United States Department of State
Final Environmental Impact Statement

For the

KEYSTONE OIL PIPELINE PROJECT

Applicant for Presidential Permit:
TransCanada Keystone Pipeline, LP

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Bureau of Oceans and International Environmental
and Scientific Affairs
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Cooperating Agencies

Advisory Council on Historic Preservation (ACHP)
Environmental Protection Agency (EPA)
Natural Resource Conservation Service (NRCS)
Rural Utilities Service (RUS)
U.S. Army Corps of Engineers (USACE)
U.S. Department of Agriculture – Farm Service Agency (USDA - FSA)
U.S. Department of Energy (DOE)
U.S. Fish and Wildlife Service (USFWS)

Assisting Agencies

Bureau of Indian Affairs (BIA)
Council on Environmental Quality (CEQ)
Department of Homeland Security (DHS)
Department of Transportation-Federal Highway Administration (FHWA)
Department of Transportation-Office of Pipeline Safety (DOT-OPS)
Federal Energy Regulatory Commission (FERC)
National Park Service (NPS)
Western Area Power Administration (WAPA)

January 11, 2008

United States Department of State
Bureau of Oceans and International
Environmental and Scientific Affairs
OES/ENV Room 2657
Washington, D.C. 20520

January 11, 2008

Subject: Keystone Pipeline Final EIS

Dear Colleagues and Stakeholders:

The US Department of State (DOS) has issued the Final Environmental Impact Statement (EIS) for the Keystone Pipeline Project. This document has been prepared in accordance with the National Environmental Policy Act (NEPA). The Consultation for Section 106 of the National Historic Preservation Act (NHPA) is occurring concurrently with the NEPA process. DOS is the lead federal agency in cooperation with U.S. Department of Energy, Army Corps of Engineers, U.S.Fish and Wildlife Service, U.S. Department of Agriculture - Farm Service Agency, U.S. Department of Agriculture - Natural Resources Conservation Service, U.S. Department of Agriculture - Rural Utilities Service, Environmental Protection Agency, and the Advisory Council on Historic Preservation and in consultation with the State Historic Preservation Offices in North Dakota, South Dakota, Illinois, Nebraska, Missouri, Oklahoma, and Kansas and Indian tribes.

The proposed action is to construct and operate a crude oil pipeline and related facilities to transport Western Canadian Sedimentary Basin (WCSB) crude oil from an oil supply hub near Hardisty, Alberta, Canada to destinations in the Midwest United States. The Final EIS assesses the potential impacts of the proposed action and alternatives and identifies the proposed action as the Preferred Alternative of DOS.

DOS intends to issue its Record of Decision (ROD) for the Keystone Pipeline Project 30 days after the Environmental Protection Agency publishes a Notice of Availability for the FEIS in the Federal Register (expected NOA publication date of January 11, 2008).

Options for submitting comments on the Final EIS are:

- Mail comments to: Elizabeth Orlando, Keystone Project Manager, US Department of State, OES/ENV Room 2657, Washington, DC 20520. Please note that mail can be delayed due to security screening
- Fax comments to: (202) 647-1052
- Email comments to: KeystoneEIS@state.gov
- Comment via the Keystone EIS website: www.keystonepipeline.state.gov

DOS will consider any substantive comments on the FEIS prior to issuance of the ROD.

The Final EIS is available at public reading rooms and libraries (please see attached list) and it will be available for download on the project website: www.keystonepipeline.state.gov. Upon request CD copies will be mailed.

Thank you for your interest in the Keystone Pipeline EIS.

Sincerely,

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LIST OF ACRONYMS

µS/cm	microSiemens per centimeter
ACHP	Advisory Council on Historic Preservation
AEUB	Alberta Energy and Utilities Board
amsl	above mean sea level
ANSI	American National Standards Institute
APE	area of potential effect
API	American Petroleum Institute
ARG	American Resources Group, Ltd.
ASME	American Society of Mechanical Engineers
BA	biological assessment
BACT	best available control technology
bbl	barrels
bgs	below ground surface
BMP	best management practice
BNSF	Burlington Northern Santa Fe
BO	biological opinion
bpd	barrels per day
CAA	Clean Air Act
CAPP	Canadian Association of Petroleum Producers
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMR Plan	Keystone's Construction Mitigation and Reclamation Plan
CNEB	Canadian National Energy Board
COA	Conservation Opportunity Area
COE	U.S. Army Corps of Engineers

LIST OF ACRONYMS (CONTINUED)

CORE	Coker and Refinery Expansion
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CWA	Clean Water Act
DHS	U.S. Department of Homeland Security
DNV	Det Norske Veritas
DOE	U.S. Department of Energy
DOS	U.S. Department of State
DOT	U.S. Department of Transportation
EIA	U.S. Energy Information Administration
EIS	environmental impact statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ERP	Emergency Response Plan
ESA	Endangered Species Act
FBE	fusion-bonded epoxy
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FR	Federal Register
FSA	Farm Service Agency
FWCA	Fish and Wildlife Coordination Act
FWP	Farmable Wetlands Program
GLO	General Land Office
gpm	gallons per minute
HCA	high-consequence area
HDD	horizontal directional drill

LIST OF ACRONYMS (CONTINUED)

I-	Interstate-
IDNR	Illinois Department of Natural Resources
IPA Plan	Integrated Public Awareness Plan
KDWP	Kansas Department of Wildlife and Parks
Keystone Project	Keystone Pipeline Project
Keystone	TransCanada Keystone Pipeline, L.P.
kV	kilovolt
kW	kilowatt
LWCF	Land and Water Conservation Fund
MDC	Missouri Department of Conservation
Metcalf	Metcalf Archaeological Consultants
mg/L	milligrams per liter
MLV	mainline valve
MP	milepost
NDGFD	North Dakota Game and Fish Department
NEPA	National Environmental Policy Act
NGPC	Nebraska Game and Parks Commission
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NPDES	National Permit Discharge Elimination System
NPMS	National Pipeline Mapping System
NPS	National Park Service
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NWCP	Noxious Weed Control Plan
NWI	National Wetlands Inventory

LIST OF ACRONYMS (CONTINUED)

OCC	Operations Control Center
OKDWC	Oklahoma Department of Wildlife Conservation
OPS	Office of Pipeline Safety
ORV	off-road vehicle
Overthrust	Questar Overthrust Pipeline Company
PA	Programmatic Agreement
PADD	Petroleum Administration for Defense District
PAH	polycyclic aromatic hydrocarbon
PCBs	polychlorinated biphenyls
PCE	primary constituent element
PDVSA	*Petroleos de Venezuela, S. A.*
PHMSA	Pipeline and Hazardous Materials Safety Administration
ppm	parts per million
PS	pump station
psig	pounds per square inch, gauge
PWS	public water supply
RCRA	Resource Conservation and Recovery Act
REX	Rockies Express Western Phase Project
Rockies Express	Rockies Express Pipeline, LLC
ROW	right-of-way
RTU	remote terminal unit
RUS	Rural Utilities Service
RV	recreational vehicle
SATG	Section 106 Agency/Tribal Group
SCADA	Supervisory Control and Data Acquisition
SDGFP	South Dakota Game, Fish and Parks

LIST OF ACRONYMS (CONTINUED)

SHPO	State Historic Preservation Officer
SPCC Plan	Spill Prevention, Control, and Countermeasure Plan
SWCA	SWCA Environmental Consultants
SMYS	specified minimum yield strength
SWPPP	Stormwater Pollution Prevention Plan
TAC	Tribal Advisory Committee
TDS	total dissolved solids
THPO	Tribal Historic Preservation Officer
TPH	total petroleum hydrocarbons
TransColorado	TransColorado Gas Transmission Company
TSS	total suspended solids
UPS	uninterruptible power supply
US-	U.S. Highway-
USC	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
VSS	volatile suspended solids
Western	Western Area Power Administration
WCSB	Western Canadian Sedimentary Basin
WFCR	Western Fordville Conceptual Route
WMA	Wildlife Management Area
WRP	Wetlands Reserve Program

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ES.0 EXECUTIVE SUMMARY

ES.1 INTRODUCTION

TransCanada Keystone Pipeline, L.P. (Keystone) has applied to the U.S. Department of State (DOS) for a Presidential Permit for the construction, connection, operation, and maintenance of facilities at the U.S. border for a proposed pipeline and associated facilities for importation of crude oil from Canada. DOS receives and considers applications for Presidential Permits for such oil pipelines pursuant to the authority delegated to it by the President of the United States under Executive Order (EO) 13337 as amended (69 Federal Register [FR] 25299). DOS has determined that issuance of a Presidential Permit would constitute a major federal action that may have a significant impact upon the environment within the context of the National Environmental Policy Act of 1969 (NEPA) (42 United States Code [USC] § 4321 et seq.).

DOS, as the lead agency for the environmental impact statement (EIS), discussed the appropriate level of participation required with other federal agencies that will be required to issue permits associated with the proposed Keystone Project. The following federal agencies have elected to participate as cooperating agencies in the process:

- Advisory Council on Historic Preservation
- U.S. Environmental Protection Agency
- Natural Resources Conservation Service
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- Farm Service Agency
- U.S. Department of Energy
- Rural Utilities Service

The following agencies have agreed to provide technical assistance to the environmental review:

- U.S. Department of Transportation – Office of Pipeline Safety
- U.S. Department of Transportation – Federal Highway Administration
- Federal Energy Regulatory Commission
- Department of Homeland Security
- Council on Environmental Quality
- National Park Service
- Bureau of Indian Affairs

State agencies also were consulted to ensure that their needs for state permitting analyses would be assessed in the EIS. Potentially affected Native American tribes with interests along the proposed pipeline corridor were invited to be part of the public scoping and DOS consultation process.

ES.2 PROPOSED ACTION – DOS PREFERRED ALTERNATIVE

Keystone proposes to construct and operate a crude oil pipeline and related facilities to transport Western Canadian Sedimentary Basin (WCSB) crude oil from an oil supply hub near Hardisty, Alberta, Canada to destinations in the Midwest United States. In total, the Keystone Project would consist of the Mainline Project (approximately 1,849 miles of pipeline, including about 767 miles in Canada and 1,082 miles in the United States) and the Cushing Extension (296 miles of pipeline in the United States). Including the Cushing Extension, the total length of pipeline in the United States would be 1,380 miles. The Keystone Project initially would have the nominal transport capacity of 435,000 barrels per day (bpd) of crude oil from the oil supply hub near Hardisty to an existing terminal and refinery at Wood River, Illinois, and an existing terminal at Patoka, Illinois. Additional pumping capacity could be added to increase the average throughput to 591,000 bpd if warranted by future shipper demand and market conditions.

In the United States, the proposed Mainline Project comprises 1,082 miles of new 30-inch-diameter pipe from the Canada/U.S. border to Patoka, Illinois. The Cushing Extension would consist of 296 miles of 36-inch-diameter pipe extending from Steele City, Nebraska to Cushing, Oklahoma. This EIS describes and evaluates the U.S. portion of the proposed Keystone Project, including both the Mainline Project and Cushing Extension.

The objective of the Proposed Route was to meet the original Project objective of delivering crude oil to Wood River and Patoka, Illinois as well as delivering oil to Cushing, Oklahoma. To accomplish the objective of delivering crude oil to Wood River and Patoka, and eventually to Cushing, the Proposed Route follows the shortest route possible between the Canadian border and Cushing. The route crosses the U.S./Canada border at Pembina County North Dakota, and follows a southerly track through North Dakota, South Dakota, and Nebraska (see Figure 2.1-1). At Steele City on the Nebraska/ Kansas border, the Mainline Project of the Proposed Route turns east through the northeast corner of Kansas and crosses Missouri to terminals at Wood River and Patoka, Illinois. The Cushing Extension continues south from Steele City through Kansas to Ponca City and Cushing, Oklahoma. This route would facilitate access to Cushing while preserving access to the original markets in Illinois, and would provide collocation opportunities along the existing Platte pipeline.

The length of pipeline proposed within each affected state is listed in Table ES-1.

