion in the National Register. Approximately 1,823 acres of lease tract lands have been subjected to field inventory. The extent that each lease tract has been inventoried ranges from 0 to 72 percent. Currently, 30 cultural sites on the lease tracts are eligible for, or potentially eligible for, inclusion in the National Register. These include sites that have been officially determined to be National Register-eligible by federal or state agencies, sites that have been recommended as eligible by site recorders but not formally evaluated by the agencies, and sites that are classified by either the agencies or the recorders as “needs data.” As of December 2006, none of the sites on the lease tracts were actually listed in the National Register. Of the 30 cultural sites, 20 are prehistoric, six are historic, and three have both historic and prehistoric components. One site cannot be classified because of the lack of data. Most of the prehistoric sites are classified as either lithic scatters or as campsites. One prehistoric site is classified as a stone quarry (for stone tools reduction), and

one is classified as a rock shelter. Historic sites are dominated by mines, but also include a highway, a cabin, and a mining camp (Reed 2006).

Cultural site densities within DOE's lease tracts vary greatly. Cultural resource inventories on some of the Slick Rock lease tracts have indicated densities of 14, 31, 22, and 24 sites per square mile (lease tracts 10, 11, 13A, and 15, respectively) (Reed 2006). Cultural resource inventories on some of the Paradox Valley lease tracts indicate densities of 54, 53, 22, 32, and 21 sites per square mile (lease tracts 5, 9, 21, 22, and 22A, respectively) (Reed 2006). Two well-known cultural sites are present near lease tract 9: the Bull Canyon rock-shelter, a prehistoric site, and Indian Henry's Cabin, a noneligible, late-19th century site containing a well-preserved log cabin, corral, and gravesite. Cultural resource inventories on one of the Uravan lease tracts (lease tract 18) indicate a density of 11 sites per square mile. Other lease tracts in this grouping (lease tracts 19, 19A, 20, 24, and 25) are expected to have similar or higher site densities (Reed 2006).

Cultural resource inventories on some of the Gateway lease tracts indicate densities of 32, 48, 13, and 69 sites per square mile (lease tracts 26, 26A, 27, and 27A, respectively) (Reed 2006). Numerous sites associated with historical uranium mining are present. Of these, Calamity Camp is probably the most significant. Located on lease tract 26, it encompasses approximately 23 stone and wood structures, many of them constructed prior to 1922. This camp was occupied first by radium miners (mining carnotite) from the early 1900s through the early 1920s and later by vanadium and uranium miners through the 1960s. This camp and others on Outlaw and Calamity Mesas, notably Foster Camp, Climax Camp, and Arrowhead Camp, served as community centers for miners and their families during the vanadium and uranium booms in southwest Colorado. BLM has determined that Calamity Camp is eligible for inclusion in the National Register, and the camp is expected to be listed in the National Register by the end of 2007 (Laforge 2006). To protect the structures and features associated with this camp, BLM and DOE agreed to a "No Surface Occupancy" area that includes and surrounds the camp. No cleanup or remediation work has or will take place within this area, and no remediation or disturbance is allowed within a 30-meter buffer zone surrounding the camp boundary.

4.11.3 Traditional Cultural Properties

Some culturally significant properties or places may be eligible for inclusion in the National Register but may not be readily identifiable by archaeologists during a Class I inventory or a Class III field inventory (required prior to any new surface disturbing activity). A Class III field inventory is an intensive survey of an entire target area, aimed at locating and recording all archaeological properties that have surface indications, and is performed by walking close-interval parallel transects until the area has been thoroughly examined. These "traditional cultural properties" (TCPs) may be associated with the cultural practices or beliefs of a community and may be significant to the community's history or may be important in maintaining the community's cultural identity. The National Historic Preservation Act requires that these properties or places be considered by federal agencies in the same manner as other eligible cultural resources through the Section 106 consultation process. To identify TCPs that may be affected by its proposed actions, DOE contracted a cultural anthropologist to assist in communicating with tribal members who may have knowledge of such properties.

In February 2006, DOE formally initiated the Section 106 of the National Historic Preservation Act consultation process by notifying potentially interested Native American tribes that resided in or had cultural ties to the project area to inform them of DOE's proposed alternatives and to

solicit their concerns or comments. A total of 11 representatives from five Native American tribes—the Ute Mountain Ute Tribe (including the White Mesa Ute Tribe), Southern Ute Tribe, Uintah-Ouray Ute Tribe, Navajo Nation, and Hopi Tribe—were contacted by mail, telephone, and e-mail. All representatives were contacted again in July 2006 and given a copy of the Class I inventory. Follow-up phone calls and e-mails were made through November 2006. To date, none of the tribes have made a determination regarding TCPs on the lease tracts, primarily because future, site-specific development activities and the cultural sites they might affect have not yet been determined. Section 5.10.1 discusses the future involvement of tribes prior to exploration and mining activities.

In the document *Potential Traditional Cultural Properties Within 38 Uranium Leasing Tracts in Southwestern Colorado: A Background Ethnographic Analysis* (Fritz 2006), DOE's contracted anthropologist provides an analysis of the likely occurrence and density of TCPs by lease tract. Table 4–7 summarizes this analysis.

4.12 Visual Resources

Visual resources are the visible physical features of a landscape that impart scenic value. BLM has described the areas surrounding the lease tracts as having diverse and spectacular scenery. In general, they are characterized by broad to narrow river valleys, steep canyons, mesas, rolling parks, mountains, and ridges (BLM 1984, 1985).

The Gateway lease tracts are remotely located on the tops and side slopes of piñon pine- and juniper-covered mesas. They are not visible from State Highway 141, which is located approximately 3 to 4 miles west of the lease tracts and is the nearest paved roadway. The segment of State Highway 141 traversing the Gateway lease tracts area is part of the Unaweep/Tabeguache Scenic and Historic Byway. BLM has designated the byway corridor as an area with high visual resource management importance. The lease tracts are accessed by county and unimproved roads. BLM has not assigned specific visual resource classification or protection status to these lease tracts (Laub 2005).

The Uravan lease tracts are either adjacent to or near the Unaweep/Tabeguache Scenic and Historic Byway (State Highway 141). The majority of these lease tracts are not visible from the byway and would not be affected by this designation. This area is characterized by deep-cut valleys and contrasting red rock formations. No specific visual resource protection status has been assigned to the lease tracts (BLM 1984).

Table 4–7. Likely Occurrence and Density of Traditional Cultural Properties by Tribe on the 38 Lease Tracts

Lease Tract No.	Ute Mountain Ute Tribe	White Mesa Ute Tribe	Uintah-Ouray Ute Tribe	Navajo Nation	Hopi Tribe
5	M	M	M	L	L
5A	M	M	M	L	L
6	M	M	M	L	L
7	L	L	L	L	L
7A	L	L	L	L	L
8	M	M	M	L	L
8A	L	L	L	L	L
9	M	M	M	L	L
10	M	M	M	L	L
11	M	M	M	L	M
11A	M	M	M	L	M
12	M	M	M	M	M
13	H	H	H	M	M
13A	H	H	H	M	M
14	H	H	H	M	M
14A	UK	UK	UK	UK	UK
15	M	M	M	L	L
15A	L	L	L	L	L
16	H	H	H	M	M
16A	H	H	H	M	M
17	UK	UK	UK	UK	UK
17A	UK	UK	UK	UK	UK
18	H	H	H	M	M
19	H	H	H	M	M
19A	H	H	H	M	M
20	UK	UK	UK	UK	UK
21	H–M	H–M	H–M	L	M
22	H–M	H–M	H–M	M–L	M
22A	H–M	H–M	H–M	M–L	M
23	H–M	H–M	H–M	L	M
23A	H–M	H–M	H–M	L	M
23B	H–M	H–M	H–M	L	M
24	UK	UK	UK	L	L
25	M	M	M	L	L
26	H	H	H	M	M
26A	H	H	H	M	M
27	EH	EH	EH	M	M–H
27A	M–L	L–L	M–L	L	L

Probability of occurrence: EH = Extremely High
H = High
M = Medium
L = Low
UK = Unknown

The Paradox Valley lease tracts are located on side slopes and ridges adjacent to a wide valley floor and generally are not readily visible from State Highway 90, which provides primary access to the area. Access from State Highway 90 to the lease tracts is provided by gravel, seasonal, and four-wheel-drive roads. Primary users of this lease tract area include hunters, grazing permittees, and four-wheel-drive enthusiasts. These areas typically are not considered visual area destinations, although the visual features have considerable merit. The lease tract 7 open-pit mine is visible from State Highway 90, as are other non-DOE mining activities. BLM has not assigned a specific visual resource protection status to the Paradox Valley lease tracts (BLM 1984). The Dolores River Canyon Wilderness Study Area is approximately 1 mile northwest of lease tracts 17 and 17A and 1 mile northwest of lease tract 8. BLM manages actions within the study area under Visual Resource Management Class I. Under a Class I designation, changes to the visual landscape should be very low and must not attract attention.

The Slick Rock lease tracts are traversed by or located adjacent to State Highway 141, near the former community of Slick Rock. State Highway 141 in this area is not part of the Unaweep/Tabeguache Scenic and Historic Byway. The area surrounding the Slick Rock lease tracts is subject to heavy non-DOE mining activities that are visible from the highway. DOE lease tract activity also is readily visible from the highway. Visible signs of activity primarily consist of roads and mine-waste-rock piles that have naturally revegetated.

BLM manages actions on these lease tracts under Visual Resource Management Class III (Wu 2005). Under a Class III designation, changes to the visual landscape from new activities must, at a minimum, partially retain the existing character of the landscape. The level of change to the landscape should be moderate at most; management activities may attract attention but should not dominate the view of the casual observer. Portions of lease tracts 13, 13A, and 14 straddle the Dolores River Canyon SRMA. BLM manages actions within these sections of the SRMA under Visual Resource Management Class II. Under a Class II designation, BLM attempts to retain the existing character of the landscape; any changes should have a low visual impact. Presently, numerous mine workings on lease tracts 13 and 13A and on BLM-administered lands are readily visible from the river corridor.

Portions of the potential ore truck-haul routes (Figure 3−2) have been designated as Colorado Scenic and Historic Byways. State Highway 141 between Whitewater and Placerville, Colorado, is designated as the Unaweep/Tabeguache Scenic and Historic Byway. State Highway 62 between Placerville and Ridgway, Colorado, is part of the San Juan Skyway Scenic and Historic Byway. A 28-mile segment of U.S. Highway 50 immediately west of Gunnison is part of the West Elk Loop Scenic and Historic Byway, and a 9-mile segment of U.S. Highway 50 immediately west of Cañon City is part of the Gold Belt Tour Scenic and Historic Byway.

4.13 Wilderness Areas

No designated Wilderness Areas are located near the DOE lease tracts. However, BLM has managed a portion of the Dolores River Canyon as a Wilderness Study Area since 1984. Lease tracts 17 and 17A in the Paradox lease tract area are approximately 1 mile southeast of the study area boundary, and lease tract 8, also in the Paradox lease tract area, is approximately 1 mile southeast of the study area boundary.

4.14 Noise

Noise is technically defined as sound waves that are unwanted and perceived as a nuisance by humans. Sound waves are characterized by frequency and measured in hertz (Hz); sound pressure is expressed as decibels (dB). Humans have a perceptible hearing range of 31 to 20,000 Hz. The threshold of audibility ranges from about 60 dB at a frequency of 31 Hz to less than about 1 dB between 900 and 8,000 Hz. For regulatory purposes, noise levels for perceptible frequencies are weighted to provide an A-weighted sound level [dBA] that correlates highly with individual community response to noise. Sound pressure levels outside the range of human hearing are not considered noise in a regulatory sense, even though wildlife may be able to hear at those frequencies. A better understanding of noise impacts is facilitated by associating noise levels with common activities or sources (Figure 4–1).

Noise Measurement

What are *sound* and *noise*?

When an object vibrates it possesses energy, some of which transfers to the air, causing the air molecules to vibrate. The disturbance in the air travels to the eardrum, causing it to vibrate at the same frequency. The ear and brain translate the vibration of the eardrum to what we call *sound*. *Noise* is simply unwanted sound.

How is sound measured?

The human ear responds to sound pressures over an extremely wide range of values. The range of sounds people normally experience extends from low to high pressures by a factor of 1 million. Accordingly, scientists have devised a special scale to measure sound. The term decibel (abbreviated dB), borrowed from electrical engineering, is the unit commonly used.

Another common sound measurement is the A-weighted sound level, denoted as dBA. The A-weighting accounts for the fact that the human ear responds more effectively to some frequencies than others. Higher frequencies receive less weighting than lower ones. Most of the sound levels provided in this report are A-weighted; however, some are in decibels because of lack of information on the frequency spectrum of the sound. Figure 4–5 shows common references to sound on the A-weighted sound-level scale.

Noise levels are often reported as the equivalent sound level (L_{eq}). The L_{eq} is expressed in an A-weighted sound level over a specified period of time, usually 1 or 24 hours. The L_{eq} is the equivalent steady sound level that, if continuous during a specified time period, would contain the same total energy as the actual time-varying sound over the monitored or modeled time period. Another expression of noise levels is the day-night sound level (L_{dn}). This is the average of the day and nighttime A-weighted sound level with a built-in penalty of 10 dB at night. The L_{dn} is particularly useful for evaluating community-level noise effects.

The uranium lease tracts are located in quiet, open sagebrush-grass and piñon-juniper plant communities where natural phenomena such as wind, rain, and wildlife account for most natural background sounds. At times, insect activity and birds may account for significant portions of environmental sounds. Sources of man-made background noise near the lease tracts may include automobile and truck traffic, aircraft flying overhead, and limited outdoor recreational activities in adjacent areas.

Sound Source	Sound Level (dBA)	Response
Carrier deck jet operation	140	
Civil defense siren (at 100 ft)	130	Painfully loud
Jet takeoff (at 200 ft)	120	Threshold of feeling and pain
Riveting machine (at 1 ft)	110	
Ambulance siren (at 100 ft)	100	Very loud
Heavy truck (at 50 ft)	90	
Freight train cars (at 50 ft)	80	
Vacuum cleaner (at 10 ft)	70	Moderately loud
Air conditioning unit (at 20 ft)	60	
Speech in normal voice (at 15 ft)	50	
Residence, no TV or radio	40	Quiet
Soft whisper (at 5 ft)	30	
Recording studio	20	
	10	
	0	Threshold of hearing

Figure 4–1. Comparison of A-Weighted Sound Pressure Levels Associated With Different Sources of Noise

The cities and towns in the region are located beyond the influence of noise originating at any lease tract. Typical noise levels in and around cities and towns of the region likely range from 45 to 55 dBA and have levels approaching 65 dBA around busy roads. If noise is regulated, municipalities often have a noise ordinance specifying that evening noise levels not exceed 65 dBA. If regulated, this evening noise restriction typically specifies hours and locations, such as residential zones from 10:00 p.m. to 7:00 a.m. Monday through Saturday and not before 9:00 a.m. on Sunday, and commercial zones from 10:00 p.m. to 6:00 a.m. the following day. The acoustic environment in southwestern Colorado is typical of other desert environments where average L_{dn} values range from 22 dB on calm days to 38 dB on windy days (Brattstrom and Bondello 1983).

4.15 Wild and Scenic Rivers

In 1976, sections of the Dolores River downstream from McPhee Dam, including the section near Slick Rock that passes through lease tracts 13, 13A, and 14, were evaluated for Wild and Scenic River status and recommended for inclusion into the Wild and Scenic Rivers System. However, Congress did not take any designation action, and the proposed withdrawal associated with the river corridor expired in 1981 (BLM 1984).

The Dolores River Canyon contains unique ecosystems and historic and geologic features and provides the solitude sought by rafters. The segment of the river just downriver from Bradfield Bridge and McPhee Reservoir to the Dolores River Wilderness Study Area is advertised nationally as a popular rafting destination. This stretch may be completed as a single trip or divided into two 3-day trips. The 1985 Resource Management Plan for the San Juan−San Miguel Resource Area included protection for the river under the BLM Special Recreation Management Area designation. BLM continues to manage the Dolores River for recreational opportunities and as a designated Wild and Scenic River, even though it does not have federal status as such. As of June 12, 2006, BLM is completing a draft plan amendment to the 1985 Resource Management Plan that will provide additional protection of resources.

BLM also manages sections of the San Miguel River for wild and scenic values, although it also does not carry federal status.

4.16 Floodplains and Wetlands

Portions of Slick Rock lease tracts 13, 13A, and 14 are located within the 100-year floodplain of the Dolores River. Calamity Creek flows across and between Gateway lease tracts 26 and 27. Classified as a perennial stream, it occasionally becomes intermittent in the vicinity of the lease tracts during drought years. Although vegetation surveys have not been conducted on these tracts, the floodplains adjacent to the waterways likely contain riparian and wetland-type vegetation (e.g., willow, Fremont cottonwood, reed canarygrass, forestiera, and sedges). Historically, preoperational and operational activities have not occurred on the Dolores River floodplain.

Vegetation characteristic of wetland ecosystems appears on lease tracts 7, 9, and 14. These areas on lease tracts 7 and 9 are formed by mine dewatering operations (mine water is pumped to containment ponds); the potential wetland areas on lease tract 14 are formed by storm-water accumulation in small, shallow, surface mines. The total area encompassed by these areas ranges from 2 to 10 acres.

4.17 Human Health

Mine sites on the DOE lease tracts comprise rocks and soils that contain naturally occurring radioactive material; most of the natural radioactivity is derived from the uranium-238 and uranium-235 decay chains. One of the products in the uranium-238 decay chain is radium-226, which is the principal radionuclide of concern for characterizing the distribution of radioactivity in the environment.

Background levels of radium-226 are normally present in soil in trace concentrations of about 1 picocurie per gram (pCi/g); however, background concentrations within ore-bearing formations may be as high as hundreds of thousands of picocuries per gram. Background concentrations of radium-226 in mine-waste-rock piles average 23.7 pCi/g (EPA 1991). In the DOE lease tracts, the concentration of radium-226 in mine-waste-rock piles is about 110 pCi/g. The primary radioactive sources on the DOE lease tracts are mine-waste-rock piles, mine portals, ore-bearing outcrops (Salt Wash Member of the Morrison Formation), and airborne particulates derived from these sources. In underground mines, the primary radium-226 source is the ore-bearing Salt Wash Member.

Nationwide, people are exposed to an average of about 300 mrem/yr of natural background radiation (NCRP 1987). Table 4–8 presents a summary of radiation doses from natural background for the nation and representative doses for the region containing the uranium lease tracts.

Table 4–8. United States and DOE Uranium Lease Tract Natural Background Radiation Doses

Source	U.S. Average Natural Background Radiation Dose (millirem/yr)	Uranium Lease Tract Natural Background Radiation Dose (millirem/yr)
Cosmic and cosmogenic radioactivity	28	68
Terrestrial radioactivity	28	74
Internal radioactivity	40	40
Inhaled radioactivity	200	260
Rounded Total	300	440

The largest natural source is inhaled radioactivity, mostly from radon-222 and its radioactive decay products in homes and buildings, which accounts for about 200 mrem/yr. Additional natural sources include radioactive material in soils (primarily external radiation from the uranium and thorium decay series), radioactive material in the body (primarily potassium-40), and cosmic rays from space filtered by the atmosphere.

The actual radiation dose from natural background radiation varies with location. The radiation dose from cosmic and cosmogenic radioactivity is about 68 mrem/yr in the region containing DOE's lease tracts (based on data for Blanding, Utah); the dose from external terrestrial radioactivity is about 74 mrem/yr; and the dose from radon-222 and its radioactive decay products is about 260 mrem/yr (IUC 2003). The total natural background radiation dose in the region around DOE's lease tracts is about 440 mrem/yr, which is higher than the national average.

4.18 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 7629), directs federal agencies to identify and address, as appropriate, any activities that may affect minority and low-income populations. A minority has been defined as individuals who are members of the following population groups: American Indian or Alaska Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. A minority population has been identified where the minority population of the

affected area exceeds 50 percent of the population. Low-income populations are groups with an annual income below the poverty threshold. Because only a few lease tracts have any residents within several miles and because of the remoteness of the lease tracts, no minority or low-income populations live within miles of any lease tract.

Table 4–9 presents a summary of the distribution of minority populations throughout the lease tract counties and adjacent counties. With the exception of San Juan County, Utah, where American Indians represent more than half the population, and Mesa, Montrose, and Fremont Counties, where Hispanics and Latinos represent more than 10 percent of the population, minorities are a small percentage of the population within the region.

Table 4–9. Minority Populations in the Lease Tract Counties and Adjacent Counties[a]

Population Group	Minorities as a Percentage of the Population						
	Mesa	Montrose	San Miguel	Dolores	Ouray	Freemont	San Juan, Utah
White	87.0	82.4	90.4	92.8	93.2	81.1	39.6
Black or African American	0.5	0.3	0.3	0.1	0.1	5.3	0.1
American Indian or Alaska Native	0.9	1.0	0.8	2.0	0.9	1.5	55.7
Asian or Pacific Islander	0.6	0.5	0.8	0.5	0.4	0.6	0.2
Hispanic or Latino (of any race)	10.0	14.9	6.7	3.9	4.1	10.3	3.7
Total Population	127,253	36,674	7,116	1,788	4,139	47,425	14,015

[a]U.S. Census Bureau (2004). (Totals are not exactly 100% because of other minority mixes.)

Table 4–10 presents a summary of the distribution of low-income families and individuals throughout the lease tract counties and adjacent counties based on the 2000 census. The poverty level established by the U.S. Census Bureau for 2000 for a family of four with two children below the age of 18 was $17,463, and the poverty level for an individual was $8,794.

Table 4–10. Low-Income Population in the Uranium Lease Tract Counties and Adjacent Counties

State	County	Families Below Poverty Level[a] (%)	Individuals Below Poverty Level[c] (%)
Colorado[b]		6.2	9.3
	Mesa	7.0	10.2
	Montrose	8.9	12.6
	San Miguel	6.6	10.4
	Dolores	10.2	13.1
	Ouray	6.0	7.2
	Freemont	8.3	11.7
Utah[b]		6.5	9.4
	San Juan	26.9	31.4

Sources
[a]U.S. Census Bureau (2004).
[b]CDLE 2005.
[c]Utah Department of Workforce Services (2005).

5.0 Environmental Impacts

This section characterizes the environmental impacts that could occur under the Expanded Program, the Existing Program, and the No Action alternatives characterized in Section 3. The discussion first assesses impacts by technical disciplines such as socioeconomics, surface water and ground water, and terrestrial and aquatic biota. The section concludes with a comparison of impacts among the alternatives (Section 5.20) and a discussion of cumulative impacts (Section 5.21) that might occur within the region when DOE's actions are added to other reasonably foreseeable activities planned or ongoing in the region.

As discussed in Section 1, within this final PEA, impacts are assessed on a more regional basis as opposed to lease-tract-specific analyses. However, to support DOE's programmatic decision-making, Section 5.20 includes a brief assessment by lease tract of the potential for mining development to affect sensitive environmental features. Should DOE decide to proceed with the ULP, as has been the practice in the past, DOE would review all activities proposed by the leaseholders in accordance with the two-tiered review process described in Section 3.5.

5.1 Socioeconomics

5.1.1 Expanded Program Alternative

Under the Expanded Program alternative, the leaseholders could conduct preoperational, operational, and postoperational activities at a level exceeding that of the last decade. If the market were to allow a resumption of uranium and vanadium production on all 38 lease tracts, up to 570 direct jobs could be created. The local economies of communities in Mesa, Montrose, San Miguel, and Fremont Counties in Colorado and San Juan County in Utah would be beneficially affected by an increase in the number of jobs and by increases in local wages and secondary wages, and by an increase in tax base. Surrounding counties would also feel the positive economic effects of this increased labor force. Because these jobs would be spread over a large geographic region, no single county or municipality would be burdened with large increases in demands on infrastructure such as schools, police and fire protection, or utilities.

As shown in Table 4–2, housing vacancies exist in all counties in the region. Should uranium mining expand to include all 38 lease tracts and be sustained, a decrease in vacancy rates would be expected over the long term. The increase in jobs could increase housing construction in the smaller communities near the lease tracts and in Cañon City, Blanding, and White Mesa near the ore-processing mills. In the short term, however, due to the limited availability of temporary housing in the towns nearest the lease tracts, temporary housing capacity could be exceeded, necessitating longer commuting distances for some workers, which would result in increased traffic from commuting workers.

5.1.2 Existing Program Alternative

Under the Existing Program alternative, the leaseholders would conduct preoperational, operational, and postoperational activities at a levels similar those occurring in 2005. Assuming all 13 leases were brought into production, up to 186 direct jobs could be created. The local economies of communities in Mesa, Montrose, San Miguel, and Fremont Counties in Colorado and San Juan County in Utah would be beneficially affected by an increase in the number of jobs

and by increases in local wages and secondary wages. Surrounding counties would also feel the positive economic effects of this increased labor force. Because these jobs would be spread over a large geographic region, no single county or municipality would be burdened with large increases in demands on infrastructure such as schools, police and fire protection, or utilities.

As shown in Table 4–2, housing vacancies exist in all counties in the region. Should uranium mining occur on all 13 lease tracts and be sustained, a decrease in vacancy rates would be expected over the long term. The increase in jobs could increase housing construction in the smaller communities near the lease tracts and in Cañon City, Blanding, and White Mesa near the ore-processing mills. In the short term, however, due to the limited availability of temporary housing in the towns nearest the lease tracts, temporary housing capacity could be exceeded, necessitating longer commuting distances for some workers.

5.1.3 No Action Alternative

Under the No Action alternative, all existing long-term, mining-related jobs would be terminated. Approximately 60 short-term jobs would exist during the reclamation activities when current leases expire. Many of these jobs would be filled with the existing leaseholder workforce. Reclamation activities would most likely be completed within 1 to 2 years of initiation. The loss of current mining-related jobs and of up to 60 short-term jobs would have minor adverse impacts on the overall economies of the four counties.

5.2 Transportation

Under the Expanded and Existing Program alternatives, DOE would collaborate with BLM, CDOT, and the respective county agencies to monitor future minerals development activities (uranium exploration and mining, and oil and gas development) within the region to identify specific areas where adverse traffic impacts would occur and then implement any site-specific measures that might be required. Such measures could include acceleration/deceleration lanes, intersection controls, including left/right turn lanes, and/or passing lanes.

5.2.1 Expanded Program Alternative

All ore shipments must be conducted in accordance with applicable Colorado and Utah Department of Transportation regulations, which require that specific shipping documents be prepared for each shipment and then accompany the shipment to its destination. The regulations also mandate that all shipments be tarped to reduce the potential for accidental spillage or fugitive dust.

As referenced in Section 3.5.2.2, this section evaluates the impacts related to potential increased truck traffic on various Colorado and Utah highway segments. The conservative or worst-case scenario is based on the simultaneous and immediate development of all DOE lease tracts and the transport of all ore materials to each mill. In reality, lease tracts would be developed over time and at levels commensurate with available capital for development, desirability and quality of the ore for mining, as well as other factors that may include availability of workforce and national and international uranium and vanadium prices. It is also likely that ore would be transported to more than one mill, or even that a new processing plant could be constructed in the area; both situations would reduce estimated truck use of the area highways.

Additionally, in this final PEA, DOE has also evaluated the potential impacts associated with haul-truck traffic that can reasonably be expected to occur.

5.2.1.1 Worst-Case Scenario

Under the Expanded Program alternative, an average of 120 haul trucks and a maximum of 150 haul trucks (or truck-and-pup combinations) per day (one way) would transport uranium and vanadium ore to the processing mill near Cañon City, Colorado, or to the mill near Blanding and White Mesa, Utah. It is likely that under this full-scale production assumption both mills would be operating, and therefore some percentage of the shipments would go to each mill, it is possible that only one mill might be receiving ore at a given time. Therefore, the analyses conservatively assume shipping of all 150 shipments to each mill (300 one-way trips per day). However, the traffic impacts as presented in Table 5–1 could not simultaneously occur on the routes to both mills. This section assesses the impacts of ore shipments in terms of increases in haul-truck numbers, the effect of those increases on traffic congestion, the radiological impacts on workers and the public from the shipments, and the projected accident rates that would result from the Expanded Program alternative. Other potential impacts from the projected increase in haul-truck traffic (i.e., noise levels, visual aesthetics, dust generation, and truck/animal accidents) are discussed in subsequent sections.

Table 5–1 presents data that include the 2005 Average Annual Daily Traffic (AADT) for all vehicles, the existing number of trucks in the AADT, and the potential new truck traffic along the potential haul routes (see Figure 3–2 for potential routes and route segments). It also provides information related to existing and potential volume to capacity (V/C) ratios and Design Hour Volume (DHV), which are useful in describing congestion. Shipments were apportioned to each highway segment on the basis of the number of lease tracts that might use each segment. As shipments from multiple lease tracts accumulate along any given haul route, and as highway segments merge, the number of shipments along that haul route increases proportionally until the maximum number of haul trucks (150 rounds trips per day) is reached. Table 5–1 provides the percent increases in the number of trucks and in total traffic that would result from additional haul trucks making round trips from the lease tracts to the mills.

From a pure vehicle number perspective, even though some of the percent increases in traffic are large in Table 5–1, under the worst-case scenario, 150 haul trucks making one round trip would result in an average of 37.5 haul trucks per hour, or approximately 1 every 1.6 minutes along some route segments. However, under the Expanded Program alternative, in no case would the increase in total traffic (under the worst case—all shipments to a single mill) exceed 10 percent through urban areas.

Most populated areas would see less than a 5 percent increase in total traffic. For the highest percent traffic increase, 93 percent in sparsely populated Segment D west of Paradox Valley, Colorado, a resident who now sees and hears one vehicle every 2 minutes would see one approximately every minute, depending on proximity to the highway.

The DHV provides useful information that assists in determining how additional traffic will affect existing use of a highway segment. Highway segments are classified as urban or rural on the basis of population and commuter peak traffic. These designations are useful in assessing

Table 5–1. Transportation Statistics for Haul Route Segments—Expanded Program Alternative, Worst-Case Scenario

Figure 3−2 Map Symbol	Location Description	2005 AADT[a]	No. Trucks	Existing % Trucks[b]	Increased Number of Trucks	% Increase Total Traffic[b]	% Increase Trucks[b]	DHV %[c]	Current V/C Ratio[d]	Projected V/C Ratio
AA	Jct SR 313-Jct FAI-70 Crescent Jct	2,850	998	35	33	1	3	14 R	0.32	0.32
BB	US-191 & entrance to Arches NP	3,375	641	19	33	1	5	14R	0.19	0.19
CC	US-191 and central Moab	9,455	2,931	31	33	<1	1	10 U	0.31	0.31
D2	Jct 191 and SR 46 La Sal Jct	3,535	1,555	44	204	6	13	11 R	0.28	0.29
A	US-191 and SR 491 in Monticello	3,020	997	33	300	10	30	11 U	0.22	0.25
B	US-191 and SR-95, 4 mi south of Blanding	2,830	538	19	300	11	56	11 R	0.11	0.12
DD	On I-70, just east of US-191	6,680	3,540	53	33	<1	1	13 R	0.14	0.14
C	SH-491 at Colo/Utah state line	2,100	630	30	300	14	48	11 R	0.14	0.16
D	SH-90 west of CR-575 to Paradox	220	40	18	204	93	510	10 R	0.02	0.04
E	SH-90 0.25 mi south of SH-141, Vancorum	400	50	13	126	32	252	10 R	0.04	0.05
D1	SR-46 Jct. with SR-191 at La Sal Jct	545	71	13	204	37	287	11 R	0.06	0.08
EE	I-70 west of Mack interchange	6,800	1,770	26	33	<1	2	12 R	0.15	0.15
FF	I-70 SW of SH-6 & I-70, west of GJ	19,400	3,450	18	33	<1	1	9 U	0.25	0.25
F	SH-141 0.25 mi north of SH-491	570	70	12	300	53	429	9 R	0.02	0.04
G	SH-141 0.8 mi south of SH-145	430	90	21	204	47	227	9 R	0.02	0.03
H	SH-141 0.25 mi west of SH-90, Vancorum	360	40	11	79	22	198	9 R	0.03	0.04
GG	SH-141 NE of NE jct. CR SX.90, Gateway	700	100	14	33	5	33	9 R	0.08	0.08
HH	SH-141 0.3 mi west of US 50, Whitewater	1,400	390	28	33	2	8	9 R	0.07	0.07
I	SH-145 0.25 mi east of SH-141	1,100	90	8	300	27	333	9 R	0.05	0.07
J	SH-145 east of Market St., Norwood	3,100	210	7	300	10	143	9 R	0.30	0.33
K	SH-145 0.25 mi NW of SH 62, Placerville	1,900	300	16	300	16	100	11 R	0.24	0.28

Table 5−1 (continued). Transportation Statistics for Haul Route Segments—Expanded Program Alternative, Worst-Case Scenario

Figure 3−2 Map Symbol	Location Description	2005 AADT[a]	No. Trucks	Existing % Trucks[b]	Increased Number of Trucks	% Increase Total Traffic[b]	% Increase Trucks[b]	DHV %[c]	Current V/C Ratio[d]	Projected V/C Ratio
L	SH-62 0.25 mi NE of SH-145, Placerville	3,800	370	10	300	8	81	12 R	0.51	0.54
M	SH-62 west of US-550, Ridgway	7,700	460	6	300	4	65	12 R	0.66	0.69
N	US-550 0.6 mi north of SH-62, Ridgway	6,400	460	7	300	5	5	12 R	0.51	0.53
O	US-550 south of US-50 & SH-90, Montrose	24,000	1,200	5	300	1	1	9 U	0.66	0.67
II	US-50, south of Nolan Ave., GJ	37,700	1,360	4	33	<1	2	8 U	0.98	0.98
JJ	US-50 NW of SH-141, Whitewater	9,300	860	9	33	<1	4	9 U	0.28	0.28
KK	US-50 @ Gunnison River Bridge	10,400	860	8	33	<1	4	8 U	0.27	0.27
LL	US-50 south of SH-92, Delta	17,100	1,040	6	33	<1	3	8 U	0.43	0.43
MM	US-50 south of SH-348, Olathe	12,700	770	6	33	<1	4	11 R	0.46	0.46
P	US-50 east of SH-90 & SH-550, Montrose	15,500	1,330	9	300	2	23	8 U	0.40	0.41
Q	US-50 0.8 mi east of SH-92, Blue Mesa Dam	2,800	330	12	300	11	91	9 R	0.21	0.23
R	US-50 east of SH-149	4,000	500	13	300	8	60	14 R	0.51	0.55
S	US-50 west of SH-135, Main St., Gunnison	13,700	1,560	11	300	2	19	14 R	0.69	0.70
T	US-50 0.8 mi west of SH-114	3,000	360	12	300	10	83	17 R	0.44	0.48
U	US-50 east of CR-229, east of Monarch Pass	2,600	620	24	300	12	48	14 R	0.45	0.50
V	US-50 west of N. Jct. US 285, Poncha Spgs	3,500	800	23	300	9	38	14 R	0.65	0.71
W	US-50 east of G & 16 St., Salida	11,300	1,010	9	300	3	30	14 R	0.55	0.56
X	US-50 west of CR-45, Coaldale	3,000	230	8	300	10	130	16 R	0.47	0.51
Y	US-50 east of SH-69, Texas Creek	3,100	490	16	300	10	61	14 R	0.37	0.40
Z	US-50 west of 1st St., Cañon City	12,400	1340	11	300	2	22	14 R	0.61	0.62

CDOT 2006a and 2006b; UDOT 2006a, 2006b, and 2006c.
[a]AADT = average annual daily traffic.
[b]All percents rounded to nearest whole number.
[c]DHV (Design Hour Volume): the 30th highest annual hourly traffic volume reported as percent of AADT.
[d]V/C (Volume to Capacity) Ratio: the ratio of the volume of traffic that is using a road to the volume of traffic it could be expected to carry. A road segment is considered congested when the V/C ratio is greater than 0.85 (CDOT 2006b).
Abbreviations: US = U.S. Highway mi = mile CR = County Road SR = State Road SH = State Highway R = rural road U = urban road

how well a road segment can accommodate traffic. Urban areas are expected to have a DHV between 8 and 9 percent, while rural areas are expected to have a DHV between 11 and 12 percent. The majority of the route segments under study are rural and have DHVs either within or below the expected rural DHV, although several road segments between the Curecanti National Recreational Area and Cañon City currently exceed expected values. The majority of road segments classified as urban are within or at expected values; US-191 through Moab and Monticello both exceed expected urban DHVs. The limitation on use of these data is that they are based on a 24−48 hour vehicle count that does not necessarily reflect a daily or hourly situation.