TABLE ES-1
Miles of Pipeline by State for the Keystone Project

	ND	SD	NE	KS	MO	IL	OK	Total
Mainline Project	217.8	219.9	214.6	98.7	274.0	56.9	0.0	1,081.9
Cushing Extension	0.0	0.0	2.5	210.4	0.0	0.0	83.1	296.0
Keystone Project total	**217.8**	**219.9**	**217.1**	**309.1**	**274.0**	**56.9**	**83.1**	**1,377.9**

Keystone would construct the 30- and 36-inch-diameter pipelines within a 110-foot-wide corridor, consisting of a temporary 60-foot-wide construction right-of-way (ROW) and a 50-foot-wide permanent ROW.

Ownership of lands that would be crossed by the proposed Keystone Project is identified in Table ES-2.

TABLE ES-2
Ownership of Land Crossed by the Keystone Project (miles)

	Federal	Tribal	State	Private	Total
Mainline Project					
North Dakota	0.0	0.0	0.8	217.0	217.8
South Dakota	0.0	0.0	0.0	219.9	219.9
Nebraska	0.0	0.0	0.0	214.6	214.6
Kansas	0.0	0.0	0.0	98.7	98.7
Missouri	0.0	0.0	0.5	273.5	274.0
Illinois	3.0	0.0	0.0	53.9	56.9
Mainline Project subtotal	*3.0*	*0.0*	*1.3*	*1,077.6*	*1,081.9*
Cushing Extension					
Nebraska	0.0	0.0	0.0	2.5	2.5
Kansas	3.6	0.0	0.0	206.8	210.4
Oklahoma	0.0	0.0	3.6	79.5	83.1
Cushing Extension subtotal	*3.6*	*0.0*	*3.6*	*288.8*	*296*
Keystone Project total	**6.6**	**0.0**	**4.9**	**1,366.4**	**1377.9**

ES.3 PURPOSE AND NEED FOR THE PROPOSED ACTION

The primary purpose of the proposed pipeline is to transport crude oil from the WCSB across the border to meet the growing demand by refineries and markets in the United States. The need for the Project is dictated by:

- Increasing WCSB heavy crude oil supply and uncertain availability of oil from world supplies;
- U.S. demand for crude oil, particularly in the Midwest and Gulf States supported by the Keystone Mainline and Cushing Extension; and
- Pipeline capacity available to ship WCSB crude oil.

ES.3.1 Increasing Western Canadian Sedimentary Basin Crude Oil Supply

According to Oil and Gas Journal, Canada has 179 billion barrels of proven oil reserves, with 174 billion of those reserves in oil sands located in the WCSB. The Alberta Energy and Utilities Board also estimates that 174 billion barrels of proven reserves are recoverable from Canada's oil sands. The province of Alberta is now widely accepted as having the second largest reserves in the world, second only to Saudi Arabia.

Crude oil production from the entire WCSB, including oil sands and conventional production, is now at 2.3 million bpd. According to CNEB, conventional crude oil production in the WCSB is expected to decline but because of rapidly growing oil sands production total WCSB production will rise to 3.9 million bpd by 2015.

ES.3.2 Uncertainty of World Oil Supplies

Global oil production capacity and consumption remain tightly balanced after 4 years of rapid demand growth in Asia, the United States, and the Middle East. DOS and industry analysts project that it will remain so into the medium term. The ability and willingness of major oil and gas producers to step up investment in order to meet rising global demand are particularly uncertain. Political instability in several of the United States' top 11 suppliers is also expected to increase demand for crude oil from Canada. Canada's expected production increases, coupled with the adverse factors affecting other major U.S. suppliers make it likely that an ever larger share of U.S. oil imports will be sourced from this stable and nearby supplier. Even if the share of total imported oil in overall U.S. demand remains the same or declines slightly in coming years, as expected, DOS expects that heavy oil imports from the WCSB will continue to increase.

ES.3.3 U.S. Crude Oil Market Demand

According to the U.S. Energy Information Administration (EIA), U.S. consumption of liquid fuels (crude oil and refined products) is projected to total 26.9 million bpd in 2030, an increase of 6.2 million bpd over the 2005 total. Most of this increased demand is expected to be met with crude oil imports. Canada has traditionally been the United State's largest supplier of oil due to its reliability and proximity to U.S. markets. Canada's share of U.S. oil imports has risen from 15 to 16 percent over the last 10 years, while the whole of the Western Hemisphere now accounts for 41 percent of U.S. oil imports. Demand for the proportion of heavy to light crude used by U.S. refiners has increased over the last 20 years as world supplies of light crude have diminished in proportion to supplies of heavy and extra-heavy crude. Many U.S. refiners have completed or are in the process of completing retrofits to handle the heavier types of crude in response to this change in the world supply. In recent years, crude oil imports from Venezuela (most of which are of heavy grade) have declined. The heavy crude oil that Keystone will deliver to U.S. refiners is ideally suited to replace the loss of these types of crude and meet the expected increase in demand.

ES.3.4 Mainline Project and Cushing Extension Demand

In December 2005, Keystone provided shippers an opportunity to participate in the Keystone Project by entering into contractual commitments for pipeline capacity. Shippers committed to binding contracts for 340,000 bpd. These binding commitments demonstrate the need for incremental pipeline capacity and access to Canadian crude supplies, and represent a commitment to utilize the Keystone Project. Keystone expects that the remainder of the excess capacity will be utilized by non-contract shippers at the tariff rate approved by the Federal Energy Regulatory Commission (FERC) (ENSR 2006a). Potential shippers also have expressed strong interest in a proposed pipeline extension to the Cushing market area. TransCanada conducted an Open Season process for the Mainline Project which ran from November 4 to December 1, 2005. As a result of the Open Season, TransCanada has secured firm, long-term contracts totaling 340,000 bpd, with an average duration of 18 years. Keystone anticipates that existing contracts will be renewed and additional contracts will be entered into such that the average contract term will continue beyond 18 years. This reasoning is based on the amount of crude oil reserves in the WCSB and the expected increase in production from the oil sands (TransCanada 2007c). A binding Open Season for the Cushing Extension closed at noon on March 14, 2007 (ENSR 2006a).

ES.3.5 Pipeline Capacity from the Western Canadian Sedimentary Basin

Nearly all of the 1.9 million bpd of crude oil imported from Canada in 2006 came from the WCSB, and all of that was transported through three major pipeline systems: Enbridge, Kinder Morgan Express, and Kinder Morgan Trans Mountain. Total capacity from the WCSB for crude oil to U.S. markets now stands

at 2.4 million bpd. However, the majority of WCSB crude continues to be sold into the U.S. Midwest where a large proportion of U.S. refining capacity is located, and an increasing amount is forwarded on to refiners in the U.S. Gulf Coast to offset declines in offshore production. These two districts are directly and indirectly served by the Enbridge system and Kinder Morgan Express, which together have a capacity of 2.1 million bpd. Total capacity for heavy oil on the Enbridge and Kinder Morgan Express systems now stands at 1.2 million bpd. In 2006, approximately 1 million bpd of heavy crude was exported from the WCSB to the United States via these two pipelines.

Even with modifications to existing systems and de-bottlenecking efforts that are underway by Enbridge, it is likely that crude oil exports from the WCSB to the United States will exceed available pipeline capacity in 2009, necessitating the construction of a new pipeline to facilitate continued importation of crude oil.

Exactly how much more capacity will be needed in the short term to mid term can be estimated. Given CNEB projections of an additional 1.6 million bpd of WCSB production over the current level by 2015, expected increased U.S. demand, and a similar proportion continued to be consumed by Canada (30 percent), an additional 1.1 million bpd of pipeline capacity would be needed by 2015 to accommodate U.S. crude oil imports from the WCSB. This increase in capacity would justify construction of Keystone's planned 450,000-bpd pipeline, and would necessitate additional pipeline construction to meet the remaining 700,000 bpd of capacity.

ES.4 PUBLIC INVOLVEMENT PROCESS

ES.4.1 Scoping

On October 4, 2006, DOS issued a Notice of Intent (NOI) to prepare an EIS. The NOI informed the public about the proposed action, announced plans for scoping meetings, invited public participation in the scoping process, and solicited public comments for consideration in establishing the scope and content of the EIS. The NOI was published in the Federal Register and distributed to affected landowners, Federal agencies, Native American tribes, State agencies, Municipalities and counties, elected officials, non-governmental organizations, the media, and other interested individuals. DOS held 13 separate scoping meetings in the vicinity of the Proposed Route to provide opportunity for public comment on the scope of the EIS. Meetings were held in Michigan and Lisbon, North Dakota; Clark and Yankton, South Dakota; Stanton and Seward, Nebraska; St. Charles and Carrolton, Missouri; Collinsville, Illinois; Seneca, Abilene, and El Dorado, Kansas; and Morrison, Oklahoma. The official scoping period ended on November 30, 2006; however, any comments received after this date were considered in the Draft EIS.

DOS received verbal, written, and electronic comments during the scoping comment period. All verbal scoping comments formally presented at the meetings were recorded and transcribed. Additional written scoping comments were received on comment forms provided to the public at the meetings and in letters. Table ES-3 summarizes the issues identified and comments received during the public scoping process for the Keystone Project. For each comment, the table references the section in this FEIS that addresses the concern. Details are provided in the Scoping Summary Report (Appendix A).

TABLE ES-3
Issues Identified and Comments Received during the Public Scoping Process for the Keystone Pipeline Project

Issue	Comment	Section Where Comment/Issue Is Addressed in Draft EIS
Purpose and Need	Need for the Mainline Project and the Cushing Extension, expected life of the pipeline, agency involvement, and required approvals.	1.2
Project Description	Distance to adjacent structures, construction methods, abandonment plans, sources of Keystone Project materials, construction schedule, maintenance and inspection plans and procedures, expected service life of the pipeline, right-of-way (ROW) revegetation, pipeline temperature, protection measures, operations, construction impacts to adjacent areas, powering, pipeline security, hydrostatic testing, and pump stations.	2.0
Alternatives	Selection of alternatives, route adjustments, use of abandoned rail ROWs, route selection, routes that avoid sensitive areas, Kinder Morgan and Enbridge Pipelines, shipping refined products instead of a crude oil pipeline, renewable energy sources, seasonal avoidance of construction in agricultural areas, collocation with other ROWs, and adding a new refinery along the Mainline Project rather than constructing the Cushing Extension.	4.0
Geology	Potential rock slope instability and effects of earthquakes and fault lines.	3.1
Soils and Sediments	Soil compaction and settlement, topsoil segregation during construction, replacement of top soils after construction and abandonment, soil erosion, streambank erosion, pipeline effects on soil temperature, and soil instability.	3.2
Water Resources	Impacts on springs, aquifers, and water wells; water supply contingencies in the event of a spill; impacts to septic systems and sewage treatment facilities; stream channel erosion; impacts to dikes, dams, and reservoirs; runoff during construction; effects on drain tiles and drainage systems; and impacts on flood protection.	3.3
Wetlands	Impacts and mitigation measures, stabilization during construction, enforcement of wetland protection requirements.	3.4
Terrestrial Vegetation	Impacts on prairies and woodlands, impacts of pipeline temperature on vegetation and crops, revegetation of affected area, impacts on crop growth, invasive and noxious weeds, use of herbicides near organic farms, and effects on old-growth trees.	3.5
Fish and Wildlife	Impacts on game animals and their habitats; and impacts on deer, turkey, frogs, toads, bald eagles, beaver, pheasants, and quail.	3.6 and 3.7

ES.4.2 Comments on the Draft EIS

The 2007 Keystone Oil Pipeline Project Draft Environmental Impact Statement (Draft EIS) was released for public review on August 10, 2007. The public comment period ended on September 24, 2007; however, additional comments were accepted into November 2007. Comments were sent to DOS by email, website link (e-comments), phone, and U.S. mail. From September 4 through September 20, 2007, 13 public meetings were held to solicit oral testimony on the Draft EIS. Written comments also were accepted. These meetings were held at the following locations along the pipeline corridor and corresponded with the locations of the scoping meetings held in October 2006:

September 4 – Carrolton Missouri
September 5 – St. Charles, Missouri
September 6 – Collinsville, Illinois
September 11 – Michigan, North Dakota and Yankton, South Dakota
September 12 – Lisbon, North Dakota and Stanton, Nebraska
September 13 – Clark, South Dakota and Seward, Nebraska
September 17 – Seneca, Kansas
September 18 – Abilene, Kansas
September 19 – El Dorado, Kansas
September 20 – Ponca City, Oklahoma.