Whereas the DHV characterizes the peak traffic volumes, the V/C ratio provides more useful information when evaluating potentially congested areas. This ratio is based on the AADT, DHV, a directional factor, and a route capacity factor. In both Utah and Colorado, the V/C ratio is based on all vehicles; these states do not have a separate calculation based on truck traffic only (CDOT 2006b and UDOT 2006b).

The current and projected V/C ratios are provided on Table 5–1. When the ratio exceeds 1.0, the road is at capacity. When the V/C ratio exceeds 0.85, the road segment is said to be approaching capacity and would be considered congested (CDOT 2006b). With one exception, no road segments currently have a V/C ratio above 0.8, and none are projected to exceed 0.8 under this alternative. The exception occurs in Grand Junction, Colorado, just south of Nolan Avenue on US-50. It currently has a V/C ratio of 0.98, and this would not increase as a result of additional traffic under this alternative.

Projecting V/C ratios based on additional haul trucks resulted in only minor changes in the V/C ratio. In most cases, the ratio would remain unchanged or would change by 0.01 to 0.05. The current lowest V/C ratio of 0.02 occurs on highway segments D, F, and G, all in largely unpopulated areas in western Colorado. As a result of projected related traffic, values may increase from 0.02 to 0.04. The highest existing ratios occur along highway segments M, O, and S. These values vary from 0.66−0.69 and are found on SH-62, west of Ridgway, Colorado, downtown Montrose, Colorado, and west of SH-135 in Gunnison, respectively. V/C ratios or road segments in Utah are generally higher than in western Colorado, probably because US-191 carries greater volumes of truck and recreational traffic than would be found in western Colorado. Existing values on US-191 range from 0.11 to 0.31. As a result of projected haul truck traffic in Utah, the ratios would change from 0.11 to 0.12 or to a high of 0.32. Most road segments would not change.

In 2004, there were two road segments in Colorado that potentially would be traveled by haul trucks that had fatal accidents involving trucks. One fatal accident occurred between Gunnison and Monarch Pass on US-50 and resulted in one fatality. This road segment also had five injury accidents that resulted in a total of 11 injuries. One other fatal accident was recorded on SH-141 between Dove Creek and just south of the intersection with SH-145. This segment also recorded one injury accident. No other injury or fatal accidents were recorded in 2004 on applicable road segments (CDOT 2006d).

In 2005, there were a total of four fatalities related to heavy truck crashes on all Colorado state highways within the applicable counties that would be traveled by haul trucks. The two counties with the reported fatalities were Mesa County (one fatality) and Gunnison County (three

fatalities). The specific highways and locations within the counties were unavailable for the 2005 data (NCSA 2007).

Actual accident occurrences in Utah were similarly low. In 2005, there were a total of 35 crashes involving large trucks on all route segments considered in this alternative in Utah. The 35 crashes included two fatal accidents; the others involved injuries or property damage. Truck crashes represented 22 percent of the total crashes for these route segments (UDOT 2007c).

Fatal and injury accident rates were projected using rates based on 2004 crash data provided by CDOT (CDOT 2006c). CDOT developed injury and fatal accident numbers and rates for large trucks and buses traveling the identified road segments in western Colorado. A large truck is over 10,000 pounds, gross vehicle weight. The CDOT specific road segment information was used to calculate a single injury and fatal accident rate for all combined road segments. Using CDOT methodology, a fatal accident rate of 0.28 fatal accident per 100 million miles of travel and an injury accident rate of 0.033 injury accident per one million miles of travel were calculated. Fatal and injury rates should not be confused with actual numbers of fatalities or injuries sustained in traffic accidents. Under the worst-case scenario, 150 haul trucks per day traveling to Cañon City (the longest of the three routes, a distance of 640 miles round trip) traveling 22 days per month, 264 days per year would travel a maximum of 25.3 million miles in 1 year. Given the rate of 0.28 fatal accident per 100 million vehicle miles per year, an estimated 0.07 fatal accident per year could be expected to occur related to haul-truck traffic. Using the injury accident rate and the same assumptions, an estimated 0.83 injury accident per year would be associated with haul truck traffic. It should be noted that the rates were developed based on limited 2004 data. In comparison, using 2003 rates developed for all rural state highways in Colorado resulted in a fatal accident rate of 2.02 per 100 million miles of travel by all vehicles and an injury accident rate of 0.39 per one million miles of travel. Using the same assumptions developed above, an estimated 0.51 fatal accident and 9.87 injury accidents would occur. It is expected that rates based on all vehicle travel on all state roads would be higher but also represent a further worst-case analysis. As previously stated, it is unlikely that this alternative would actually occur, and these projected accidents would be considered a very worst case scenario.

5.2.1.2 Realistic Evaluation

As stated earlier, this evaluation is based on the most likely truck transportation scenario under this alternative. As shown on Table 5–3, actual expected truck trips are considerably less than under the worst-case scenario. Projected truck trips would vary from zero to 90, with many highway segments either not likely to have additional traffic or to have 32 trucks per day as the projected traffic related to the Expanded Program alternative. The maximum number of project-related trucks (90) would be on highway segments A and B (Figure 3−2), which would include traffic to White Mesa Mill in Utah. These 90 trucks would represent a 3 percent increase over total existing traffic and a 9−17 percent increase in truck traffic on US-191. The DHV for potentially used route segments in eastern Utah (segments A, B, and D2) is overall below expected values with the exception of Monticello, Utah, where the existing DHV is above the expected value of 8−9 percent. US-191 in general is not considered congested in eastern Utah and has an existing V/C ratio between 0.11 and 0.32. As shown on Table 5–3, the potential addition of 90 trucks would not appreciably change the V/C ratio. Congestion and capacity would not be a concern on these road segments based on the rural nature and existing low traffic volumes. No trucks would travel through Moab, Utah, or Grand Junction, Colorado.

The majority of potentially used road segments in Colorado would experience none or one percent increase in total traffic related to haul trucks. However, several road segments may experience total traffic increases of 13−35 percent. Highway segments F and C, located on SH 141 just north of Dove Creek and on US-491 in Colorado near the Colorado-Utah state line, respectively, may experience an increase of 86 trucks per day. The existing DHV for highway segment F is 9 percent, which is below expected rates for rural areas. Highway segment C has a DHV of 11 percent, which is within expected rates for rural areas (11−12 percent). The existing V/C ratio for highway segment F is among the lowest at 0.02 and would be expected to increase to 0.03, well below the level of congestion (0.85). Highway segment C has an existing V/C ratio of 0.14, and there would be no expected V/C ratio increase to this segment.

Based on the realistic evaluation, the number of projected fatal accidents per year related to this alternative would be less than those projected for the worst-case scenario. It is estimated that 6,742,560 miles would be traveled between the lease tracts and the milling facilities per year, which may result in 0.02 fatal accident annually, based on a fatal truck accident rate of 0.28 fatal accident per 100 million miles. The same assumptions were used to evaluation potential injury accidents. Using the injury accident rate of 0.033 injury accident per one million miles of travel, an estimated 0.22 injury accident related to haul truck traffic may occur.

Residents who live along county roads near some of the lease tracts do not routinely experience truck traffic. Specifically, occupants of the 16 residences along the county roads that would be used to transport ore from the lease tracts to the state highways might experience noise or dust from passing haul trucks and increased traffic. This increased traffic could also increase the likelihood of accidents. DOE would work with federal, state, and local agencies and the leaseholders, as appropriate, to minimize any increase in accident rates. Actions taken could include additional signage, speed restrictions, and if deemed appropriate, limitations on haul-truck numbers. Occupants of 15 of the 16 residences could have seen uranium ore shipments over the last 10 years from DOE lease tracts. The actual noise and dust impacts would vary among residences with their distance from the county or BLM roads and whether the road surface is gravel or blacktop. Table 5–2 identifies the lease tracts with nearby residences and the specific lease tracts that could make ore shipments that would pass these residences. Based on the realistic evaluation depicted in Table 5–3, the single residence near lease tract 13 would have the most shipments and would have a haul-truck passing by on average every hour (6 haul trucks making a round trip in a 12-hour day). As shown on Table 5–2, shipments would pass other residences even less frequently. From a regulatory perspective, current regulations within San Miguel County limit uranium ore shipments (e.g., from Slick Rock lease tracts) to 8 haul trucks per day per mine, which is more than twice the average shipping rates that have occurred in the past or are anticipated to occur under the Expanded Program alternative.

Table 5–2. Expanded Program Alternative—Trucking Impacts on County Roads for the Realistic Evaluation

Nearest Lease Tract	Residences Potentially Affected	Possibly Affected by Shipments from Lease Tracts	Average Number of Trucks per Day
Slick Rock - 11, 11A	8	11,11A,	2
Slick Rock - 13	1	13, 13A, 15, 15A	6
Slick Rock - 13A	1	13A, 15, 15A	4
Slick Rock - 15, 15A	4	15, 15A	2
Slick Rock - 16	1	10,16,	3
Gateway - 26, 26A, 27, 27A	1	26, 26A, 27, 27A	3

Table 5–3. Transportation Statistics for Haul Route Segments—Expanded Program Alternative, Realistic Evaluation

Figure 3−2 Map Symbol	Location Description	2005 AADT[a]	No. Trucks	Existing % Trucks[b]	Increased Number of Trucks	% Increase Total Traffic[b]	% Increase Trucks[b]	DHV %[c]	Current V/C Ratio[d]	Projected V/C Ratio
AA	Jct SR-313 Jct FA I-70 Crescent Jct	2,850	998	35	0	0	0	14 R	0.32	0.32
BB	US-191 & entrance to Arches NP	3,375	641	19	0	0	0	14 R	0.19	0.19
CC	US-191 and Central Moab	9,455	2,931	31	0	0	0	10 U	0.31	0.31
D2	Jct 191 and SR-46 La Sal Jct	3,535	1,555	44	76	2	5	11 R	0.28	0.28
A	US-191 and SR-491 in Monticello	3,020	997	33	90	3	9	11 U	0.22	0.23
B	US-191 and SR-95, 4 mi south of Blanding	2,830	538	19	90	3	17	11 R	0.11	0.11
DD	On I-70, just east of US 191	6,680	3,540	53	0	0	0	13 R	0.14	0.14
C	SH-491 at Colo/Utah state line	2,100	630	30	86	4	14	11 R	0.14	0.14
D	SH-90 west of CR-575 to Paradox	220	40	18	76	35	190	10 R	0.02	0.03
E	SH-90 0.25 mi south of SH-141, Vancorum	400	50	13	70	18	140	10 R	0.04	0.04
D1	UT SR-46 Jct with US-191 at La Sal Jct	545	71	13	76	14	107	11 R	0.06	0.07
EE	I-70 west of Mack interchange	6,800	1,770	26	0	0	0	12 R	0.15	0.15
FF	I-70 SW of SH-6 & I-70, west of GJ	19,400	3,450	18	0	0	0	9 U	0.25	0.25
F	SH-141 0.25 mi north of SH-491	570	70	12	86	15	123	9 R	0.02	0.03
G	SH-141 0.8 mi south of SH-145	430	90	21	76	18	84	9 R	0.02	0.03
H	SH-141 0.25 mi west of SH-90, Vancorum	360	40	11	46	13	115	9 R	0.03	0.03
GG	SH-141 NE of NE jct. CR SX.90, Gateway	700	100	14	0	0	0	9 R	0.08	0.08
HH	SH-141 0.3 mi west of US-50, Whitewater	1,400	390	28	0	0	0	9 R	0.07	0.07
I	SH-145 0.25 mi east of SH-141	1,100	90	8	32	3	36	9 R	0.05	0.05
J	SH-145 east of Market St., Norwood	3,100	210	7	32	1	15	9 R	0.30	0.31
K	SH-145 0.25 mi NW of SH-62, Placerville	1,900	300	16	32	2	11	11 R	0.24	0.25

Table 5−3 (continued). Transportation Statistics for Haul Route Segments—Expanded Program Alternative, Realistic Evaluation

Figure 3−2 Map Symbol	Location Description	2005 AADT[a]	No. Trucks	Existing % Trucks[b]	Increased Number of Trucks	% Increase Total Traffic[b]	% Increase Trucks[b]	DHV %[c]	Current V/C Ratio[d]	Projected V/C Ratio
L	SH-62 0.25 mi NE of SH-145, Placerville	3,800	370	10	32	1	9	12 R	0.51	0.51
M	SH-62 west of US-550, Ridgway	7,700	460	6	32	<1	7	12 R	0.66	0.66
N	US-550 0.6 mi north of SH-62, Ridgway	6,400	460	7	32	1	7	12 R	0.51	0.51
O	US-550 south of US-50 & SH-90, Montrose	24,000	1,200	5	32	1	3	9 U	0.66	0.67
II	US-50, south of Nolan Ave., GJ	37,700	1,360	4	0	0	0	8 U	0.98	0.98
JJ	US-50 NW of SH-141, Whitewater	9,300	860	9	0	0	0	9 U	0.28	0.28
KK	US-50 @ Gunnison River Bridge	10,400	860	8	0	0	0	8 U	0.27	0.27
LL	US-50 south of SH-92, Delta	17,100	1,040	6	0	0	0	8 U	0.43	0.43
MM	US-50 south of SH-348, Olathe	12,700	770	6	0	0	0	11 R	0.46	0.46
P	US-50 east of SH-90 & SH 550, Montrose	15,500	1,330	9	32	<1	2	8 U	0.40	0.41
Q	US-50 0.8 mi east of SH 92, Blue Mesa Dam	2,800	330	12	32	1	10	9 R	0.21	0.21
R	US-50 east of SH-149	4,000	500	13	32	1	6	14 R	0.51	0.51
S	US-50 west of SH-135, Main St., Gunnison	13,700	1,560	11	32	<1	2	14 R	0.69	0.69
T	US-50 0.8 mi west of SH 114	3,000	360	12	32	1	9	17 R	0.44	0.44
U	US-50 east of CR-229, east of Monarch Pass	2,600	620	24	32	1	5	14 R	0.45	0.45
V	US-50 west of N. Jct. US 285, Poncha Spgs	3,500	800	23	32	1	4	14 R	0.65	0.66
W	US-50 east of G & 16 St., Salida	11,300	1,010	9	32	<1	3	14 R	0.55	0.55
X	US-50 west of CR-45, Coaldale	3,000	230	8	32	1	14	16 R	0.47	0.47
Y	US-50 east of SH-69, Texas Creek	3,100	490	16	32	1	7	14 R	0.37	0.37
Z	US-50 west of 1st St., Cañon City	12,400	1,340	11	32	<1	2	14 R	0.61	0.61

CDOT 2006a and 2006b; UDOT 2006a, 2006b, and 2006c.
[a]AADT = average annual daily traffic.
[b]All percents rounded to nearest whole number.
[c]DHV (Design Hour Volume): the 30th highest annual hourly traffic volume reported as percent of AADT.
[d]V/C (Volume to Capacity) Ratio: the ratio of the volume of traffic that is using a road to the volume of traffic it could be expected to carry. A road segment is considered congested when the V/C ratio is greater than 0.85 (CDOT 2006b).
Abbreviations: US = U.S. Highway mi = mile CR = County Road SR = State Road SH = State Highway R = rural road U = urban road

5.2.1.3 Radiological Transportation Impacts

Under the Expanded Program alternative (for the worst-case scenario), an average of 120 to 150 haul trucks per day would deliver uranium ore to either the White Mesa or Cañon City uranium mill. Shipments would take place for 22 days per month, 12 months per year. In 1 year, there would be between 31,680 and 39,600 shipments of uranium ore.

Workers. For shipments of uranium ore to the White Mesa or Cañon City uranium mills, the maximally exposed transportation worker would be a haul-truck driver. This person was assumed to drive a haul truck containing uranium ore for 1,000 hours per year. For the other 1,000 hours per year, the haul truck would be empty. The driver was assumed to be 10 ft from the trailer containing the uranium ore, and the radiation dose rate in the cab of the haul truck was estimated to be 0.014 mrem per hour.

This driver would receive a radiation dose of 14 mrem per year, which is equivalent to a probability of a latent cancer fatality of about 8.4×10^{-6}, or about 8 chances in 1 million. If the driver worked for 10 years, the probability of a latent cancer fatality would be about 8.4×10^{-5}, or about 8 chances in 100,000. For perspective, an individual has a lifetime probability of dying of cancer from all sources of about 220,000 in 1 million, or a risk of lung cancer of 60,000 in 1 million (SEER 2005).

Public. Four representative scenarios were evaluated to estimate exposures of the public to shipments containing uranium ore:

- An individual in a vehicle stopped in traffic next to a uranium ore truck. This individual would be exposed to one shipment of uranium ore for 30 minutes. The distance between the haul truck and the individual's vehicle was assumed to be 6.6 ft. Using the MICROSHIELD code (Grove 2006) the radiation dose rate was estimated to be 0.052 mrem per hour at 6.6 ft from the haul truck.
- An individual in a vehicle who passes a uranium ore truck going the opposite direction. This individual would be exposed to one shipment of uranium ore. The distance between the haul truck and the individual's vehicle was assumed to be 6.6 ft, and the two vehicles were assumed to be traveling at 25 miles per hour. Using the RISKIND code (Yuan et al. 1995) the radiation dose rate was estimated to be 0.052 mrem per hour at 6.6 ft from the haul truck.
- An individual in a vehicle stopped at an intersection when a haul truck passes by. This individual would be exposed to one shipment of uranium ore. The distance between the haul truck and the individual's vehicle was assumed to be 6.6 ft, and the haul truck was assumed to be traveling at 25 miles per hour. Using the RISKIND code the radiation dose rate was estimated to be 0.052 mrem per hour at 6.6 ft from the haul truck.
- A nearby resident located 33 ft from a road used by haul trucks. The haul truck was assumed to be traveling at 25 miles per hour. This individual would be exposed to all shipments of uranium ore over the course of a year. Using the RISKIND code the radiation dose rate was estimated to be 0.052 mrem per hour at 6.6 ft from the haul truck.

Table 5–4 presents the impacts of the public exposure scenarios. The largest radiation dose would be for the nearby resident, who would receive a dose of 0.22 mrem per year from the

passing haul trucks. This is equivalent to a probability of a latent cancer fatality of about 1.3×10^{-7}, or about 1 chance in 10 million. If the nearby resident was exposed to shipments for 10 years, the probability of a latent cancer fatality would be about 1.3×10^{-6}, or about 1 chance in 1 million. As described above, an individual has a lifetime probability of dying of cancer from all sources of about 220,000 in 1 million, or a risk of lung cancer of 60,000 in 1 million.

Table 5–4. Radiation Doses to the Public From Shipments Under the Expanded Program Alternative

Scenario	Radiation Dose	Latent Cancer Fatalities
Individual in traffic jam	0.026 mrem	1.6×10^{-8}
Individual in passing vehicle	7.4×10^{-6} mrem	4.4×10^{-12}
Individual in vehicle at intersection	1.5×10^{-5} mrem	9.0×10^{-12}
Nearby resident	0.22 mrem per year	1.3×10^{-7}

5.2.1.4 Radiological Truck Accidents

Transportation accidents involving uranium ore haul trucks could result from driver error; collisions with other traffic, livestock, or wildlife; or severe road and weather conditions, or they could result from an intentional act of sabotage. The post-accident impacts to the general public and the environment would remain the same regardless of what caused the accident.

If a severe transportation accident occurred during shipment of uranium ore, an individual could receive exposure to radiation. Radiation doses were estimated for inhalation and direct exposure from the passing radioactive cloud, direct exposure from radioactivity deposited on the ground, and inhalation of resuspended radioactive particulates from the ground.

For this conservative analysis, the maximally exposed individual is assumed to be located about 33 ft from the site of the accident, which is assumed, on average, to be the closest an individual (resident) could be to a haul route. Neutral atmospheric conditions (Pasquill Stability Class D and a wind speed of 4.47 meters per second) were assumed to exist during the accident. Radiation doses were estimated for inhalation and direct exposure from the passing radioactive cloud (cloudshine), direct exposure from radioactivity deposited on the ground (groundshine), and inhalation of resuspended radioactive particulates from the ground. This individual would receive a radiation dose of 4.9 mrem, which is equivalent to a probability of a latent cancer fatality of about 2.9×10^{-6}, or about 3 chances in 1 million.

If the accident occurred in a rural area, the population would receive a collective radiation dose of about 8.4×10^{-5} person-rem. This is equivalent to a probability of a latent cancer fatality of about 5.0×10^{-8}, or about 5 chances in 100 million.

If the accident occurred in a more populated area such as Moab, Grand Junction, Norwood, Ridgway, Montrose, Gunnison, Salida, or Cañon City, the population would receive a collective radiation dose of about 9.9×10^{-3} person-rem. This is equivalent to a probability of a latent cancer fatality of about 5.9×10^{-6}, or about 6 chances in 1 million.

If an accident occurred and the uranium ore was spilled on the ground, the ore would be completely removed, loaded onto a truck, and transported to the mill. Except for soil and

vegetation disturbance, impacts to natural resources are not expected to occur from a spill or spill cleanup.

If an accident occurred where the uranium ore was dumped into a surface water source, it is unlikely that any adverse impacts to biota would occur because of the relatively low toxicity and low concentrations of the hazardous constituents of uranium ore. If the ore were spilled into a shallow surface water source, it would be removed before water quality could be adversely affected. Most ore would be in large enough sizes (e.g., cobbles) that it would be recovered easily from the water source. The finer particles would be dispersed by stream flow and would not create a radiological hazard to aquatic life. The primary impact to water quality from a spill would be a short-term increase in turbidity and total suspended solids.

Uranium ore from the Uravan Mineral Belt typically contains the uranium-bearing mineral carnotite. In addition to uranium, carnotite can contain additional metals (aluminum, arsenic, barium, copper, iron, lead, manganese, selenium, vanadium, and zinc) that are potentially toxic to aquatic species. Based on the relative toxicities of these constituents and the relative concentrations of these constituents as determined by leach tests conducted on ores from the Uravan Mineral Belt, uranium was identified as the indicator metal because its potential concentration and aquatic toxicity is significantly higher than that of the other metals. If submerged in waters typically found in the Dolores, San Miguel, and Gunnison Rivers, carnotite would yield dissolved uranium concentrations that range from 2.95 to 4.80 mg/L. These concentrations were used in conservative mixing calculations to estimate the potential effect that the spill of an ore truck might have on water quality in a river during critical low-flow conditions. Flow rates and water quality data for three rivers, the Dolores River (near Slick Rock), the San Miguel River (near Naturita), and the Gunnison River (near Gunnison), were used in these calculations. Results of the calculations showed that the hypothetical ore spill would not perceptibly increase uranium concentrations in the rivers during low flow. Uranium concentrations in the rivers would increase by approximately 0.017 to 0.082 micrograms per liter (μg/L). Added to background uranium concentrations, which are approximately 1 μg/L, this increase in uranium concentrations would not impair the river water quality to the point that aquatic life would be harmed, because the aquatic toxicity benchmark for uranium is 46 μg/L (Suter and Tsao 1996).

After a spill, the radiation dose rate above the spill would be about 1 mrem per hour. The radiation dose for a first responder would be less than 5 mrem, and the radiation dose for a cleanup worker would be less than 10 mrem. These radiation doses are equivalent to a probability of a latent cancer fatality of less than 6.0×10^{-6}, or about 6 chances in 1 million.

Wildlife would continue to be injured or killed along the haul routes through collisions with haul trucks, and this would increase proportionately with an increase in haul-truck traffic. Typically, haul-truck drivers would not take evasive action to avoid wildlife because that action could lead to an accident involving a turnover or collision with another vehicle. Wildlife most likely to be affected would include mule deer, elk, porcupines, rabbits, prairie dogs, ground squirrels, golden eagles, coyotes, foxes, and turkey vultures.

5.2.2 Existing Program Alternative

All ore shipments must be conducted in accordance with applicable Colorado and Utah Department of Transportation regulations, which require that specific shipping documents be

prepared for each shipment and then accompany the shipment to its destination. The regulations also mandate that all shipments be tarped.

As referenced in Section 3.5.2.2, this section evaluates the impacts related to potential increased truck traffic on various Colorado and Utah highway segments. As explained in Section 5.2.1, the conservative or worst-case scenario includes the simultaneous and immediate development of all available leases with the additional criterion that all trucks would travel to one mill. This approach bounds the analyses because the actual development of lease tracts is dependent on multiple factors that would not believably result in simultaneous development. It is most likely that leases would be developed over time, and that mining-related traffic would gradually increase.

Additionally, in this final PEA, DOE has also evaluated the potential impacts associated with the haul-truck traffic that can reasonably be expected to occur.

5.2.2.1 Worst-Case Scenario

Under this alternative, ore from currently active lease tracts would be mined and transported for processing. Traffic increases from current conditions would be expected under the Existing Program alternative because there was little interest in mining the active lease tracts in the recent past. Table 5–5 shows traffic characteristics for a maximum case of 50 haul trucks per day (round trip of 100) on various highway road segments (see Figure 3−3 for potential routes). Fewer road segments would be used for this alternative because the existing leases are proximate to either the White Mesa Mill, or, potentially to the Cañon City Mill via fewer roads. See Table 5–5 for projected numbers of haul trucks per road segment, traffic increases, DHV, and V/C ratios.

This alternative would increase daily truck traffic between 30 and 100 vehicles; most road segments, however, would have an additional 100 haul trucks per day. The resulting percent increase in total traffic would be in general between 1 and 10 percent. The largest total increase in traffic is predicted along SH-90 between Paradox, Colorado, and the Utah border. The addition of 54 trucks on SH-90 would result in a 25 percent increase in overall traffic for road segment D. However, this increase would not be expected to impact area highway use due to the low resident population and low traffic levels. The existing DHV is lower (10 percent) than expected for this rural area (11−12 percent expected) and the V/C ratio is among the lowest found on all affected highway road segments. As stated earlier, a V/C ratio of over 0.85 indicates that the road segment is congested and approaching capacity; this road segment is characterized as having a V/C ratio of 0.02. The increased truck traffic related to this alternative would not increase the V/C ratio. The current highest V/C ratio is 0.69, which occurs on road segment S, located west of Gunnison, Colorado (Figure 3−3). Adding 100 trucks per day would not change this ratio.

In Utah, only two road segments would be affected by truck traffic related to this scenario. Segments A and B may experience a 3 to 4 percent increase in total traffic. Current traffic volumes are low, although the DHV for Monticello (Segment A) is slightly higher than desired. The V/C ratio for Segment A would change from 0.22 to 0.23; there would be no change in the V/C/ ratio for Segment B. Both of these ratios would be considered low, and congestion would not typically be a concern.

Table 5–5. Transportation Statistics for Haul Route Segments—Existing Program Alternative, Worst-Case Scenario

Figure 3−3 Map Symbol	Location Description	2005 AADT[a]	No. of Trucks	Existing % Trucks[b]	Increased Number of Trucks	% Increase Total Traffic[b]	% Increase Trucks[b]	DHV %[c]	Current V/C Ratio[d]	Projected V/C Ratio
A	US-191 and SR-491 in Monticello	3,020	997	33	100	3	10	11 U	0.22	0.23
B	US-191 and SR-95, 4 mi south of Blanding	2,830	538	19	100	4	19	11 R	0.11	0.11
C	SH-491 at Colo/Utah state line	2,100	630	30	100	5	16	11 R	0.14	0.14
D	SH-90 west of CR-575 to Paradox	220	40	18	54	25	135	10 R	0.02	0.02
E	SH-90 0.25 mi south of SH-141, Vancorum	400	50	13	38	10	76	10 R	0.04	0.04
F	SH-141 0.25 mi north of SH-491	570	70	12	100	18	143	9 R	0.02	0.03
G	SH-141 0.8 mi south of SH-145	430	90	21	54	13	60	9 R	0.02	0.03
H	SH-141 0.25 mi west of SH-90, Vancorum	360	40	11	30	8	75	9 R	0.03	0.03
I	SH-145 0.25 mi east of SH-141	1,100	90	8	100	9	111	9 R	0.05	0.06
J	SH-145 east of Market St., Norwood	3,100	210	7	100	3	48	9 R	0.30	0.31
K	SH-145 0.25 mi NW of SH-62, Placerville	1,900	300	16	100	5	33	11 R	0.24	0.26
L	SH-62 0.25 mi NE of SH-145, Placerville	3,800	370	10	100	3	27	12 R	0.51	0.52
M	SH-62 west of US-550, Ridgway	7,700	460	6	100	1	22	12 R	0.66	0.67
N	US-550 0.6 mi north of SH-62, Ridgway	6,400	460	7	100	2	22	12 R	0.51	0.51
O	US-550 south of US-50 & SH-90, Montrose	24,000	1,200	5	100	<1	8	9 U	0.66	0.67

Table 5−5 (continued). Transportation Statistics for Haul Route Segments—Existing Program Alternative, Worst-Case Scenario

Figure 3−3 Map Symbol	Location Description	2005 AADT[a]	No. of Trucks	Existing % Trucks[b]	Increased Number of Trucks	% Increase Total Traffic[b]	% Increase Trucks[b]	DHV %[c]	Current V/C Ratio[d]	Projected V/C Ratio
P	US-50 east of SH-90 & US-550, Montrose	15,500	1,330	9	100	1	8	8 U	0.40	0.41
Q	US-50 0.8 mi east of SH-92, Blue Mesa Dam	2,800	330	12	100	4	30	9 R	0.21	0.22
R	US-50 east of SH-149	4,000	500	13	100	3	20	14 R	0.51	0.52
S	US-50 west of SH-135, Main St., Gunnison	13,700	1,560	11	100	1	6	14 R	0.69	0.69
T	US-50 0.8 mi west of SH-114	3,000	360	12	100	3	28	17 R	0.44	0.45
U	US-50 east of CR-229, east of Monarch Pass	2,600	620	24	100	4	16	14 R	0.45	0.47
V	US-50 west of N. Jct. US-285, Poncha Spgs	3,500	800	23	100	3	13	14 R	0.65	0.67
W	US-50 east of G & 16 St., Salida	11,300	1,010	9	100	1	10	14 R	0.55	0.55
X	US-50 west of CR-45, Coaldale	3,000	230	8	100	3	43	16 R	0.47	0.48
Y	US-50 east of SH-69, Texas Creek	3,100	490	16	100	3	20	14 R	0.37	0.38
Z	US-50 west of 1st St., Cañon City	12,400	1,340	11	100	1	7	14 R	0.61	0.61

CDOT 2006a and 2006b; UDOT 2006a, 2006b, and 2006c.
[a]AADT = average annual daily traffic.
[b]All percents rounded to nearest whole number.
[c]DHV (Design Hour Volume): the 30th highest annual hourly traffic volume reported as percent of AADT.
[d]V/C (Volume to Capacity) Ratio: the ratio of the volume of traffic that is using a road to the volume of traffic it could be expected to carry. A road segment is considered congested when the V/C ratio is greater than 0.85 (CDOT 2006b).
Abbreviations: US = U.S. Highway mi = mile CR = County Road SR = State Road SH = State Highway R = rural road U = urban road

Under a worst-case scenario, 50 haul trucks per day traveling to Cañon City (the longest of the existing routes, a distance of 640 miles round trip) 22 days per month, 264 days per year would travel a maximum of 8.5 million miles in 1 year. Given the calculated fatality rate of 0.28 per 100 million vehicle miles (see Section 5.2.1), approximately 0.024 fatal accident per year could be expected to occur related to haul-truck accidents.