In total, 67 people provided oral testimony at these meetings, incorporating 230 individual comments on the 2007 Draft EIS. These comments were recorded and transcribed. In addition to the oral testimony, 110 letters, cards, emails, e-comments, or telephone conversation records incorporating 1009 comments were received from the public, agencies, the Applicant (Keystone), and other interested groups and stakeholders. All written and oral comments and responses are summarized in Appendix A.

ES.5 ALTERNATIVES CONSIDERED

Alternatives to the Keystone Project were analyzed to determine whether they would be reasonable and environmentally preferable to the proposed action. A No Action Alternative, system alternatives, major route alternatives, route variations, and aboveground facility site alternatives were considered in the EIS. Identification of alternatives to the proposed project incorporated public comments and input received from federal, state, and local regulatory agencies.

ES.5.1 No Action Alternative

Under the No Action Alternative, the Keystone Project would not be constructed and operated and issuance of a DOS Presidential Permit for the specific action of building and operating the Keystone pipeline would not be required. While this alternative would eliminate the environmental impacts directly associated with the Keystone Project, it would not meet the proposed action's purpose and need, which involve both supply and demand components.

Without the Keystone Project, the increasing supply of crude oil from the WCSB would not have a ready conduit for export to available refineries and markets in the United States. Additional export pipeline capacity above supply requirements also is required to avoid potential situations where short-term supply exceeds export pipeline capacity.

U.S. demand for petroleum products has increased, while domestic U.S. crude oil supplies continue to decline. The No Action Alternative would not provide the United States with a relatively stable and

secure source of North American crude oil for Midwest and Gulf Coast markets, thereby continuing increasing U.S. dependence on less reliable sources of oil with higher associated shipping costs.

While the increasing demand for refined crude oil products could be met by other projects or alternatives, it is purely speculative to predict the resulting effects and actions that could be taken by local governments and other suppliers or refineries in the region, as well as any associated direct and indirect environmental impacts of these actions. In addition, each of these actions may result in environmental impacts that are less than, equal to, or greater than those of the currently proposed Keystone Project. The No Action Alternative also could result in more expensive and less reliable crude oil supplies for Midwestern refineries, increasing costs and availability of the refined products for end-users.

ES.5.2 System Alternatives

Several existing and proposed crude oil pipeline systems that currently or would eventually serve the markets targeted by the proposed Keystone Project were assessed. The analysis considered whether those systems would meet the proposed Project objectives while offering an environmental advantage over the proposed Project.

One system alternative considered was the expansion of the existing Express and Platte Pipeline systems. This 1,700-mile pipeline system transports crude oil from Alberta's oil sands in Hardisty, Alberta to refineries in the U.S. Rocky Mountain and Midwest regions. In the United States, the pipeline crosses Montana, Wyoming, Nebraska, Kansas, and Missouri and terminates in Wood River, Illinois. The Express system has been in operation from 1997, with a current capacity of 280,000 bpd. The Platte pipeline was built in 1952, and its current capacity is 164,000 bpd. However, as operated today, neither of these existing systems would have the capacity of the proposed Keystone pipeline (435,000 bpd, with a potential increase to 591,000 bpd). As they exist today, neither system could be considered as a system alternative for the proposed action

New construction of other crude oil pipeline systems (Alberta Clipper, Southern Lights, and Spearhead Cushing Expansion) was also considered. Enbridge is proposing these expansion projects to help address current and future increases in refinery demand as supply from western Canada's vast oil sands increases. The Enbridge projects propose to deliver crude oil directly to Midwestern markets. However, the proposed Enbridge pipelines would provide a less direct route to the Cushing refineries than the Cushing Extension portion of the Keystone Project, involving the need for additional miles of pipe and likely incurring additional impacts to resources. In addition, these projects aim to fulfill other market demands and would not meet the market need and in-service date proposed by the Keystone Project. Therefore, as noted in Section ES.3.5 above, it is possible that market demand and supply of WCSB crude could support construction of the Keystone Project and the Enbridge projects.

ES.5.3 Major Route Alternatives

Three major route alternatives are considered in the EIS: the Iowa Route Alternative, the Proposed Route Alternative, and the Direct Route Alternative. During initial screening, it was determined that the Iowa Route Alternative did not meet the purpose and need for the Project, and the alternative was not considered further in the analysis. Table ES-4 summarizes the potential impacts of the remaining two alternatives, and the following sections discuss these alternatives in more detail. Based on the analysis of the two alternatives, the Proposed Route Alternative has been determined to be the preferred route and a resource-by-resource analysis of potential impacts is conducted in this EIS. Section ES.6 summarizes the results of the analysis.

ES.5.3.1 Iowa Route Alternative

Initial route development identified a ROW that avoided Nebraska and crossed Iowa into northern Missouri (Figure 4.3-1). Desktop data analysis, along with limited aerial and ground reconnaissance, was used to identify this route. The Iowa Route entered the United States in Pembina County, North Dakota, just north of Walhalla, and ran due south to the North Dakota/South Dakota border. In South Dakota, the route ran generally south to the Spink County border before turning southeast toward Plymouth County, Iowa. From there, it crossed the South Dakota/Iowa border north of Sioux City, Iowa and continued in a southeasterly direction through Iowa and Missouri toward a delivery point at Salisbury, Missouri.

Here, the Iowa Route was collocated with the existing Platte pipeline to Troy, Missouri. North of Troy, the route was moved to a power line ROW to avoid areas where the city has expanded. East of Troy, the route again collocated with the Platte pipeline, running east to the Missouri/Illinois border—where it deviated from the Platte pipeline and crossed the Mississippi River south of Wood River, Illinois. From Wood River, the route ran eastward through the Carlyle Lake WMA into Patoka, Illinois.

While the Iowa Route would meet the objectives of crude oil delivery to the refineries in Illinois, it would not efficiently deliver crude oil to Cushing, Oklahoma and would not meet the Keystone Project purpose and need, and is not considered further.

ES.5.3.2 Direct Alternative

The Direct Alternative was designed to take the shortest feasible route between the U.S./Canada border crossing and the delivery points at Patoka and Wood River, Illinois, and from there to take the shortest route to the delivery point at Cushing, Oklahoma (Figure 4.3-2). The straight-line path was modified to skirt populated areas and to minimize the number of stream crossings by traveling along drainage divides whenever possible. Between Wood River and Patoka, the Direct Alternative follows the same alignment as Keystone's proposed route. Between Wood River and Cushing, the Direct Alternative roughly parallels Enbridge's Ozark pipeline corridor, but collocation was not assumed.

A reconnaissance-level GIS analysis and comparison of the Direct Alternative and Keystone's Proposed Route was performed (see Table 4.3-1). Based on this analysis, there is no clear environmental advantage associated with the Direct Alternative. The pipeline miles are very close, as are the approximate number of acres required for the pipeline ROW (acres required for ancillary facilities, access roads, work pads, etc. were not included in this assessment). The Direct Alternative would require an additional 48 water body crossings, and may require additional pump stations. It does not take advantage of collocation with other pipeline corridors. While slightly fewer miles of wetlands (based on available wetlands inventory mapping) and federal lands (based on available GIS coverage) may be crossed by the Direct Alternative, in a general sense this alternative would likely lead to more environmental impact than would construction of the Proposed Route.

TABLE ES-4
Comparison of the Proposed Route and Direct Alternatives for the Keystone Project

Comparative Category	Unit	Proposed Route	Direct Alternative
Facility Requirements			
Pipeline length	Miles	1,378	1,380
Pump station requirements	Number	24	29
Land Requirements			
Construction ROW	Acres	18,300	18,303
Permanent ROW	Acres	8350	8,362
Environmental Considerations			
Water body crossings	Number	213	261
Wetlands crossed	Miles	44.4	40.0
Federal lands crossed	Miles	4.9	2.2

ES.5.4 Route Variations for the Proposed Route Alternative

As part of the route development and selection process, numerous route variations to the initially planned Mainline Project route and Cushing Extension route have been incorporated into the proposed route. These variations were developed based on discussions with landowners, resource stewards, and project engineers to avoid or minimize impacts to natural or cultural resources, reduce or eliminate engineering and constructability concerns, and avoid or minimize conflicts with existing or proposed residential and agricultural land uses.

In addition to the route variations described, the scoping process identified public concerns related to route location. Many of these comments addressed specific route variations related to avoiding shelterbelts and aesthetic features, such as bike paths and parks. The Scoping Report is provided as Appendix A for reference. Specific Route Alternatives in the vicinity of Seward Nebraska, Fordville North Dakota, and in the Hecla Sandhills Region were analyzed in detail based on public and agency comments. Aspects of two of the variations, the Seward Route Alternative and the Hecla Sandhills Route Alternative were incorporated into the proposed route for the Keystone Project. The final design alignment, where feasible, considers these minor route variations and attempts to address additional landowner requirements, such as crossing property along quarter section lines. Additional minor alignment shifts would be required prior to and during construction to accommodate unforeseeable site-specific constraints related to other engineering, landowner, and environmental concerns.

ES.5.5 Aboveground Facility Alternatives for the Proposed Route

Pump stations, valve sites, temporary worksites, and pipe and contractor yards are identified in the EIS for the Keystone Project. The proposed project includes 24 pump stations, 44 pipe storage yards, 36 contractor yards, and 57 main line valves (MLVs) along the Mainline Project and 3 pump stations, 10 pipe storage yards, 6 contractor yards, and 15 MLVs along the Cushing Extension. Although the preferred locations for these facilities were chosen based on Project need, the proximity of public access, habitats, dwellings, and other land and ROW issues also were considered in siting the facilities. Over the course of Project development, pump station locations have been relocated due to environmental, engineering or landowner concerns.

ES.6 PROPOSED PROJECT IMPACTS AND MITIGATION MEASURES

Table ES-5 summaries the potential impacts of the proposed route. The table also summaries mitigation measures proposed by Keystone in Appendix B. Additional mitigation measures are recommended in subsequent resource sections within the EIS and are summarized in Section 5.0.

ES.6.1 Geology

The proposed project would not involve substantial topographical alteration and would not disturb any geological features protected by federal or state laws. Seismic activity is not expected to pose an unacceptable risk to the project.

The proposed pipeline route does not cross any active surface mines or quarries; however, it does cross 40 miles of underlying coal seams between Wood River and Patoka, Illinois, where coal is mined with underground methods (ENSR 2006a). The proposed route does not cross the well pads of any active oil and gas wells. Extraction of oil and gas resources would not be affected by routing operations because any new wells would be located outside of the pipeline ROW. The proposed pipeline would pass through deposits of sand, gravel, clay, and stone in North Dakota, South Dakota, and Nebraska but would restrict access to comparatively small areas of these deposits. In Kansas, Missouri, and Illinois, the proposed route lies adjacent to an existing pipeline, limiting impacts to potentially exploitable geologic resources.

A minimal risk of localized subsidence or collapse exists where the pipeline crosses karst formations or passes above historic coal mines. It is also possible that land clearing would increase the risk of erosion and localized landslides. Most of the proposed Keystone Project route is not located in landslide-prone terrain, but the proposed route does cross areas of high landslide potential, as described by the National Pipeline Mapping System at the Yankton and Mississippi River crossings. Keystone has considered landslide potential in its routing work and has selected crossings of these areas where the landslide potential is reduced.

ES.6.2 Soils

Temporary or short term increases in soil erosion could occur during construction, particularly in areas classified as highly erosive. Receiving water bodies could be affected, and agricultural soils containing agrochemical products could be eroded. During construction, soil compaction is likely, increasing the possibility of runoff.

Approximately 17,000 acres of farmland or rangeland within the ROW would be taken out of production during the 18-month construction period. Some short- or long-term decreases in agricultural productivity are possible. In addition, tile drainage systems would be disturbed during construction. Keystone has proposed to avoid, replace, and/or repair any tile drainage system within the ROW.

There could be compaction-related decreases in productivity from non-agricultural vegetated land, particularly where soils are classified as hydric. It is also possible that boulders and rocks unearthed during construction would be concentrated near the surface at completion. There are also concerns that spills or leakage from equipment could contaminate soils. Keystone has proposed construction methods and mitigation measures to address these concerns, and additional recommended measures are described in the EIS.

In terms of operations impacts, differential settling around the proposed pipeline likely would be minor and would be addressed by mitigation measures. Soil temperature impacts would be limited to within 3 feet of the pipeline and would not result in serious soil moisture loss; mitigation would be adequately addressed through the recommendations discussed in the EIS

TABLE ES-5
Summary of Potential Impacts and Proposed Mitigation for the Proposed Route Alternative

Resource	Draft EIS Section	Direct and Indirect Impacts	Cumulative Impacts[a]	Proposed Mitigation Measures[b]
Geology	3.1	The proposed project would not involve substantial topographical alteration and would not disturb any geological features protected by federal or state laws, or tribal practice. Seismic activity is not expected to pose an unacceptable risk to the project. The proposed pipeline would pass through deposits of sand, gravel, clay, and stone in North Dakota, South Dakota, and Nebraska but would restrict access to comparatively small areas of these deposits. The proposed route does cross areas of high landslide potential, as described by the National Pipeline Mapping System at the Yankton and Mississippi River crossings. A minimal risk of localized subsidence or collapse exists where the pipeline crosses karst formations or passes above historic coal mines.	In Kansas, Missouri, and Illinois, the proposed route lies adjacent to an existing pipeline, limiting impacts to potentially exploitable geologic resources.	Keystone has considered landslide potential in its routing work and has selected crossings of these areas where the landslide potential is reduced. Prior to surface disturbance activities within karst terrain, a geological investigation will be completed to determine the presence and type of karst features. The investigation will identify the location, distribution, and dimensions of rock cavities within the potential influence zone of construction.
Soils	3.2	Construction. Temporary or short term increases in soil erosion could occur during construction. Short- or long-term decreases in agricultural productivity are possible. In addition, tile drainage systems would be disturbed during construction. Boulders and rocks unearthed during construction would be concentrated near the surface at completion. There are also concerns that spills or leakage from equipment could contaminate soils. In terms of operations impacts, differential settling around the proposed pipeline likely would be minor and would be addressed by mitigation measures. Operations. Soil temperature impacts would be limited to within 3 feet of the pipeline and would not result in serious soil moisture loss.	Potential cumulative erosion effects could occur where construction disturbance areas overlap, or are located near each other, particularly along the sections of Keystone pipeline that are collocated with the Rockies Express Western Phase Project (REX Project). Both the REX Project and the Keystone Project would apply best management practices (BMPs) for soil management and protection to the pipelines and appurtenant facilities. Revegetation mixtures that are appropriate to soil conditions and expected future uses (such as grazing and wildlife habitat) would be applied to the disturbed areas. Consequently, the potential for cumulative erosion effects caused by one or more of these projects is low.	Keystone has proposed to avoid, replace, and/or repair any tile drainage system within the ROW. The objective of topsoil handling is to maintain topsoil capability by conserving topsoil for future replacement and reclamation and to minimize the degradation of topsoil from compaction, rutting, loss of organic matter, or soil mixing so that successful reclamation of the ROW can occur. In cultivated agricultural lands, the actual depth of the topsoil shall be stripped from the area to be excavated above the pipeline to a maximum of 12 inches. When grading is required, the topsoil shall be removed from the entire area to be graded and stored. Stripped topsoil is to be stockpiled in a windrow along the edge

TABLE ES-5
(Continued)

Resource	Draft EIS Section	Direct and Indirect Impacts	Cumulative Impacts[a]	Proposed Mitigation Measures[b]
				of the ROW to minimize the potential for subsoil and topsoil to be mixed. Keystone shall monitor the pipeline ROW and all stream crossings for erosion or other potential problems that could affect the integrity of the pipeline. Any erosion identified shall be reclaimed as expediently as practicable by Keystone or by compensation of the landowner to reclaim the area.
Water Resources	3.3	Surface water or groundwater quality would not be significantly affected by normal disposal activities (such as disposal of hydrostatic test water), non-catastrophic spills, or leaks during pipeline construction and operation.	If construction activities of the Keystone Project and the collocated portion of REX pipeline follow a similar schedule, there could be a cumulative contribution to incremental sedimentation in adjacent surface waters. Each project—as well as any other collocated construction projects—would be required to follow BMPs and permit conditions to protect surface waters. Both the Keystone Project and other portions of the REX Project plan to use surface water for hydrostatic testing. However, the timing for REX withdrawals would not overlap with withdrawals planned for Keystone.	Temporary erosion and sediment control measures shall be installed immediately after initial disturbance of the soil and maintained throughout construction (on a daily basis) and reinstalled as necessary until replaced by permanent erosion control structures or restoration of the construction ROW is complete. These measures include sediment barriers, trench plugs, temporary slope breakers, drainage channels or ditches, temporary mulching, and use of a tackifier. All extra work areas (such as staging areas and additional spoil storage areas) at least 10 feet from the water's edge. Flagging shall be installed at all water body crossings, across the construction ROW at least 10 feet from the banks prior to clearing and to ensure that riparian cover is maintained where practicable during construction. Details for water body crossing methods and mitigation are provided in Section 7.4 of Appendix B.

TABLE ES-5
(Continued)

Resource	Draft EIS Section	Direct and Indirect Impacts	Cumulative Impacts[a]	Proposed Mitigation Measures[b]
Wetlands	3.4	Wetlands that would be affected within the ROW include emergent wetlands (403 acres), forested wetlands (80 acres), perennial riverine wetlands (37 acres), intermittent riverine wetlands (107 acres), and scrub-shrub wetlands (32 acres).	Cumulative impacts on wetlands would occur in locations where any of the Keystone Project and REX pipelines or other construction projects would be collocated while crossing wetlands. Total wetland impacts within the collocated area could be about 156 acres of wetlands. Both projects would implement mitigation measures to protect wetlands. Other construction projects, such as town expansions, new roads and highways, and other industrial facilities could affect additional wetlands. None of the wetlands crossed by the Keystone Project would be permanently filled or drained, and the contribution of the Keystone Project on cumulative effects to wetlands in the Project area would be minor.	Wetland boundaries shall be clearly marked in the field with signs and/or highly visible flagging during construction. Aboveground facilities shall not be located in a wetland, except where the location of such facilities outside of wetlands would preclude compliance with U.S. Department of Transportation (USDOT) pipeline safety regulations. The width of the construction ROW shall be reduced to 85 feet or less in standard wetlands unless non-cohesive soil conditions require utilization of a greater width. All extra work areas (such as staging areas and additional spoil storage areas) shall be located at least 10 feet away from wetland boundaries. Sediment barriers shall be installed across the entire construction ROW immediately upslope of the wetland to prevent sediment flow into the wetland. Specific wetland crossing procedures are described in Section 6.5 of Appendix B.
Terrestrial Vegetation	3.5	Grassland impacts due to pipeline construction are expected to be minimal, and affected vegetative communities generally are expected to reestablish within 2 years. Construction through previously untilled prairie could produce irreversible impacts. Impacts on upland forest and shrubland would be longer term than those anticipated for grassland.	The total amount of vegetation that may be affected by all of the reasonably foreseeable projects, including the Keystone Project, is relatively small compared to the abundance of similar habitat in the Project area. Impacts would result in the long-term and permanent loss of non-herbaceous vegetation and would cause a small incremental increase	Clearing, grubbing and grading of trees, brush and stumps shall be performed in accordance with the following measures: ROW boundaries including temporary workspaces shall be clearly staked to prevent disturbance to unauthorized areas; timber shall be salvaged as per landowner request; tree stumps shall be grubbed only

TABLE ES-5
(Continued)

Resource	Draft EIS Section	Direct and Indirect Impacts	Cumulative Impacts[a]	Proposed Mitigation Measures[b]
			in fragmentation of forested areas. All of the projects would implement mitigation measures designed to minimize the potential for erosion, revegetate disturbed areas, increase the stabilization of site conditions, and control the spread of noxious weeds—thereby minimizing the degree and duration of the cumulative impact on vegetation from these projects.	5 feet either side of the trench line and where necessary for grading a level surface; timber salvage operations shall use cut off-type saw equipment; trees shall be felled in such a way that they fall toward the center line of the ROW; there will be no disposal of woody debris in wooded areas along the pipeline ROW; pruning of branches hanging over the ROW shall be done only when necessary for construction; and stump removal and brush clearing shall be done with bulldozers equipped with brush rakes to preserve organic matter.
Wildlife	3.6	Pipeline construction would result in short-term disturbance and long-term modification to wildlife habitats. However, the total habitat loss is expected to be small in the context of total available habitat.	Construction and operation of the Keystone Project, along with the reasonably foreseeable projects, would result in short-term disturbance to wildlife and long-term wildlife habitat modification. Keystone would incrementally add to the area of habitat disrupted and to the disturbance of resident and migrating species, causing associated impacts on these species as they adjust to the changes brought about by the proposed projects. Increased movement or displacement of species dependent on the disturbed habitats could reduce carrying capacities, reproductive effort, or survival. This potential is greater for species for which suitable habitat is limited in the Project area or that are otherwise sensitive to disturbance.	Spoil and topsoil wind rows shall not be located such that obvious wildlife trails are blocked.

TABLE ES-5
(Continued)

Resource	Draft EIS Section	Direct and Indirect Impacts	Cumulative Impacts[a]	Proposed Mitigation Measures[b]
Fisheries	3.7	Possible impacts to fisheries could occur through siltation and disturbance of streams crossed by the proposed pipeline. Any short-term disturbance caused by instream activities likely would resemble natural high-flow events in the stream. Keystone has proposed to undertake hydrostatic testing during spring, summer, and autumn, overlapping with key spawning months of April to July. This overlap could affect some sensitive species during breeding.	Because construction schedules for the REX pipeline and the other non-linear projects are different from the Keystone Project, cumulative impacts on fisheries would not occur. If construction of facilities or other projects does become concurrent due to schedule changes, the Keystone Project would contribute to cumulative sedimentation impacts on fisheries. Nevertheless, these impacts would be short term and minor due to implementation of mitigation measures and the requirements of any individual state permits to minimize impacts while crossing water bodies.	Following the proposed mitigation procedures during construction would result in minor short-term impacts to aquatic habitats and organisms. To mitigate impacts, construction would involve dry-ditch techniques at crossings where the timing of construction does not adequately protect environmentally sensitive water bodies, as determined by the appropriate regulatory authority. Horizontal directional drilling (HDD) would be used at designated major and sensitive water bodies. For hydrostatic testing, the intake hose shall be screened to prevent the entrainment of fish or debris. The hose shall be kept off the bottom of the water body. Pumps used for hydrostatic testing within 100 feet of any water body or wetland shall be operated and refueled in accordance with Section 3.0 of Appendix B. Adequate flow rates in the water body shall be maintained to protect aquatic life, provide for all water body uses, and provide for downstream withdrawals of water by existing users. Chemicals shall not be used in the test water. Water containing oil or other substances in sufficient amounts to create a visible color film or sheen on the surface of the receiving water shall not be discharged. Any water obtained or discharged shall comply with permit requirements. Detailed mitigation measures for dewatering the pipeline are provided in Section 8.4 of Appendix B.