Injury accidents were also calculated. Based on the calculated injury accident rate of 0.033 injury accident per one million miles of travel, an estimated 0.28 injury accident related to haul truck traffic may occur.

As stated in Section 5.2.1, actual recorded injuries and fatal accidents did include one fatal and five injury accidents on US-50 between Gunnison and Monarch Pass, Colorado, which would be on the route to the Cañon City Mill. One injury and one fatality were also recorded on SR-141, which included road segments F and G. There were no other fatalities recorded in 2004 (CDOT 2006d).

5.2.2.2 Realistic Evaluation

Mining-related traffic volume under this alternative would be similar to what has occurred in the past when these leases were being developed and mined. Table 5–7 provides traffic characteristics for this analysis.

Under this alternative, truck traffic would increase by a maximum addition of 62 trucks per day, with the majority of the road segments experiencing an increase of 32 trucks per day. The projected total traffic increases vary from less than one percent to a high of 18 percent, which occurs along SH-90, along road segment D. This road segment is classified as rural and has a DHV of 10 percent and a very low V/C ratio of 0.02. The V/C ratio would be unaffected by traffic increases.

In Utah, two road segments would have daily total traffic increases of 2 percent. Segments A and B are not currently congested and have V/C ratios of 0.11−0.22. Additional traffic would result in a negligible change of 0.01 to Segment A. Potential injury and fatal accidents would be less under this scenario than previously stated for the worst-case scenario.

Residences along the county and BLM roads and visitors would be subjected to noise, dust, and traffic impacts similar to those characterized under the Expanded Program alternative. However, as shown on Table 5−6, there would be 14 (instead of the 15 under the Expanded Program alternative) residences affected; the residence adjacent to lease tract 13 would have the most haul-truck traffic—5 haul trucks per day. All of these residences, or the lands on which new residences have been built, have had ore shipments along these county and BLM roads within the last 10 years.

Table 5–6. Existing Alternative—Trucking Impacts on County Roads for the Realistic Evaluation

Nearest Lease Tract	Residences Potentially Affected	Possibly Affected by Shipments from Lease Tracts	Average Number of Trucks per day
Slick Rock - 11	8	11	2
Slick Rock - 13	1	13, 13A, 15,	5
Slick Rock - 13A	1	13A, 15	3
Slick Rock - 15	4	15	1

Table 5–7. Transportation Statistics for Haul Route Segments—Existing Program Alternative, Realistic Evaluation

Figure 3−3 Map Symbol	Location Description	2005 AADT[a]	No. of Trucks	Existing % Trucks[b]	Increased Number of Trucks	% Increase Total Traffic[b]	% Increase Trucks[b]	DHV %[c]	Current V/C Ratio[d]	Projected V/C Ratio
A	US-191 and SR-491 in Monticello	3,020	997	33	50	2	5	11 U	0.22	0.23
B	US-191 and SR-95, 4 mi south of Blanding	2,830	538	19	50	2	9	11 R	0.11	0.11
C	SH-491 at Colo/Utah state line	2,100	630	30	46	2	7	11 R	0.14	0.14
D	SH-90 west of CR-575 to Paradox	220	40	18	40	18	100	10 R	0.02	0.02
E	SH-90 0.25 mi south of SH-141, Vancorum	400	50	13	62	16	124	10 R	0.04	0.04
F	SH-141 0.25 mi north of SH-491	570	70	12	46	8	66	9 R	0.02	0.03
G	SH-141 0.8 mi south of SH-145	430	90	21	40	9	44	9 R	0.02	0.02
H	SH-141 0.25 mi west of SH-90, Vancorum	360	40	11	10	3	25	9 R	0.03	0.03
I	SH-145 0.25 mi east of SH-141	1,100	90	8	32	3	36	9 R	0.05	0.05
J	SH-145 east of Market St., Norwood	3,100	210	7	32	1	15	9 R	0.30	0.31
K	SH-145 0.25 mi NW of SH-62, Placerville	1,900	300	16	32	2	11	11 R	0.24	0.25
L	SH-62 0.25 mi NE of SH-145, Placerville	3,800	370	10	32	1	9	12 R	0.51	0.51
M	SH-62 west of US-550, Ridgway	7,700	460	6	32	<1	7	12 R	0.66	0.66
N	US-550 0.6 mi north of SH-62, Ridgway	6,400	460	7	32	1	7	12 R	0.51	0.51
O	US-550 south of US-50 & SH-90, Montrose	24,000	1,200	5	32	<1	3	9 R	0.66	0.67

Table 5−7 (continued). Transportation Statistics for Haul Route Segments—Existing Program Alternative, Realistic Evaluation

Figure 3−3 Map Symbol	Location Description	2005 AADT[a]	No. of Trucks	Existing % Trucks[b]	Increased Number of Trucks	% Increase Total Traffic[b]	% Increase Trucks[b]	DHV %[c]	Current V/C Ratio[d]	Projected V/C Ratio
P	US-50 east of SH-90 & SH-550, Montrose	15,500	1,330	9	32	<1	2	8 U	0.40	0.41
Q	US-50 0.8 mi east of SH-92, Blue Mesa Dam	2,800	330	12	32	1	10	9 R	0.21	0.21
R	US-50 east of SH-149	4,000	500	13	32	1	6	14 R	0.51	0.51
S	US-50 west of SH-135, Main St., Gunnison	13,700	1,560	11	32	<1	2	14 R	0.69	0.69
T	US-50 0.8 mi west of SH-114	3,000	360	12	32	1	9	17 R	0.44	0.44
U	US-50 east of CR-229, east of Monarch Pass	2,600	620	24	32	1	5	14 R	0.45	0.45
V	US-50 west of N. Jct. US-285, Poncha Spgs	3,500	800	23	32	1	4	14 R	0.65	0.66
W	US-50 east of G & 16 St., Salida	11,300	1,010	9	32	<1	3	14 R	0.55	0.55
X	US-50 west of CR-45, Coaldale	3,000	230	8	32	1	14	16 R	0.47	0.47
Y	US-50 east of SH-69, Texas Creek	3,100	490	16	32	1	7	14 R	0.37	0.37
Z	US-50 west of 1st St., Cañon City	12,400	1340	11	32	<1	2	14 R	0.61	0.61

CDOT 2006a and 2006b; UDOT 2006a, 2006b, and 2006c.
[a]AADT = average annual daily traffic.
[b]All percents rounded to nearest whole number.
[c]DHV (Design Hour Volume): the 30th highest annual hourly traffic volume reported as percent of AADT.
[d]V/C (Volume to Capacity) Ratio: the ratio of the volume of traffic that is using a road to the volume of traffic it could be expected to carry. A road segment is considered congested when the V/C ratio is greater than 0.85 (CDOT 2006b).
Abbreviations: US = U.S. Highway mi = mile CR = County Road SR = State Road SH = State Highway R = rural road U = urban road

5.2.2.3 Radiological Transportation Impacts

Under the Existing Program alternative, an average of 30 to 50 haul trucks per day would deliver uranium ore to either the White Mesa or Cañon City uranium mill. Shipments would take place for 22 days per month, 12 months per year. In 1 year, there would be between 7,920 and 13,200 shipments of uranium ore.

A driver hauling ore from a mine to a mill would receive the same annual exposure under the Existing Program alternative as under the Expanded Program alternative characterized in Section 5.2.1, a radiation dose of 14 mrem per year, which is equivalent to a probability of a latent cancer fatality of about 8.4×10^{-6}, or about 8 chances in 1 million. If the driver worked for 10 years, the probability of a latent cancer fatality would be about 8.4×10^{-5}, or about 8 chances in 100,000.

The same public exposure scenarios assessed in Section 5.2.1 could occur under the Existing Program alternative; however, because the number of shipments would decrease, the radiation doses would also decrease. Table 5–8 presents the impacts of the public exposure scenarios described in Section 5.2.1.1. The largest radiation dose was for the nearby resident, who would receive a radiation dose of 0.074 mrem per year from the passing uranium ore trucks. This is equivalent to a probability of a latent cancer fatality of about 4.4×10^{-8}, or about 4 chances in 100 million. If the nearby resident was exposed to shipments for 10 years, the probability of a latent cancer fatality would be about 4.4×10^{-7}, or about 4 chances in 10 million. As described under the Expanded Program alternative, an individual has a lifetime probability of dying of cancer from all sources of about 220,000 in 1 million, or a risk of lung cancer of 60,000 in 1 million.

Table 5–8. Radiation Doses for the Public From Shipments Under the Existing Program Alternative

Scenario	Radiation Dose	Latent Cancer Fatalities
Individual in traffic jam	0.026 mrem	1.6×10^{-8}
Individual in passing vehicle	7.4×10^{-6} mrem	4.4×10^{-12}
Individual in vehicle at intersection	1.5×10^{-5} mrem	9.0×10^{-12}
Nearby resident	0.074 mrem per year	4.4×10^{-8}

5.2.2.4 Transportation Accidents

Transportation accidents involving uranium ore haul trucks could result from driver error; collisions with other traffic, livestock, or wildlife; or severe road and weather conditions, or they could result from an intentional act of sabotage. The post-accident impacts to the general public and the environment would remain the same regardless of what caused the accident.

The same accident scenarios and consequences that were assessed in Section 5.2.1 for the Expanded Program alternative could occur under the Existing Program alternative. Impacts to the environment are expected to be minimal from haul-truck traffic. If a spill were to occur on the ground, the ore would be completely removed, loaded onto a haul truck, and transported to the mill. Except for soil and vegetation disturbance, impacts to natural resources are not expected to occur from a spill or spill cleanup. If the ore were spilled into a shallow surface water source,

it would be removed before water quality could be adversely affected. Most ore would be in large enough sizes (e.g., cobbles and stones) that it would be recovered easily from the water source. The finer particles would be dispersed by stream flow and would not create a radiological hazard to aquatic life. The primary impact to water quality from a spill would be a short-term increase in turbidity and total suspended solids. As discussed previously, such an ore spill would not impair the river water quality to the point that aquatic life would be harmed.

Wildlife would continue to be injured or killed along the haul routes through collisions with haul trucks. Typically, haul-truck drivers would not take evasive action to avoid wildlife because that action could lead to an accident involving a turnover or collision with another vehicle. Wildlife most likely to be affected would include mule deer, elk, porcupines, rabbits, prairie dogs, ground squirrels, golden eagles, and turkey vultures.

5.2.3 No Action Alternative

All ore shipments must be conducted in accordance with applicable Colorado and Utah Department of Transportation regulations, which require that specific shipping documents be prepared for each shipment and then accompany the shipment to its destination. The regulations also mandate that all shipments be tarped.

Some ore transportation could be conducted under this alternative. The former leaseholders would have rights to the ore that has already been mined and stockpiled on the lease tracts. Currently, less than 5,000 tons of ore are stockpiled on the lease tracts. Using 20 haul trucks per day, the leaseholders could transport the ore to the processing mills in approximately 10 days. If the haul-truck drivers were to take the longest route from the existing lease tracts to the Cañon City Mill (380 miles each way), the haul trucks would travel a maximum of 152,000 miles. Using a fatal truck accident rate of 0.28 fatal accident per 100 million miles, approximately 0.0004 fatal accident and 0.005 injury accident could be expected to occur during transport of the ore.

Because of this very limited potential for ore shipment under the No Action alternative, impacts to humans from radiation exposure and impacts to the environment, and the possibility of transportation accidents would be far lower than the negligible consequences predicted under the Existing Program alternative (Section 5.2.2).

5.3 Land Use

5.3.1 Mining

5.3.1.1 Expanded Program Alternative

Under the Expanded Program alternative, DOE could extend the ULP to make all 38 leases available for mining. Mining activities would result in the creation of mine-waste-rock piles and ore storage stockpiles at the mine site. Storm-water management controls, required at all leaseholder operations, would minimize the potential for erosion and transportation of contaminant-laden sediments into surface drainages. Therefore, potential impacts to surface water sources from storm-water runoff would be negligible. The potential for these materials to leach into subsurface soils and any underlying ground water is minimal due to the low solubility of the ore, as discussed in Section 5.2. Additionally, state permitting regulations include

requirements that address this issue. Once mined, the ores would then be transported for milling and subsequent commercial use. Removing the ore would deplete known domestic reserves of uranium and vanadium; however, continued exploration could result in discovery of previously unidentified ore reserves. Further, ore removal would be beneficial to supply the marketplace with additional uranium and vanadium, which helps meet current and future needs.

5.3.1.2 Existing Program Alternative

Under the Existing Program alternative, DOE would maintain the Uranium Leasing Program at its current level, and the existing 13 leases would continue to be available for mining activity. Mining activities would result in the creation of mine-waste-rock piles and ore storage stockpiles at the mine site. Storm-water management controls, required at all leaseholder operations, would minimize the potential for erosion and transportation of contaminant-laden sediments into surface drainages. Therefore, potential impacts to surface water sources from storm-water runoff would be negligible. The potential for these materials to leach into subsurface soils and any underlying ground water is minimal due to the low solubility of the ore, as discussed in Section 5.2. Additionally, state permitting regulations include requirements that address this issue. Once mined, the ores would then be transported for milling and subsequent commercial use. Removing the ore would deplete known domestic reserves of uranium and vanadium; however, continued exploration could result in discovery of previously unidentified ore reserves.

5.3.1.3 No Action Alternative

Under the No Action alternative, DOE's leases would be allowed to expire as scheduled and the active lease tracts would be reclaimed. At that point, DOE could choose to continue (indefinitely) its management of the withdrawn lands without leasing or all lands could be restored to the public domain with the concurrence of BLM and under the BLM's administrative control and DOE's leasing program would end. Any future mining on these lands would be subjected to the laws and regulations governing such development on BLM lands.

5.3.2 Recreation

5.3.2.1 Expanded Program Alternative

Under the Expanded Program alternative, effects on recreational activities in the lease tract areas would be minimal even if all leases were to open up for all phases of operations. If all lease tracts were engaged in mining activities, approximately 750 acres would be unavailable for recreational use. Increases in noise, dust, traffic, and human activity in and around the lease tracts could deter recreational users from using public lands adjacent to the lease tracts; however, there are numerous unimproved roads in the vicinity of the lease tracts that allow easy access to all public lands.

Mining activities on lease tracts 13, 13A, and 14 in the Dolores River Canyon SRMA could potentially detract from the recreational experience of those using the Dolores River. Expected impacts to those recreational users would consist of noise from equipment during operational activities and fans used to vent mine operations that would be heard along the river. In addition, there would be visual degradation from the mining activities, which, however, would not be unlike other viewsheds that traversed mining areas.

The extent of the distraction would depend on the types and number of operations occurring on these tracts. Because most of the anticipated activities would be exploration and underground mining, the potential detractions would be expected to be minimal. In addition, DOE would restrict activities at these existing mine sites so that they do not further encroach on the Dolores River, and new mining activities would not be allowed within 0.25-mile of the Dolores River. Tract 2 of lease tract 14 is traversed extensively by the Dolores River and, for that reason, was specifically excluded from past leasing activities and will be excluded from such activities in the future. Activities on the lease tracts would not affect any areas used for river access or overnight camping and could be noticed or heard, along with other activities on existing roads, by river users for only a few minutes in the first mile or two downstream of the highway 141 launch site in Slick Rock.

5.3.2.2 Existing Program Alternative

Under the Existing Program alternative, approximately 410 acres would be unavailable for recreational use if the 13 leases in the program were in operation. The recreational use effects would be minimal because the amount of land unavailable would be negligible compared to the amount of public land available for recreational use. As described in Section 5.3.2.1, mining activities on lease tracts 13 and 13A in the Dolores River Canyon SRMA could potentially detract from the recreational experience of those using the Dolores River.

5.3.2.3 No Action Alternative

Cessation of mining activities on all lease tracts would have minimal impact for recreational users for most of the lease tracts because most tracts are fairly remote, although generally open for public access, and they are not designated as specific recreational areas. However, the absence of mining activities (e.g., noise, dust, traffic, and human activity) and reclamation of the land would benefit recreational users in and near some lease tracts, especially those tracts in and close to the Dolores River Canyon SRMA. Leases that are now fenced as a result of active mining would become available for other uses such as off-highway vehicle traffic, hiking, and hunting.

5.3.3 Timber Harvesting

5.3.3.1 Expanded Program Alternative

Under the Expanded Program alternative, some piñon pine and juniper trees would likely be removed as more leases become available for access roads, mine construction and development, and mine site expansion. Because of the abundance of piñon pine and juniper in the lease tract areas, impacts to these species would be minimal. For all future leaseholder activities, DOE would restrict the time period in which leaseholders can perform the bulk removal of vegetation, particularly piñon pine, to minimize the spread of the Ips beetle.

5.3.3.2 Existing Program Alternative

In the current leasing program, not all leases are currently in operation. If all 13 leases were engaged in mining activities, there would be some minimal increase in timber removal for roads and mine-related activities. For all future leaseholder activities, DOE would restrict the time

period in which leaseholders can perform the bulk removal of vegetation, particularly piñon pine, to minimize the spread of the Ips beetle.

5.3.3.3 No Action Alternative

No impacts to piñon pine and juniper resources would occur under the No Action alternative.

5.3.4 Agriculture and Grazing

5.3.4.1 Expanded Program Alternative

Under the Expanded Program alternative, a maximum of 9 to 15 AUMs could be lost as a result of an increase in active mining activities from the additional surface disturbance of 450 acres. This small loss in acreage would not adversely affect the volume of grazing forage in grazing allotments over the lease tracts. Additional impacts to livestock may include increased animal/vehicle accidents, damage to or increased maintenance requirements for access roads or range improvements such as cattle guards and fences, and disruption of normal livestock trailing/movement from mine development. DOE requires the leaseholders to repair damages to fences, cattle guards, and other infrastructure caused by their operations.

5.3.4.2 Existing Program Alternative

If all leases under the existing program were engaged in operations, approximately one to two additional AUMs would be lost for grazing from the additional 110 acres that could be disturbed. This would be an increase over the 6 to 10 AUMs that may have been lost to grazing from the 300 acres that are currently disturbed on the 13 existing lease tracts and associated roads. Because most mining activities occur in lands not suitable for crops, there would be no impacts to agriculture.

5.3.4.3 No Action Alternative

Under the No Action alternative, grazing allotments on DOE's lease tracts would be beneficially affected by the cessation of mining activities and reclamation of disturbed lands. Assuming all disturbed lands (approximately 300 acres) were reclaimed and suitable for grazing, there would be a net increase of 6 to 10 AUMs.

5.4 Air Quality

5.4.1 Expanded Program Alternative

The Expanded Program alternative would result in localized increases in fugitive dust; however, *regional* air quality would not be expected to be adversely affected by these localized increases. Localized impacts to air quality would result from fugitive dust emissions produced by surface disturbances associated with mining and truck hauling and, to a lesser extent, from engine emissions produced from on-site equipment and haul trucks.

The regulatory requirements applicable to any mining operation at any lease tract would largely depend on the size and extent of the mining operations and activities (e.g., annual production rate, production quantity over the anticipated life of the mine, amount of surface disturbances,

distances traveled on haul roads). The State of Colorado Air Quality Control Commission (AQCC) regulations that have potential applicability to mining activities and operations at the uranium lease tracts include:

- Regulation 1: Particulates, Smokes, Carbon Monoxide & Sulfur Oxides
- Regulation 3: Stationary Source Permitting and Air Pollutant Emission Notice Requirements
- Regulation 8: Part A, Federal NESHAPs (National Emission Standards for Hazardous Air Pollutants); Subpart B, National Emission Standards for Radon Emissions from Underground Uranium Mines (40 CFR 61.20)

Leaseholders are responsible for identifying the regulations that apply specifically to their operations and activities and for fully complying with all permitting and other regulatory requirements that are applicable to their operations and activities.

Because fugitive dust emissions are the primary air pollutant of concern associated with these mining activities, all leaseholders would evaluate their activities and operations for compliance with the requirements for preparing and submitting an Air Pollutant Emissions Notice in accordance with AQCC Regulation 3, Section II. Where applicable, all leaseholders would develop a Fugitive Dust Control Plan and employ control measures and operating procedures, as necessary, to minimize fugitive particulate emissions into the atmosphere. AQCC Regulation 1 Section III.D requires that mining operations comply with the 20 percent opacity and no off-property transport emission limitation guidelines. The leaseholder would be required to implement control measures and operating procedures that would achieve compliance with this regulation. Some counties require a use permit to haul ore on the county roads and through that process may require a lessee to implement dust control measures on county roads.

As outlined in Part B of AQCC Regulation 3, "Concerning Construction Permits," a Construction Permit may also be required in certain circumstances. The leaseholder would be responsible for consulting with the CDPHE Air Pollution Control Division to determine if their activities and operations are subject to Construction Permit requirements.

The NESHAPs Subpart B regulations, "National Emission Standards for Radon Emissions from Underground Uranium Mines," apply to an underground uranium mine that "(a) Has mined, will mine or is designed to mine over 100,000 tons of ore during the life of the mine; or (b) Has had or will have an annual ore production rate greater than 10,000 tons, unless it can be demonstrated … that the mine will not exceed total ore production of 100,000 tons during the life of the mine." For any mine meeting this definition, the leaseholder must comply with the emission standard for radon-222 as required at 40 CFR 61.22 and is subject to the annual NESHAPs Subpart B reporting requirements as outlined at 40 CFR 61.24.

All leaseholders would provide copies of all regulatory correspondence (including permits and applications, Air Pollutant Emissions Notices, Fugitive Dust Control Plans, NESHAPs annual reports) to DOE for incorporation into the official ULP lease files.

5.4.2 Existing Program Alternative

The Existing Program alternative would also result in localized air quality impacts similar to those expected under the Expanded Program alternative. Under the Existing Program alternative, localized air quality impacts also would be attributable to the fugitive dust and visible emissions resulting from surface disturbances associated with mining and truck hauling and, to a lesser extent, from engine emissions produced from on-site equipment and haul trucks. It is anticipated that, although the *types* of air quality impacts would be similar to those described for the Expanded Program alternative, the severity of those impacts would decrease proportionately by the number of leases actively worked.

5.4.3 No Action Alternative

Short-term increases in fugitive dust would occur under the No Action alternative during reclamation of the lease tracts; however, regional air quality would not be adversely affected. Over the long term, local air quality would improve slightly from the reclamation of disturbed lands.

5.5 Ground Water

5.5.1 Expanded Program Alternative

Under the Expanded Program alternative, mining operations would be expanded to encompass the inactive lease tracts. Preoperational, operational, and postoperational activities under the Expanded Program alternative are not expected to adversely affect ground water resources on any of the lease tracts. The shallowest significant ground water is in the Entrada Sandstone. Because this aquifer is generally several hundred feet below the surface at all lease tracts, surface-disturbing activities would have no effect on the aquifer. Downward percolation of recharge water, which could infiltrate at the surface, would be slowed considerably by the presence of the thick (several hundred feet), relatively impermeable mudstones and siltstone beds of the Brushy Basin Member of the Morrison Formation. The Entrada aquifer is hydrologically separated from the surface by the Brushy Basin and Salt Wash Members of the Morrison Formation and by the Wanakah Formation.

With the exception of mines on lease tracts 7, 9, and 13, ground water would not be present in notable amounts within the subsurface areas exposed during mining. In some cases, water would be brought into underground mines during drilling to prevent dust from becoming airborne and to remove cuttings from drill bits. This water would not be present in large enough quantities to transport mineral contaminants from the ore-bearing layer to underlying layers. The Entrada aquifer would not be affected because it is hydrologically isolated from the ore-bearing layer by the low-permeability Wanakah Formation, which directly overlies the Entrada.

In the existing mines on lease tracts 7 and 9, where water is present, ground water would continue to be pumped into surface treatment ponds. Therefore, it generally would not be available for seepage into underlying layers. Even if ground water were not pumped and removed, the underlying low-permeability layers would retard seepage of the ground water into the Entrada aquifer. If seepage into the Entrada aquifer were to occur over time, the small amount of ground water emanating from the ore-bearing layer would not affect ground water

quality within the aquifer. At lease tract 13, ground water may have to be pumped to surface treatment ponds, which would be installed once mining activities resume.

5.5.2 Existing Program Alternative

Under the Existing Program alternative, mining at existing lease tracts would continue until leases were terminated. As described under the Expanded Program alternative (Section 5.5.1) preoperational, operational, and postoperational activities under the Existing Program alternative are not expected to adversely affect ground water resources on any of the lease tracts.

5.5.3 No Action Alternative

Under the No Action alternative, reclamation activities, including the removal of surface contaminants, would not affect the quantity or quality of ground water within any aquifer. The cessation of pumping at mines on lease tracts 7 and 9 would not adversely affect water quality in the underlying Entrada aquifer. The low-permeability Wanakah Formation would retard seepage of water into the Entrada aquifer. If seepage into the Entrada aquifer were to occur over time, the small amount of water emanating from the ore-bearing layer would not affect ground water quality within the aquifer.

5.6 Surface Water

5.6.1 Expanded Program Alternative

Under the Expanded Program alternative, DOE would restrict activities at existing mine sites so that they do not further encroach toward the Dolores River, and new mining activities would not be allowed within 0.25-mile of the Dolores River. Additionally, DOE would exclude tract 2 of lease tract 14 (which is extensively traversed by the Dolores River) from future leasing activities.

Storm-water management controls are required at all leaseholder operations to minimize the potential for erosion and transportation of contaminant-laden sediments. These storm-water management controls would be designed to reduce runoff from lease tract operations, thus minimizing the amount of runoff reaching a perennial stream or river. Therefore, potential impacts to surface water sources from storm-water runoff would be negligible.

Two existing mining operations (on lease tracts 7 and 9) have mine-water treatment systems (ponds), and other lease tracts under the Expanded Program alternative could require the construction of such systems. These treatment systems would be designed to receive discharge water from the underground and open-pit mines. The leaseholder would consult with USFWS to address any concerns that the agency might have. These treatment systems would be constructed in accordance with applicable regulations. Those regulations might require that the ponds be adequately lined, fenced, and possibly netted to ensure that wildlife, livestock, and the environment are not adversely affected.

5.6.2 Existing Program Alternative

Under the Existing Program alternative, DOE would restrict activities at existing mine sites so that they do not further encroach toward the Dolores River, and new mining activities would not

be allowed within 0.25-mile of the Dolores River. Additionally, DOE would exclude tract 2 of lease tract 14 (which is extensively traversed by the Dolores River) from future leasing activities.

Storm-water management controls are required at all leaseholder operations to minimize the potential for erosion and transportation of contaminant-laden sediments. These storm-water management controls would be designed to reduce runoff from lease tract operations, thus minimizing the amount of runoff reaching a perennial stream or river. Therefore, potential impacts to surface water sources from storm-water runoff would be negligible under this alternative.

Two existing mining operations (on lease tracts 7 and 9) have mine-water treatment systems (ponds), and other lease tracts under the Existing Program alternative could require the construction of such systems. These treatment systems would be designed to receive discharge water from the underground and open-pit mines. The leaseholder would consult with USFWS to address any concerns that the agency might have. These treatment systems would be constructed in accordance with applicable regulations. Those regulations might require that the ponds be adequately lined, fenced, and possibly netted to ensure that wildlife, livestock, and the environment are not adversely affected.

5.6.3 No Action Alternative

Under the No Action alternative, storm-water management controls implemented by the leaseholder would prevent runoff from affecting nearby surface water sources and would be terminated upon remediation.

Termination of mine dewatering activities under this alternative would eliminate the conveyance of water to the mine-water treatment system (ponds), thus eliminating point discharges to the environment associated with these ponds.

5.7 Soils

5.7.1 Expanded Program Alternative

Under the Expanded Program alternative, an estimated 450 acres of additional soil could be disturbed during preoperational and operational activities. Disturbance of the soil surface and removal of vegetation would increase the soil erosion potential. Adverse impacts would be minimized by incorporating erosion-control techniques (e.g., water bars, vegetation, erosion-control fabric, and land contours) in the construction design. Surface soil materials would be stockpiled as practicable during new or expanded mining activities to be used later during reclamation of disturbed sites.

5.7.2 Existing Program Alternative

Under the Existing Program alternative, an estimated 110 acres of additional soil could be disturbed during preoperational and operational activities and result in the same consequences as described under the Expanded Program alternative in Section 5.7.1.

5.7.3 No Action Alternative

Under the No Action alternative, soils that have already been incorporated into reclaimed areas would continue to develop and foster plant growth. Surface soil materials would be used as practicable during reclamation of lease tracts that have not already been reclaimed to establish a growth medium for plants. Recontouring and reseeding would also reduce the erosion potential of these areas and allow the existing soils to stabilize and mature.

5.8 Vegetation

5.8.1 Expanded Program Alternative

The Expanded Program alternative would result in additional disturbances to vegetation and cryptobiotic crusts. An estimated 450 of the 21,000 acres scattered throughout 38 lease tracts would be newly disturbed. These 450 acres would consist of previously undisturbed and reclaimed land. With the exception of the open-pit mine on lease tract 7 (200 acres, currently being developed as an underground operation), surface disturbance from mining activities is limited to small acreages of less than 15 acres per mine site. For example, for the four mines currently in active production, approximately 1.5 percent of the lease tract acreage is disturbed by operations.

Construction of small structures, ventilation shafts, haul and access roads, portals, and drill holes would involve significant short-term, small-scale impacts to upland vegetation. The degree of impact would depend on the areas disturbed. More impacts would result from disturbance to diverse, healthy plant communities than to previously degraded or species-poor communities. Weed invasion would be expected to increase in disturbed areas, particularly before reclamation efforts are successful. Additionally, weed invasion would be expected to increase in areas where vehicle traffic would facilitate the spread of weed seed. DOE requires the leaseholders to be proactive in their efforts to avoid and control weed infestations on their lease tracts, including a requirement to wash all tracked equipment prior to its mobilization into the lease tracts. Additionally, DOE coordinates with county weed programs to facilitate the control of weed infestations along county roads that access and traverse the lease tracts. Long-term impacts after successful reclamation would be similar to those of the No Action alternative (Section 5.8.3).

Cryptobiotic soil crusts are fragile and can be destroyed by even minor activities such as foot traffic. They take decades to reestablish. Destruction of cryptobiotic crust can lead to increased soil erosion, decreased moisture-holding capacity, decreased nutrition to surrounding plants, and reduced seed germination (Belnap 1992). The risk of weed invasion can also be increased in areas of crust disturbance. Destruction of cryptobiotic crusts would result in small-scale but long-term impacts that would continue until crusts are reestablished.

Impacts from vegetation disturbance would be greatest on lease tracts containing primarily undisturbed land (tracts 5A, 7A, 8A, 17, 17A, 19A, 20, and 23A). These areas are more likely to contain late-successional plant communities such as piñon-juniper woodland, sensitive species, and well-developed cryptobiotic crusts. Excellent quality piñon-juniper habitat is present on some of the lease tracts. Mature plant communities and crusts may also occur on lease tracts reclaimed prior to 1970 (portions of tracts 5, 7, 10, 11, 11A, 13, 13A, 14, 14A, 15, 15A, 16, 16A, 19, 22A, 24, 25, 26, 26A, 27, and 27A). The lowest impacts to vegetation would occur on more

recently reclaimed areas (portions of tracts 10, 12, 13A, 15, 15A, 16, 16A, 19, 22, 22A, 23, 23B, 25, 26, 26A, and 27), where mature vegetation communities and crusts have not had sufficient time to redevelop. For all future leaseholder activities, DOE would restrict the time period in which the leaseholders can perform the bulk removal of vegetation, particularly piñon pine, to minimize the spread of the Ips beetle.

Exploration and/or development in portions of lease tract 13 could adversely affect individuals of the Naturita milkvetch or Dolores River skeletonplant but is not likely to lead to listing of either species. Because there is suitable habitat for several sensitive plant species on several other tracts, unknown impacts could also occur. A threatened and endangered plant survey would be required by leaseholders as a part of their plan of operations, and impacts would be minimized.

5.8.2 Existing Program Alternative

Under the Existing Program alternative, small-scale disturbances to vegetation associated with the development of currently authorized activities would be expected on up to 410 acres, most of which (300 acres) is currently disturbed or was disturbed by previous mining activities. Weed invasion would be expected to increase in disturbed areas, particularly before reclamation efforts are successful. Additionally, weed invasion would be expected to increase in areas where vehicle traffic would facilitate the spread of weed seed. DOE requires the leaseholders to be proactive in their efforts to avoid and control weed infestations on their lease tracts, including a requirement to wash all tracked equipment prior to its mobilization into the lease tracts. Additionally, DOE coordinates with county weed programs to facilitate the control of weed infestations along county roads that access and traverse the lease tracts. Wetland vegetation, sustained by pumped ground water, would continue to grow in and around the containment ponds on lease tracts 7 and 9 while mining operations continued. Vegetation on inactive lease tracts would remain undisturbed, and vegetation communities in reclaimed areas would continue to mature. Specific impacts to disturbed areas and in areas with increased vehicle traffic would be similar to those of the Expanded Program alternative (Section 5.8.1). Long-term impacts after successful reclamation would be similar to those of the No Action alternative (Section 5.8.3).

5.8.3 No Action Alternative

Under the No Action alternative, reclamation activities would result in minimal short-term impacts. Newly reclaimed areas would be susceptible to the encroachment of noxious and nonnoxious weeds until mature stands were established, but this would be minimized with integrated weed control measures. Reclamation activities would result in beneficial impacts over the long term because existing disturbed land (300 acres) would be revegetated to increase plant cover that favors desirable plant species. All disturbed areas would be reclaimed with the concurrence of BLM before restoring to the public domain. Over the long term, cryptobiotic soil crusts would form in the reclaimed areas, which would increase soil water-holding capacity and plant growth.

Mine abandonment on lease tracts 7 and 9 would entail removing existing ponds that currently hold pumped ground water. The ponds would be contoured and revegetated with upland plant species, replacing the wetland species currently associated with the ponds.

5.9 Wildlife

5.9.1 Expanded Program Alternative

The Expanded Program alternative would result in impacts to wildlife in approximately 750 total acres distributed over the 38 lease tracts (27,000 acres). Wildlife short-term habitat would be lost as a result of vegetation removal, surface disturbance, and blasting during preoperational and operational activities. Wildlife would be displaced by noise, light, traffic, and other human activities. Animals with large home ranges (e.g., deer, birds of prey, coyotes) would experience minimal impacts unless roads impeded migration between areas of critical range. Animals with small home ranges (e.g., rodents or lizards) would likely be displaced, and some individual mortality would be expected. A small number of animals may also be lost as a result of accidental road kill.

Foraging areas for large birds of prey may be slightly reduced, but roosting or nesting sites, some of which are located near lease tract areas, would not be affected. The occupied habitat of the Gunnison sage grouse, a state candidate species, overlaps the western portion of lease tract 9. Disturbance in this area is unlikely because the occupied habitat exists on the valley floor, not on the mesa top where mining activities are located. There is a small chance that the federal candidate species, the yellow-billed cuckoo, may occur in cottonwood-dominated portions of the Dolores River Canyon near the Slick Rock lease tracts. It is unlikely that these areas will be disturbed by operational activities, and impacts to this bird are also unlikely.

Because the area of surface construction activities is small and dispersed over a large geographic area it would be expected to have minimal impact on migratory bird populations. Because federal law prohibits the destruction of birds and nests, roads or other structures would be constructed during a time of year when no migratory birds are nesting in the area, or nesting areas would be located and avoided. Disturbance to prairie dog towns could result in negative impacts to burrowing owls, a state-listed threatened species known to occur on Calamity Mesa. If burrowing owls were found to be nesting at any actively worked lease tract, DOE would be required to avoid activities within a 0.25-mile buffer area of the nest during nesting and until mid to late August, in compliance with the Migratory Bird Treaty Act.

Two existing mining operations (on lease tracts 7 and 9) have mine-water treatment systems (ponds), and other lease tracts under the Expanded Program alternative could require the construction of such systems. These treatment systems would be designed to receive discharge water from the underground and open-pit mines. The leaseholder would consult with USFWS to address any concerns that the agency might have. These treatment systems would be constructed in accordance with applicable regulations. Those regulations might require that the ponds be adequately lined, fenced, and possibly netted to ensure that wildlife, livestock, and the environment are not adversely affected.

Impacts to threatened, endangered, and sensitive fish in the Dolores River or downstream in the Colorado River would be highly unlikely due to the small scale of disturbances, implementation of storm-water controls, and lack of discharge into waterways during mining operations.

The reopening of abandoned mine entrances and other structures could potentially result in disturbance to populations of sensitive species of bats, particularly Townsend’s big-eared bats,

spotted bats, and fringed myotis. The CDOW was consulted on this issue and provided guidance to minimize the effects that the reopening of these mines would have on the bats potentially inhabiting the mine workings. A copy of this guidance is provided in Appendix C. Actions, such as displacement of known bats to previously identified suitable nearby habitats, would lessen impacts; however, the potential exists for impacts by some operational activities. Bats are discussed in more detail in Section 5.9.3. The eventual long-term reclamation of these areas after mining is completed would result in an overall increase in habitat for many of these species.

Midget faded rattlesnakes, if they occur in the area, may also be affected by the reopening of abandoned mine entrances and other structures. Although the midget faded rattlesnake is a state-listed candidate species, its range and status are currently under discussion by regulating agencies.

5.9.2 Existing Program Alternative

Under the Existing Program alternative, wildlife would continue to be displaced by noise, light, traffic, and other human activities. A very small number of animals may also be lost as a result of accidental road kill. Some additional impacts to wildlife would be expected as presently authorized activities (e.g., installation of ventilation shafts or exploration drill roads) continue on active lease tracts. Due to the small acreages involved (410 acres spread over 13 lease tracts), animals with large home ranges (e.g., deer, birds of prey, coyotes) would not be negatively affected. Animals with small home ranges (e.g., rodents or lizards) would likely be displaced. Because federal law prohibits the destruction of birds and nests, roads or other structures would be constructed during a time of year when no migratory birds are nesting in the area, or nesting areas would be located and avoided. Small-scale construction activities, such as installation of fences, could be accomplished at any time if nests were located and avoided.

Two existing mining operations (on lease tracts 7 and 9) have mine-water treatment systems (ponds), and other lease tracts under the Existing Program alternative could require the construction of such systems. These treatment systems would be designed to receive discharge water from the underground and open-pit mines. The leaseholder would consult with USFWS to address any concerns that the agency might have. These treatment systems would be constructed in accordance with applicable regulations. Those regulations might require that the ponds be adequately lined, fenced, and possibly netted to ensure that wildlife, livestock, and the environment are not adversely affected.

If presently authorized activities came to an end during the lease period, disturbed areas would be reclaimed, and habitat areas would be reestablished. The closure of mine entrances would potentially destroy bat habitat. Issues relating to bat populations would be similar to those described under the No Action alternative in Section 5.9.3.

5.9.3 No Action Alternative

Under the No Action alternative, most area wildlife species would benefit over the long and short terms because cessation of operations would reduce or eliminate noise, traffic, and human activity from the lease tracts. Positive impacts to large mammals such as mule deer, elk, pronghorn antelope, and desert bighorn sheep would likely be small-scale because of the acreages involved. Small mammals and reptiles would likely benefit more in the reclaimed areas as habitat increased and improved after reclamation.

A small number of birds and other wildlife species would be displaced with the elimination of ponds on lease tracts 7 and 9, which currently hold pumped ground water. It is likely that the displaced species would relocate to other riparian areas on or near the lease tracts.

The closure of mine entrances would destroy potential habitat for many bat species. Although no bats are federally listed as threatened or endangered, many species are listed by the State of Colorado and/or BLM. These agencies are responsible for managing populations to ensure that they are not driven to federal listing, and DOE policy and environmental directives support this effort. Potential impacts to bats will vary according to site conditions. Before mine entrances are closed, a summer and winter bat survey would be conducted to determine the number and species of bats potentially occupying a site. Depending on the sensitivity of the species and the availability of other suitable habitat in the area, some actions may be warranted, such as the installation of bat gates (mine closures that allow bats to pass in and out of a mine but prevent humans from entering) in the abandoned mines.

5.10 Cultural Resources

5.10.1 Expanded Program Alternative

Under the Expanded Program alternative, an estimated 450 acres of previously undisturbed land might be disturbed during preoperational and operational activities on the 38 lease tracts. Assuming an average site density of 32 sites per square mile (calculated by averaging the estimated site densities reported in the Class I inventory for 14 of the lease tracts) (Reed 2006), approximately 22 cultural resource sites would be expected to occur within the 450-acre area of new disturbance. The leaseholder would be required to inventory the areas targeted for disturbance and provide the inventory results to DOE and BLM (BLM is the surface-managing agency). DOE would consult with tribal representatives to determine if any of the inventoried cultural sites were TCPs. If cultural resource sites, including TCPs, eligible for inclusion in the National Register were present and were expected to be adversely affected, DOE, BLM, SHPO, and other affected parties would negotiate an action plan, and the leaseholder would be required to implement it. Surface disturbance would not be allowed until the action plan was agreed upon and implemented. Typical actions might include (1) avoiding cultural sites, (2) monitoring cultural sites during surface-disturbing activities, or (3) mapping, documenting, or excavating cultural sites before they are disturbed. Some of the cultural sites would be avoided by the leaseholder. Those that could not be avoided could be destroyed, but information about the site would be preserved through data collection and documentation.

Calamity Camp, located on lease tract 26, is probably the most significant historical site associated with the lease tracts. It encompasses approximately 23 stone and wood structures, many of them constructed prior to 1922. BLM has determined that Calamity Camp is eligible for inclusion in the National Register of Historic Places, and the camp is expected to be listed in the National Register by the end of 2007 (Laforge 2006). To protect the structures and features associated with this camp, BLM and DOE agreed to a “No Surface Occupancy” area that includes and surrounds the camp. No lease activities (exploration or mining) would be allowed within this area or within a 30-meter buffer zone surrounding the camp boundary.

5.10.2 Existing Program Alternative

Under the Existing Program alternative, an estimated 110 acres of previously undisturbed land might be disturbed during preoperational and operational activities on the 13 active lease tracts. Assuming an average site density of 32 sites per square mile, approximately five or six cultural resource sites would be expected to occur within the 110-acre area of new disturbance. As under the Expanded Program alternative, the leaseholder would be required to inventory the areas targeted for disturbance and provide inventory results to DOE and BLM. DOE would consult with tribal representatives to determine if any of the inventoried cultural sites were TCPs. If cultural resource sites, including TCPs, eligible for inclusion in the National Register were present and were expected to be adversely affected, DOE, BLM, SHPO, and other affected parties would negotiate an action plan, and the leaseholder would be required to implement it. Surface disturbance would not be allowed until the action plan was agreed upon and implemented. These actions would be the same as that described under the Expanded Program alternative. Cultural sites that could not be avoided by the leaseholder could be destroyed, but information about the site would be preserved through data collection and documentation.

5.10.3 No Action Alternative

When the 13 leases expire, disturbed areas would be reclaimed, and no new surface disturbance would occur. Closure of roads on the lease tracts would reduce potential access by vandals to cultural sites and hence would positively affect cultural resources. The lack of new surface disturbances in the long term would have a beneficial effect on cultural resources, as cultural sites and TCPs would not be disturbed.

5.11 Visual Resources

5.11.1 Expanded Program Alternative

Under the Expanded Program alternative, the primary impacts to visual resources would be from landscape disturbance associated with preoperational and operational activities on the 38 lease tracts; visible dust and barren areas would be the primary impacts. The severity of the visual impacts would depend on the location of the disturbance and its visibility from access roads or corridors. The visual character of the Dolores River Canyon Wilderness Study Area (WSA) is not expected to be affected by lease tract activities because of the natural barriers that occur between the lease tracts and the WSA. Lease tract activities already occur within the viewshed of the Dolores River Canyon SRMA on lease tracts 13 and 13A, and additional disturbances to the landscape within the SRMA would likely occur under the Expanded Program alternative. DOE would restrict activities at the existing mine sites so that they do not further encroach on the Dolores River, and new mining activities would not be allowed within 0.25 mile of the Dolores River. As a result, the visual landscape would continue to be adversely affected but should not deteriorate. The objective of the Visual Resource Management Class II designation, currently not being met within lease tracts 13 and 13A, would not be met in the future.

In areas outside the Dolores River Canyon SRMA, proposed activities are expected to meet the objectives of BLM's Visual Resource Management Class III objectives, in that no more than a moderate contrast in the landscape's form, line, texture, or color would occur from site activities.

The increase in haul-truck traffic (maximum of 37.5 trucks per hour in an 8-hour work day) on segments of the Colorado Scenic and Historic Byways, for most travelers, would not affect visual resources along the byways. Truck traffic on state and federal highways is an everyday occurrence, and travelers tend to not notice expected and usual events, especially if their focus is on surrounding scenic landscapes. Residents that live along the scenic byways, particularly in remote areas, would likely notice the increase in truck traffic. For these people, the trucks would adversely affect their views of the landscape during the brief moment that the truck passes the residence.

5.11.2 Existing Program Alternative

Under the Existing Program alternative, the primary impacts to visual resources would be the same as those described for the Expanded Program alternative, except that these impacts could occur on only 13 lease tracts, including lease tracts 13 and 13A within the Dolores River Canyon SRMA. Barren areas associated with existing mine sites and visible dust would be the primary impacts. Overall, proposed activities are expected to meet the objectives of BLM's Visual Resource Management Class III objectives, in that no more than a moderate contrast in the landscape's form, line, texture, or color would occur from site activities. DOE would restrict activities at these existing mine sites so that they do not further encroach on the Dolores River.

Under the Existing Program alternative, the increase in haul truck traffic (maximum of 12.5 trucks per hour in an 8-hour work day) on segments of the Colorado Scenic and Historic Byways, for most travelers, would not affect visual resources along the byways. Residents that live along the scenic byways would likely notice the increase in truck traffic. For these people, the trucks would adversely affect their views of the landscape during the brief moment that the truck passes the residence.

5.11.3 No Action Alternative

When the 13 leases expire, the lease tracts would be reclaimed, and no new surface disturbances would occur. Mine site reclamation would have a positive effect on visual resources, because it would reduce landscape contrasts in form, line, texture, and color that had resulted from preoperational and operational activities. The lack of new surface disturbances in the long term would benefit visual resources, because the landscape would not be changed.

Under the No Action alternative, the increase in haul-truck traffic (maximum of 20 trucks per 8-hour work day during a period of approximately 10 days) on segments of the Colorado Scenic and Historic Byways, for most travelers, would not affect visual resources along the byways. Residents that live along the scenic byways might notice the increase in truck traffic. For these people, the trucks would adversely affect their views of the landscape during the brief moment that the truck passes the residence; the negative impact would occur for approximately 10 days.

5.12 Wilderness Areas

5.12.1 Expanded Program Alternative

Under the Expanded Program alternative, increased activity and active mining on lease tracts 8, 17, and 17A could adversely affect the Dolores River Canyon WSA. However, the likelihood of this occurring would be remote. These lease tracts are approximately 1 mile southeast of the

WSA boundary (at varying locations) and are geographically separated from the WSA by deep canyons. Only activities occurring in the upper elevations of the lease tracts would be visible from or within hearing distance of the WSA. Depending on the wind direction and velocity, a WSA visitor could potentially see dust or hear noise emanating from drilling activity on the lease tracts. Because drilling is typically short term, no long-term impacts would be expected from drilling. If mining were to occur on the lease tracts, operational activities would most likely occur at the lower elevations along the side slopes of Monogram Mesa and Wedding Bell and Radium Mountains. These activities would not be visible and likely would not be audible from the WSA.

5.12.2 Existing Program Alternative

Under the Existing Program alternative, increased activity and active mining on lease tract 8 could adversely affect the Dolores River Canyon WSA in a manner similar to that described in the Expanded Program alternative.

5.12.3 No Action Alternative

There would be no impacts to the Dolores River Canyon WSA under the No Action alternative because no new surface-disturbing activities would occur.

5.13 Wild and Scenic Rivers

5.13.1 Expanded Program Alternative

The Expanded Program alternative would not affect any currently designated wild and scenic rivers; neither the Dolores River nor the San Miguel River has any sections designated as wild and scenic. It is noted that BLM manages these rivers as though they did have wild and scenic river status. Lease tract activities already occur along the Dolores River (on lease tracts 13 and 13A) in the Slick Rock area, and additional disturbances to the landscape would likely occur under the Expanded Program alternative. DOE would restrict activities at the existing mine sites so that they do not further encroach on the Dolores River, and new mining activities would not be allowed within 0.25 mile of the Dolores River. As a result, the wild and scenic nature of this section of the Dolores River would continue to be adversely affected but should not deteriorate. The noise associated with fans venting the mine workings would be considered intrusive by river float-trip participants; however, the duration would be brief in terms of the total river trip. Tract 2 of lease tract 14 is traversed extensively by the Dolores River and, for that reason, was specifically excluded from past leasing activities and will be excluded from such activities in the future.

5.13.2 Existing Program Alternative

Under the Existing Program alternative, impacts to the wild and scenic nature of the Dolores River in the Slick Rock area would be similar to those described in the Expanded Program alternative. Lease tract activities at the existing mines on lease tracts 13 and 13A would be restricted so that they do not further encroach on the Dolores River, and new mining activities would not be allowed within 0.25 mile of the Dolores River. As a result, the wild and scenic nature of this section of the Dolores River would continue to be adversely affected but should not deteriorate.

5.13.3 No Action Alternative

There would be no impacts to the wild and scenic nature of the Dolores River under the No Action alternative because all mining activities would cease and the existing mine sites would be reclaimed.

5.14 Noise

This section addresses the impacts of noise to human receptors under the Expanded Program, Existing Program, and No Action alternatives. All noise impacts would be intermittent during the 10-year lease period of the Expanded Program and Existing Program alternatives and no more than 2 years under the No Action alternative.

5.14.1 Expanded Program Alternative

Noise associated with the Expanded Program alternative would come from mine operations and ore shipping. The largest sources of aboveground noise at the mine sites would be heavy earth-moving equipment and haul trucks. Typical noise emissions from construction equipment such as mine trucks, front-end loaders, bulldozers, excavators, and other heavy equipment range from 70 to 85 dBA at a 50-ft distance (Table 5–9) (Parsons 2003). A combination of the loudest pieces of equipment would have a cumulative noise source of 95 dBA at a 50-ft reference distance. This is a worst-case assumption; because most equipment is operated underground, it would not result in maximum noise levels, and all the equipment would never be operating at the same point at the same time.

Table 5–9. Noise Levels (dBA) Used for Noise Assessment

Source of Noise	Reference Distance (ft)	Range of Measured Noise Levels (dBA)	Maximum Noise Level Estimate Used (dBA)
Loader	50	82	85
Bulldozer	50	85	85
Backhoe	50	80−82	85
Blade	50	85	85
Roller	50	82	85
Dump Truck	50	79	85
Concrete Truck	50	82	85
Truck at 60 mph	25	81−87	95
Truck at 30 mph	25	77−80	85
Car at 70 mph	25	76−78	80
Car at 35 mph	25	61−65	67
Freight Train	30	72−82	97

A maximum noise level of 95 dBA at 50 ft would produce a 1,480-ft radius of influence where 1-hour L_{eq} noise levels would exceed a 65 dBA nighttime noise standard. Since there are only a very limited number of residences, and no towns or cities within 1,480 ft of any of the lease tracts, and operations are typically not conducted at night, mine operations would not result in noise impacts to the public. Visitors to the area may notice operational noise if they are

sufficiently close to mine operations. Noise from haul trucks transporting material to the mill in Cañon City or White Mesa would have a similar estimated maximum noise level of 95 dBA at 50 ft. The haul-truck noise would attenuate to levels below a 65 dBA noise standard within 1,480 ft of county, state, or federal highways used to transport ore and that also currently support commercial truck traffic (see Section 4.3). Residents living on or near the collector routes used would experience noise from passing haul trucks. A resident near lease tract 13 at Slick Rock would experience the greatest amount of noise from the additional three haul trucks per hour traveling along the collector routes. At an average of 150 haul trucks per day under this alternative (or 300 round trips per 8-hour day), an individual adjacent to a highway used for mill shipments would experience noise from about 37 additional haul trucks per hour, conservatively assuming that all haul trucks used the same route and only traveled during an 8-hour day.

Noise from mining activities could disrupt wildlife in a small area around individual mine workings and along haul roads.

5.14.2 Existing Program Alternative

Noise at the 13 existing lease tracts under the Existing Program alternative would have the same noise sources and generate the same noise levels as those discussed under the Expanded Program alternative (see Section 5.14.1). As with the Expanded Program alternative, only a very limited number of residences, and no towns or cities are near enough to the 13 proposed lease tracts to be affected by noise from mining operations. Noise from mining activities could disrupt wildlife in a small area around individual mine workings and along haul roads and might be noticed by visitors to the area.

Noise from haul trucks traveling to the mills would generate the same noise levels per haul truck as under the Expanded Program alternative. Residents living on or near the collector routes used would experience noise from passing haul trucks. A resident near lease tract 13 at Slick Rock would experience the greatest amount of noise from the three additional haul trucks per hour traveling along the collector routes. At an average of 50 haul trucks per day (or 100 round trips per day) under the Existing Program alternative, an individual adjacent to a highway used for mill shipments would experience noise from 12 to 13 additional haul trucks per hour, conservatively assuming that all haul trucks used the same route and only traveled during an 8-hour day.

5.14.3 No Action Alternative

Until existing leases expire, operational noise resulting from closure activities at each mine site under the No Action alternative would be similar to noise resulting from surface activities under the Existing or Expanded Program alternatives and continue until reclamation was completed. Upon site closures, noise levels would return to naturally occurring background levels, and there would be no potential to disturb native wildlife.

5.15 Floodplains and Wetlands

5.15.1 Expanded Program Alternative

Under the Expanded Program alternative, disturbance to any portion of the withdrawn areas is possible. Although portions of lease tracts 13, 13A, and 14 occur within the floodplain of the

Dolores River, and portions of lease tracts 26 and 27 have intermittent flow from Calamity Creek, operations are unlikely to occur within these areas. On lease tracts 13 and 13A, DOE would restrict activities at the existing mine sites so that they do not further encroach on the Dolores River. In addition, new mining activities proposed for all three lease tracts would not be allowed within 0.25 mile of the Dolores River. Tract 2 of lease tract 14 is traversed extensively by the Dolores River and, for that reason, was specifically excluded from past leasing activities and will be excluded from such activities in the future. If individual activities within a floodplain or wetland were unavoidable, compliance with DOE's environmental review requirements, codified at 10 CFR 1022, in concert with the U.S. Army Corps of Engineers would be required.

5.15.2 Existing Program Alternative

Although portions of lease tracts 13 and 13A are within the floodplain of the Dolores River, operational activities are unlikely to occur within this area under the Existing Program alternative. On these two lease tracts, DOE would restrict activities at the existing mine sites so that they do not further encroach on the Dolores River. In addition, new mining activities proposed for these lease tracts would not be allowed within 0.25 mile of the Dolores River. If individual activities within a floodplain or wetland were unavoidable, compliance with DOE's environmental review requirements, codified at 10 CFR 1022, in concert with the U.S. Army Corps of Engineers would be required.

5.15.3 No Action Alternative

Wetland vegetation associated with the mine-water treatment systems (ponds) on lease tracts 7 and 9 would be lost as the result of the No Action alternative. However, these are temporary ponds and contain ground water pumped to the surface for mine dewatering operations and are not delineated jurisdictional wetlands.

5.16 Human Health

5.16.1 Expanded Program Alternative

Public. For the Expanded Program alternative, members of the public would not be allowed access to the mining sites. However, individuals located near mines or working in mines could be exposed to radon emissions from the mines.

EPA evaluated exposures from radon emissions for individuals located near uranium mines (EPA 1989). For underground uranium mines, radon concentrations for nearby individuals (within 0.33 to 33 miles) ranged from 2.0×10^{-6} to 0.0031 working levels (EPA 1989). Assuming that an individual was continuously exposed, this is equivalent to a probability of a latent cancer fatality of 5.5×10^{-8} to 8.5×10^{-5}, or about 5 chances in 100 million to 8 chances in 100,000. Over 10 years, the probability of a latent cancer fatality would range from 5.5×10^{-7} to 8.5×10^{-4}, or about 5 chances in 10 million to 8 chances in 10,000. For perspective, an individual has a lifetime probability of dying of cancer from all sources of about 220,000 in 1 million, or a risk of lung cancer of 60,000 in 1 million.

For surface uranium mines, radon concentrations for nearby individuals (within 0.15 to 15.5 miles) ranged from 7.7×10^{-9} to 3.5×10^{-5} working levels (EPA 1989). Assuming that an individual was continuously exposed, this is equivalent to a probability of a latent cancer fatality

of 2.1×10^{-10} to 9.7×10^{-7}, or about 2 chances in 10 billion to 1 chance in 1 million. Over 10 years, the probability of a latent cancer fatality would range from 2.1×10^{-9} to 9.7×10^{-6}, or about 2 chances in 1 billion to 1 chance in 100,000.

Workers. As discussed previously in Section 3.5, all uranium mines are required to conduct operations in accordance with MSHA regulations, which establish maximum levels of radon and radon-daughter products that workers can be exposed to. Over the period 1985 through 1989, the average occupational radiation dose for uranium miners in the United States was 350 mrem per year (UNSCEAR 2000). This radiation dose is equivalent to a probability of a latent cancer fatality of 2.1×10^{-4}, or about 2 chances in 10,000. Over 10 years, the probability of a latent cancer fatality would be 2.1×10^{-3}, or about 2 chances in 1,000.

For the Expanded Program alternative, there would be a total of 570 workers. Based on the 350 mrem per year average occupational radiation dose (UNSCEAR 2000), the collective radiation dose to these workers would be 200 person-rem. This collective radiation dose is equivalent to a probability of a latent cancer fatality of 0.12, or about 1 chance in 10. Over 10 years, it is estimated that there could be about 1 latent cancer fatality from the radiation exposure of these workers.

5.16.2 Existing Program Alternative

Public. For the Existing Program alternative, members of the public would not be allowed access to the mining sites. However, individuals located near mine sites could be exposed to radon emissions from the mines. Radon exposures and latent cancer fatalities for individuals living near underground and surface uranium mines would be the same as those described under the Expanded Program alternative (Section 5.16.1).

Workers. The risk to an individual worker would be the same under this alternative as was described for the Expanded Program alternative in Section 5.16.1.

For the Existing Program alternative, there would be a total of 186 workers. Based on the 350 mrem per year average occupational radiation dose from UNSCEAR (2000), the collective radiation dose to these workers would be 65 person-rem. This collective radiation dose is equivalent to a probability of a latent cancer fatality of 0.039, or about 4 chances in 100. Over 10 years, the probability of a latent cancer fatality would be 0.39, or about 4 chances in 10.

5.16.3 No Action Alternative

Public. Most of the lease tracts are readily accessible to members of the public by public roads and are not secured by fences or locked gates. Although members of the public are not permitted to permanently or temporarily reside on the lease tracts, some visitors may camp for one or more days. Other activities that bring public visitors to the lease tracts include hunting, hiking, and mountain biking. In general, a public visitor would not spend more than 2 weeks per year on the lease tracts.

An individual may be exposed to radiation on the lease tracts through three primary pathways: (1) external exposure to gamma radiation, (2) inhalation and ingestion of resuspended radioactive particulates, and (3) inhalation of radon and radon daughter products. To assess exposures to members of the public, an individual was assumed to camp on a mine-waste-rock

pile for 24 hours a day over a 14-day period. Lease tract 13 was selected for the assessment because it is the most accessible to the public and is near State Highway 141 and the historical community of Slick Rock. In addition, this area is popular with visitors for viewing desert bighorn sheep and for rafting the Dolores River. The radiation dose resulting from camping on lease tract 13 is considered representative of the amount of radiation an individual could be exposed to at any other lease tract because of the physical similarities of all the mine sites and mine-waste-rock piles.

The uranium concentration in waste-rock at lease tract 13 is about 0.040 percent U_3O_8. This results in a radium-226 concentration of about 110 pCi/g in the waste rock, assuming that uranium is in equilibrium with its radioactive decay products (see Table 5–10). On the basis of calculations using the RESRAD computer code (Yu et al. 2001), the radiation dose from camping on waste rock was estimated to be 49 mrem per year. The most significant exposure pathway was external exposure from gamma radiation emitted from the mine-waste-rock pile, which caused over 90 percent of the radiation dose. This radiation dose is equivalent to a probability of a latent cancer fatality of 2.9×10^{-5}, or about 3 chances in 100,000.

Table 5–10. Radionuclide Concentrations in Waste Rock at Lease Tract 13

Radionuclide	Concentration in Waste Rock (pCi/g)
Uranium-238	110
Uranium-234	110
Thorium-230	110
Radium-226	110
Lead-210	110
Uranium-235	5.3
Protactinium-231	5.3
Actinium-227	5.3

Concentrations are based on a uranium concentration of 0.040 percent U_3O_8. Concentrations also assume that uranium-238 and uranium-235 are in equilibrium with their radioactive progeny.

After a mine site was reclaimed, the potential for exposing members of the public to radiation from waste rock would be reduced. The degree to which exposures would be reduced would depend on the reclamation method used—some methods would involve removal and burial of radioactive sources, whereas other methods would involve only recontouring and seeding. For both methods, the potential for radiation exposures after reclamation is expected to be negligible.

Workers. At the present time, mine workers typically visit the inactive lease tracts for approximately 3 hours each month, or for a total of 36 hours per year. These workers may also be exposed through external exposure to gamma radiation, inhalation and ingestion of resuspended radioactive particulates, and inhalation of radon and radon daughter products. On the basis of calculations using the RESRAD computer code (Yu et al. 2001) and the uranium concentrations from lease tract 13, the radiation dose for these workers was estimated to be 5.3 mrem per year. This radiation dose is equivalent to a probability of a latent cancer fatality of 3.2×10^{-6}, or about 3 chances in 1 million. Over 2 years, the probability of a latent cancer fatality would be 6.4×10^{-6}, or about 1 chance in 160,000.

For the No Action alternative, there would be a total of 60 workers. The collective radiation dose to these workers would be 0.32 person-rem. This collective radiation dose is equivalent to a

probability of a latent cancer fatality of 1.9×10^{-4}, or about 2 chances in 10,000. Over 2 years, the probability of a latent cancer fatality would be 3.8×10^{-4}, or about 1 chance in 2,600.

5.17 Environmental Justice Considerations

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, states that federal programs and actions shall not disproportionately affect minority or low-income populations. None of the alternatives addressed in this final PEA would adversely affect any particular cultural or socioeconomic group of people more than the population as a whole. The populations of the communities that would most likely be affected by the alternatives are culturally and economically diverse.

5.18 Short-Term Uses Versus Long-Term Impacts

The use of a few hundred acres of land over the next decade for uranium-mining surface facilities across the region encompassing DOE's uranium lease tracts would not result in long-term impacts to the biological or human environment under any of the alternatives assessed in this final PEA. DOE requires the leaseholders to adequately address post-operation reclamation activities as part of their plans of operations, and the leaseholders are required to post reclamation performance bonds with DOE to ensure that the reclamation activities are performed. These bonds are lease-specific, and the amounts are calculated periodically and assessed by DOE based on site conditions and existing environmental regulations. Past experience has demonstrated that disturbed lands in this region can be successfully reclaimed.

5.19 Irreversible or Irretrievable Commitment of Resources

As with any mineral extraction, uranium mining on DOE's lease tracts would result in the irreversible extraction of uranium and vanadium ores. As a result, these uranium and vanadium resources would not be available for future extraction and use. Other than fuel used to extract and transport the ore, there would be no other irreversible or irretrievable commitment of resources under any of the alternatives assessed in this final PEA.

5.20 Comparison of Alternatives

Under the Expanded and Existing Program alternatives, the intensity of activity and the duration of the program (10 years) would not seriously affect the resources identified in this section over the long term. The Expanded Program alternative would have slightly larger surface impacts than the Existing Program alternative, requiring approximately 450 acres of new surface disturbance, but would also have a larger positive socioeconomic impact from the employment of approximately 570 mine workers and subsequent indirect economic benefits from secondary spending. Operations that would occur under the Existing Program alternative would result in a negligible increase in overall activity within the lease tract region. The total area of surface disturbance within the 13 lease tracts is expected to be no more than 410 acres, of which 300 acres is already disturbed. As a result of the increased activity, the socioeconomics of nearby communities would be enhanced through the direct employment of 570 to 186 mine workers and indirectly through indirect expenditures on equipment, supplies, lodging, and other needs. Both action alternatives would increase haul-truck traffic within the region, including on routes to the uranium mills. Although there would be large increases in haul-truck traffic along many highway

segments (see Section 5.2), these increases would generally occur in sparsely populated areas, and the predicted impacts would result in less than one additional fatal accident.

Under the No Action alternative, most resources would realize a net positive impact, primarily through reducing access to remote areas of the lease tracts and reclaiming roads that historically have served the lease tracts. Socioeconomics would be adversely affected over the long term by the elimination of work opportunities associated with exploration and mining activities on the lease tracts.

Table 5–11 summarizes the potential impacts to all affected elements of the environment that could occur under each alternative across all impact areas. Table 5–12 identifies the potential for impacts at each DOE lease tract to support the programmatic decision-making that will use this final PEA. Should DOE decide to continue with the ULP, Table 5–12 would provide summary information for more detailed environmental evaluations specific to each lease tract (see Section 3.5 for the review and approval process for leaseholders' plans.