TABLE ES-5
(Continued)

Resource	Draft EIS Section	Direct and Indirect Impacts	Cumulative Impacts[a]	Proposed Mitigation Measures[b]
Threatened and Endangered Species	3.8	Preliminary data identified 55 federally or state-listed threatened, endangered, or candidate species potentially occurring in or near the Keystone Project ROW. Potential impacts on individual species include habitat loss, alteration, and fragmentation; decreased breeding; direct mortality; and reduced survival or reproduction.	Because the Keystone pipeline would parallel the REX pipeline across Kansas and Missouri, many of the state- and federally listed threatened and endangered species could potentially be affected by construction and operation of these projects. Each project is required to consult with federal, state, and local agencies to determine which species may occur within each individual project area; evaluate potential impacts on those species during construction and operation; and implement measures to avoid, minimize, or mitigate impacts on special-status species and their habitats.	Keystone has been and will continue to contract a qualified biologist to conduct surveys of sensitive species associated with particular habitats along the pipeline corridor. Details regarding mitigation measures for potential encounters with threatened and endangered species are provided in Section 2.9 of Appendix B.
Land Use	3.9	Agricultural, rangeland, forestland, recreational/special use, commercial, and residential land use classes would be affected in areas intersected by the proposed ROW. The largest amount of acreage that would be affected by the Keystone Project would be agricultural land, followed by rangeland. After construction, nearly all agricultural land along the ROW would be allowed to return to production, and productivity is not expected to be reduced significantly over the long term. Approximately 140 acres would be necessary for construction of aboveground facilities; these acres would be permanently removed from farming production. Recreational lands potentially affected include bike trails, sightseeing areas, hiking trails, and wildlife viewing areas; public lands are limited along the ROW. Construction activities are anticipated to cause only temporary impacts.	Land use changes associated with the portion of the REX pipeline that is collocated with Keystone would cumulatively add to the acreage of aboveground oil and gas facilities in the Project area. In addition, the ethanol and coal-fired power plants that would be constructed in Audrain County and Carroll County, Missouri, respectively, would further increase the amount of land in those counties that would be converted to industrial use	Keystone also has developed mitigation plans for limiting impacts on soil drainage mechanisms, compaction, irrigation systems, farm access areas, windbreaks and living fences, and Conservation Reserve Program lands. Keystone has further sought to minimize impacts on rangelands by developing range-specific mitigation measures. Keystone would coordinate with agency and land use managers to reduce conflicts between construction activities and recreational uses. Details on these measures are provided in Appendix B.

TABLE ES-5
(Continued)

Resource	Draft EIS Section	Direct and Indirect Impacts	Cumulative Impacts[a]	Proposed Mitigation Measures[b]
Socio economics	3.10	Construction. Pipeline construction activities would generate substantial direct and indirect economic benefits. Potentially negative impacts include agricultural losses, and increased demands on local highways and emergency services. Some disruption of traffic flows would be expected. Potentially adverse socioeconomic effects including increased demand for public services and inexpensive housing could disproportionately affect lower income areas. Other environmental justice concerns, such as disproportionate air and water quality impacts to communities, would not be expected. Operations. The economic impacts of operating the pipeline are expected to be positive, due to generation of permanent jobs and increased property tax revenue.	Portions of the construction period and locations for the Keystone Project and the collocated portion of the REX Project could overlap due to delays or other issues. These projects, together with any other linear and non-linear projects planned for the Project area, would require workers to temporarily relocate to the Project area during construction, potentially inducing housing shortages at certain locations during certain periods of the construction schedule. The increased tax revenue paid to the state and local governments over the life of the projects also may result in a beneficial long-term cumulative impact. Operation of the proposed facilities would require relatively few permanent employees; thus, there would be no long-term cumulative or additive impacts on population, housing, or municipal services in the Project area.	Agricultural losses would be compensated by Keystone during the easement procurement process, Keystone will maintaining access and traffic flow on local roads during construction activities, particularly for emergency vehicles. Any impacts on local roads would be repaired by Keystone.
Cultural Resources	3.11	To limit impacts on cultural resources, the Keystone Project is avoiding all cultural resources that are listed in or potentially eligible for listing in the National Register of Historic Places (NRHP). Short term construction-related impacts will be minimized through implementation of Keystone's Mitigation Plan (Appendix B). Inadvertent discoveries of buried cultural resources may occur.	No cumulative impacts to cultural resources are anticipated.	Keystone intends to avoid all cultural resources by rerouting the pipeline corridor and/or related appurtenances, avoiding construction activities on properties listed in or eligible for listing in the NRHP, as well as boring and using HDD through culturally sterile soils. Short-term, construction-related impacts will be mitigated through implementation of Keystone's Mitigation Plan (Appendix B). If any adverse effects do occur, they will be resolved through consultation with the Advisory Council on Historic

TABLE ES-5
(Continued)

Resource	Draft EIS Section	Direct and Indirect Impacts	Cumulative Impacts[a]	Proposed Mitigation Measures[b]
				Preservation, as well as any applicable Native American tribes, agencies, and the State Historic Preservation Officers. A Programmatic Agreement also will be drafted to address the protocols for inadvertent discoveries, future cultural resources identification and avoidance commitments, and the process for future consultation.
Air	3.12	Construction. Because pipeline construction would move through an area relatively quickly, air emissions typically would be localized, intermittent, and short term. Because Keystone will be required to comply with applicable regulations, emissions from construction-related activities would not significantly affect local or regional air quality. Operations. Project operations would not produce significant air quality impacts, and only minor emissions from the backup gasoline generator and fugitive emissions from valves, tanks, and pumping equipment would occur. Because operating emissions are expected to be minimal, no operational permits would be required.	Should construction periods overlap, the proposed Keystone Project would incrementally add to dust generation and combustion emissions from heavy equipment that also would be produced by the other reasonably foreseeable future projects discussed above. On a local scale, cumulative increases in air emissions could occur where new compressor or pump stations are located at or near existing or proposed compressor stations, or other existing industrial facilities. Pump stations for the Keystone Project also could be located near a proposed ethanol plant in Audrain County, Missouri and the proposed coal-fired power plant in Carroll County, Missouri. Each pump or compressor station and ethanol or power plant would be required to obtain state construction and operation permits, and potential interactions with nearby emission sources would be considered in these permit applications. Emissions from the facilities would be reduced by best available technology.	Keystone's contractor shall at all times control airborne dust levels during construction using water trucks, sprinklers or calcium chloride as necessary to reduce dust to acceptable levels. Dust shall be strictly controlled where the work approaches dwellings, farm buildings, and other areas occupied by people and when the pipeline parallels an existing road or highway. Emissions from fugitive dust, construction equipment combustion, open burning, and temporary fuel transfer systems and associated tanks would be controlled to the extent required by state and local agencies, through the permit process.

TABLE ES-5
(Continued)

Resource	Draft EIS Section	Direct and Indirect Impacts	Cumulative Impacts[a]	Proposed Mitigation Measures[b]
Noise	3.12	Construction. Residential, agricultural, and commercial areas within 500 feet of the project would experience short-term inconvenience from construction equipment noise. Operations. Noise associated with the electric pump stations would be limited to the immediate vicinity of the facilities, and are projected to be minor.	The Keystone Project, along with the other reasonably foreseeable projects, would contribute to ambient noise levels during construction. These noise impacts would be temporary and would occur only during the construction period for each facility or linear project. Because construction proceeds in sections along the pipelines and linear projects, the duration of construction activities—and therefore noise impacts—at any given location at any given time would be limited and short term. Cumulative effects on ambient noise levels would occur only if construction on a congruent section of each project occurred simultaneously. No new major sources of noise are expected during operation of the Keystone facilities that would be near or collocated with facilities associated with the other reasonably foreseeable projects.	Noise impacts from construction would be mitigated in accordance with Keystone's Mitigation Plan (Appendix B) to reduce effects on individuals, sensitive areas, and livestock. To limit disturbance of residential and commercial areas within 500 feet of construction activities by increased noise levels, Keystone would give advanced notice to landowners prior to construction, limit the hours during which construction activities with high-decibel noise levels are conducted, and ensure that construction proceeds quickly through such areas. Keystone would perform a noise assessment survey during operations to confirm the level of noise at each listed noise-sensitive area. Project-related operations therefore are not expected to result in a significant effect on the noise environment.
Reliability and Safety	3.13	The reliability and safety of the Keystone Project can be expected to be well within industry standards. Further, the low probability of large, catastrophic spill events and the routing of the pipeline to avoid most sensitive areas suggest a low probability of impacts to human and natural resources. Nevertheless, some potential for construction- and operation-related spills can be expected.	Keystone and similar crude oil pipeline projects are required to comply with USDOT and state and local regulations regarding pipeline safety, leak detection, and spill response. The Platte pipeline (which is collocated with both the REX and Keystone Projects from the Nebraska/ Kansas border to Troy, Missouri and collocated with Keystone to Wood River, Illinois) could contribute to cumulative effects should an incident occur in relatively the same timeframe from each pipeline or facility.	The Keystone pipeline system would be designed, constructed, and maintained in a manner that meets or exceeds industry standards and regulatory requirements. Details regarding Keystone's Spill Prevention and Containment Plan are provided in Section 3.0 of Appendix B. Keystone's preventative maintenance, inspection, and repair program would monitor the integrity of the pipeline and make repairs if necessary. In compliance with applicable regulations governing the operation of pipelines, periodic inline inspections would be conducted to collect

TABLE ES-5
(Continued)

Resource	Draft EIS Section	Direct and Indirect Impacts	Cumulative Impacts[a]	Proposed Mitigation Measures[b]
				information on the status of pipe for the entire length of the system. In addition, line patrol, leak detection systems, SCADA, fusion-bond epoxy coating, and construction techniques with associated quality control would be implemented. To mitigate the impacts of small spills and leaks, refueling of construction equipment shall be conducted a minimum distance of 100 feet from the stream or a wetland.

[a] Cumulative impacts for each resource category are discussed in Section 3.14 of the Draft EIS.

[b] Mitigation has been proposed by Keystone at the time of Draft EIS publication and is summarized briefly in this table; additional details and a comprehensive list of measures proposed by Keystone are provided in Appendix B. Additional measures recommended by DOS can be found in the appropriate Draft EIS section for the resource.

ES.6.3 Water Resources

Overall, it is not anticipated that surface water or groundwater quality would be significantly affected by normal disposal activities (such as disposal of hydrostatic test water), non-catastrophic spills, or leaks during pipeline construction and operation. Hydrostatic testing, which would involve the uptake and discharge of water, should not cause any adverse impacts if Keystone's Construction, Mitigation, and Reclamation Plan (CMR) (Appendix B) is followed.

Many of the aquifers present beneath, or in the vicinity of, the proposed route are isolated by the presence of glacial till, which characteristically inhibits downward migration of water and contaminants into these aquifers. Although the pipeline has been routed to avoid most near-surface aquifers, in several areas shallow or near-surface aquifers are present beneath the proposed route. For these areas, measures have been proposed (such as containment structures) to reduce the potential impact of leaks and spills during construction. Keystone's CMR Plan (Appendix B) outlines procedures for contractor preparedness and emergency spill response to reduce the potential for contaminants to migrate into the aquifer during construction activities. Additionally, the risk of dewatering shallow groundwater aquifers or reducing groundwater quality through an increase in total suspended solids during construction likely would be temporary, and these aquifers are expected to recover quickly following construction activities. Construction and normal operations therefore are not expected to result in a long-term significant impact on groundwater.

Keystone has proposed three construction methods for crossing surface water bodies: dry-cut methods, open cut wet crossings, and horizontal directional drilling (HDD). The HDD method would avoid any impacts on water bodies; however, the open cut wet method, involving trenching while water continues to flow, would entail a high risk of temporary siltation to streams and other water bodies. Dry-cut methods are not feasible for wider streams. The risks of open-cut trenching could be temporary (for the duration of construction) or longer term (where compromised stream bank stability or bank erosion occurs). Keystone's CMR Plan (Appendix B) includes several measures to reduce siltation and erosion. Additional measures are recommended in the Draft EIS.

ES.6.4 Wetlands

Wetlands that would be affected within the ROW include emergent wetlands (403 acres), forested wetlands (80 acres), perennial riverine wetlands (37 acres), intermittent riverine wetlands (107 acres), and scrub-shrub wetlands (32 acres). While emergent wetlands would regenerate quickly after disturbance (within 3–5 years generally), forested and scrub-shrub wetlands would potentially experience long-term effects. Wetlands in parks or reserves have significant conservation value. Keystone would implement mitigation measures described in its CMR Plan, including restoration efforts in some cases. As a result of this environmental analysis, Keystone has committed to additional mitigation measures that would be included in a revised CMR Plan prior to construction. Additional recommended mitigation measures may be included in the specific permits issued by relevant jurisdictional agencies or conservation easement holders where applicable.