Table 5–11. Summary of Environmental Impacts

	Expanded Program	Existing Program	No Action
Socioeconomics	Up to 570 additional jobs would be created; local wages and secondary wages would increase.	Up to 186 additional jobs would be created; local wages and secondary wages would increase.	Up to 60 short-term jobs would be created. After 1 to 2 years, these jobs would be terminated.
Transportation	Under the worst-case scenario, up to 150 haul trucks per day (one way) could be transporting ore to the milling facilities. Depending on the road segment, these trucks could represent an increase in total traffic from 0 to 93 percent and an increase in truck traffic from 1 to 510 percent. A more realistic projection includes a 35 percent increase in total traffic and increase in truck traffic of between 0 and 190 percent. The projected maximum number of trucks could be 45. Volume to capacity ratios would not appreciably increase with either scenario. The increase in heavy truck traffic may result in approximately 0.07 fatal accident and 0.83 injury accident per year. Radiation exposures to truck drivers and members of the public would be negligible. In addition, there would be increases in the amount of noise and dust along the haul routes and in the number of vehicle/animal accidents that would likely occur.	Under the worst-case scenario, up to 50 haul trucks per day (one way) could be transporting ore to the milling facilities. Depending on the road segment, these trucks could represent an increase in total traffic from 0 to 25 percent and an increase in truck traffic from less than 1 to 143 percent. A more realistic projection could include up to 25 new trucks on road segments and a maximum total traffic increase of 18 percent. This increase in heavy truck traffic may result in approximately 0.024 fatal accident and 0.28 injury accident per year. Radiation exposures to truck drivers and members of the public would be negligible. In addition, there would be increases in the amount of noise and dust along the haul routes and in the number of vehicle/animal accidents that would likely occur.	Up to 20 haul trucks per day (one way) could be transporting ore (current stockpiles) to the milling facilities for a period of 10 days. This increase in heavy truck traffic may result in approximately 0.0004 fatal accident and 0.005 injury accident during the period. Radiation exposures to truck drivers and members of the public would be negligible. In addition, there would be increases in the amount of noise and dust along the haul routes and in the number of vehicle/animal accidents that would likely occur.

Table 5−11 (continued). Summary of Environmental Impacts

	Expanded Program	Existing Program	No Action
Mining	Uranium and vanadium ores would be immediately available; new reserves might be discovered. All mines would be reclaimed when program ends.	Uranium and vanadium ores would be immediately available; new reserves might be discovered. All mines would be reclaimed when program ends.	Uranium and vanadium ores could continue to be available for extraction over the long term. All mines would be reclaimed.
Recreation	Increases in mining-related traffic on local roads, including haul trucks, could impact recreationists. Increases in noise, dust, and human activity could impact recreationists, especially near the Dolores River Canyon SRMA.	Increases in mining-related traffic on local roads, including haul trucks, could impact recreationists. Increases in noise, dust, and human activity could impact recreationists, especially near the Dolores River Canyon SRMA.	Recreation activities may increase in lease tract areas as a result of decreases in noise, dust, and human activity.
Timber Harvesting	A small number of piñon pine and juniper trees would be removed. DOE would restrict the time period in which leaseholders could perform the bulk removal of vegetation, particularly piñon pine, to minimize the spread of the Ips beetle.	A small number of piñon pine and juniper trees would be removed. DOE would restrict the time period in which leaseholders could perform the bulk removal of vegetation, particularly piñon pine, to minimize the spread of the Ips beetle.	No impacts to timber resources would occur.
Agriculture and Grazing	Nine to 15 AUMs would be lost from new surface-disturbance activities.	One to two AUMs would be lost from new surface-disturbance activities.	Six to 10 AUMs would be gained from reclamation of existing disturbed land.
Air Quality	Local fugitive dust would increase slightly; regional air quality would not be affected.	Local fugitive dust would increase slightly; regional air quality would not be affected.	Local air quality would improve slightly from reduction of fugitive dust; regional air quality would not be affected.
Ground Water	Ground water quality would not be expected to be affected by surface or underground mining operations.	Ground water quality would not be expected to be affected by continued operations.	Ground water quality would not be expected to be affected by postoperational activities.
Surface Water	Surface water quality would not be expected to be affected by surface or underground mining operations. DOE would restrict operations and will not lease part of lease tract 14 near the Dolores River at Slick Rock so further encroachment does not occur and the river corridor does not deteriorate.	Surface water quality would not be expected to be affected by surface or underground mining operations. DOE would restrict operations near the Dolores River at Slick Rock so further encroachment does not occur and the river corridor does not deteriorate.	Dewatering ponds receiving ground water discharge would be eliminated.
Soils	An estimated 450 acres of soil would be newly disturbed; erosion potential would be minimized by on-site controls. Reclamation would be performed at the end of the program.	An estimated 110 acres of soil would be newly disturbed; erosion potential would be minimized by on-site controls. Reclamation would be performed at the end of the program.	Existing areas of disturbed soils (300 acres) would be reclaimed; erosion potential would decrease.

Table 5−11 (continued). Summary of Environmental Impacts

	Expanded Program	Existing Program	No Action
Vegetation	An additional 450 acres of upland vegetation and cryptobiotic soil crusts could be disturbed project-wide. The degree of impact would depend on the areas disturbed. T&E and sensitive species surveys to be conducted. All impacts would be to small acreages. DOE would be proactive to control noxious weed infestations. Reclamation would be performed at the end of the program.	An additional 110 acres of upland vegetation and cryptobiotic soil crusts could be disturbed project-wide. The degree of impact would depend on the areas disturbed. T&E and sensitive species surveys to be conducted. DOE would be proactive to control noxious weed infestations. Reclamation would be performed at the end of the program.	Reclamation would result in beneficial impacts over the long term. DOE would be proactive to control noxious weed infestations. Artificially sustained wetland vegetation on lease tracts 7 and 9 would be lost.
Wildlife	Displacement of large and small mammals and birds associated with disturbance of 450 noncontiguous acres of additional land. T&E, sensitive, and special status species/habitat surveys to be conducted. Loss of bat habitat in inhabited abandoned mines and structures. Some individual mortality and loss of habitat for small animals. Migratory birds would be protected from adverse risk from any on-site ponds.	Displacement of large and small mammals and birds associated with disturbance of 110 noncontiguous acres of additional land. T&E, sensitive, and special status species/habitat surveys to be conducted. Loss of bat habitat if mine entrances are closed, but potential to increase habitat if bat gates are installed. Migratory birds would be protected from adverse risk from any on-site ponds.	Wildlife habitat would improve on lease tracts. Removal of ponds on tracts 7 and 9 would displace small number of animals, including birds. Loss of bat habitat if mine entrances are closed, but potential to increase habitat if bat gates are installed.
Cultural/Historic Resources	Approximately 22 cultural resource sites are expected to occur in areas of disturbance. If any were expected to be negatively affected, DOE, BLM, SHPO, and other affected parties would negotiate the appropriate actions. Calamity Camp would be avoided.	Approximately 5 to 6 cultural resource sites are expected to occur in areas of disturbance. If any were expected to be negatively affected, DOE, BLM, SHPO, and other affected parties would negotiate the appropriate actions. Calamity Camp would be avoided.	Cultural/historic resources are not expected to be disturbed.
Visual Resources	An increase in haul trucks along scenic byways would affect those visual resources. Visible dust and surface disturbance would increase.	An increase in haul trucks along scenic byways would affect those visual resources. Visible dust and surface disturbance would increase.	A limited increase in haul trucks along scenic byways would affect those visual resources. Visible dust and surface disturbance would decrease.
Wilderness Areas	The Dolores River Canyon WSA is not expected to be affected.	The Dolores River Canyon WSA is not expected to be affected.	The Dolores River Canyon WSA would not be affected.
Noise	Some increases in local noise levels would occur.	Some increases in local noise levels would occur.	Local noise levels would decrease over the long term.
Wild and Scenic Rivers	Impacts related to noise and visual changes would occur along various river segments. DOE would restrict operations and would not lease a portion of lease tract 14 near the Dolores River at Slick Rock so further encroachment does not occur and the river corridor does not deteriorate.	Impacts related to noise and visual changes would occur along various river segments. DOE would restrict operations near the Dolores River at Slick Rock so further encroachment does not occur and the river corridor does not deteriorate.	No impacts would occur.

Table 5−11 (continued). Summary of Environmental Impacts

	Expanded Program	Existing Program	No Action
Floodplains and Wetlands	Potential for disturbance to floodplain and wetland areas is not expected. DOE would restrict operations near the Dolores River at Slick Rock so further encroachment does not occur and the river corridor does not deteriorate.	Potential for disturbance to floodplain and wetland areas is not expected. DOE would restrict operations near the Dolores River at Slick Rock so further encroachment does not occur and the river corridor does not deteriorate.	Disturbance to floodplains is not expected. Removal of ponds on tracts 7 and 9 would result in the loss of small acreage of wetland-type habitat.
Human Health	For a member of the public living near an underground mine, the probability of a latent cancer fatality over 10 years would range from 5.5×10^{-7} to 8.5×10^{-4}, or 5 chances in 10 million to 8 chances in 10,000, and for a surface mine, over 10 years, the probability of a latent cancer fatality would range from 2.1×10^{-9} to 9.7×10^{-6}, or 2 chances in 1 billion to 1 chance in 100,000. Radiation exposures to workers would not exceed MSHA values; however, for a workforce of 570, over 10 years, the probability of an additional latent cancer fatality would be about 1 above that which is generally associated with this population.	The public's exposure would be the same as the exposure in the Expanded Program alternative. Radiation exposures to workers would not exceed MSHA values; however, for a workforce of 186, over 10 years, the probability of an additional latent cancer fatality would be 0.39 above that which is generally associated with this population.	The potential for human exposure to radiation from uranium mining operations on DOE lease tracts would not occur. A member of the public that camped for 2 weeks on an unreclaimed mine-waste-rock pile would receive a radiation dose equivalent to a probability of an additional latent cancer fatality of 2.9×10^{-5} above that which is generally associated with this population.
Environmental Justice	Disproportionate impacts would not occur to minority or low-income populations.	Disproportionate impacts would not occur to minority or low-income populations.	Disproportionate impacts would not occur to minority or low-income populations.

Table 5–12. Potential Impacts Across DOE Lease Tracts

	Uranium Lease Tract																																							
Sensitive Environmental Conditions Would Uranium Mining:	**5**	**5A**	**6**	**7**	**7A**	**8**	**8A**	**9**	**10**	**11**	**11A**	**12**	**13**	**13A**	**14**	**14A**	**15**	**15A**	**16**	**16A**	**17**	**17A**	**18**	**19**	**19A**	**20**	**21**	**22**	**22A**	**23**	**23A**	**23B**	**24**	**25**	**26**	**26A**	**27**	**27A**
Adversely affect members of the public	P[a]	P[a]	P[a]	P[a]	N	N	N	N	P[a]	N	P[a]	P[a]	P[a]	P[a]	P[a]	P[a]	P[a]	P[a]	P[a]	P[a]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Adversely affect surface water bodies	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Adversely affect ground water	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Adversely affect a source of drinking water	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Adversely affect property of cultural, historic, archaeological, or architectural significance	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]
Adversely affect traditional cultural properties	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]	P[g]
Adversely affect federally listed threatened or endangered species or their habitat	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]	N[h]
Adversely affect a State of Colorado Potential Conservation Area (PCA)	N	N	N	N	N	N	N	N	N	N	N	N	P[c]	P[c]	P[c]	P[c]	N	N	P[c]	P[c]	N	N	P[c]	N	P[c]	P[c]	N	N	N	N	N	N	P[c]	N	N	N	N	N
Adversely affect wetlands regulated under the Clean Water Act	N	N	N	N[d]	N	N	N	N[d]	N	N	N	N	N	N	N[d]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Adversely affect areas having a special designation such as federally and state-designated areas (e.g., parks, recreation areas, forests, wild and scenic rivers)	N	N	N	N	N	N	N	N	N	N	N	N	P[f]	P[f]	P[f]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Adversely affect SRMAs and ERMAs	N	N	N	N	N	N	N	N	N	N	N	N	P[e]	P[e]	P[e]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Adversely affect prime or unique agricultural lands	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Occur in a floodplain	N	N	N	N	N	N	N	N	N	N	N	N	P[b]	P[b]	P[b]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	P[b]	P[b]N	N	N	N
Occur in or near areas of low income or minority populations	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Cause adverse socioeconomic effects	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Adversely affect air quality	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Y = Yes N = No P = Potentially UN = Unknown

[a]Members of the public reside within 1−2 miles of parts of the lease tract.
[b]Parts of the lease tract lie within a floodplain.
[c]Parts of the lease tract overlap a PCA.
[d]Presence of wetland-type vegetation due to mine dewatering or storm-water accumulation, but not regulated wetlands.
[e]Parts of the lease tract lie within an SRMA.
[f]Parts of the lease tract lie within the Dolores River Wild and Scenic Study Area and within the Dolores River Canyon SRMA.
[g]Cultural sites potentially exist on all lease tracts. Should the ULP continue, leaseholders would be required to inventory the areas of proposed activities; if sites eligible for inclusion on the National Register of Historic Places were found, develop a plan to protect or otherwise properly address the sites.
[h]DOE would not allow leaseholders activities that would adversely affect federally listed threatened or endangered species or their habitat.

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5.21 Cumulative Impacts

The Council on Environmental Quality's (CEQ) regulations for implementing NEPA define cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-federal) or person undertakes such other actions (40 CFR 1508.7)." The CEQ Guidance states: "It is not practical to analyze the cumulative effects of an action on the universe; the list of environmental effects must focus on those that are truly meaningful. For cumulative effects analysis to help the decisionmaker and inform interested parties, it must be limited through scoping to effects that can be evaluated meaningfully. The boundaries for evaluating cumulative effects should be expanded to the point at which the resource is no longer affected significantly or the effects are no longer of interest to affected parties."

The CEQ regulations do not say that the analysis cannot be performed if the information is lacking. Consequently, the analysis contained in this section includes what could be reasonably anticipated to occur given the uncertainty created by the lack of detailed investigations to support all cause and effect linkages that may result from the proposed project, and the indirect effects related to uranium mining. The cumulative effects analysis focuses on uranium mining activities.

5.21.1 Identifying Spatial Boundaries and Temporal Limitations

In assessing the potential cumulative impacts of DOE's proposed actions, DOE has considered the existing actions, or reasonably foreseeable future actions, which are occurring or might occur within the ULP region of impact during the 10-year duration of DOE's proposed actions. The geographic and temporal limitations DOE has placed on its analysis are consistent with CEQ's guidance, *Considering Cumulative Effects under NEPA* (CEQ 1997) which states that "cumulative effects result from spatial (geographic) and temporal (time) crowding of environmental perturbations." With regard to the spatial, or geographic, limitations, the CEQ states that the "cumulative effects analyses should be conducted on the scale of human communities, landscapes, watersheds, or airsheds" using the concept of "project impact zone" or more simply put, the area that might be affected by the proposed action.

DOE has limited its project impact zone to the geographic boundary encompassed by the ULP mining program. Likewise, the temporal boundaries (time frame) can generally be assumed to equal the 10-year life expectancy of the ULP. Uranium mining on public lands outside of, and surrounding, DOE's lease tracts are governed by the 1872 Mining Law and managed by BLM. While the increasing price of uranium is stimulating some interest in uranium mining, an evaluation of existing or future mining claims or operations would not provide an accurate or meaningful analysis of the impacts from these actions. Although BLM data indicates that the three counties encompassing DOE's lease tracts currently have over 4,800 valid uranium claims; most of those claims were recently staked in the last year or two. Information on the operational status of these claims is not currently available and would likely change depending on whether favorable market conditions continue. Historically, there are far more valid mining claims than mines in production. Consequently, the number of these claims that might ultimately be put into production is too uncertain to estimate.

5.21.2 Cumulative Impacts of Uranium Mining on DOE Lands

The resources and impact areas that were identified with a likelihood of such impacts are (1) social and economic resources and related traffic congestion issues; (2) noxious weed seed; and (3) other land use issues. The lack of impacts to other resources directly affected by the proposed project precludes other resources from this cumulative effects analysis.

As the regional population increases, the large tracts of public lands in the region might lead to a substantial increase in public recreation activities in the region. Under the Expanded and Existing Program alternatives and in conjunction with the potential increase in public recreation activities in the region, DOE would monitor future development such as uranium exploration and mining, and oil and gas development, within the region that may lead to increased traffic impacts. DOE would work with the appropriate federal, state, county and local agencies to develop traffic studies as required and implement site-specific measures such as, but not limited to, acceleration/deceleration lanes, intersection controls, passing lanes and other measures that would reduce or minimize traffic impacts within the region.

The potential for the spread of weed seed (including noxious weed seed) would increase with vehicle traffic associated with uranium mining on and off DOE lease tracts, and with vehicle traffic associated with oil and gas exploration. This potential would increase proportionately with the number of infested areas being accessed by vehicles. DOE requires the leaseholders to be proactive in their control of weed infestations on their respective lease tracts and requires that all tracked vehicles be washed down before entering a lease tract to prevent the introduction of weed seeds. Additionally, DOE coordinates with county weed programs to facilitate the control of weed infestations along county roads that access and traverse the lease tracts.

5.21.3 Possible Mining Activities on Non-DOE Lands

In January 2007, BLM indicated that approximately 4,800 uranium mining claims have been staked/located in recent years within the three counties that encompass the DOE lease tracts. The status of these mining claims and future uranium mining on non-DOE lands is currently unknown; however, if activity levels on those lands are comparable to historical levels on DOE's lease tracts, the range of potential impacts can be projected. For example, DOE estimates that under the Expanded Program alternative there would be 42 different mining operations (excluding the existing large open-pit mine) on its lease tracts. If just 42 claims (approximately 0.9 percent of the existing 4,800 claims in the region) were developed in a manner comparable to the development anticipated on DOE's lease tracts, then the impacts would likely be comparable to those evaluated in the Expanded Program alternative (i.e., 570 workers, 150 haul-trucks/ore shipments per day, 420 acres of land committed to mining). At the extreme, if all claims were brought into production, several thousand new workers would be needed, thousands of haul trucks could be on the county roads and state highways, potentially increasing traffic volume, noise, dust, and accident rates, and the acres of land and habitat affected would also number in the thousands. However, such an expansion may not be feasible, as additional milling capacity would be needed because the capacity of the two existing mills would be exceeded. There is speculation that a new mill might be built within the Paradox Basin and if so a reduction in ore traffic might occur throughout other areas of the impacted region. However, at this time a specific location is unknown and, therefore, a more quantified assessment of potential changes in traffic impacts is neither warranted nor possible. Because DOE's 38 lease tracts would represent a small percentage of the total potential number of mining operations in the region, development

of DOE's lease tracts would be a very small contributor to overall cumulative impacts should large numbers of non-DOE lease tracts come into production.

5.21.4 Cumulative Impacts of Ongoing Development of Oil and Gas Reserves

In addition to mining activities, there is also ongoing development of oil and gas reserves in the region. The extent of future development is unknown; however, currently six to ten drill rigs are often operating at one time in the region of DOE's uranium lease tracts. Because (1) oil and gas exploration and development does not require large numbers of workers (less than 20 per drill rig); (2) the duration of their actions at an individual site is typically a matter of weeks and not years; and (3) pipeline transport is favored over truck; the increase in the workforce and the subsequent cumulative impacts on the regional infrastructure, socioeconomics, and truck traffic resulting from mining and oil and gas development would not be appreciably greater than those assessed under the Expanded Program alternative in this EA. Based on estimates provided by the BLM, oil and gas development requires an average of 7−10 weeks for construction, drilling, and completion. During this time, assorted heavy equipment and workers' pick-up trucks would add to the traffic in the region. Although the workers would travel daily to a well location, the heavy equipment needs would not result in daily transit during this period, but brief periods of highly intensive (e.g. 5−10 trucks for a few days) heavy equipment travel. Depending upon the number of wells developed at any one time, localized traffic increases would likely be experienced in the region.

Oil and gas development would result in additional land use and biological impacts in the region; however, as with uranium mining, oil and gas drill rig impacts are limited to the localized area of a drill pad (5−10 acres), which would be dispersed throughout the region. Additional linear impacts to land use might occur if additional access roads and transmission pipelines are developed. The cumulative effects on land use and biota in the region would be an increase in the acreage of public lands that would be affected by mineral exploration. However, based on the relatively small footprint of oil and gas development operations, such an increase would likely be in the hundreds and not thousands of acres scattered across the region.

5.22 Proposed Stipulations for Future Lease Agreements

In addition to requiring its leaseholders to comply with all applicable statutes, regulations, and environmental stipulations, and based on this final PEA, DOE would adopt and incorporate the following stipulations into its standard lease requirements for all future leasing activities:

- DOE lease tract C−SR−14 tract 2 will not be offered for lease due to the extensive presence of the Dolores River as it traverses the tract. (C−SR−14)
- Stipulation that will restrict the time period for the bulk removal of vegetation, primarily piñon pine. (All)
- Stipulation that will prohibit new mining operations within ¼ mile of the Dolores and San Miguel Rivers. (C−SR−13, C−SR−13A, C−SR−14, and C−AM−19)
- Stipulation that will prohibit the existing mining operations along the Dolores River at Slick Rock from encroaching further toward the river. (C−SR−13 and C−SR−13A)
- Stipulation that will require leaseholders to wash tracked equipment prior to it being mobilized to any of the lease tracts. (All)

- Stipulation that will require leaseholders to minimize the potential risks to migratory birds from mine-water-treatment ponds through the collection of water-quality monitoring data ***or*** the erection of pond-enclosure fencing and netting. (C–JD–7 and C–JD–9 and maybe C–JD–8 and C–SR–13)
- Stipulation that will require the leaseholder to avoid the Calamity Camp Historical Site as delineated by the no-surface-occupancy boundary established jointly by BLM and DOE. (C−G–26)
- Stipulation that will require the leaseholders to limit the amount of disturbance within the sagebrush community atop Monogram Mesa to conserve it as potential habitat for the Gunnison sage grouse. (C–JD–9 and maybe C–JD–8)
- Stipulation that will require the leaseholders to determine the presence of burrowing owls on Calamity Mesa and limit their operations to avoid potential impacts to the owl's critical habitat. (C–G–26 and C–G–26A)
- Stipulation that will require the leaseholders to determine the presence of yellow-billed cuckoo along the Dolores River and limit their operations to avoid potential impacts to the cuckoo's critical habitat. (C–SR–13, C–SR–13A, and C–SR–14)
- Stipulation that will require the leaseholders to be aware of the Dolores River Canyon WSA and structure their operations to avoid potential impacts to the visual resources within the WSA. (C–WM–17 and C–WM–17A)
- Coordination with CDOW personnel to determine which existing mines and mine workings located within DOE's lease tracts are critical habitat for BLM-listed sensitive bat species; these locations need to be conserved where practicable.
- Coordination (in the future as issues are identified) with BLM and its claimants, CDOT, and the respective county agencies to review traffic impacts at specific intersections between county roadways and the state highway system and initiate site-specific measures as required.

6.0 Persons and Agencies Consulted

During the preparation of this final PEA, DOE invited BLM, USFWS, and CDRMS to be cooperating agencies based on the agencies' respective areas of expertise and jurisdictional responsibilities. Each of the agencies accepted the offer and became an integral part of the internal technical review process for the document. Additionally, DOE had discussions/consultations with, or received comments from several other federal and state agencies, including National Park Service, CDOT, and CDOW; the text of this final PEA has been revised/expanded to reflect the nature and extent of these interactions.

Name	Title	Agency
Bruce Fowler	Geologist	Bureau of Land Management Grand Junction Field Office Grand Junction, Colorado
Aline Laforge	Archaeologist	
Ron Lambeth	Wildlife Biologist	
Britta Laub	Recreation Program Manager	
Dave Lehmann	Lands Supervisor	
Jane Ross Peterson	Associate Field Supervisor	
Jim Cooper	Outdoor Recreation Planner	
Julie Coleman	Archaeologist	Bureau of Land Management Uncompahgre Field Office Montrose, Colorado
Lynn Lewis	Geologist	
Teresa Pfifer	Lands Supervisor	
Barbara Sharrow	Area Manager	
Dave Kaufman	Associate Field Office Manager	
Jim Ferguson	Biologist	
Amanda Clements	Ecologist	
Julie Stotler	Recreation Planner	
Dean Stindt	Range Conservationist	
Gary Thrash	Planning and Environmental Coordinator	Bureau of Land Management San Juan Field Office Durango, Colorado
Loren Wickstrom	Geologist	
Kay Zillich	Hydrologist	
Jamie Sellar Baker	Associate Field Manager	Bureau of Land Management Dolores Public Lands Office Dolores, Colorado
Penny Wu	Recreation Lead	
Kristen Philbrook	Wildlife Biologist	
Cara Gildar	Ecologist	
Kathy Nickell	Supervisory Biologist	

Name	Title	Agency
Barb Osmundson	Fish and Wildlife Biologist/ Environmental Contaminants Specialist	U.S. Fish and Wildlife Service Grand Junction, Colorado
Ellen Mayo	Botanist	
Terry Ireland	Fish and Wildlife Biologist	
Kurt Broderdorp	Fish and Wildlife Biologist	
Russ Means	Environmental Protection Specialist	Colorado Division of Reclamation, Mining, and Safety Grand Junction, Colorado
Dave Roberts	Byway Chair, West Elk Loop Scenic and Historic Byway	National Park Service Montrose, Colorado
Mike McVaugh	Traffic and Safety Engineer	Colorado Department of Transportation, Region 5 Durango, Colorado
Tony Cady	Environmental Engineer	
Kerry Neet	Supervisor	
Juan Robles	Traffic Analysis Unit	Colorado Department of Transportation, Headquarters, Denver, Colorado
George Ventura	Traffic Analysis Unit	
Rahim Marandi	Traffic Records Unit/Colorado FARS	
Kirk Navo	Wildlife Biologist/Western Bat Working Group	Colorado Division of Wildlife Monte Vista, Colorado
Michael Kaczorowski	Traffic Safety and Planning Division	Utah Department of Transportation, Salt Lake City, Utah

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1503. "Commenting"
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Appendix A

Scoping Comments

Table A−1. Issues Identified in Scoping

Scoping Issue	Response
Concern about increased truck traffic and accidents from ore shipments on narrow local roads.	Increases in truck traffic and accident rates are quantified under Section 5.2.
Request that all transportation routes be identified.	All reasonable routes for transporting ore from the lease tracts to the mills at White Mesa and Cañon City are shown on Figures 3−2 and 3−3.
Concern for human health from ore dust during transport to the mills.	Health consequences to miners, truck drivers, and the public are quantified in Section 5.16.
Concern for health risks to the public near uranium mill sites. Concern about increasing waste volumes at the Cañon City milling site.	Milling operations and waste disposal were evaluated under site-specific U.S. Nuclear Regulatory Commission (NRC) NEPA documents and are performed under NRC licenses. Those issues are beyond the scope of this EA.
Requested identification of air pollutants released by uranium mills.	Milling operations are performed under existing federal and state licenses and are beyond the scope of this EA (see above).
Concern that the 30-day comment period was insufficient for public participation.	The 30-day scoping period is consistent with that stipulated in DOE's NEPA regulations. The public will have additional opportunity to comment on the draft and final EA before DOE makes its decision.
Requested materials be made available in libraries.	Because of the large area potentially affected by lease tract development and transportation, DOE will be making relevant project information available through the project's website rather than incurring the cost for reproduction and mailing of information to libraries. Consistent with federal requirements, specific information requests will be reviewed on a case-by-case basis.
Concern about the final disposition and cost of wastes generated from mining or milling operations.	DOE lease agreements require the leaseholders to reclaim their operations in accordance with applicable federal, state, and local statutes, rules, and regulations, including those associated with mine-site reclamation. Past reclamation activities show that mine sites can be successfully reclaimed. In addition, DOE and the State of Colorado require reclamation performance bonds for each lease tract to cover the costs of mine-site reclamation. Milling operations are performed under existing federal and state licenses and are beyond the scope of this EA.
Miner safety and protective equipment requirements.	DOE lease agreements require leaseholders to conduct their operations in accordance with applicable federal, state, and local statutes, rules, and regulations, including those associated with worker protection.
Adverse environmental effects outweigh any benefits.	The purpose of this EA is to provide decision-makers with information on the environmental consequences of the proposed action. DOE will consider this information along with other relevant information in making its informed decision.
Energy Act of 2005 establishes nuclear power as part of the nation's future source of electricity, and therefore, access to DOE's managed lands is required.	Further clarification of DOE's responsibilities with regard to the uranium lease tracts is provided under Section 2.0, "Purpose and Need for Action."
Concern that all potentially affected parties were not notified of DOE's proposed action. Government needs to do a more comprehensive job of notifying and listening to everyone who might pay for, as well as benefit from, the lease program.	DOE placed announcements of this project in nine newspapers covering the readership from Cañon City to the White Mesa Mill and all towns and cities in the vicinity of the lease tracts. In addition, DOE mailed 70 news releases to appropriate federal, state, and local agencies, tribes, elected officials, libraries, and newspapers.

Table A−1 (continued). Issues Identified in Scoping

Scoping Issue	Response
Past experience with uranium mining and milling resulted in added costs to taxpayers for cleanup and compensation to workers for health effects.	Federal and state governments have learned from past experience and now require surety bonds sufficient to cover the cost of reclamation and apply regulations that protect the public and workers from exposures that could prove hazardous to their health.
Royalty payments to the government pale when compared to the costs of uranium mining and milling to the public and local governments.	Since 1974, DOE's lease agreements have contained provisions requiring the leaseholders to (1) obtain adequate reclamation performance bonds for their operations and (2) make production royalty payments to the government. The reclamation performance bonds required are, and have historically been, determined on a site-by-site basis. Since 1974, these bonds have been sufficient to ensure that the leaseholders operations are properly reclaimed. That requirement would continue for all future lease activities. Since 1974, DOE leases have generated approximately $55 million in royalties to the government. These payments were deposited into the U.S. Treasury's general fund. These royalties did not specifically offset payments for the uranium workers compensation or directly affect abandoned uranium mine-site reclamation; however, it can be argued that there has been a significant, positive financial benefit to the government from past leasing activities. That benefit would also continue for all future leasing activities. Additional compensation is made annually to state and local governments via "payments in lieu of taxes" to offset the lack of property tax payments on federal lands.
Concern that 30 days is insufficient time to adequately assess all impacts.	The 30-day scoping period is the public's opportunity to have early input into the issues that should be addressed in the EA. It is not the preparation time needed to perform the analyses nor does it include the public's opportunity to comment on the draft EA.
Public meetings should have been held in other locations such as the east, central, and western regions of the lease areas, or Grand Junction, Montrose, Telluride, and Ridgway and advertised in local media.	Public meetings were held in the center of the lease tract area and near one of the two milling sites and were advertised in the newspapers representing the entire region that could be affected by the proposed actions from Cañon City, Colorado, to White Mesa, Utah.
Request that all lease tracts be evaluated for the presence of Potential Conservation Areas (PCAs) under the Colorado Natural Heritage Program.	Evaluation of the lease tracts and PCAs is provided in Section 4.9.
Successful reclamation is difficult in desert environments.	DOE concurs but notes that past reclamation efforts on lease tracts have been successful in reestablishing native vegetation.
Concern for the visual impact of residual waste rock left on the surface.	Visual impacts of lease tract development are discussed in Section 5.11.
Concern for storm-water management.	DOE lease agreements require the leaseholders to conduct their operations in accordance with applicable federal, state, and local statutes, rules, and regulations, including those associated with storm-water management.
Concern for control of noxious weeds.	The DOE lease agreements require the leaseholders to monitor and control infestations of noxious weeds. DOE has been coordinating weed-control efforts with various county weed programs since 1999. This requirement/coordination of effort would continue for all future leasing activities.
Increased demand on emergency services.	The potential impacts to local infrastructure are discussed in Section 5.1.

Table A−1 (continued). Issues Identified in Scoping

Scoping Issue	Response
Applicability of federal, state, and local laws.	DOE lease agreements require the leaseholders to conduct their operations in accordance with applicable federal, state, and local statutes, rules, and regulations.
Concern about resumption of uranium mining in Moffat County.	DOE has no uranium lease tracts in Moffat County, and the two available options for milling are not in Moffat County; therefore, the proposed actions of this EA have no potential to affect Moffat County.
Concern about the impacts of in situ leach mining.	Leaseholder operations have historically employed conventional mining/extraction techniques. Other proposed technologies, including in situ mining, would require a separate, comprehensive environmental review prior to being approved by DOE.
Workers will not be covered under the Radiation Exposure Compensation Act (RECA).	The commentor is correct in that RECA, Public Law 101-426, covers workers who worked in underground uranium mines located in Colorado, New Mexico, Arizona, Wyoming, South Dakota, Washington, Utah, Idaho, North Dakota, Oregon, and Texas at any time during the period beginning on January 1, 1942, and ending on December 31, 1971. However, based on that past experience, new federal and state standards have been established to protect workers from exposures that would be harmful to their health.
Request that if leases are to be issued, mining companies provide a surety bond to cover reclamation, air monitoring should be required during operations and independently verified, and medical screening should be provided for workers annually.	Surety bonds required by both DOE and the State of Colorado for each mine have been sufficient to cover the costs of reclamation since DOE began managing the program in the 1970s. Air monitoring and reporting is a federal and state requirement of all uranium mine operations in accordance with U.S. Mine Safety and Health Administration (MSHA) regulations. Worker monitoring and medical examinations are the responsibility of mine operators, but they must be in compliance with state and federal worker protection requirements.
Tract 14 is located on the Dolores River and should be withdrawn.	Tract 14 is one of the 38 tracts being evaluated in this EA and its proximity to the Dolores River is noted.
Tracts 26 and 26A have suitable habitat for burrowing owls and should be withdrawn.	Burrowing owls as well as other environmental features are considered in this EA and by DOE in its decision-making.
An Environmental Impact Statement (EIS) should be prepared instead of an EA to assess individual and cumulative impacts.	Consistent with DOE and CEQ NEPA regulations, DOE is preparing this EA, which assesses individual and cumulative impacts, to determine whether a finding of no significant impact (FONSI) is justified or whether an EIS is needed.
An economic assessment of the quality of Colorado's uranium resources compared to other deposits in the world should be generated to determine the sustainability of the business and the ability of the mining companies to perform reclamation.	Assessment of the economic viability of uranium mining in Colorado is the responsibility of the companies that bid for DOE's leases. DOE and state requirements for surety bonds ensure that sufficient funding is available for reclamation.
Past bonding levels were insufficient to reclaim a site. Historical cleanup cost should be used to set bond levels.	Since 1974, DOE's lease agreements have contained provisions requiring the leaseholders to obtain adequate reclamation performance bonds for their operations. The reclamation performance bonds required are, and have historically been, determined on a site-by-site basis. Since 1974, these bonds have been sufficient to ensure that the leaseholders operations are properly reclaimed. That requirement would continue for all future lease activities.
Effects of increased truck traffic on Telluride's tourism, workforce, and safety on Highway 62.	The potential increases in truck traffic volume and projected accident rates are discussed in Section 5.2. Worker and public health effects of transportation are discussed in Section 5.16.

Table A−1 (continued). Issues Identified in Scoping

Scoping Issue	Response
Emergency response times to mine sites and to all segments of the transportation routes.	Because of the remote locations of most lease tracts, mine operators recognize that they bear an added burden to ensure worker safety and are the first responders in the event of an accident. As a consequence of this remoteness, many miles of the transportation routes are also distant from emergency responders. However, as assessed in Section 5.2, the consequences from an accident involving uranium ore would not be appreciably different than those from any other truck accident in this region.
Training of emergency personnel for response to an accident involving radioactive materials.	As discussed in Section 5.16, the relatively low hazard levels associated with uranium ore would not necessitate special training for emergency responders. Hazardous material training is required for emergency responders; no additional training specific to radioactive materials is required for uranium ore shipments.
Concern for surface water quality where streams are adjacent to mines.	With few exceptions, mining operations on DOE lease tracts are located away from existing stream channels, and all mining operations are required to institute controls that are protective of surface waters. Also, when mining operations encounter ground water in sufficient quantity that it must be discharged to the environment, the leaseholder is required to obtain a discharge permit from the State of Colorado and comply with all requirements of that permit, including treating the water for radium or other constituents, if necessary.
Liners used in retention ponds deteriorate when in contact with radioactive materials.	Because there is no processing of uranium ores occurring at the mine sites, with the exception of a few mines requiring dewatering and radium removal before discharging, no lined ponds could be subjected to extended exposure to materials that would experience accelerated deterioration beyond normal design parameters.
Preventive measures required to prevent ground water and surface water contamination. Potential to contaminate drinking water sources.	Most mines are dry; thus, there are no mechanisms for surface or ground water contamination. For those few mines that require dewatering, radium is removed, and the resultant ground water is discharged in accordance with State of Colorado permits.
Radioactive dust releases should be prevented from mines.	DOE lease agreements require the leaseholders to conduct their operations in accordance with applicable federal, state, and local statutes, rules, and regulations, including those associated with air emissions. Section 5.4 discusses air emissions and associated requirements.
Health risks from radon gas should be evaluated.	Health risks to the public and workers are assessed in Section 5.16.
Location of waste disposal from mines, mills, and nuclear power plants.	Mines sites are reclaimed in accordance with state and federal requirements. The two currently operating uranium mills dispose of their wastes onsite in accordance with their NRC licenses. Nuclear power plant wastes are or will be disposed of by waste types at commercial or government-operated waste disposal locations.

Table A−1 (continued). Issues Identified in Scoping

Scoping Issue	Response
How many jobs will be created?	Under ongoing operations at the 13 existing leases, approximately 186 direct jobs are estimated during the projected 10-year leases. For the Expanded Program alternative, approximately 570 jobs would be created during the projected 10-year leases. For the No Action alternative, approximately 60 employees would be required until all operations could be terminated, the sites reclaimed (estimated to require 2 years), and the properties transferred to BLM.
What type of job security will employees be provided and what will the industry give back to the communities?	Uranium mining, like all mineral development, is subject to market forces; thus, job security cannot be ensured. Industry contributions to local communities come from local purchases, sales taxes, housing taxes, and other forms of payments for needed services and materials. Additional compensation is made annually to state and local governments via "payments in lieu of taxes" to offset the lack of property tax payments on federal lands.
How will industry ensure communities will not demise when mines close?	As has been the case in the past, uranium mining, like all mineral development, is subject to market forces. The long-term viability of area communities is dependent on various industries (tourism, ranching, mineral development, etc.) and is not solely dependent on the uranium industry.
What standards are in place to protect workers and the public?	Several agencies have regulatory jurisdiction over activities conducted on or associated with the leasing program, including MSHA and Colorado Departments of Transportation (CDOT) and Natural Resources–Division of Minerals and Geology (CDMG).
What agency is responsible for worker safety and do they have the capacity to monitor all activities?	Employers are responsible for providing a safe work environment for their employees and must monitor that environment in accordance with applicable regulations. For mining, MSHA is the principal regulator. In accordance with the regulations, MSHA personnel perform periodic mine-site inspections.
What measures are in place to avoid downwind issues?	DOE lease agreements require leaseholders to conduct their operations in accordance with applicable federal, state, and local statutes, rules, and regulations, including those associated with air emissions. Typically, lease tract operations are so remote and the density of the materials handled is great enough that there are no downwind issues. However, health effects to the public and workers are assessed in Section 5.16.
What would be the effect on the tax base of the three counties containing mines?	Similar to any other industry that creates jobs within a specific area, lease tract operations will affect the tax base of the respective counties; however, a quantitative analysis of that effect is beyond the scope of this EA.
The economic impact on the local economy, including the impacts on recreational use of the Dolores River and traditional ranching communities.	Mining, ranching, and recreational interests have coexisted within the area containing the Uravan Mineral Belt for decades, each having some economic impact on the local economies. That situation will likely continue regardless of DOE's actions. Recreational use impacts are addressed in Section 5.3.2.
Impacts of mining, milling, transportation, cleanup and recovery, and waste disposal must be addressed.	The impacts of uranium mining on DOE's lease tracts and transportation to the currently available mills are evaluated in this EA. The impacts of uranium milling are assessed as a part of the mills' licensing process by NRC and are beyond the scope of this EA.

Table A−1 (continued). Issues Identified in Scoping

Scoping Issue	Response
Has adequate cleanup of historical uranium mining occurred to warrant new leasing?	All historical (legacy) mine sites on DOE lease tracts have been successfully reclaimed.
DOE's actions must comply with BLM's resource management plans.	DOE works closely with BLM in implementing the leasing program. DOE and the BLM are working on a memorandum of understanding for long-term roles and responsibilities regarding the Uranium Leasing Program.
BLM's draft Resource Management Plan contemplates more protective management of the Dolores River corridor, which conflicts with lease tract 14, and therefore that tract should be withdrawn and others that may affect the potential for the river to be designated wild and scenic and/or are within 2 miles of the river should also be withdrawn.	Section 5.3.2 addresses recreational use impacts, and Section 4.15 discusses wild and scenic river status
Site-specific decision to allow exploration, mining, or milling of uranium should be conducted after completion of an EIS.	The DOE lease agreements require the leaseholders to submit exploration and/or mining plans to DOE for approval. The lease agreements also require the leaseholders to comply with all applicable federal, state, and local statutes, rules, and regulations. Accordingly, the leaseholder may be required to perform additional site-specific environmental surveys and provide the associated documentation to DOE for review. These requirements would continue for future leasing activities should DOE decide to continue with the Uranium Leasing Program.
Local land use and zoning laws should be examined that could limit mining development on adjacent private lands.	DOE's leasing decisions would affect only mining activities on federal lands and do not apply to mining actions on private lands.
DOE must coordinate with state public health agencies.	The Colorado Department of Public Health and Environment was a reviewing agency to DOE's EA in 1995 and will receive a copy of this EA to review as well.

Appendix B

Plants and Wildlife Species Expected To Occur On or Near DOE Lease Tracts

Table B−1. Common and Scientific Names of Plants Associated With DOE Lease Tracts

Scientific Name	Common Name
Achillea millefolium L.	common yarrow
Achnatherum hymenoides (Roemer & J.A. Schultes) Barkworth	Indian ricegrass
Acroptilon repens (L) DC.	Russian knapweed
Agropyron cristatum (L.) Gaertn.	crested wheatgrass
Amaranthus blitoides S. Wats	mat amaranth
Amelanchier utahensis var. *utahensis* Koehne	Utah serviceberry
Aristida purpurea Nutt.	purple threeawn
Artemisia frigida Willd	fringed sagebrush
Artemisia tridentata Nutt.	big sagebrush
Artemisia tridentata ssp. *vaseyana* (Rydb.) Beetle	mountain big sagebrush
Astragalus linifolius Osterhout*	Grand Junction milkvetch*
Astragalus naturitensis Payson*	Naturita milkvetch*
Astragalus rafaelensis ME Jones*	San Rafael milkvetch*
Astragalus sesquiflorus S. Wats.*	sandstone milkvetch
Astragalus sp.	milkvetch
Astragalus wetherillii M.E. Jones*	Wetherill's milkvetch*
Atriplex canescens (Pursh) Nutt.	fourwing saltbush
Atriplex confertifolia (Torr. & Frem.) S. Wats.	saltbush
Balsamorhiza sagittata (Pursh) Nutt.	arrowleaf balsamroot
Bassia scoparia (L.) A.J. Scott.	common kochia
Bouteloua gracilis (Willd. ex Kunth) Lag. ex Griffiths	blue grama
Bromus inermis Leyss.	smooth brome
Bromus tectorum L.	cheatgrass
Cardaria draba (L.) Desv.	hoary cress
Castilleja sp.	Indian paintbrush
Cercocarpus ledifolius Nutt.	curlleaf mountain mahogany
Cercocarpus montanus Raf.	true mountain mahogany
Chrysothamnus viscidiflorus (Hook.) Nutt.	yellow rabbitbrush
Convolvulus arvensis L.	field bindweed
Cryptantha sp.	catseye
Descurainia sophia (L.) Webb ex Prantl	herb sophia
Elaeagnus angustifolia L.	Russian olive
Elymus elymoides (Raf.) Swezey	bottlebrush squirreltail
Ephedra viridis var. *viridis* Coville	Mormon tea
Epipactis gigantea Dougl. Ex Hook.*	helleborine*
Ericameria nauseosa ssp. *nauseosa* var. *nauseosa* (Pallas ex Pursh) Nesom & Baird.	rubber rabbitbrush
Erigeron kachinensis Welsh & Moore*	kachina daisy*
Eriogonum sp.	buckwheat
Erodium cicutarium (L.) L'Her. ex Ait.	redstem stork's bill
Forestiera pubescens var. *pubescens* Nutt.	forestiera
Fraxinus anomala Torr. ex S. Wats.	singleleaf ash
Grindelia squarrosa (Pursh) Dunal	curlycup gumweed
Gutierrezia sarothrae (Pursh) Britt. & Rusby	broom snakeweed
Halogeton glomeratus (Bieb.) C.A. Mey	halogeton
Helianthus annuus L.	common sunflower
Hesperostipa comata ssp. *comata* (Trin. & Rupr.) Barkworth	needle and thread grass
Heterotheca villosa var. *villosa* (Pursh) Shinners	hairy goldenaster
Hordeum jubatum ssp. *jubatum* L.	foxtail barley
Juniperus osteosperma (Torr.) Little	Utah juniper
Juniperus scopulorum Sarg.	Rocky Mountain juniper
Koeleria macrantha (Ledeb.) J.A. Schultes	prairie Junegrass
Krascheninnikovia lanata (Pursh) Guldenstaedt	winterfat
Lactuca serriola L.	prickly lettuce
Lactuca tatarica (L.) C.A. Mey.	blue lettuce
Lepidium latifolium L.	broadleaved pepperweed
Leymus salinus (M.E. Jones) A. Love	saline wildrye
Lupinus crassus Payson*	Paradox lupine*
Lygodesmia doloresensis S. Tomb.*	Dolores River skeletonplant*
Lygodesmia sp.	skeletonplant
Machaeranthera canescens (Pursh) Gray	hoary aster
Mahonia repens (Lindl.) G. Don	Oregongrape
Melilotus officinalis (L.) Lam	yellow sweetclover
Mimulus eastwoodiae Rydb.*	Eastwood monkey-flower*
Mirabilis multiflora (Torr.) Gray	Colorado four o'clock

Table B−1 (continued). Common and Scientific Names of Plants Associated With DOE Lease Tracts

Scientific Name	Common Name
Oenothera sp.	primrose
Opuntia polyacantha var. *polyacantha* Haw	prickly pear
Pascopyrum smithii (Rydb.) A. Love	western wheatgrass
Pediomelum aromaticum (Payson) W.A. Weber*	Paradox breadroot*
Penstemon sp.	penstemon
Peraphyllum ramosissimum Nutt.	squaw apple
Petradoria pumila (Nutt.) Greene	grassy rockgoldenrod
Phalaris arundinacea L.	reed canarygrass
Phlox longifolia Nutt.	longleaf phlox
Picrothamnus desertorum Nutt..	bud sagebrush
Pinus edulis Engelm.	twoneedle piñon
Pinus ponderosa P. & C. Lawson	ponderosa pine
Pleuraphis jamesii Torr.	galleta grass
Poa bulbosa L.	bulbous bluegrass
Poa secunda J. Presl	Sandberg bluegrass
Polypogon monspeliensis (L.) Desf.	annual rabbitsfoot grass
Populus fremontii S. Wats	Fremont's cottonwood
Prunus virginiana var. *melanocarpa* (A. Nels) Sarg.	black chokecherry
Psathyrostachys juncea (Fisch.) Nevski	Russian wildrye
Purshia tridentata (Pursh) DC.	antelope bitterbrush
Quercus gambelii Nutt.	Gambel's oak
Rhus trilobata Nutt.	skunkbush sumac
Rumex crispus L.	curly dock
Salix sp.	willows
Salsola kali L.	Russian thistle
Sarcobatus vermiculatus (Hook.) Torr.	Greasewood
Sclerocactus J.A.Purpus ex K. Schum, L. Bensen	Uinta basin hookless cactus
Sisymbrium altissimum L.	tall tumblemustard
Sphaeralcea coccinea (Nutt.) Rydb.	scarlet globemallow
Sporobolus airoides (Torr.) Torr	alkali sacaton
Sporobolus contractus A.S. Hitchc.	spike dropseed
Sporobolus cryptandrus (Torr.) Gray	sand dropseed
Symphoricarpos longiflorus Gray	desert snowberry
Tamarix ramosissima Ledeb.	saltcedar
Tetradymia canescens DC.	spineless horsebrush
Thinopyrum intermedium (Host) Barkworth & D.R. Dewey	pubescent wheatgrass
Thinopyrum ponticum (Podp.) Z.-W. Liu & R.-C. Wang	slender wheatgrass
Thlaspi arvense L.	field pennycress
Typha latifolia L.	broadleaf cattail
Xanthium strumarium L.	rough cocklebur
Yucca baccata Torr.	banana yucca
Yucca harrimaniae Trel.	Spanish bayonet

*Sensitive species.

Table B−2. Wildlife Species Expected to Occur On or Near DOE Lease Tracts

Scientific Name	Common Name
Fish	
Ameiurus melas	black bullhead
Catostomus discobolus	bluehead sucker
*Catostomus latipinnis**	flannelmouth sucker*
Cottus bairdi	mottled sculpin
Cyprinella lutrensis	red shiner
Cyprinus carpio	common carp
*Gila cypha**	humpback chub*
*Gila elegans**	bonytail*
*Gila robusta**	roundtail chub*
Ictalurus punctatus	channel catfish
Lepomis cyanellus	green sunfish
Notropis stramineus	sand shiner
Onchorhynchus mykiss	rainbow trout
Pimephales promelas	fathead minnow
*Ptychocheilus lucius**	Colorado pikeminnow*
Rhinichthys osculus	speckled dace
*Xyrauchen texanus**	razorback sucker*
Reptiles and Amphibians	
Ambystoma tigrinum	tiger salamander
Bufo punctatus	red-spotted toad
Bufo woodhousei	Woodhouse's toad
Cnemidophorus tigris	northern whiptail
Cnemidophorus velox	plateau whiptail
Coluber constrictor	racer
Crotalus viridis	western rattlesnake
*Crotalus viridis concolor**	midget faded rattlesnake*
Crotaphytus collaris	collared lizard
Eumeces multivirgatus	many-lined skink
*Gambelia wislizenii**	leopard lizard*
Hyla arenicolor	common treefrog
Phrynosoma douglassii	short-horned lizard
Pituophis melanoleucus	gopher snake
*Rana pipiens**	leopard frog*
Scaphiopus intermontanus	Great Basin spadefoot
Sceloporus undulatus	western fence lizard
Seloporus graciosus	sagebrush lizard
Thamnophis elegans	western terrestrial garter snake
Urosaurus ornatus	tree lizard
Uta stansburiana	side-blotched lizard
Birds	
*Accipiter gentiles**	northern goshawk*
Actitis macularia	spotted sandpiper
Aeronautes saxatalis	white-throated swift
*Amphispiza belli***	sage sparrow**
Amphispiza bilineata	black-throated sparrow
Anas platyrhynchos	mallard
Aphelocoma coerulescens	scrub jay
*Aquila chrysaetos***	golden eagle**
Archilochus alexandri	black-chinned hummingbird
Ardea herodias	great blue heron
*Asio flammeus***	short-eared owl**
*Athene cunicularia**	burrowing owl*
Bombycilla cedrorum	cedar waxwing
Bubo virginianus	great horned owl
Buteo jamaicensis	red-tailed hawk

Table B−2 (continued). Wildlife Species Expected to Occur On or Near DOE Lease Tracts

Scientific Name	Common Name
Birds (continued)	
*Buteo regalis**	ferruginous hawk*
*Buteo swainsonii***	Swainson's hawk**
Carduelis psaltria	lesser goldfinch
Carduelis tristis	American goldfinch
Carpodacus mexicanus	house finch
Cathartes aura	turkey vulture
Catherpes mexicanus	canyon wren
Ceryle alcyon	belted kingfisher
*Centrocercus minimus**	Gunnison sage grouse*
Charadrius vociferus	killdeer
Chondestes grammacus	lark sparrow
Chordeiles minor	common nighthawk
*Circus cyaneus***	northern harrier**
*Coccyzus americanus**	yellow-billed cuckoo*
Colaptes auratus	northern flicker
Columbaa fasciata	band-tailed pigeon
Columbao livea	rock dove
Contopus sordidulus	western wood pewee
Corvus brachyrhynchos	American crow
Corvus corax	raven
*Dendroica nigrescens***	black-throated grey warbler**
Dendroica petechia	yellow warbler
Empidonax wrightii	gray flycatcher
Eremophila alpestris	horned lark
Euphagus cyanocephalus	brewer's blackbird
*Falco mexicanus***	prairie falcon**
*Falco peregrinus**	peregrine falcon*
Falco sparverius	American kestrel
Glaucidium gnoma	northern pigmy owl
Guiraca caerulea	blue grosbeak
*Gymnorhinus cyanocephalus***	piñon jay**
*Haliaeetus leucocephalus**	bald eagle*
Hirundo pyrrhonota	cliff swallow
Hirundo rustica	barn swallow
Ictaria virens	yellow-breasted chat
Icterus galbula	northern oriole
Lanius ludoviceanus	loggerhead shrike
*Melanerpes lewis***	Lewis's woodpecker**
Meleagris gallopavo	wild turkey
Mimus polyglottos	northern mockingbird
Molothrus ater	brown-headed cowbird
Myiarchus cinerascens	ash-throated flycatcher
Otus trichopsis	western screech-owl
Passerculus sandwichensis	savannah sparrow
Passerina amoena	lazuli bunting
Phasianus colchicus	ringnecked pheasant
Pheucticus melanocephalus	black-headed grosbeak
Pica pica	black-billed magpie
Picoides villosus	hairy woodpecker
Pipilo erythrophthalmus	rufous-sided towhee
Polioptila caerulea	blue-gray gnatcatcher
Pooecetes gramineus	vesper sparrow
Salpinctes obsoletus	rock wren
Sayornis saya	Say's phoebe
Selasphorus playtcercus	broad-tailed hummingbird
Sialia currucoides	mountain bluebird
Sitta pygmaea	pygmy nuthatch
Spizella passerina	chipping sparrow
Stelgidopteryx serripennis	northern rough-winged swallow
Sturnella neglecta	western meadowlark

Table B−2 (continued). Wildlife Species Expected to Occur On or Near DOE Lease Tracts

Scientific Name	Common Name
Birds (continued)	
Tachycineta thalassina	violet-green swallow
Toxostoma bendirei	Bendire's thrasher
Troglodytes aedon	house wren
Turdus migratorius	American robin
Tyrannus verticalis	western kingbird
*Vermivora virginiae***	Virginia's warbler**
Vireo gilvus	warbling vireo
Vireo solitarius	solitary vireo
*Vireo vicinior***	gray vireo**
Zenaida macroura	mourning dove
Mammals	
Ammospermophilus leucurus	white-tailed antelope ground squirrel
Antilocapra americanus	pronghorn antelope
Antrozous pallidus	pallid bat
Bassariscus astutus	ringtail
Canis latrans	coyote
Castor canadensis	beaver
Cervus canadensis	elk
Citellus richardsoni	Richardson's ground squirrel
Citellus variegatus	rock squirrel
Dipodomys ordi	Ord's kangaroo rat
Eptesicus fuscus	big brown bat
Erethizon dorsatum	porcupine
*Euderma maculatum**	spotted bat*
Eutamias minimus	least chipmunk
Felis concolor	mountain lion
Felis rufus	bobcat
Lasionycteris noctivagans	silver-haired bat
Lasiurus cinereus	hoary bat
Lepus californicus	black-tailed cottontail
Lutra canadensis	river otter
Mephitis mephitis	striped skunk
Mustella frenata	long-tailed weasel
*Mustella nigripes**	black-footed ferret*
Mustella vison	mink
Myotis californicus	California myotis
Myotis ciliolabrum	small-footed myotis
Myotis evotis	long-eared myotis
Myotis lucifugus	little brown myotis
*Myotis thysanodes**	fringed myotis*
Myotis velifer	cave myotis
Myotis volans	long-legged myotis
Myotis yumanensis	Yuma myotis
Neotoma lepida	desert woodrat
Odocoileus hemionus	mule deer
Ondatra zibethica	muskrat
Onychomys leucogaster	northern grasshopper mouse
Ovis canadensis mexicana	desert bighorn sheep
Perognathus flavus	silky pocket mouse
Peromyscus crinitus	canyon mouse
Peromyscus maniculatus	deer mouse
Peromyscus truei	piñon mouse
Pipistrellus hesperus	western pipistrel
*Plecotus townsendii**	Townsend's big-eared bat*
Procyon lotor	raccoon
Spilogale putorius	western spotted skunk
Sylvilagus auduboni	desert cottontail
Sylvilagus nuttalli	mountain cottontail

Table B−2 (continued). Wildlife Species Expected to Occur On or Near DOE Lease Tracts

Scientific Name	Common Name
Mammals (continued)	
Tadarida brasiliensis	Mexican freetail bat
Tadarida molossa	big freetail bat
Taxidea taxus	badger
Thomomys talpoides	northern pocket gopher
Urocyon cinereoargenteus	gray fox
Zapus princeps	western jumping mouse

*Endangered, threatened, candidate, or sensitive species.
**Birds of conservation concern.

Appendix C

Guidelines for the Protection of Potential Bat Habitat

STATE OF COLORADO

Bill Owens, Governor
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
AN EQUAL OPPORTUNITY EMPLOYER

Bruce McCloskey, Director
6060 Broadway
Denver, Colorado 80216
Telephone: (303) 297-1192

For Wildlife-
For People

Ed Cotter, Site Lead
Uranium Leasing Sites
S.M. Stoller Corporation
2597 B 3/4 Road
Grand Junction, CO 81503

November 28, 2005

RE: Guidelines for bat mitigation at renewed mining sites in western Colorado.

Dear Ed;

Regarding our recent communications on the issue of bat mitigation at mines with bat gates undergoing renewed mining, I can offer the following comments for your use. I understand that mines that are currently gated to conserve bat roosting habitat, are potentially being re-opened for active mining operations with the recent increase in energy development in Colorado. While the best option to protect any bats using these sites, and preserve the roosting habitat that they provide, is to avoid re-entry into those features, I understand that is highly unlikely in most cases. However, any gated mine system that can be re-worked by other directions or ways that leave the system undisturbed, the best mitigation is to avoid re-entry of that feature and preserve the habitat. This would only seem possible with large mining systems that might leave portions un-disturbed. When avoidance is not possible, then the following guidelines should be considered.

1. Avoid re-entry into **winter** roosting sites (hibernacula) during the hibernation season of use. Bats are very vulnerable at this stage, and disturbance and mining activities can be both directly and indirectly deadly to bats roosting in these mines at that time. In western Colorado, where the uranium mines are located, the **winter season should be considered from October 1 – April 15**. Disturbance at winter roost sites can be greatly reduced by planning initial re-entry work around these dates. Once bats become active again, they can respond and disperse to the activity at the mine, hopefully avoiding any direct impact to individual bats.
2. Prior to re-entry into **winter/fall** roosting sites, exclusions should be conducted to help prevent the entry and use of the site by bats. This would involve screening out bats by placing chicken wire (1" mesh or more) across the entire bat gate, as well as any un-gated but open access point to the mine complex. The chicken wire should cover the gate from the top to about 5-6" from the floor or bottom of the gate. This will help prevent bats from entering the mine, and also allow any bats that may be inside the mine prior to the exclusion effort, to escape for the mine before the mining operations begin. I would suggest that exclusions begin by September 1 at these fall/winter sites. They can go up at any time prior to the start of the fall transition season, but no later than September 30, to avoid weather related variations to fall bat activity. In addition, exclusions are not functional from October 1 – April 15, because bats are not active.
3. **Summer** roosting sites, *other than at maternity roost sites*, can be handled in the same manner, with bat exclusions. I recommend that mines fitting this profile should have a chicken wire exclusion for at least 2-3 weeks prior to any re-entry of the mine. Again, the wire should cover the entire bat gate and any other un-

gated but open access point to the mine complex. **The summer season can be considered April 15 – September 1st.**

4. **Maternity roosts** will be the most critical, as these roosting habitats are very rare. Re-entry and potential loss of these roost types will require more advanced planning. I recommend that any maternity site that cannot be avoided for re-entry, undergo an exclusion effort by April 15. The ideal situation would be to allow the exclusion effort to cover the first half of the maternity season, at least, to prevent any attempt for the colony to try and re-establish use while operations are underway. That would provide an exclusion period of April 15 – June 15th. In addition, I would suggest that after re-entry of the mine for mining, that the portal(s) be covered during night time periods, to prevent the potential of re-use at maternity sites.
5. For sites that have ***bat use year round***, the target time periods for renewed mining activity should be spring or fall. This would be an April-May period, or September-October time period.

Information on what type of roosting habitat is provided at a gated site can be obtained from me, or possibly, the BLM office with jurisdiction. In summary, disturbance at hibernation sites will cause bats to awaken, burning their fat reserves before food is again available in the spring. This will potentially lead to the death of those individuals. Smoke bombs are not recommended as exclusion methods, as to the best of my knowledge, they have not been confirmed to be effective. Additionally, use of these devices during the hibernation period would more than likely kill any roosting bats, as arousal from hibernation takes too much time to avoid the hazardous nature of the smoke fumes. Exclusions will only work during seasons when bats are active.

Consideration can be given to the potential of preserving any nearby mine features to serve as possible alternate habitat for bats. This may be more important during exclusion efforts. Lastly, the creation of artificial bat habitat has been attempted in some places, and it could serve as an important tool for conservation consideration. This would only be feasible for roost sites that are considered of the highest significance for bats, including maternity roosts and large hibernacula.

I hope these "guidelines" will be useful to you in your efforts to address this issue. The Division of Wildlife thanks you for your interest in minimizing impacts to bats with renewed mining activities in western Colorado. Please feel free to contact me if you have any questions.

Sincerely,

Kirk W Navo

Kirk W. Navo
Wildlife Conservation Biologist
Monte Vista Service Center
0722 S. Rd 1E
Monte Vista, CO 81144
719-587-6906

Appendix D

Responses to Public Comments

Uranium Leasing Program – Programmatic Environmental Assessment
Responses to the Public's Comments

A. ENVIRONMENTAL IMPACT STATEMENT (EIS) NEEDED

A1. COMMENT: Commentors have requested that an Environmental Impact Statement (EIS) be prepared instead of an Environmental Assessment (EA), although no specific reason was provided.

RESPONSE: The preparation of an EA is defined in both CEQ's and DOE's NEPA regulations as a step in the process of evaluating impacts, the outcome of which is either a Finding of No Significant Impact (FONSI) or a determination that an EIS is needed. As documented in the Final PEA, DOE has performed an appropriate analysis and review of the impacts each alternative will have on the environment and will determine whether an EIS is warranted.

A2. COMMENT: Each of the alternatives analyzed in the PEA "raises serious questions and discloses significant impacts regarding management of federally owned uranium resources…" therefore and EIS should be prepared.

RESPONSE: It is DOE's position that neither serious questions nor significant impacts are identified by the analyses in PEA. Based on the comments received on the draft PEA, traffic impacts appeared to be the publics' greatest concern; however, the analyses in the final PEA for the realistic ore production and transportation evaluation indicated that traffic impacts would not be significant. Discussions pertaining to the potential impacts to other specific affected environments are provided elsewhere in this Appendix D.

A3. COMMENT: The traffic impacts warrant analysis in an EIS instead of an EA.

RESPONSE: The analyses in this final PEA have been expanded to include realistic ore production and transportation evaluations in addition to the worst-case analyses, included in the draft PEA. These analyses demonstrate that the traffic increases through any populated area would not be significant and, therefore, do not warrant further, more detailed evaluation.

A4. COMMENT: A joint DOE/BLM comprehensive cleanup plan should be developed in conjunction with the leasing program and considered in an EIS.

RESPONSE: Reclamation of past mining activities on DOE's lease tracts is complete. Reclamation activities on BLM lands, though outside the scope of DOE's actions, is ongoing as BLM's funding allows and is covered under BLM's NEPA regulations.

A5. COMMENT: DOE must disclose in an EIS the legacy of uranium mining in the Uravan Mineral Belt, which includes significant impacts on human health, including worker deaths caused by uranium exposure.

RESPONSE: The legacy of uranium mining has no relevance to the assessment of impacts of future mining, other than to point out that because of past impacts, new human health and environmental standards have been established to protect workers, the public, and the environment. All land affected by historical mining on DOE's lease tracts has been reclaimed.

A6. COMMENT: The PEA is deficient because it fails to consider the "full intensity and scope of many site specific environmental impacts" including impacts to threatened, endangered, and sensitive species; bat species; critical habitat for threatened and endangered fish species; Western Yellow-billed Cuckoo; reintroduced River Otter populations and habitat; migratory bird species; cryptobiotic soils; and identified Wild and Scenic River characteristics, therefore an EIS should be prepared.

RESPONSE: The PEA addresses threatened, endangered, sensitive, and special status species and habitats, as well as the Wild and Scenic River study areas. DOE specifically coordinated and addressed these issues with two cooperating agencies having jurisdiction (BLM and the U.S. Fish and Wildlife Service [USFWS]). As a programmatic document, the PEA identifies those areas where there might be potential for impacts to sensitive elements of the environment such as those listed. In no area would the presence of sensitive species be so extensive as to prevent mining activities. In the case of Wild and Scenic River study areas, DOE has excluded new mining within 0.25 mile of the Dolores and San Miguel Rivers, as agreed to by BLM (the governing land management agency), even though these rivers have never been formally designated by Congress. Further, until DOE implements the decision to proceed with leasing is implemented by DOE, leases awarded, exploration conducted, and mining plans submitted, the location of new sites that might be mined are unknown. In addition, as stated in the PEA, before any site disturbance activities would be allowed, each leased tract would undergo site-specific characterization to determine whether sensitive species were present, and if so, how impacts would be minimized, in cooperation with the BLM and USFWS, as appropriate.

A7. COMMENT: The federal agencies with management authority over federal lands in the Uravan Mineral Belt must take no action to allow further uranium mining activities without first completing an EIS.

RESPONSE: DOE has evaluated all relevant impacts in this PEA and will use this PEA to determine whether to issue a FONSI or prepare an EIS. Uranium mining on BLM lands has been and will continue to be addressed in accordance with that agency's review processes, which include the preparation of NEPA documents, as appropriate.

A8. COMMENT: The PEA reveals that uranium mining on public lands in the Uravan Mineral Belt has significant effects based on: a) public health and safety; b) unique characteristics of the geographic area; c) impacts to the environment that are likely to be highly controversial, uncertain, and involve unique or unknown risks; d) precedent for future actions; e) adverse effects to sites listed in or eligible for the National Register of Historic Places; f) adverse impacts to threatened or endangered species and habitat; and g) threatened violations of federal, state, or local law or requirements

RESPONSE: The PEA specifically addresses all the subjects listed, and the analyses do not support the commentors' assertion of significant effects. Specifically: (a) Public health—all exposures to workers and members of the public would be below regulatory standards and the projected doses would result in less than one latent cancer fatality among the public. (b) Unique geography—disturbances would be limited to 5- to 15-acre impacts at individual mine sites dispersed over hundreds of square miles in remote areas where few members of the public travel. (c) Controversy, Uncertain and Unique risks— as defined in CEQ's NEPA regulations (40 CFR 1508.27) there have been no specific challenges that the effects of the proposed actions on the human environment are controversial, uncertain or unique. Further, DOE has successfully operated this program for over 30 years without unacceptable risk or impacts to the workers, the

public, or the environment, and with successful reclamation. The risks are not uncertain or unique and the analyses in the PEA show that potential impacts on the environment would be small. (d) Congress set the precedent for the program more than 50 years ago, and the current resurgence of interest in uranium mining is being driven by an increase in worldwide demand for uranium. (e) Eligible historic sites—all known and listed sites are identified in the PEA and would be avoided. Site-specific reviews prior to disturbance would identify any other eligible structures, and impacts would be avoided or minimized in consultation with the State Historic Preservation Officer, as has been the program's practice for more than 30 years. (f) The potential for threatened or endangered species on the lease tracts is addressed in the PEA. As is DOE's practice, should a protected species be present, DOE and the leaseholders would work with the USFWS to ensure that no unacceptable impact would occur. (g) Lease stipulations have always mandated that leaseholders comply with all applicable regulations. There is absolutely no waiver of these regulations, as is stated in the PEA.