ES.6.5 Terrestrial Vegetation

Terrestrial vegetation classes include all the wetland classes in addition to grasslands, upland forest, and developed land. Grassland impacts due to pipeline construction are expected to be minimal, and affected vegetative communities generally are expected to reestablish within 2 years. Construction through 29 miles of previously untilled prairie could produce irreversible impacts, as prairie sod can take up to 100 years to recover. Keystone has identified several measures to limit impacts on vegetation in its CMR Plan (Appendix B) As a result of this environmental analysis, Keystone has committed to additional

mitigation measures that would be included in a revised CMR Plan prior to construction. Additional recommended mitigation measures may be included in the specific permits issued by relevant jurisdictional agencies or conservation easement holders where applicable.

Impacts on upland forest and shrubland would be longer term than those anticipated for grassland, because of the time required for these plant communities to reestablish and reach mature, pre-construction conditions.

ES.6.6 Wildlife

Pipeline construction would result in short-term disturbance and long-term modification to wildlife habitats. Increased habitat fragmentation would be experienced by white-tailed deer and other large mammals. Although disturbance of dens during winter hibernation could be potentially fatal for newborn black bears cubs, the probability of this event is extremely low, as black bear habitat minimally overlaps the ROW. Small game birds and rodents would be affected through destruction of nests and burrows, death of young or loss of eggs, and loss of foraging areas and cover. However, the total habitat loss is expected to be small in the context of total available habitat.

ES.6.7 Fisheries

Possible impacts to fisheries could occur through siltation and disturbance of streams crossed by the proposed pipeline. Following the proposed mitigation procedures during construction would result in minor short-term impacts to aquatic habitats and organisms. Any short-term disturbance caused by instream activities likely would resemble natural high-flow events in the stream. To mitigate impacts, construction would involve dry-ditch techniques at crossings where the timing of construction does not adequately protect environmentally sensitive water bodies, as determined by the appropriate regulatory authority.

In addition, Keystone has committed to using the HDD method at 17 designated major and sensitive water bodies (13 on the Mainline Project and four on the Cushing Extension). As a result of this environmental analysis, Keystone has agreed to prepare site specific crossing plans for each major water body and for water body crossings where important fisheries resources could be impacted that would not be crossed using HDD. All stream crossings would require the review and approval of the COE and other relevant agencies prior to construction.

Keystone has proposed to undertake hydrostatic testing during the spring, summer, and autumn months, overlapping with key spawning months of April to July. This overlap could affect some sensitive species during breeding.

ES.6.8 Threatened and Endangered Species

Federally protected threatened or endangered species with the potential to occur in the Keystone Project area include three birds, two mammals, four fish, two mollusks, and three plants. Candidate species include one reptile, one insect, and one fish. In addition to the federally protected species described above, six of the seven states crossed by the Keystone Project maintain state statutes and lists of endangered and threatened animals and plants. Most affected habitat would include croplands (13,594 acres) and grasslands (4,112 acres), followed by wetlands and open water (845 acres), and upland and riparian forests (1,078 acres). Loss of shrublands and wooded habitats would be long term (5–20 years) in reclaimed areas of the construction ROW.

As discussed in detail in the EIS, potential impacts on individual species include:

- Habitat loss, alteration, and fragmentation;
- Decreased breeding success due to disturbance from construction and operations noise and increased human activity;
- Direct mortality from project construction and operation and/or collision with or electrocution by power lines;
- Loss of individuals and habitats due to exposure to toxic materials or crude oil releases (addressed in Section 3.13).
- Reduced survival or reproduction due to decreased abundance of forage species;
- Interruption of foraging activities due to exposure to construction and operations noise and increased human activity.

ES.6.9 Land Use

Agricultural, rangeland, forestland, recreational/special use, commercial, and residential land use classes would be affected in areas intersected by the proposed ROW. The largest amount of acreage that would be affected by the Keystone Project would be agricultural land, followed by rangeland.

Keystone is planning to undertake construction over an 18-month period. During a short portion of that period while construction is underway in a specific area, agricultural lands in that area of the ROW would not be farmed. Keystone has agreed to compensate landowners for crop and other losses on a case-by-case basis. Keystone also has developed mitigation plans for limiting impacts on soil drainage mechanisms, compaction, irrigation systems, farm access areas, windbreaks and living fences, and Conservation Reserve Program (CRP) lands. After construction, nearly all agricultural land along the ROW would be allowed to return to production, and productivity is not expected to be reduced significantly over the long term. Approximately 140 acres would be necessary for construction of aboveground facilities; these acres would be permanently removed from farming production. Keystone has further sought to minimize impacts on rangelands by developing range-specific mitigation measures.

Although it is unclear at present exactly how many CRP acres would be affected by pipeline construction and operation, the Farm Service Agency has estimated that, in a worst-case scenario, over 16,000 acres of CRP land would be affected during construction, with over 6,500 acres remaining affected due to pipeline operation. It is likely that total affected CRP acreage would be less than these estimates. Impacts on CRP lands would include tilling of grasslands and clearance and tillage of forested lands; if within the operational ROW, these lands would not be allowed to regenerate during the life of the Project. Keystone would restore all disturbed CRP lands in consultation with the local FSA and NRCS offices. All CRP lands would therefore remain eligible for continued enrollment in the programs. Should any lands not be restored, such as forested CRP lands within the permanent ROW or should a pump station be sited on CRP lands, Keystone would compensate the landowners for demonstrated costs or lost revenue associated with the CRP programs. Keystone would work with each individual landowner where CRP lands are encountered, assisting individuals to inform the local FSA and to develop restoration plans to the satisfaction of the FSA and NRCS.

Thus, impacts on these lands would be localized but long term. Keystone would address these impacts, and any impacts to Farmable Wetland Program Lands and Wetlands Reserve Program lands, with NRCS and landowners on a case-by-case basis. Overall impacts on residential and commercial land uses are expected to be minor and would be addressed by Keystone through landowner negotiations on a case-by-case basis to ensure conservation values are mitigated.

Recreational lands potentially affected include bike trails, sightseeing areas, hiking trails, and wildlife viewing areas; public lands are limited along the ROW. Construction activities are anticipated to cause only temporary impacts. Keystone would coordinate with agency and land use managers to reduce conflicts between construction activities and recreational uses.

ES.6.10 Socioeconomics

The proposed pipeline construction has the potential to generate substantial direct and indirect economic benefits. Keystone is expected to utilize temporary local construction labor where possible. Work force demands would likely mean however that some non-local residents would temporarily move into the area of influence. This would translate into the need for additional housing units, rental units, and or hotel rooms. Keystone estimates that, at the local level, construction income benefits are expected to total from $28 to $48 million. Approximately 40 percent of the cost of construction goods and services, or from $44 to $52 million, would be spent locally.

Potentially negative impacts include agricultural losses, which would be compensated by Keystone during the easement procurement process, and increased demands on local highways and emergency services. Keystone does not anticipate any other increased public expenditures. Some disruption of traffic flows would be expected; Keystone would use public and preexisting private roads to access most of the ROW. Any impacts on local roads would be repaired by Keystone.

The impacts of operating the pipeline are expected to be positive. The cost of operational goods and services is estimated at $1.3 million per year, plus an additional $46.5 million for electricity. About 90 percent of this ($43 million annually) would be spent locally in the Project area. Approximately 26 permanent full-time jobs would be associated with operation of the pipeline, representing an annual payroll of $5.5 million. The project would generate additional property tax revenues of approximately $46.7 million throughout the Project area.

Agricultural losses along the pipeline corridor would likely be relatively low; however, in a very unlikely "worst case" scenario, over 16,000 acres of CRP-enrolled lands could be affected. This scenario assumes that all acreage enrolled in the program along the corridor would be sufficiently affected that the land would need to be removed from the program according to the rules of the CRP. In reality, the actual acreage that would be removed is likely to be a fraction of the overall enrolled acreage. Keystone has agreed to address the actual economic impacts resulting from crossing CRP lands on a case-by-case basis with the individuals potentially affected. In addition, as part of the ROW procurement process, Keystone would negotiate with the affected landowners to obtain an easement, compensating for any losses, including potential decreases in property values.

Expansion of the Wood River Refinery in response to increased crude oil deliveries from the Keystone pipeline is expected to generate both positive and adverse socioeconomic effects. Expansion of the Wood River Refinery is estimated to cost approximately $1 billion, which likely would include expenditures on capital equipment, other goods and materials, services, and labor. To the extent that these expenditures are made in the local region, for example Madison County, and industries are present to meet Project demands, the Project would result in substantial regional economic benefits. Within an input-output model framework, these benefits would include increases in direct, indirect, and induced economic output; value added (i.e., labor income, other property income, and indirect business taxes); and employment in the region.

In the long term, expansion of the Wood River Refinery would result in greater refining capacity and increased production/output in the refined petroleum industry. Based on an estimated 340,000 bpd in increased crude oil shipments and an approximate crude oil contract price of $60 per barrel, the estimated

value of refinery inputs is $20.4 million per day, or $744.6 million annually. Other socioeconomic parameters that could be affected by expansion of the Wood River Refinery include increases in fiscal revenues and increased demands for public services and other local resources.

Potentially adverse socioeconomic effects could occur—particularly during construction—as a result of increased demand for a range of public services, including law enforcement, fire protection, and medical aid. This could disproportionately affect lower income areas. Depending on the characteristics of the construction workforce, demands may increase for short-term housing in the region, such as hotels/motels and rental units, driving rents up and affecting lower income or minority populations. Other environmental justice concerns, such as disproportionate air and water quality impacts to communities, would not be expected.

ES.6.11 Cultural Resources

A cultural resource is defined as any historic district, archeological site, building, structure, or object that is either listed, or eligible for listing, in the National Register of Historic Places (NRHP). Cultural resources may also include traditional cultural properties. Resource types that have been currently identified within the Keystone Project APE include pre-contact and historic archaeological sites, historic-era farmsteads, railroads, historic trails, as well as historic cemeteries and pre-contact burial sites. The principal types of adverse effects that could occur for this project include physical destruction of or damage to all or part of the property caused by pipeline trenching or related excavations or boring, introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features by short term pipeline construction or construction of above-ground appurtenant facilities and roads, and change of the character of the property's use or of physical features within the property's setting that contribute to its significance.

To mitigate impacts to cultural resources, the Keystone Project is avoiding all cultural resources that are potentially eligible for listing in the NRHP. Avoidance is achieved by rerouting the pipeline corridor or related roadways, work spaces, and appurtenances; avoiding construction activities on NRHP-eligible properties; and by boring or using HDD beneath resources. Short term, construction-related impacts will be mitigated by implementing measures in Keystone's CMR Plan (Appendix B). If impacts do occur to any Eligible historic property or Unevaluated cultural resource, they will be resolved through consultation with all consulting parties, using the protocols that were developed for this project and outlined in the Programmatic Agreement (PA see Appendix R). The PA addresses unanticipated discoveries, future historic properties identification and evaluation efforts, avoidance commitments and measures, as well as the process for future consultation.

DOS is in the process of consulting under Section 106 of the National Historic Preservation Act (NHPA) with the SHPOs, Native American tribes, and the ACHP to make final determinations of NRHP eligibility and findings of effect for the cultural resources identified within the Keystone area of potential effect. Monthly consultation meetings and conference calls have been ongoing with interested agencies and tribes to share information on the Project and to develop the PA (Appendix R).

ES.6.12 Air Quality

Two types of impacts on air quality were considered for this analysis: temporary impacts resulting from emissions associated with construction activities, and long-term or permanent impacts resulting from emissions generated from continued operation of a stationary source.

Construction of the proposed Keystone Project would be similar to other pipeline projects in terms of schedule, equipment used, and types of activities. Because pipeline construction would move through an

area relatively quickly, air emissions typically would be localized, intermittent, and short term. Emissions from fugitive dust, construction equipment combustion, open burning, and temporary fuel transfer systems and associated tanks would be controlled to the extent required by state and local agencies, as explained above. Because Keystone would be required to comply with applicable regulations, emissions from construction-related activities would not significantly affect local or regional air quality. Project operations would not produce significant air quality impacts, and only minor emissions from the backup gasoline generator and fugitive emissions from valves, tanks, and pumping equipment would occur. Because operating emissions are expected to be minimal, no operational permits would be required.