A9. COMMENT: Transportation and environmental impacts would be significant and therefore an EIS is needed.

RESPONSE: Under worst-case traffic scenarios, there would be less than 10 percent increases in traffic volume through population centers. Under the realistic ore production and transportation evaluations generated for the final PEA in Section 5.2, all municipalities except Monticello and Blanding, Utah, would likely not have increases above 1 to 2 percent. The analyses show that these small levels of traffic increases are not significant.

B. CONNECTED ACTIONS

B1. COMMENT: The scope needs to include all uranium mining in the Uravan Mineral Belt including uranium extraction on lands managed by the Bureau of Land Management (BLM) because DOE's actions will likely stimulate more uranium extraction on public lands.

RESPONSE: The increasing price of uranium is stimulating the recent interest in uranium mining, not DOE's Uranium Leasing Program. Uranium mining on public lands outside of, and surrounding, DOE's lease tracts is governed by the 1872 Mining Law and managed by BLM. Mining outside the lease tracts is beyond DOE's authority and the scope of this PEA. Likewise, under the 1872 Mining Law, Congress has provided little if any discretion for the BLM to restrict mining claims. DOE consulted with BLM as a cooperating agency under NEPA regarding the potential impacts from increased uranium mining on BLM lands in the area. More information regarding potential impacts from increased uranium mining activities on BLM lands is included in the Cumulative Impacts section of the PEA.

B2. COMMENT: Federal action by both DOE and BLM is required to stabilize and reclaim uranium impacts to the public lands in the Uravan Mineral Belt.

RESPONSE: DOE has reclaimed all of the mines on its inactive lease tracts and, as funding is made available, BLM is reclaiming sites on its lands. Adequate funding for reclamation of all future mining on DOE's lease tracts is required via reclamation performance bonds by DOE and the Colorado Division of Reclamation, Mining, and Safety (CDRMS). The CDRMS, in cooperation with BLM, has similar requirements for mine-reclamation bonding on BLM lands.

B3. COMMENT: During the preparation of the EIS, DOE and BLM must continue to require interim reclamation and site stabilization.

RESPONSE: Reclamation and site stabilization will occur at a time that is appropriate for those mines and consistent with the terms of their leases or claims.

B4. COMMENT: The proper scope of analysis must include the uranium mills in Blanding, Utah and Canon City, Colorado, and mills that may open if DOE takes action to expand uranium mining on public lands.

RESPONSE: The operations of these mills are governed by their licenses with the U.S. Nuclear Regulatory Commission (NRC) and the States of Utah and Colorado. The decision to operate the mills is based on the price of uranium, not DOE's leasing decisions. Furthermore, ore from DOE's lease tracts represents only a small percentage (estimated to be less than 10 percent) of the total ore processed by these mills. The majority comes from mines on non-DOE lands. Any new uranium processing mill(s) proposed for the Uravan Mineral Belt are beyond the scope of DOE's PEA. Any such mill(s) would be required to go through a permitting process with the State of Colorado and/or the NRC, plus county and local agencies, as required. That permitting process (expected to take 1−2 years to complete) will allow ample opportunity for public involvement. If an additional mill is permitted, built, and becomes operational (competitively with the other, existing mills), it is likely that some ores originating from DOE's lease tracts would be taken there for processing. Such a scenario would lessen the transportation impacts currently outlined in DOE's PEA. The final PEA has been revised to include a qualitative discussion concerning a potential new milling facility being permitted and built in the area.

B5. COMMENT: Degradation of BLM lands from uranium mining must also be considered in an EIS.

RESPONSE: BLM meets its responsibilities under their regulations, NEPA, and the 1872 Mining Law through their Resource Management Plans and subsequent mining-claim-specific NEPA evaluations. DOE has evaluated both the short-term and long-term impacts of uranium mining on DOE−administered lands in this PEA and analyses show that potential impacts would be small. Further, both DOE and CDRMS require sufficient reclamation bonds from all leaseholders to provide adequate funding for post-mining reclamation. The CDRMS, in cooperation with BLM, has similar requirements for mine-reclamation bonding on BLM lands.

B6. COMMENT: DOE has improperly limited the scope of its NEPA analysis to its own internal plans regarding the leasing program on 38 lease tracts covering 27,000 acres of Western Colorado public lands for uranium mining over the next 10 years.

RESPONSE: Consistent with NEPA regulations and DOE's historical approach to compliance that has been used for the last several decades, the scope of the PEA is limited to that which is relevant to DOE's decision-making authority. Potentially relevant actions of other agencies, though outside the jurisdiction of DOE, are acknowledged and assessed in the Cumulative Impacts section of the PEA.

C. SITE-SPECIFIC IMPACTS

C1. COMMENT: An EIS is needed to look at the lease tract and site-specific impacts. The broad and generalized analysis in the PEA does not support the issuance of any uranium leases.

RESPONSE: As established by past practice (and the program's existing EA) and described in the PEA, issuance of a lease does not create any action that would result in impacts. Issuance of a lease merely allows the leaseholder to propose actions that are then subjected to further NEPA review before they are authorized by DOE. Until DOE reaches a decision to proceed with leasing, leases are awarded, exploration is conducted, and mining plans are submitted, the locations of new sites that might be mined are unknown.

D. INDIRECT IMPACTS

D1. COMMENT: The scope needs to include the impacts of bringing more uranium out of the ground and into nuclear fuel cycle and weapons programs and the consideration of the problems related to lack of storage/disposal at all stages of uranium's life cycle.

RESPONSE: The scope of DOE's Uranium Leasing Program does not include the entire nuclear fuel cycle. Such actions are the result of Presidential and Congressional policy decisions and, as applicable, have been and will be subject to their own evaluations under NEPA. DOE's action that is the subject of this NEPA document is limited to decision-making regarding the future of the Uranium Leasing Program. As discussed in Section 1.3 of the Final PEA, the available reserves associated with DOE's lease tracts are estimated to be 13.5 million pounds of uranium, which represents approximately 1.5 percent of the available domestic uranium reserves (purported to be nearly 900 million pounds).

E. CUMULATIVE IMPACTS

E1. COMMENT: The document should address the past, present, and future impacts of uranium mining in the Uravan Mineral Belt by all Federal agencies.

RESPONSE: The PEA evaluates present mining on DOE's lease tracts under the Existing Program alternative and future mining under the Expanded Program alternative. Because all land affected by historical mining on DOE's lease tracts has been reclaimed, past uranium mining has no relevance to the assessment of impacts of present and future mining, other than to point out that because of past impacts, new human health and environmental standards have been established to protect workers, the public, and the environment. Related actions of other agencies, though outside the jurisdiction of DOE, are acknowledged and assessed to the extent practicable given the uncertainty of uranium mining on other federal lands, in the Cumulative Impacts section of the PEA. Although DOE is cognizant of other federal agencies' related actions, DOE's decision-making is distinctly independent of such actions, because those actions are governed by federal laws such as the 1872 Mining Law, which do not apply to DOE's leasing program.

E2. COMMENT: The analysis of cumulative impacts should include oil and gas development and potential oil shale development in the region.

RESPONSE: The cumulative impacts of oil and gas development in the region are discussed in Section 5.21 of the PEA. Potential cumulative impacts from oil shale development have not been included because oil shale resources are not known to occur within DOE's lease tracts, and oil shale development is still too speculative to characterize potential impacts.

E3. COMMENT: NEPA opportunities for public involvement in the cumulative impacts analysis must be provided before any decision can go forward.

RESPONSE: Cumulative impacts were included in the public draft PEA, and therefore, the public has had the opportunity to comment on those analyses. Based on the comments received on the draft PEA, only minor changes have been made in the cumulative impacts text of this final PEA, none of which are of such significance as to warrant additional public review prior to DOE's decision-making on this final PEA.

E4. COMMENT: Past uranium mining has had an impact on rivers in the region such as the Dolores River leaving a legacy of contaminated river sediments. This legacy should be addressed as part of the assessment of cumulative impacts that might result from future mining that would add contamination to the rivers.

RESPONSE: Given the extensiveness of naturally occurring uranium in the region, uranium and radium are found in stream sediments because of the natural weathering of uranium- and radium-bearing geologic formations. While past uranium milling in the region certainly contributed to sediment contamination loading, there are few mechanisms by which uranium mining would result in stream sediment contamination. Because of restrictions on mining in proximity to surface water bodies, mandatory storm water runoff controls, and very limited but treated and permitted discharges that typically evaporate before reaching any surface water body, there would be no source of contamination from future mines to surface water bodies.

E5. COMMENT: The PEA fails to address the cumulative impacts of past, present, and future mining on ground water.

RESPONSE: Because uranium mining in the region occurs hundreds of feet or more above ground water aquifers, there have been no impacts to ground water, and none are anticipated from future mining (see Section 5.5).

F. RANGE OF ALTERNATIVES

F1. COMMENT: The document should consider a no action alternative of maintaining current withdrawals without issuing leases.

RESPONSE: As a matter of policy and consistent with the intent of Congress in establishing the lease tracts, should DOE decide not to issue leases as evaluated under the No Action alternative in the draft PEA, the withdrawn lands would be reclaimed and would be restored to the public domain, pending BLM's approval. The No Action alternative has been revised in the final PEA to reflect that DOE could choose to manage these lands indefinitely without leasing.

F2. COMMENT: The document should consider an alternative of issuing fewer leases, requiring interim reclamation, and requiring additional lease stipulations for protection of public lands.

RESPONSE: Given the range of alternatives and the bounding analyses of the PEA and consistent with CEQ guidelines on the range of alternatives, DOE can and may issue less than the 13 of 38 leases that have been assessed without explicitly evaluating all perturbations of zero to 38 leases. This is included in the preferred alternative.

F3. COMMENT: The No Action alternative analyzed in the PEA is the return of the federal lands to the public domain. This requires additional federal action by the Secretary of the Interior that should be evaluated in the document and would allow mining under the 1872 Mining Law.

RESPONSE: Claims under the 1872 Mining Law would be administered under existing BLM policies and procedures just as non-DOE lease tracts are currently managed. No additional federal action needs to be evaluated in DOE's PEA for this decision.

F4. COMMENT: The PEA should consider an alternative of making further AEA withdrawals from mineral entry.

RESPONSE: Additional withdrawals under the Atomic Energy Act (AEA) would require congressional action and are not within the authority of DOE. Further, any such action would be subject to valid existing rights, and based on the level of claim-staking activities during the last 2 years, most if not all areas with favorable uranium resources have been restaked, making their availability for new withdrawal under the AEA highly questionable.

F5. COMMENT: An alternative that includes a full cleanup program should be evaluated.

RESPONSE: Current leaseholders have valid existing rights that cover their lease activities, and no reclamation is warranted at this time. As a matter of record, all land affected by past mining on DOE's lease tracts has already been reclaimed. BLM is working to reclaim historical mining disturbances on their lands as funding allows. Neither action has any bearing on DOE's decision-making for the future of the program other than to ensure that sufficient bonding is required to fund all future reclamation needs. This is a requirement that DOE has adhered to in the past and will continue to adhere to, as stated in the PEA.

F6. COMMENT: An alternative should be evaluated that identifies the specific footprint where actual mining would be taking place.

RESPONSE: The lease boundaries establish vertical planes within which the leaseholder has specific rights to explore for, develop, and mine/extract uranium and vanadium ores after further action and site-specific evaluation and approval by DOE. The aerial extent of these rights far exceeds the footprint of lease activities on the ground surface. However, until leases are issued, exploration plans submitted, reviewed under NEPA and approved, and exploration completed, no specific footprint for mining disturbance can be identified; therefore, site-specific footprints cannot be assessed at this time in the decision-making process.

F7. COMMENT: An alternative should be evaluated under which DOE and BLM continue co-managing uranium lands without issuing leases at this time, and under a joint Department of Interior/DOE program, additional uranium-bearing lands are segregated and withdrawn.

RESPONSE: Under the program mandate from Congress, DOE policy, and as defined in the draft PEA under the No Action alternative, lease tracts would be reclaimed and the lands would be restored to the public domain, pending BLM's approval. In the final PEA the No Action alternative has been clarified to include the option of continued DOE management without leasing or restoration to the public domain. Regarding BLM's ability to restrict mining claims, within the provisions of the 1872 Mining Law, BLM is unable to deny legal mining claims. Regarding withdrawal of additional uranium-bearing lands, neither DOE nor BLM has the authority to segregate or withdraw additional lands specifically for the purpose of restricting uranium mining.

G. COOPERATING AGENCIES

G1. COMMENT: DOE must invite other federal, state, and local agencies to be cooperating agencies. The entities specifically mentioned are BLM, the Nuclear Regulatory Commission (and Agreement States), the U.S. Fish and Wildlife Service, U.S. Department of Transportation, Colorado, and Utah.

RESPONSE: As established in CEQ's regulations, DOE involved as cooperating agencies those agencies with special expertise or jurisdiction relevant to the proposed action. Cooperating agencies included BLM, USFWS, and the Colorado Division of Reclamation, Mining, and Safety. As indicated in Section 6, DOE also consulted with other agencies, and the text of the PEA has been expanded to reflect the nature and extent of these interactions.

H. CONSEQUENCES OF A TERRORIST ACT

H1. COMMENT: The PEA contains no analysis of any type of precautions or lease stipulations that protect radiological materials currently found in unfenced uranium mines, waste rock, and raw ore stored on these lease tracts.

RESPONSE: Leaseholders are required to secure their operations (using fences or other barriers) in accordance with all applicable statutes and regulations. Furthermore, raw, unprocessed ore and waste rock, similar to that which could be found at surface outcrops and countless other mine sites throughout the west, are not highly hazardous materials and would have little or no value to terrorists. Further, even though direct exposure is highly unlikely, the PEA assessed the impacts to members of the public from direct exposure to waste rock and ore and found that these exposures result in small doses and less than one additional latent cancer fatality. Due to the extreme remoteness of the lease tracts relative to population, additional controls would only reduce these already low-probability small doses.

H2. COMMENT: No analysis was provided regarding potential terrorist threats regarding the extensive hauling program.

RESPONSE: The PEA analyzes loss of an ore shipment and assesses the resulting exposures to workers and the public during cleanup. The analysis demonstrates that the doses and resulting

risk are very small. The text has been expanded to indicate that the cause of such an accident could be from an intentional act of sabotage. DOE has determined that there would be no other plausible terrorist threat to ore shipments.

I. TIERING

I1. COMMENT: DOE must prepare programmatic and site-specific NEPA analyses to address and remedy the past impacts of uranium mining.

RESPONSE: The past impacts of uranium mining have been evaluated under other government programs; compensation programs were established and reclamations were conducted. None of these actions are the subject of DOE's decision-making regarding future leasing on DOE-administered lands, and therefore, the current analyses need not be tiered from documents analyzing historical mining actions.

I2. COMMENT: When tiering is used, the program level document must be an EIS.

RESPONSE: DOE NEPA regulations explicitly allow the preparation of Programmatic EAs (10 CFR 1021.330) and subsequently the tiering provisions of CEQ's NEPA regulations (40 CFR 1502.20) are applicable. These regulations establish that whenever a broad program has been assessed, as is the case with this PEA, subsequent assessments "…*shall concentrate on the issues specific to the specific action*." As it relates to the ULS program the "specific action" that occurs subsequent to the Programmatic EA is lease tract specific exploration and mining plans which DOE reviews under its NEPA regulations, and as appropriate, tiers subsequent evaluations. DOE has followed this regulatory approach for the last three decades on its Uranium Leasing Program without significant impacts to the environment or human health.

I3. COMMENT: The two tiered review described in the PEA does not contemplate tiering as authorized by NEPA but instead constructs two categories of decision making: reapproval of old leases and mining plans based on the PEA and NEPA review of new leases and mining plans at a later date, unless DOE deems them consistent with the PEA.

RESPONSE: The two-tiered approach conducted by DOE for over 10 years is consistent with NEPA by making programmatic decisions and site-specific decisions with the appropriate level of information at the appropriate times during project development. Ongoing or "old" leases, although assessed under the 1995 PEA and subsequent site-specific analyses, are continually managed and monitored by DOE and the State, and actions are reassessed as needed due to either changes in activities or changes in other perspectives, such as regulatory requirements.

I4. COMMENT: DOE intends to deem the PEA as sufficient NEPA analysis on which to issue leases and approve mining plans without conducting further leasing or site-specific NEPA analysis.

RESPONSE: As has been DOE's practice, and as stated throughout the PEA, no mining plans would be approved without further site-specific evaluation under NEPA. The results of such further evaluations would be tiered from this PEA and could lead to a decision that no further NEPA documentation is required, a tiered EA is needed, or an EIS is needed based on the actions proposed by a leaseholder. Further these site-specific analyses would ensure that the potential

environmental impacts of specific lease proposals would be bounded by the conservative assumptions in the PEA, and provide meaningful opportunity to minimize impacts even farther.

J. MITIGATION

J1. COMMENT: The PEA is deficient because it does not adequately protect "the important wild and scenic character of this region" and it does not consider the BLM Land Management Plans in effect for the area.

RESPONSE: DOE disagrees that the PEA is deficient because it does not adequately protect "the important wild and scenic character of this region." The PEA assesses the potential impacts that might result from uranium mining activities on DOE's lease tracts, including impacts to the region's wild and scenic character. Secondly, DOE worked closely with the BLM as a cooperating agency under NEPA, and addressed all comments received on the working draft. BLM's comments do not support the commentor's assertion that mining on DOE's lease tracts would be inconsistent with BLM's management plans.

J2. COMMENT: NEPA requires consideration of mitigation measures and lease stipulations that require corrective actions for past mining activities.

RESPONSE: All past mining disturbances on DOE lease tracts have been reclaimed, and both DOE and the State require sufficient reclamation bonds for future mining to ensure adequate post-mining reclamation. The PEA has been modified to identify the kinds of stipulations that might be included in lease agreements to reduce or eliminate impacts from uranium development.

J3. COMMENT: Commentors questioned the method DOE will use to mitigate traffic impacts through municipalities and whether CDOT was involved in the assessment process.

RESPONSE: Based on the worst-case analyses and the realistic ore production and transportation evaluations added to the final PEA, DOE does not believe that the likely traffic increases resulting from any of the alternatives assessed in the PEA would necessitate mitigative measures. DOE did consult with CDOT officials in the development of the PEA, and the additional analyses included in the final PEA reflect the agreements reached between DOE and CDOT.

J4. COMMENT: Commentors stated that mining plans are out of date and have not been updated to reflect requirements of Colorado law.

RESPONSE: All leases mandate compliance with all applicable federal, state, and local laws and regulations, and, as appropriate, mining plans are revised to reflect changing requirements. DOE reviews all new leaseholder activities to ensure compliance with applicable statutes and regulations. In addition, existing leaseholder activities are routinely (several times per year based on operational status) reviewed to ensure that such compliance is maintained.

J5. COMMENT: Commentors asked that regulation be established that cap the daily numbers of ore trucks that may haul through municipalities, and that set limits on the hours of operations and the days of the week that hauling might occur.

RESPONSE: On the basis of analyses in the PEA, DOE does not anticipate that any municipality would see significant increases in traffic resulting from ore shipments from DOE's lease tracts. Furthermore, DOE's realistic ore production and transportation evaluations, added to this final PEA, indicate that a considerable decrease in truck traffic would be seen by the municipalities located on both haul routes, especially the eastern route to the Cotter mill in Cañon City. Accordingly, no limits on the number of trucks allowed or the hours of operation are deemed necessary.

J6. COMMENT: Commentors want DOE to fund mitigations needed to reduce the impacts to local municipalities resulting from the increased traffic that would result from ore shipments to the processing mills.

RESPONSE: Based on the realistic ore production and transportation evaluations added to the final PEA, DOE does not expect traffic increases in any community to require mitigation. DOE's realistic ore production and transportation evaluations indicate that a considerable decrease in truck traffic will be seen by the municipalities located on both haul routes, especially the eastern route to the Cotter mill in Cañon City.

J7. COMMENT: Commentors want mitigation measures more extensively discussed in the PEA rather than assuming adequate mitigation will occur through the site-specific approval process and stipulations in lease agreements. Suggestion were made to identify in the PEA those mitigation measures that would be minimums or best management practices that would be required and modified such requirements as needed for site specific conditions.

RESPONSE: The final PEA has been modified to identify the kinds of stipulations that might be included in lease agreements to reduce or eliminate impacts from uranium development (see Section 5.22).

J8. COMMENT: Commentors recommended that noise sources, especially above ground sources such as trucks, loaders, other diesel powered equipment, and ventilation fans, be limited in hours of operation and proximity to sensitive resources such as the Dolores River and residences.

RESPONSE: Aboveground noise sources at a typical underground mine are limited in number and hours of operation. The analyses in the PEA demonstrate that noise from surface equipment, which is typically not operating continuously, is attenuated to typical nighttime noise limits within 1,500 feet. For the Dolores River, DOE's agreed-upon restriction on new mining within 0.25 mile would minimize noise impacts within that corridor. If mining operations were proposed on a lease tract close to existing residences, DOE would work with the leaseholder and the local residences to mitigate noise impacts.

J9. COMMENT: Commentors recommended that mine site lighting be turned off during nighttime hours and utilize reflectors that minimize upward glare.

RESPONSE: While aboveground operations and, therefore, lighting are minimal, safe operating conditions mandate that some minimum lighting be maintained during operations. Since most

mines typically work only one and sometimes two shifts, extensive nighttime lighting has not been common on DOE's lease tracts.

J10. COMMENT: Commentors recommended that ore trucks be equipped with tracking systems so that their movements and speeds can be independently monitored to assure compliance with speed limits and thus enhance there safe operations. Based on past experience with ore trucks and logging trucks, policies that insist on adherence to speed limits are not effective.

RESPONSE: Ore trucks, like all other vehicles using state highways and county roads, are required to abide by state traffic regulations and are subject to fines for violating these regulations. Equipping trucks with mandatory tracking systems (as requested) would not be warranted for traffic from a single industry and would not be practical for all heavy truck traffic.

K. PUBLIC PARTICIPATION

K1. COMMENT: The PEA is insufficient to provide the required opportunity for public and governmental participation required by NEPA because DOE and BLM did not respond to Freedom of Information Act (FOIA) requests in sufficient time to allow public consideration of information relevant to leasing decisions.

RESPONSE: The subject of the FOIA request received by DOE concerned past operations. DOE disagrees that the public cannot review the impacts of the DOE's proposed action, which are provided in the PEA without reviewing the past history of the program.

K2. COMMENT: Additional public meetings should have been held in counties and municipalities throughout the region such as Telluride, Gunnison, Cannon City, and others.

RESPONSE: DOE is not required under NEPA to hold public meetings or hold a public comment period for EAs. However, DOE provided a scoping period before beginning the EA, provided a comment period on the draft PEA, conducted two public scoping meetings and three draft PEA hearings, extended the draft PEA comment period in response to public comment, notified over 120 entities of the extension (on the program's public contact list), placed notices in eleven papers regarding the meetings and comment period, and placed copies of the PEA in seven libraries in the region. Copies of the PEA were available to anyone upon request, and DOE accepted comments via e-mail, toll-free voice mail, fax, and US Postal Service. Therefore, the public had ample opportunity to participate in the process in accordance with the provisions of NEPA.

K3. COMMENT: Because of the length of the PEA and its technical complexity, additional time should have been allowed for commenting on the draft PEA.

RESPONSE: Under DOE NEPA regulations the comment period for an EA is 15 to 30 days. DOE allowed a 45-day comment period (July 12 through August 25, 2006) for this PEA, which is the minimum regulatory review period requirement for an EIS. DOE does not agree that the document is of such technical complexity or length that a longer comments period was warranted.

K4. COMMENT: The proposal to remove lease stipulations that have been in place for over 30 years is unwarranted and not supported by site-specific analyses. Lease documents have not been released to the public in response to a FOIA request so the existing stipulations can be reviewed.

RESPONSE: There is no proposal to remove from current or future leases any stipulations that have proven effective and necessary during past operations. DOE is gathering information on past operations and leasing agreements in response to a FOIA request but disagrees with the assertion that public review of such information is a necessary component of DOE's proposal to continue its Uranium Leasing Program.

K5. COMMENT: Notice of the preparation of the PEA as well as the scoping meetings and draft PEA hearings should have been made in the Federal Register.

RESPONSE: Neither CEQ's nor DOE's NEPA regulations and guidelines require publication of *Federal Register* notices for EAs. The impacts relative to DOE's Uranium Leasing Program in Colorado are of local interest, and therefore an extensive effort was made to notify interested parties via mailing lists, newspaper ads, and the public meetings that were held even though they were not required.

K6. COMMENT: Counties requested that they be provided the opportunity for input at the time that DOE and the State of Colorado are approving site lease tract specific actions such as exploration, mining, and reclamation and that the PEA clarify that new uranium development on DOE lease tracts would be subject to local planning regulations regarding operations, road use, weed control and reclamation.

RESPONSE: All lease agreements stipulate that the leaseholder is obligated to comply with all applicable federal, state, and local regulations and requirements, and the PEA includes such requirements in Sections 1.2 and 1.3.

K7. COMMENT: Public requested that they have the opportunity to be involved in the review of all lease tract specific approvals such as exploration plans, mining plans, and reclamation plans prior to approval by DOE or the State even if categorically excluded by DOE.

RESPONSE: Historically, DOE's review and approval process for leaseholder exploration, mining, and reclamation plans have been determined to be categorically excluded under DOE's NEPA regulations, and as a result, the plans are not subject to formal public review. For future actions that are categorically excluded, DOE does not anticipate public involvement; however, should a future action on a lease tract warrant evaluation under an EA or EIS, the public would be afforded the opportunity to become involved. In addition, the Colorado Division of Reclamation, Mining, and Safety reviews plans for all mineral exploitation within the state, and public involvement (review and comment) is part of that process. There is also an additional opportunity for public involvement through the various county agencies' permitting processes.

L. SCOPE OF ANALYSES

L1. COMMENT: Many impacts were not adequately studied in the PEA: impacts on the federal treasury, impacts of abandoned mine sites, impacts of milling and further exploration.

RESPONSE: With the exception of further exploration, which is adequately discussed in the PEA, all the listed actions are outside the scope of DOE's proposed action and have no bearing on DOE's decision-making on its Uranium Leasing Program. In addition, DOE has completed the reclamation of abandoned mine sites on the lease tracts.

L2. COMMENT: The analyses should address the consequences of disruption and recontamination of already reclaimed and recovering areas.

RESPONSE: The PEA acknowledges that all of DOE's lease tracts have had previous uranium mining, that they have been reclaimed, and that future mining would likely occur on or near previously disturbed but reclaimed lands because those locations are the most likely sources of economically recoverable ore. Given the small footprint of mining and the requirement for post-mining reclamation, these impacts would be neither significant nor long-term.

L3. COMMENT: Commentors proposed that utilization of DOE's uranium stockpiles, reprocessing of spent fuel, and purchase of foreign sources of nuclear materials or fuel be evaluated.

RESPONSE: The suggested actions above are being pursued as part of the nation's overall energy strategy; however, the assessment of such alternatives is beyond the scope of DOE's decision-making on the Uranium Leasing Program, which is limited to decisions on whether to continue or terminate the program, and if the program is continued, to what extent should leases be offered. Utilization of DOE's uranium stockpiles, reprocessing of spent fuel, and the purchase of foreign sources of nuclear materials are all actions that are independent of DOE's Uranium Leasing Program. Whether DOE continues it Uranium Leasing Program has no effect on any of the above actions.

L4. COMMENT: The analyses should have assessed the entire nuclear fuel cycle cradle-to-grave, from mining though milling, enrichment, power generation, and waste disposal.

RESPONSE: The scope of DOE's Uranium Leasing Program does not include the entire nuclear fuel cycle. Such actions are the result of presidential and congressional policy decisions and, as applicable, are subject to their own evaluations under NEPA. DOE's actions that are the subject of this analysis under NEPA are limited to the continuation or termination of the Uranium Leasing Program on lands under its authority and responsibility.

L5. COMMENT: The Canon City uranium mill, which is currently considered as a superfund site, should be removed from consideration by DOE. But if it remains as an option for uranium ore processing from DOE's lease tracts, the mill's operations should be thoroughly evaluated in DOE's NEPA document.

RESPONSE: The Cañon City mill is a licensed processing facility operating under the statutes and regulations of the State of Colorado and the NRC. Past, present, and future operations of the mill have been and will be subjected to independent reviews by those agencies in granting and maintaining their operating license. DOE has no authority to prohibit the use of any legally licensed uranium mill.

L6. COMMENT: In addition to the analysis of the health effects from radon exposure, the assessment should have considered the impacts from the dust that will be released from mines and trucks.

RESPONSE: Conventional mining techniques use water spray to control dust exposures to workers, and ore trucks are required to be covered during transport to the mills. Specifically, the Mine Safety and Health Administration (MSHA) strictly regulates mining activities with reference to miners' health; the U.S. Environmental Protection Agency (EPA) regulates fugitive dust emissions from mines and mine sites under the Clean Air Act; and the Colorado Department of Transportation (CDOT) regulates all activities pertaining to transportation. In addition, the worker and public exposures calculated in the PEA have included dust as one of the exposure sources in the human health effects analyses.

L7. COMMENT: The document should include information regarding the process by which any decision may be appealed.

RESPONSE: DOE has no administrative process by which decisions under its NEPA regulations (10 CFR 1021) may be appealed.

L8. COMMENT: Commentors requested that DOE's standard lease language be appended to the PEA so that the public and agencies might confirm that requirements that would avoid or mitigate unacceptable impacts are included in the lease agreements.

RESPONSE: DOE has not included a copy of the standard lease document as an appendix to this PEA because the lease documents are not subject to the public review process. However, DOE has revised the final PEA to include a section on stipulations that would be included as appropriate in future lease-related activities.

L9. COMMENT: Commentors requested that the PEA and DOE's lease agreement stipulate that all uranium mined in the United States be used exclusively within the United States and not sold as ore, processed uranium, or nuclear power plant fuel for foreign uses.

RESPONSE: This request is beyond the scope of DOE's Uranium Leasing Program PEA. Uranium is a mineral commodity that is traded in a world market. In reality, uranium produced domestically in the United States is first sent to one of two conversion facilities located in North America where it is blended with uranium from other sources (domestic and/or foreign) and is typically converted to uranium hexafluoride (UF_6), thereby losing its origination identity. From there, the uranium product is sent to an enrichment facility where the ^{235}U component of the uranium product is enriched to the point that it becomes usable in nuclear power plant reactors. Lastly, the uranium product is sent to a fuel fabrication facility for configuration into a usable fuel assembly. Different federal entities are responsible for the regulation of the uranium at different stages. Ultimately, only Congress has the authority to restrict the sale of uranium for foreign uses.

L10. COMMENT: The PEA should provide a list of persons that received copies of the PEA.

RESPONSE: DOE posted the Draft PEA on it website for the general public to review. CEQ and DOE NEPA regulations have no requirement to list recipients of EAs.

L11. COMMENT: Not all references were made available in public reading rooms.

RESPONSE: DOE maintains copies of all references in its reading room in Grand Junction. Recognizing that some references may not be readily available to readers outside of Grand Junction, DOE's practice is to make available upon request any references that were cited in its NEPA documents. In response to specific requests, DOE did provide copies of some discrete documents (that were legally and cost-effectively reproducible and were not readily available to the public via other means, i.e., the internet) to other specific reading rooms. There is no regulatory requirement to provide copies of all cited references in reading rooms throughout the region.

L12. COMMENT: The PEA is lacking references to statutes, regulations, review plans, or rules that set forth the requirements for approvals of exploration, development, production ad reclamation at the mine sites or the protection of the health and safety of worker and the public.

RESPONSE: DOE's leaseholders are required to comply with all applicable statutes and regulations. This requirement is very broad and includes federal, state, and local regulations that pertain to the activities being proposed and conducted. The PEA contains references to this lease requirement in Sections 1.2 and 1.3. In addition, there are federal and state regulations that specifically pertain to the health and safety protection of workers (via MSHA) and the public (via EPA, CDRMS, and CDOT) and are protective of the environment (via EPA, Colorado Department of Public Health and Environment [CDPHE], and CDRMS). Leaseholder plans are approved when DOE is satisfied that the proposed activities are in compliance with applicable statutes and regulations.

M. OPPOSED TO LEASING

M1. COMMENT: Actions taken in violation of NEPA must cease – DOE should notify lessees that lease extensions issued are void and no mining activities are currently authorized.

RESPONSE: No actions are taking place in violation of NEPA, and there is no reason to suspend actions that were assessed under past NEPA analyses and for which legally binding leasing agreements have been established.

M2. COMMENT: Commentors are opposed to uranium mining based on impacts to the natural beauty of the environment and the health and safety of miners and area residents.