ES.6.13 Noise

Construction would increase noise levels in the vicinity of Project activities; noise levels would vary during the construction period, depending on the construction phase. Residential, agricultural, and commercial areas within 500 feet of the Mainline Project and the Cushing Extension ROW would experience short-term inconvenience from construction equipment noise. Noise impacts from construction would be mitigated in accordance with Keystone's CMR Plan (Appendix B) to reduce effects on individuals, sensitive areas, and livestock. To limit disturbance of residential and commercial areas within 500 feet of construction activities by increased noise levels, Keystone would give advanced notice to landowners prior to construction, limit the hours during which construction activities with high-decibel noise levels are conducted, and ensure that construction proceeds quickly through such areas. Additional recommendations are summarized in Section 5.12.2.

During operation of the pipeline, the noise associated with the electric pump stations would be limited to the immediate vicinity of the facilities. Although noise impacts from the electric pump stations are projected to be minor, Keystone would perform a noise assessment survey during operations to confirm the level of noise at each listed noise-sensitive area. Project-related operations therefore are not expected to result in a significant effect on the noise environment.

ES.6.14 Reliability and Safety

As discussed in this EIS, the most common spills from pipeline construction and operations are the very small (< 5 bbl) and small (5–49.9 bbl) spills of diesel, hydraulic fluid, transmission oil, and antifreeze on work pads, roads, and facility parking or work areas. Some small spills may result from slow and small leaks of crude oil from the pipeline. Most of these small spills would not reach non-facility land or water bodies. Significant (50–499.9 bbl) and large (500–5,000 bbl) spills are much less common. Significant spills are more likely to: (1) be caused by accidents at construction and operation/maintenance sites; (2) be composed of refined products; and (3) occur on or near roads, construction pads, facility sites, or along the ROW.

Very large (>5,000 bbl) spills are a highly unlikely, but nonetheless possible, event. They are likely to result from a major rupture or a complete break in the pipeline and would release crude oil somewhere along the ROW. Causes could include corrosion; major earth movement resulting from slides, earthquakes, or flood flows eroding river banks at non-HDD crossings; mechanical damage from excavation work; or vandalism and terrorist actions. The actual volumes spilled could vary, depending on the location and the activation methods and times for valves, pressure in the line, actual location of the break, the extent to which the pipeline follows the topographic contours and presence of low spots in the pipeline, and other factors.

The Keystone pipeline system would be designed, constructed, and maintained in a manner that meets or exceeds industry standards and regulatory requirements. The proposed Keystone Project would be built within an approved ROW. Signage would be installed at all road, railway, and water crossings—

indicating that a pipeline is located in the area—to help prevent third-party damage or impact to the pipeline. Keystone would manage a crossing and encroachment approval system for all other operators. Keystone would ensure safety near its facilities through a combination of programs encompassing engineering design, construction, and operations; public awareness and incident prevention programs; and emergency response programs. Details regarding Keystone's Spill Prevention and Containment Plan are provided in Section 3.0 of the CMR Plan (Appendix B).

Keystone's preventative maintenance, inspection, and repair program would monitor the integrity of the pipeline and make repairs if necessary. Keystone is required to prepare an Integrity Management Plan that would describe Keystone's Pipeline Maintenance Program in detail. In compliance with applicable regulations governing the operation of pipelines, periodic inline inspections would be conducted to collect information on the status of pipe for the entire length of the system. Additional types of information collected along the pipeline would include cathodic protection readings, geotechnical investigations, aerial patrol reports, and routine investigative digs. In addition, line patrol, leak detection systems, SCADA, fusion-bond epoxy coating, and construction techniques with associated quality control would be implemented

The reliability and safety of the Keystone project if designed, constructed, and operated as discussed herein would be well within industry standards. The low probability of large, catastrophic spill events and the routing of the pipeline to avoid most sensitive areas suggest a low probability of long term impacts to human and natural resources. Nevertheless, some potential for construction- and operation-related spills can be expected. Commitments and procedures described for reliability and safety in Appendices B and C are intended to mitigate spill effects, particularly when considered in combination with rapid and effective response and clean-up procedures.

ES.6.15 Cumulative Impacts

As defined in 40 CFR 1508.7, cumulative impacts are the incremental impacts on the environment resulting from adding the proposed action to other past, present, and reasonably foreseeable future actions. Cumulative impacts were assessed by combining the potential environmental impacts of the proposed action with the impacts of projects that have occurred in the past, are currently occurring, or are proposed in the future within the pipeline corridor or in the vicinity of the pipeline ROW.

ES.6.15.1 Past and Existing Projects

Several existing pipelines transport natural gas liquids and compressed natural gas across North Dakota, South Dakota, and Nebraska from hubs in Montana to the west or Illinois to the east. The Williston Basin Pipeline carries compressed natural gas and crosses through the southern part of North Dakota, and a natural gas liquid pipeline crosses the southeast corner of Nebraska and continues in a southwest direction through Kansas. Portions of this pipeline may parallel the Keystone Project but are likely to be well outside of the Keystone Project ROW. In Oklahoma, Northern Natural Pipeline, NGPL of America, Williams Natural, Duke Energy, Oklahoma Natural Gas, and the Lone Star Gas Company all have lines that may parallel or intersect the Keystone Project but are not necessarily collocated (Oil Week Magazine 2005).

The Express pipeline is an existing 24-inch-diameter pipeline that interconnects with the Platte Pipeline, an existing 20-inch-diameter pipe, at Casper, Wyoming. This 1,700-mile pipeline system transports crude oil from Alberta's oil sands in Hardisty, Alberta to refineries in the U.S. Rocky Mountain and Midwest regions. In the United States, the pipeline crosses Montana, Wyoming, Nebraska, Kansas, and Missouri, and terminates in Wood River, Illinois. The section known as the Platte pipeline was built in 1952; the

proposed Keystone Project would be collocated with the existing Platte pipeline from the Nebraska/ Kansas border to the Wood River, Illinois terminal.

Along the proposed Keystone Project corridor, multiple existing utility corridors serve local and regional needs. For example, the WEB Water Development Association provides high-quality water service to 7,728 rural hookups, 100 towns and bulk users, and five ethanol plants in a 17-county service area, which includes 14 counties in South Dakota and three counties in North Dakota. The Keystone Project would cross WEB-owned PVC water pipelines at eight locations in Day and Clark Counties South Dakota. In addition, numerous existing transportation projects, such as interstate and state highways and railroads, parallel or intersect the proposed Keystone pipeline ROW.

ES.6.15.2 Reasonably Foreseeable Future Projects

The Rockies Express Western Phase Project (REX Project) would include construction and operation of approximately 795.7 miles of natural gas pipeline that would transport natural gas from the Cheyenne Hub in Colorado to its terminus at the Panhandle Eastern Pipe Line Company interconnect in Audrain County, Missouri. A portion of the proposed REX pipeline would parallel the Keystone pipeline from the Nebraska/ Kansas border to Troy, Missouri (approximately 280 miles).

The REX Project proposes to construct the Turney Compressor Station, a large aboveground facility near Plattsburg in Clinton County, Missouri that is up to several miles east of the proposed location for Keystone's Pump Station 31, and a compressor station near Steele City Gage County, Nebraska that is along the ROW for the Keystone Mainline Project.

Enbridge is proposing three expansion projects to help address current and future increases in refinery demand as supply from the WCSB increases. The Southern Access, is an expansion and extension of Enbridge's existing pipeline system, including new pipeline in Wisconsin and Illinois; the Southern Lights is a crude oil pipeline from the U.S. – Canada border at Cavalier County, North Dakota, to Clearbrook, Minnesota; and the Alberta Clipper is a new crude oil pipeline from Alberta to Superior, Wisconsin. As presently planned, these pipelines would cross Minnesota and part of Wisconsin. The sections supplying Cushing, Oklahoma and Wood River, Illinois do not appear to be collocated with the proposed Keystone Project ROW. The applicability of these projects as System Alternatives for the Keystone Project is discussed in Section ES.5.2.

Proposed non linear-projects collocated with the Keystone Project and the REX pipeline in Missouri include an ethanol plant in Audrain County (unknown completion date), and a coal-fired power plant in Carroll County (anticipated completion in 2013).

ES.6.15.3 Cumulative Impacts

Geology, Soils, and Sediments

Construction of the REX pipeline and the Keystone Project would require the commitment of granular borrow resources from areas along the pipeline corridors and areas near appurtenant facilities for the lifetime of the pipelines and related facilities. In addition, these projects and the proposed ethanol plant could result in a cumulative impact on clay pits in Audrain County, Missouri. Given the limited areal extent of the Keystone Project in comparison to the potential mineral extraction areas along the corridor, construction of the Keystone Project is not likely to result in cumulative impacts that would affect future exploitation of mineral resources in that area.

Along with construction of pipelines, roads, and other surface-disturbing activities, construction of the Keystone Project could contribute to the cumulative exposure and potential loss of scientifically valuable

fossils in the project area. However, should Keystone prepare and follow a Paleontological Resources Protection Plan, significant fossil resources that may be encountered during Project construction would be identified and protected, thereby ensuring that the Keystone Project would not contribute to cumulative effects on these resources.

Potential cumulative erosion effects could occur where construction disturbance areas overlap, or are located near each other, particularly along the sections of Keystone pipeline that are collocated with REX. However, the existing pipelines, utility, and roadway projects have been installed for a number of years and the construction ROWs have been partially or completely restored to pre-existing conditions. Irrigated hayfields and pasturelands have returned to their prior uses. Both the REX Project and the Keystone Project would apply best management practices (BMPs) for soil management and protection to the pipelines and appurtenant facilities. Revegetation mixtures that are appropriate to soil conditions and expected future uses (such as grazing and wildlife habitat) would be applied to the disturbed areas. Consequently, the potential for cumulative erosion effects caused by one or more of these projects is low because consistent erosion control practices would be applied, and structural erosion control measures would be integrated between and among adjacent projects

Water Resources

Groundwater potentially would be used for Keystone, REX, and other collocated or nearby construction projects to control dust generated and for other uses during construction. Keystone does not propose to use groundwater for hydrostatic testing; however, groundwater could be used for hydrostatic testing for certain portions of the REX Project (FERC 2006). In addition, contaminant spills during construction could occur from any project in the cumulative impact study area during construction or operation. Each project would be required to implement spill containment and control plans as required by federal and state agencies. No additional cumulative impacts on groundwater volume or quality from the Keystone Project are expected.

Impacts due to crossing of surface waters by linear projects, such as highways and pipelines, are generally localized and short term. However, if construction activities of the Keystone Project and the collocated portion of REX pipeline follow a similar schedule, there could be a cumulative contribution to incremental sedimentation in adjacent surface waters. At present, the project schedules show construction of the two projects separated by at least a year. In addition, each project—as well as any other collocated construction projects—would be required to follow BMPs and permit conditions to protect surface waters.

Both the Keystone Project and other portions of the REX Project plan to use surface water for hydrostatic testing. However the timing for REX withdrawals would not overlap with withdrawals planned for Keystone; therefore, cumulative effects on surface water or groundwater due to hydrostatic test water withdrawals would not occur.

Wetlands

Cumulative impacts on wetlands would occur in locations where any of the Keystone Project and REX pipelines or other construction projects would be collocated while crossing wetlands. A portion of the REX Project would be collocated with the Keystone pipeline for about 280 miles. Within the Keystone Project pipeline collocation, the REX pipeline would disturb a total of 77.5 acres of wetlands (55.0 acres of forested wetland, 1.3 acres of scrub-shrub wetlands, and 21.2 acres of wet meadow and marsh) (FERC 2006). Should the Keystone pipeline affect the same or similar wetland habitats within the collocated area, but within its respective construction ROW, total wetland impacts within the collocated area could be 156.0 acres of wetlands. Both projects would follow mitigation measures to protect wetlands. In the

case of REX, the FERC Procedures would apply. Other construction projects, such as town expansions, new roads and highways, and other industrial facilities—both within the section of the Keystone Project that is collocated with REX, and in other areas along the Mainline Project and Cushing Extension—could affect additional wetlands. However, applicants for any projects that would place fill in waters of the United States would be subject to conditions in the U.S. Army Corps of Engineers' Section 404 permits and to state and local water quality permits. None of the wetlands crossed by the Keystone Project would be permanently filled or drained. Long-term impacts would occur to forested and scrub-shrub wetlands which would be maintained in a herbaceous state. The Keystone Project would use best management practices to avoid and minimize impacts to wetlands and would be required to mitigate unavoidable impacts to jurisdictional wetlands as determined through the Section 404 process and other relevant permitting procedures.

Terrestrial Vegetation and Wildlife

The total amount of native vegetation and wildlife habitat that may be affected by all of the reasonably foreseeable projects, including the Keystone Project, is relatively small because the projects cross primarily previously tilled agricultural lands. Impacts resulting from construction of the pipelines and other linear and non-linear projects would result in the long-term and permanent loss of trees and shrubs and would cause incremental increases in habitat loss and fragmentation of forested areas. The effects of habitat fragmentation would be reduced by collocation of the linear projects with existing and proposed ROWs where they are located away from large areas of intact forested habitats. Habitat fragmentation would be exacerbated where ROWs are collocated across large areas of intact forested habitats. All of the projects would implement mitigation measures designed to minimize the potential for erosion, revegetate disturbed areas, increase the stabilization of site conditions, and control the spread of noxious weeds—thereby minimizing the degree and duration of the cumulative impact on vegetation from these projects.

Construction and operation of pumping stations for Keystone and compressor stations for REX also would permanently affect vegetation and wildlife habitat. Keystone would require a total of about 61 acres of land along the Mainline Project (for aboveground facilities, including pump stations, delivery facilities, and mainline valves) and about 13 acres for similar facilities along the Cushing Extension. The two compressor stations for the portion of REX that is collocated with the Keystone Project each would affect about 13 acres.

Construction and operation of the Keystone Project, along with the reasonably foreseeable projects, would result in short-term disturbance to wildlife and long-term wildlife habitat modification. Keystone would incrementally add to the area of habitat disrupted and to the disturbance of resident and migrating species, causing associated impacts on these species as they adjust to the changes brought about by the proposed projects. Increased movement or displacement of species dependent on the disturbed habitats could reduce carrying capacities, reproductive effort, or survival. This potential is greater for species for which suitable habitat is limited in the Project area or that are otherwise sensitive to disturbance.

Removal of woodlands and shrublands would result in a long-term reduction of wildlife habitat because the regeneration of woody species is typically slow in the Project region. However, most of the Project area consists of relatively open fields or is presently used for agricultural purposes. Habitat types potentially crossed or affected are widely available for wildlife use outside of the immediate area of disturbance. In addition, each proposed project would be required to follow appropriate mitigation measures to minimize impacts or compensate for unavoidable impacts on wildlife.

Fisheries

Stream channel disturbance and hydrostatic test water withdrawals from water bodies in Kansas and Missouri would occur during the Keystone Project, including in areas where the REX pipeline would parallel the Keystone pipeline. Because construction schedules for the REX pipeline and the other non-linear projects are different from the Keystone Project, cumulative impacts on fisheries would not occur. If construction of facilities or other projects does become concurrent due to schedule changes, the Keystone Project would contribute to cumulative sedimentation impacts on fisheries. Nevertheless, these impacts would be short term and minor due to implementation of mitigation measures and the requirements of any individual state permits to minimize impacts while crossing water bodies.

Threatened and Endangered Species

Because the Keystone pipeline would parallel the REX pipeline across Kansas and Missouri, many of the state and federally listed threatened and endangered species could potentially be affected by construction and operation of these projects. Each project is required to consult with federal, state, and local agencies to determine which species may occur within each individual project area; evaluate potential impacts on those species during construction and operation; and implement measures to avoid, minimize, or mitigate impacts on special-status species and their habitats. Because all applicants would be required to restore their respective construction ROWs and follow all applicable laws and regulations regarding special-status species and habitats, the contribution of the Keystone Project to cumulative impacts on special-status species and their habitats would not be significant.

Land Use, Recreation and Special Interest Areas, and Visual Resources

New land requirements for construction and operation of the aboveground facilities for the Keystone pipeline would involve acquisition of about 109 acres of land along the Mainline Project and 18 acres for similar facilities along the Cushing Extension. Land use changes associated with the collocated portion of the REX pipeline would cumulatively add to the acreage of aboveground oil and gas facilities in the Project area. In addition, the ethanol and coal-fired power plants that would be constructed in Audrain County and Carroll County, Missouri, respectively, would further increase the amount of land in those counties that would be converted to industrial use.

Recreation and special interest areas to the west of Troy, Missouri that would be crossed by the Keystone pipeline also would be potentially affected by the REX pipeline. This includes a number of conservation and hunting areas that are either privately or publicly owned. Recreational uses of these areas could be temporarily affected during construction activities for the pipelines. Mitigation measures created to protect the conservation area and parks would minimize the contribution of Keystone to recreational impacts.

A significant contribution to cumulative effects on visual resources from the Keystone Project is not expected due to collocation with other linear projects, restoration of the ROW, and the lack of sensitive visual resource areas that would be crossed. The majority of aboveground facilities associated with both the Keystone and REX Projects would be located in agricultural or rangeland areas, or adjacent to existing industrial facilities. In addition, the new aboveground facilities associated with the projects would be limited in number and widely distributed. Mitigation measures such as screening with vegetation and use of non-reflective paints that are similar in color to the surrounding terrain would help to minimize visual impacts.

Overall, the Keystone Project would contribute to cumulative impacts on agricultural land use and farming practices and on recreation and visual resources along the extent of the proposed ROW. While

construction of new pipelines parallel to existing corridors would incrementally reduce the area available for future development, use of established utility corridors would concentrate the cumulative land use and other impacts into a less extensive area.

Socioeconomics

Portions of the construction period and locations for the Keystone Project and the collocated portion of the REX Project could overlap due to delays or other issues. These projects, together with any other linear and non-linear projects planned for the Project area, would require workers to temporarily relocate to the Project area during construction, potentially inducing housing shortages at certain locations during certain periods of the construction schedule. Workers would be dispersed over the entire length of the pipeline route and throughout the counties and states crossed by the pipelines. Based on the review of the information regarding availability of local rental housing for both projects, the combined number of non-local workers may exceed the available housing in a given area. However, the preference of most workers likely would be short-term accommodations, primarily in hotels and motels that would be found in the more populated, service-oriented communities located within a reasonable commuting distance from the work site.

During construction of the Keystone Project, expenditures for payroll, local purchases, and related tax revenues would provide a short-term beneficial impact to the affected counties. Similar benefits are likely to be associated with the REX Project and any other non-linear or industrial projects. The increased tax revenue paid to the state and local governments over the life of the projects also may result in a beneficial long-term cumulative impact. Operation of the proposed facilities would require relatively few permanent employees; thus, there would be no long-term cumulative or additive impacts on population, housing, or municipal services in the Project area.

Cultural Resources

To date, the REX Project surveys have identified nine potential historic properties in Nebraska, Kansas, and Missouri that may also be in the vicinity of the Keystone Project. Federally regulated projects such as Keystone and REX are required to conduct cultural resources surveys and identify historic properties that may be affected by those projects. In accordance with 36 CFR 800, the ACHP's regulations for implementing Section 106 of the NHPA, the lead federal agencies for those projects would consult with the appropriate SHPOs, Native American tribes, and other consulting parties, and would mitigate impacts on any historic properties that may be adversely affected. Other potential non-federal actions in the Project area would be required to comply with any identification procedures and mitigation measures required by the state where the action is proposed. Therefore, no cumulative impacts on cultural resources are expected. Keystone has mitigated possible effects on potentially eligible cultural and historical properties through avoidance wherever possible. As a result of collocation with existing disturbed alignments for substantial distances along the proposed ROW and avoidance of potentially eligible properties wherever possible, the incremental impact of the Keystone Project to cultural resources is minor.

Air Quality

Should construction periods overlap, the proposed Keystone Project would incrementally add to dust generation and combustion emissions from heavy equipment that also would be produced by the other reasonably foreseeable future projects discussed above. Cumulative fugitive dust (particulate) increases could occur where the REX, Keystone, and other non-linear construction projects use the same access road systems.

On a local scale, cumulative increases in air emissions could occur where new compressor or pump stations are located at or near existing or proposed compressor stations, or other existing industrial facilities. Depending on the final locations for pump stations for the Keystone Project, facilities also could be located near a proposed ethanol plant in Audrain County, Missouri and the proposed coal-fired power plant in Carroll County, Missouri. Each pump or compressor station and ethanol or power plant would be required to obtain state construction and operation permits, and potential interactions with nearby emission sources would be considered in these permit applications. Emissions from the facilities would be reduced by best available technology.

The majority of the potential cumulative construction and operational effects on air quality due to the Keystone Project would be negligible because of the large geographical area over which the various existing and reasonably foreseeable projects are located, and the fact that these projects likely would be constructed over varying periods.

Noise

The Keystone Project, along with the projects discussed above, would contribute to ambient noise levels during construction. Construction noise impacts would be temporary and would occur only during the construction period for each facility or linear project. Because construction proceeds in sections along the pipelines and linear projects, the duration of construction activities—and therefore noise impacts—at any given location at any given time would be limited and short term. Cumulative effects on ambient noise levels would occur only if construction on a congruent section of each project occurred simultaneously.

No new major sources of noise are expected during operation of the Keystone facilities that would be near or collocated with facilities associated with the other reasonably foreseeable projects. Noise levels resulting from operation of the pump stations for Keystone and the meter and regulator facilities for REX would be minimal or not noticeable, as the proposed facilities would be located in areas of low population density. Consequently, no cumulative impacts are expected. Based on a review of available information, it appears that Keystone's Pump Station 31 could be located up to several miles west of REX's proposed Turney Compressor Station in Clinton County, Missouri. Taking into account the geographical locations of the two stations, the noise data available, and preliminary calculations, Keystone's contribution to cumulative noise impacts during operations would not be significant.

Reliability and Safety

Landowners have expressed concerns about the safety of collocating multiple pipelines in a common corridor across their property. As described in this Draft EIS, Keystone is required to comply with USDOT and state and local regulations regarding pipeline safety, leak detection, and spill response. Because the REX Project will transport natural gas rather than any type of liquid material, cumulative effects caused by spills and leaks of crude oil are not expected from the two collocated pipelines. The Platte pipeline (which is collocated with both the REX and Keystone Projects from the Nebraska/Kansas border to Troy, Missouri and collocated with Keystone to Wood River, Illinois) could contribute to cumulative effects should an incident occur in relatively the same time frame from the Keystone pipeline and from one or several of the other pipelines or facilities. Large release events are rare however and therefore the likelihood of an event occurring in the same general area within two separate pipeline systems is remote.

Greenhouse Gases and Global Warming

In attempting to meet the purpose and need for the Keystone Project, construction and operation of the proposed Project would incrementally increase the cumulative impact of greenhouse gas emissions. The

carbon emissions associated with construction and operation would occur irrespective of the routing of the pipeline. However, the ultimate construction and operation of the pipeline would offset potential emissions associated with other methodologies for meeting the demand for imported crude oil, such as delivery of crude oil by tanker from alternative international sources. Keystone has committed to restoration and replanting of vegetative cover along the proposed pipeline corridor to the extent compatible with safety and operational requirements. This commitment would allow any advantages associated with carbon sinks along the proposed corridor to be reestablished after temporary disruption during the construction phase. Therefore, the incremental contribution to greenhouse gas emissions associated with construction and operation of the proposed Keystone is likely to be relatively small compared to the nationwide production of greenhouse gases on an annual basis.

ES.6.16 Conclusions

The analysis presented in this EIS is based on information provided in ten filings by TransCanada and was further developed from three data requests; public and agency scoping; literature research; alternatives analysis; and contacts with federal, state, and local agencies. Based on the information provided in Section 3.0 of this Final EIS for each resource category, DOS concludes that the proposed Keystone Mainline Project and Cushing Extension, if designed, constructed, and operated in accordance with the Project Description in Section 2.0 of this Final EIS as amended by additional approaches and mitigations agreed to by Keystone as a result of this environmental analysis and as further amended by specific permit conditions to be assigned by the state and federal agencies with permit jurisdiction along the pipeline corridor would result in limited adverse environmental impacts.

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