RESPONSE: The PEA fully assesses the impacts of the proposed actions to biota, the visual environment, and the health and safety of workers. Based on the relatively small footprint and remoteness of the mine sites and the regulatory limits for worker and public exposures, it is DOE's position that these impacts would not be significant.

M3. COMMENT: Commentors are opposed to leasing because of concerns to cultural resources, including traditional cultural properties, which have high densities in this region.

RESPONSE: DOE is currently in consultation with six area tribes to identify any traditional cultural properties that potentially exist within or adjacent to the DOE lease tracts, and such consultation will continue into the future. The final PEA has been revised to include a summary discussion of these tribal consultations. In addition, DOE requires that all proposed exploration and mining sites undergo detailed review for historic, archaeological, and cultural resources and

that impacts to such resources be adequately addressed in consultation with the State Historic Preservation Officer and Tribal Historic Preservation Officer before surface disturbance activities such as exploration or mining take place. DOE will not authorize on-site activities until these reviews are completed and any concerns adequately addressed.

M4. COMMENT: Commentors suggested that rather than allowing new uranium mining, existing stockpile should be used and spent fuel from reactors reprocessed.

RESPONSE: As a matter of national energy policy, all sources of nuclear material for power generation are being evaluated and may lead to options sometime in the future. However, at this time in technology development and as a part of the national energy policy, mining of uranium is an integral part of the nation's energy strategy.

M5. COMMENT: The benefits of nuclear power do not outweigh the risks and impacts. Nuclear power should be abandoned in favor of more renewable energy, less impactful, energy sources such as wind and solar.

RESPONSE: The Energy Policy Act of 2005 includes efforts toward all energy sources. The Uranium Leasing Program is a component of the expanded emphasis on nuclear power in the national policy.

M6. COMMENT: Commentors are opposed to leasing because the industry's participants have limited liability and therefore the taxpayer is really on the line for accidents, site cleanups and storage problems.

RESPONSE: Both DOE and the State of Colorado require surety bonds from all mine operators in amounts sufficient to cover the cost of post-mining site reclamation.

M7. COMMENT: Commentors are opposed to leasing because federal agencies do not have sufficient manpower or resources to monitor the activities of the mines or truckers hauling the radioactive ore.

RESPONSE: DOE, MSHA, and the State of Colorado routinely monitor mining activities, and the State Highway Patrol and CDOT oversee shipping and respond to any accident involving ore shipments.

M8. COMMENT: Commentors are opposed to uranium mining because past mining has caused health effects in the region that are a continuing cost burden to Medicare/Medicaid as well as private insurances, in addition to which huge compensations are being paid to industry workers that have suffered as a result of mining.

RESPONSE: Because of the lessons learned from historical mining activities, today's regulations that limit the exposure of the public and workers are designed to prevent the health effects that occurred historically. Measures such as dust control and ventilation practices, and worker exposure monitoring are the direct result of this improved regulatory environment.

M9. COMMENT: Commentors were opposed to leasing mineral rights under their private property.

RESPONSE: There are very limited private lands (surface ownership only) associated with DOE's lease tracts where DOE controls the mineral rights beneath the private lands. DOE has successfully administered leasing activities on these lands for over 30 years.

M10. COMMENT: Commentors are opposed to uranium mining and nuclear power because it violates their commitment to sustainability, as the wastes cannot be either kept out of nature or be used as a building block for more life.

RESPONSE: Nuclear power is a component of the nation's energy policy because it represents a viable energy source that does not depend upon foreign imports. Fuel reprocessing is currently being pursued as part of the nation's overall energy strategy; such action would significantly decrease the amount of waste materials that are currently being managed. In addition, by regulation, the waste products of the nuclear fuel cycle must be disposed of in a manner and location that keeps it out of the human environment.

N. TRAFFIC IMPACTS

N1. COMMENT: CDOT made several comments regarding the traffic that would be generated from commuting workers and ore trucks and based their comments on provisions of the State Highway Access Code. Their concerns included safety at intersections, traffic entering the State Highway system, peak hour volumes, physical deterioration of roads, estimation of highway accident rates, the need for traffic studies, and permit requirements.

RESPONSE: DOE met with CDOT and clarified that the point of entry to the highway system for all leases would be onto county roads, and therefore the leaseholders would obtain their permits from the counties. In order to more clearly demonstrate the very small increases in traffic at the intersections of county roads with the state highways, additional tables have been generated and a map plate included in this final PEA. DOE also clarified that for no alternative would the peak hour volume approach the 100 vehicles per hour levels at which the Code suggests that more detailed traffic studies be performed. DOE has recalculated the projections of accident rates from ore trucks in this final PEA using statistical data for heavy, long-haul trucks. In the meeting with CDOT, it was clarified that the Colorado fuel tax is the mechanism by which highway maintenance funds are collected from highway users and that additional user-specific taxes are not collected. Recognizing the potential for increased traffic to result from development of uranium claims on BLM lands and the expanding oil and gas industry in the region, DOE and CDOT agreed on a collaborative approach among representatives from DOE and its leaseholders, BLM and its claimants, CDOT, and the respective counties to monitor traffic growth in the future and assess the traffic impacts at various intersections where county roads meet state highways. Site-specific actions may be needed in the future to address these impacts. CDOT indicated that this action would likely occur during the County permitting process. The final PEA includes a brief, qualitative discussion of this requirement.

N2. COMMENT: Ore truck traffic will result in significant impacts in cities and towns.

RESPONSE: The traffic analyses in the draft PEA on which the comment is based were bounding analyses that assumed the worst-case conditions under the Expanded Program alternative of all 150 ore trucks traveling to each mill, a highly unlikely scenario. However, even under this highly unlikely, worst-case scenario, under the Expanded Program alternative these increases would not exceed 10 percent through population centers, even under the highly unlikely worst-case shipping analyses, and through most populated areas the increase would be less than 5 percent (Section 5.2.1). The only areas in which traffic would increase more than 10 percent under worst-case conditions would be areas of sparse population and very low daily

traffic levels. Based on level of service analyses (Section 5.2.1), even under the worst case there would be no increase in traffic congestion under the Expanded Program alternative. Under DOE's realistic ore production and transportation evaluation (added to the transportation discussion in the final PEA), far fewer ore trucks would be seen by the municipalities located on both haul routes, especially the eastern route to the Cotter mill in Cañon City.

N3. COMMENT: Many of the roads that would be used by ore truck are not straight or flat and are difficult to safely pass on for long distances.

RESPONSE: The analyses in the PEA have assessed the effect that ore trucks would have on traffic, congestion, and accident rates, and even under the worst-case analyses there would not be a significant effect on any of these factors from even the Expanded Program alternative. Under the realistic ore production and transportation evaluation added to the final PEA, a considerable decrease in truck traffic would be seen by the municipalities located on both haul routes, especially the eastern route to the Cotter mill in Cañon City. In addition, the majority of the ore trucks would be hauling in the non-mountainous, remote, flatter, straighter, and higher-visibility areas of western Colorado.

N4. COMMENT: Local emergency responders and facilities are not equipped to deal with accidents involving radioactive materials. Spills could take months to cleanup and put emergency responders at great risk.

RESPONSE: As analyzed in the PEA, uranium ore presents no undue risk to emergency responders in the event of an accident. The hazard of the material as shipped ore is no more than the hazard to the miners involved in its extraction. For example, in 2006 on Highway 50 east of Salida an ore truck tipped over and deposited its entire load on the side of the road. The spill was cleaned up within a week with no unacceptable exposures to workers or the traveling public. After the cleanup, there remained no residual evidence of the spill affecting the public, agricultural or other land uses, or property values.

O. IMPACTS TO SURFACE WATER BODIES

O1. COMMENT: Commentors expressed concern over the impact to rivers and streams from uranium mining, particularly the Dolores and San Miguel Rivers. Some requested that alternatives considered should add operation stipulations and interim reclamation stipulations that are necessary to protect the Dolores River watershed from further contamination.

RESPONSE: In consultation with the BLM, a 0.25-mile exclusion zone on new mining has been stipulated in the PEA for protection of the Dolores and San Miguel Rivers under all alternatives. All lands affected by past mining on DOE's lease tracts have been reclaimed, and BLM (as budget allows) is working to reclaim inactive mines on BLM lands. All new mining leases include stipulations for post-mining reclamation, and bonds are required by DOE and CDRMS to ensure that sufficient funding would be available for reclamation.

O2. COMMENT: DOE should evaluate an alternative that refrains from issuing leases within 1 mile of the Dolores River or San Miguel River, adopts protections for the Dolores River Canyon that have been recommended for Wild and Scenic River status.

RESPONSE: Based on DOE's past leasing experience, the exclusion of leasing activities from areas within one mile of the Dolores and/or San Miguel Rivers is considered excessive and unwarranted. In consultation with BLM, DOE has stipulated in the PEA that no new mining would be permitted within 0.25 mile of these rivers, even though their status as study areas has exceeded the regulatory period specified in the original Act. This stipulation applies to all alternatives.

O3. COMMENT: Commentors expressed concern over the impacts on aquatic life, fisheries, and water quality that would result from an ore spill into one of the many rivers or lakes that would be crossed by ore shipments.

RESPONSE: As discussed in the PEA (Sections 5.2.1.4 and 5.2.2.4), uranium ore is not highly soluble, and therefore, the consequences of an ore spill into a water body would not be significant. Additional quantitative information has been added to this final PEA that addressed the low potential toxicity of uranium ore to water bodies and aquatic organisms.

O4. COMMENT: Commentors noted that the draft PEA failed to identify the Black Canyon of the Gunnison National Park and the Curecanti National Recreation Area both of which are accessed by State Highway 50 between Montrose and Gunnison, a primary ore haul route to Canyon City. Given the proximity of these special areas to the haul route there are concerns on the impacts to visitors to these areas as well as the potential for truck collision with terrestrial biota such as Rocky Mountain bighorn Sheep. Concerns were also expressed over the effects on water quality and aquatic biota in the event of an accident.

RESPONSE: Both the National Park and National Recreation Area have been added to the final PEA. Based on the realistic ore production and transportation evaluation added to the final PEA, the likely increases in traffic past these sensitive areas would only be about one percent over a 24-hour period. This minor increase would not result in significant impacts to visitors or terrestrial biota. As discussed in the PEA, the impacts of an accidental spill on workers and the hypothetical nearby public would not be significant, nor would the impacts be significant to any aquatic environment into which ore might spill.

O5. COMMENT: Commentors requested that the PEA identify where sediments and liners used in retention ponds are disposed of and discuss past problems with mine water discharge ponds such as leakage, impacts on wildlife, and discharges to surface water bodies, ground water and reclamation.

RESPONSE: As described in the PEA, very few mines require dewatering, and those that do use engineered ponds that meet all federal and state requirements, including those of the USFWS to protect wildlife, if needed. No chemical dissolution is used in mines on DOE's lease tracts, and the water being removed from the mines is unaltered ground water, not mine process water. Liners and sediments would be disposed of at State-approved disposal sites. Water is treated if necessary before discharge, and CDPHE inspects ponds as part of its discharge-permitting process.

O6. COMMENT: The PEA fails to adequately discuss the potential for hazardous components of ore and waste rock besides uranium and radium to percolate from ore piles and harm water resources and other elements of the environment including plants that might take up these contaminants and the animals that graze on them.

RESPONSE: This final PEA has been expanded to include a discussion of the low toxicity of uranium ore and the associated low risk to the environment from ore or waste rock storage.

P. SUPPORT FOR LEASING

P1. COMMENT: Commentors with personal experience in uranium mining submitted comments in support of mining. Based on their experience, comments expressed opinions that neither mining nor shipping of ore resulted in significant negative impacts in the past nor would there be any significant impacts from future mining on DOE lease tracts.

RESPONSE: Based on the analyses performed within the PEA, DOE has determined that under the preferred alternative, the impacts of its Uranium Leasing Program would not be significant.

P2. COMMENT: Commentors spoke in favor of nuclear power and felt that the issues of waste disposal from the nuclear fuel cycle are political and not technical issues that should not affect decision-making on DOE leasing.

RESPONSE: DOE agrees that other elements of the nuclear fuel cycle are outside the scope of this analysis.

P3. COMMENT: Commentors spoke out against suspending uranium mining for an indefinite period to lock up the resources for the future.

RESPONSE: Based on this PEA, public and agency comments, and other national energy policy considerations, DOE has decided that continuation of the leasing program would not cause significant environmental impacts and that it's leasing program will continue.

P4. COMMENT: Commentors cited the Energy Policy Act of 2005 language supporting increasing the nations electric generating capacity and using more nuclear power as the policy basis behind DOE's Uranium Leasing Program and supported the need for the Expanded Program alternative to meet the needs of an expanding nuclear power industry.

RESPONSE: DOE agrees with the comment.

P5. COMMENT: Commentors noted that DOE's lease tracts are among the most viable in the country given their known resource potential and their proximity to the very limited uranium mills in the US.

RESPONSE: DOE acknowledges that, from a historic perspective, the DOE lease tracts were recognized for their known resource potential. However, as discussed in Section 1.3 of the Final PEA, the available reserves associated with DOE's lease tracts are estimated to be 13.5 million pounds of uranium, which represents approximately 1.5 percent of the available domestic uranium reserves (purported to be nearly 900 million pounds).

P6. COMMENT: Commentors spoke in favor of the Existing Program alternative to minimize environmental damages, health impacts, and the quality of life.

RESPONSE: It is DOE's position that under the Expanded Program alternative, which is DOE's preferred alternative, impacts would not be significant.

P7. COMMENT: Commentors spoke in favor of the Expanded Program alternative, as the uranium and vanadium are needed nationally. By themselves, mining on the existing lease tracts are not sufficient to sustain any operating mill.

RESPONSE: The Expanded Program alternative is DOE's preferred alternative for these and other reasons set forth in the PEA.

P8. COMMENT: Commentors spoke in favor of the Expanded Program alternative based on the positive socioeconomic benefits that they believe will result for the local area.

RESPONSE: DOE agrees that positive economic impacts would result from this action.

Q. SENSITIVE TRANSPORTATION CORRIDORS

Q1. COMMENT: Commentors noted that ore trucks hauling between Montrose and Canon City would pass through Curecanti National Recreation Area and traverse about 30 miles of the West Elk Loop Scenic and Historic Byway. Commentors stated that the PEA failed to adequately assess the impacts of ore shipments to users of the picnic grounds, campgrounds, and scenic overlooks along this corridor, as well as other travelers from 300 daily ore truck shipments.

RESPONSE: Based on CDOT statistics provided in the PEA, average daily traffic on US-50 between Montrose and Cañon City ranges between 2,600 and 12,500 vehicles a day. Under the worst-case analyses in the PEA, the increase in traffic that would result in the 150 one-way (300 round trip) ore shipments would range between 2.4 and 11.7 percent. Based on the realistic ore production and transportation evaluation added to the final PEA, the likely increases in traffic past these sensitive areas would only be about one percent over a 24-hour period. Increases of this small percentage would not affect the experience of users of this section of the highway.

Q2. COMMENT: Commentors questioned the advantage of hauling ore to the Canon City Mill instead of the White Mesa Mill given its proximity to most of the lease tracts, windy mountain roads and passes that are difficult to travel in the winter, and asked that ore hauling not exceed past levels of hauling.

RESPONSE: The bounding analyses included in the PEA represent an approach typically used in NEPA documents to inform decision-makers of the maximum possible impacts that could occur from a proposed action even though those impacts are highly unlikely. DOE agrees that economic factors would govern the choice of processing mills that would be used by mine owners and has included a realistic ore production and transportation evaluation in the final PEA based on historical production rates and likely mill choices. This analysis shows that the likely increase in traffic to the Cañon City mill would be 0.2 to 1.2 percent and not the 2.4 and 11.7 percent projected by the worst-case analyses, which assumed all 150 daily ore shipments went to the Cañon City mill or to the White Mesa mill.

Q3. COMMENT: Commentors questioned whether wastes from ore processing at Canon City would travel on the West Elk Loop Scenic Byway for disposal.

RESPONSE: The current license for the Cañon City mill allows for on-site disposal of waste from ore processing. Whether that would be changed in the future, and if so, where a new disposal site would be located is too speculative to assess at this time. However, any such off-site disposal would at a minimum require a license amendment and its own evaluation under NEPA by the NRC and/or other state-specific environmental review requirements, as applicable.

Q4. COMMENT: Commentors requested that DOE take all actions necessary to protect citizen-proposed Wilderness areas.

RESPONSE: Such areas have no legal protection, and providing protection would inappropriately grant de facto wilderness status to such areas and preclude uses such as oil and gas exploration, minerals extraction, and other uses allowable under current laws and regulations. The Department of Agriculture and Department of Interior are responsible for managing the National Wilderness Preservation System, pursuant to the Wilderness Act of 1964.

R. SOCIOECONOMICS

R1. COMMENT: The jobs that will result from this action would be of more benefit if they were used to cleanup existing waste dumps.

RESPONSE: All historical mine sites on DOE's lease tracts have been reclaimed, and under the Uranium Mill Tailings Radiation Control Act, DOE has reclaimed all abandoned uranium mill sites except the Moab site, which is currently being remediated. All new mining activities assessed in this PEA would be required to post surety bonds that would be sufficient to cover the costs of reclamation. If the commentor is suggesting the reclamation of nonuranium mining-related wastes, such actions would be beyond the scope of this PEA.

R2. COMMENT: Royalties to the federal government are of little value to the local communities who must deal with the impacts of mining and transporting these hazardous materials.

RESPONSE: The royalty payments (revenue) generated from DOE's Uranium Leasing Program have far exceeded the costs of remediation of the historical mining sites on DOE's lease tracts. In addition, the lease tracts are located on public lands and are included within the acreages considered for federal "PILT" (payment-in-lieu-of-taxes) funds.

R3. COMMENT: The corporations that promise counties wealth and prosperity for their towns and cities either go broke or leave after ruining those towns and cities that they were going to "save".

RESPONSE: The boom-bust cycle of resource extraction activities such as uranium, coal, or other mining actions, oil and gas drilling, or even logging, are a recognized impact that these activities can cause. At the anticipated scale of DOE's Uranium Leasing Program, a maximum of 570 workers spread over lease tracts from southeast of Gateway to north of Dove Creek, no significant socioeconomic impacts are expected, even under the Expanded Program alternative.

S. PURPOSE AND NEED

S1. COMMENT: There is no demonstrated or articulated purpose or need to issue leases or approve uranium mining plans on the Uravan Mineral Belt.

RESPONSE: The Purpose and Need section has been revised to reinforce DOE's need to support the national energy policy.

S2. COMMENT: Commentors noted that the Energy Policy Act does not contain language emphasizing the reestablishment of nuclear power as described in the under purpose and need in the PEA. Also noted was a failure to note the requirement under 10 CFR 760.1 to seek the highest bid or most return for the Treasury.

RESPONSE: DOE disagrees with the comment's premise that the Energy Policy Act does not significantly support the reestablishment of nuclear power and refers the commentors to Sections 601 through 657 of the Act. The purpose and need section has been revised to include DOE's intent to procure the highest bid for its leases in accordance with 10 CFR 760.1.

S3. COMMENT: The purpose and need statement does not explain what makes an action in the Government's best interest and suggests that the question should be what is in the publics best interest.

RESPONSE: The Purpose and Need section has been revised to reinforce DOE's responsibility to support the national energy strategy, which among other energy sources, promotes nuclear energy.

T. ECONOMICS

T1. COMMENT: An economic or market analysis should be included that determines whether the best value for the government and taxpayers for these assets would be through sales now or at some time in the future. Such and analysis should also confirm that any such sale would be for domestic use and not foreign sale.

RESPONSE: Under NEPA, decision makers are provided assessment of the environmental impacts of a proposed action. NEPA does not require a cost-benefit analysis, but notes if such is done it shall be included by reference and may be summarized in a NEPA document (40 CFR 1502.23). DOE is mandated to support the national energy policy and has no authority to delay leasing until some time in the future when there may or may not be active milling capabilities in the region to process mined ore. DOE achieves the best value to the government and taxpayers for its lease through a competitive bid process.

U. ENVIRONMENTAL JUSTICE

U1. COMMENT: The PEA fails to acknowledge that San Juan County Utah, the location of the IUC Uranium Mill is the poorest in Utah and the fact that the mill is only a few miles away and upwind of the White Mesa Ute Indian Reservation. Hauling ore to this mill and processing it there would be a disproportionate and adverse impact to the Native Americans that live in that area.

RESPONSE: The IUC mill at White Mesa is a licensed mill operating under the authority of the State of Utah and the NRC, and its continued operations are outside the scope of this PEA and outside DOE's authority. The mill's construction and operation was the subject of an EIS prior to its original licensing in 1979, and every modification to its license has been the subject of re-evaluation under NEPA. Further, exposure pathways to Native Americans that might utilize resources from the IUC site were generated for DOE's EIS for the Moab mill tailings (DOE/EIS-355), and the analysis did not identify any adverse or disproportionate impacts. In addition, haul routes from DOE's lease tract to the IUC mill would not pass through the White Mesa Ute Reservation; they would be coming from the north through Monticello and Blanding.

End of current text

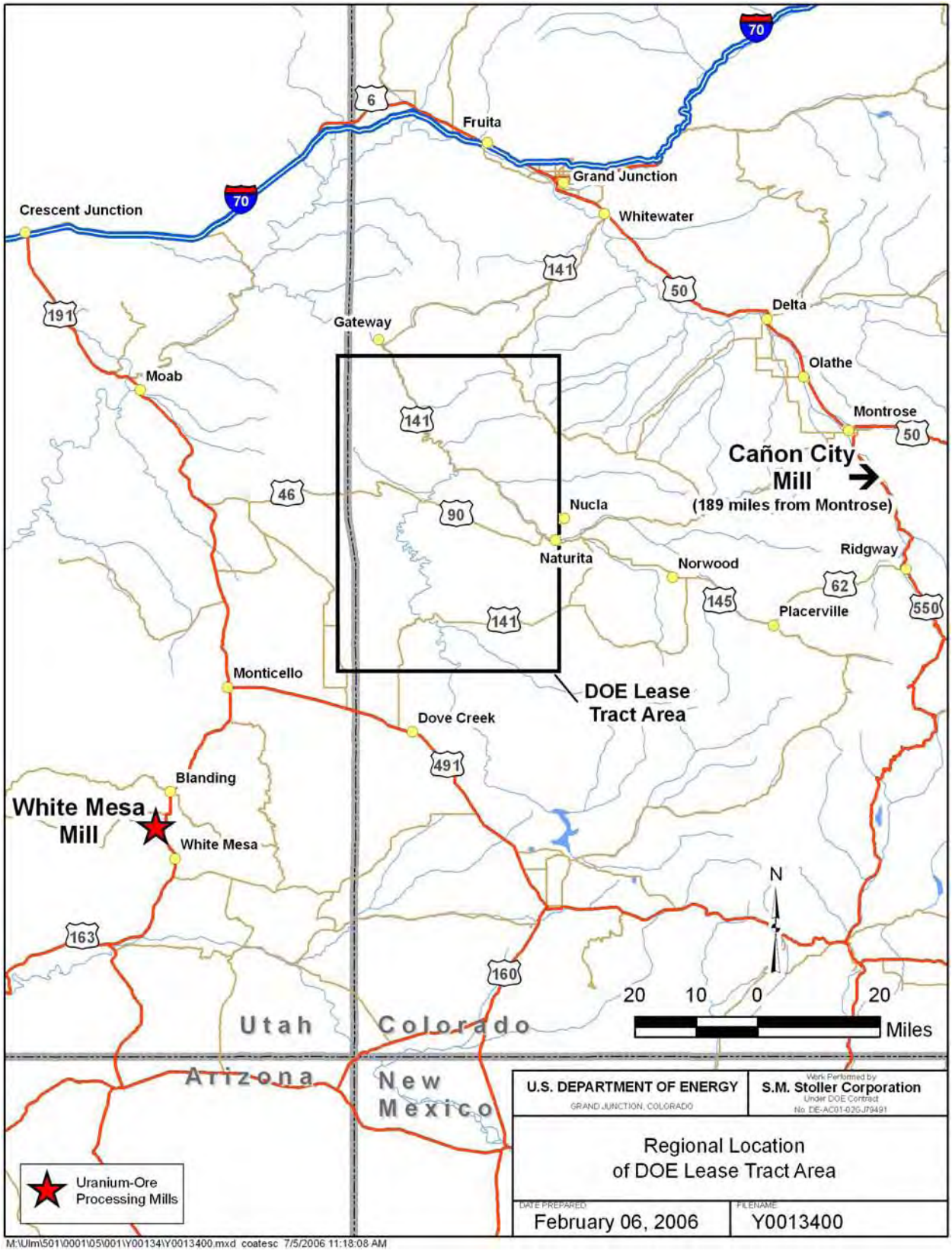

Figure 1–1. Regional Location of DOE Lease Tract Area and Uranium-Ore Processing Mills

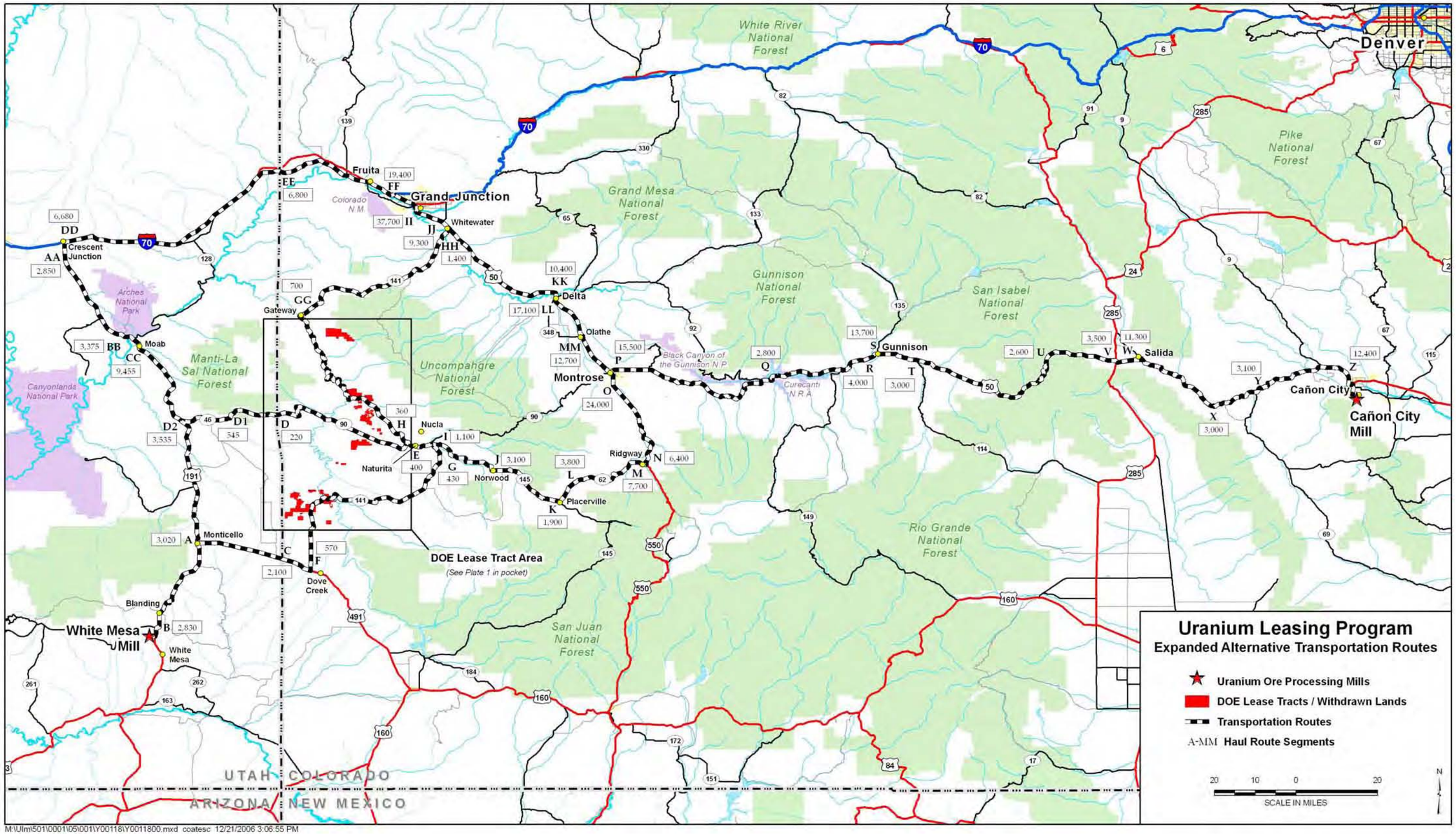

Figure 3–2. Expanded Alternative Transportation Haul Routes

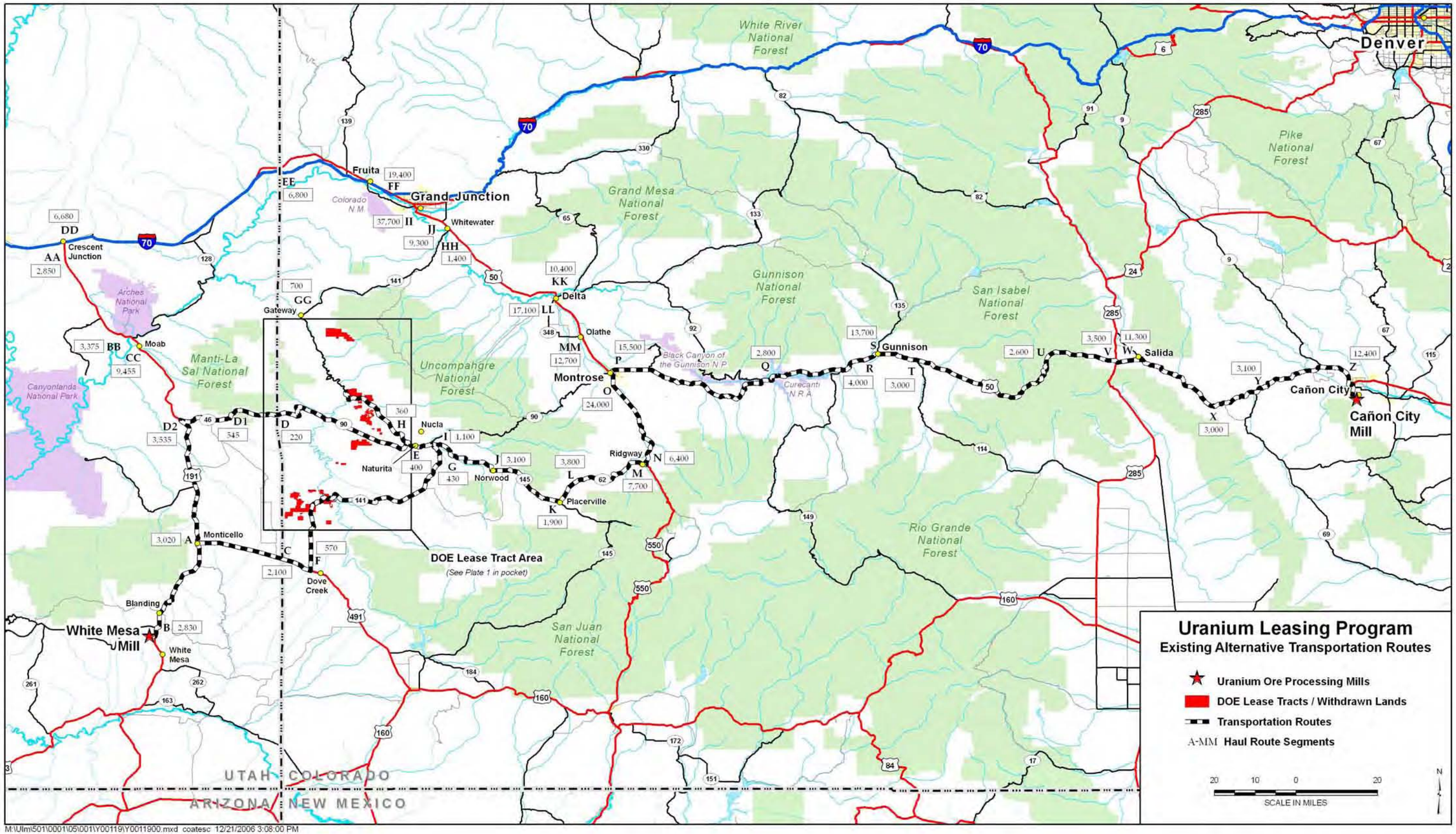

Figure 3–3. Existing Alternative Transportation Haul Routes

PLATE 1

DOE Uranium Leasing Sites
Lease Tract Location Map
Mesa, Montrose, and San Miguel Counties

U.S. Department of Energy
GRAND JUNCTION, COLORADO

Work Performed by
S.M. Stoller Corporation
Under DOE Contract
No. DE-AC01-02GJ79491

DATE PREPARED: January 11, 2007
FILENAME: Y0015100

LEGEND

Lease Tracts and Withdrawn Lands
- DOE Withdrawn Lands
- DOE Active Lease Tracts
- DOE Lease Tracts
- Road Intersections Identified in Tables 3-3 and 3-4

Roads
- US Highway
- State Highway
- County Road (Good Condition, Paved)
- County Road (Good Condition, Gravel)
- County Road (Good Condition, Dirt)
- Other County and Local Roads

SCALE IN MILES
2 1 0 2 4
NAD27 STATE PLANE COLORADO SOUTH

GATEWAY LEASE TRACTS
URAVAN LEASE TRACTS
PARADOX LEASE TRACTS
SLICK ROCK LEASE TRACTS

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