3.14 CUMULATIVE IMPACTS

The analysis of cumulative impacts in this EIS employs the definition of cumulative impacts found in the Council on Environmental Quality's (CEQ) regulations implementing NEPA: "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions" (40 CFR 1508.7). Not all actions identified in this chapter would have cumulative impacts in all discipline areas. Potential impacts for such actions are discussed for the appropriate discipline areas. In some instances for which an action is reasonably foreseeable, quantitative estimates of impacts are not possible because the action is in its early stages.

Although rare in occurrence, it is plausible that accidental or emergency events may arise due to an unforeseen chain of events during the Project's operational life. As a result of the rarity and magnitude of such events, they have not been assessed here, as they are extreme in nature when compared to the effects of normal operation and maintenance activities, and require separate response plans. For an assessment of the potential short- and long-term effects of oil releases to the environment, see Section 3.13 (Risk Assessment and Environmental Consequences Analysis).

3.14.1 Methods

Cumulative impacts were assessed by combining the potential environmental impacts of the Project with the impacts of projects that have occurred in the past, are currently occurring, or are proposed in the future within the Project corridor or in the vicinity of the Project right-of-way (ROW). The actions considered in the cumulative impact analysis may vary from the proposed Project in nature, magnitude, and duration. These actions are included based on their likelihood of occurrence, and only projects with either ongoing or reasonably foreseeable impacts are identified.

The anticipated cumulative impacts of the proposed Project and these other actions are discussed below, along with any pertinent mitigation actions. In general, the analysis of cumulative impacts in this chapter follows the process recommended in the Council on Environmental Quality (CEQ) handbook *Considering Cumulative Effects Under the National Environmental Policy Act* (DIRS 103162-CEQ 1997, all). This process includes the identification, through research and consultations, of Federal, non-Federal, and private actions with possible effects that would be coincident with those of the Project on resources, ecosystems, and human communities. Coincident effects would be possible if the geographic and time boundaries for the effects of the Project and past, present, and reasonably foreseeable future actions overlapped.

3.14.1.1 Scope of the Cumulative Impacts Analysis

For the purposes of this cumulative impacts analysis, the Project area encompasses not only the area of physical disturbance along the Project construction ROW, but adjacent areas that could have localized impacts associated with temporary access roads and aboveground facilities. In addition, the Project area extends approximately 1 mile from the Project ROW to account for potential impacts of noise and dust and potential impacts to visual resources. The Project area boundary is beyond the zone of influence of pipeline construction and operation activities (e.g., dust and noise), and consequently, it is expected that the identified effects will diminish to background levels within the Project area (also known as the Project corridor). As described in Section 3.14.3.14, the cumulative impacts of emissions, including greenhouse gases, are considered at a regional or national level. Any analysis of cumulative impacts from activities in territory under the jurisdiction of another nation, or on the environment in the territory of another

nation, are not required by DOS regulations, 22 CFR 161.12, or by Executive Order 12114, Environmental Affects Abroad of Major Federal Actions.

The temporal boundaries for this analysis reflect the nature and timing of Project activities and the availability of information surrounding future projects that have a high probability of proceeding. The Project schedule identifies two key milestone activities that is considered in this cumulative impacts assessment; including, i) construction – 2011-2012[1]; and, ii) operation – 2011 through 2061. Fifty years of Project operation is used as an assumption for the purpose of this analysis, although the pipeline system may be operational beyond fifty years. There currently is no plan for abandonment of the project at this time. The period 2011-2012, covering construction and post-construction clean-up activities, was selected to represent the construction and reclamation period. Forecasting beyond 2013 increases the uncertainty in predicting whether future projects would proceed, and the effects associated with these unrelated projects. For the purpose of this analysis, short-term effects are those that would occur during the construction period, and long-term impacts are those that would occur over the operational lifetime of the Project.

3.14.2 Past, Present, and Reasonably Foreseeable Projects

The Project area includes numerous existing, under construction, and planned linear energy transportation systems, including natural gas pipelines, crude oil pipelines, and electric transmission lines. Additionally, the Project area supports a major water delivery project and a number of energy development projects, including producing oil and natural gas well fields (with associated collection piping systems), coal mines, and wind power facilities.

The projects to be considered in the cumulative impact analysis were identified through comments, scoping, and independent research including queries to the PHMSA National Pipeline Mapping System (https://www.npms.phmsa.dot.gov/). Table 3.14.2-1 below outlines multiple existing, under construction, or proposed projects that may contribute to cumulative impacts within the Project area. While Table 3.14.2-1 may not include an exhaustive list of projects that may contribute to regional cumulative impacts, the analysis of the cumulative impact of these projects are representative of the effects that could arise from any other existing or future projects that have not yet been identified. Those projects that are considered to have the greatest potential to contribute to cumulative impacts in the Project area are discussed in more detail in the Sections 3.14.2.1 through 3.14.2.5. The potential impacts associated with these projects that are most likely to be cumulatively significant are related to wetlands and waterbodies, vegetation and wildlife, land use, air quality, noise, and socioeconomics. A detailed description of potential cumulative impacts by resource category is presented in Section 3.14.3.

TABLE 3.14.2-1
Existing, Under Construction or Proposed Projects That Could Cumulatively Impact Environmental Resources in the Project Area

Project Name (Status)	Description	States Crossed	Relationship to KXL
Crude Oil Pipelines			
Express Pipeline System (Express Pipeline and Platte Pipelines; Existing)	Approximately 1,700—mile-long crude oil pipelines that are 20- and 24-inches in diameter.	Montana, Wyoming, Nebraska, Missouri, and Illinois.	Portions of this pipeline would likely intersect the Project area in southern Nebraska.
Keystone Mainline Oil	Approximately 1,379–mile-	North Dakota, South	Portions of the pipeline

[1] The Project is planned to be placed into service in phases. The Gulf Coast Segment and the Houston Lateral are planned to be in service in 2011, and the Steele City Segment is planned to be in service in 2012.

TABLE 3.14.2-1 Existing, Under Construction or Proposed Projects That Could Cumulatively Impact Environmental Resources in the Project Area			
Project Name (Status)	**Description**	**States Crossed**	**Relationship to KXL**
Pipeline (Existing)	long crude oil pipeline has a design capacity between 435,000 bpd to 591,000 bpd.	Dakota, Nebraska, Kansas, Missouri and Illinois.	contained in the Project area near Steel City, Nebraska.
Keystone Cushing Extension (Under Construction)	296-miles–long crude oil pipeline. The target in-service date for this pipeline is 2010.	Nebraska, Kansas and Oklahoma.	The proposed Project area would overlap with both ends of the Keystone Cushing Extension near Steele City, Nebraska, and Cushing, Oklahoma.
Natural Gas Pipelines			
Williston Basin Interstate Pipeline System (Existing)	A 3,364-mile-long natural gas pipeline transmission system.	Montana, North Dakota, South Dakota, Wyoming, Colorado, and Kansas	Portions of this pipeline system may intersect the Project area in Montana and South Dakota.
Northern Border Pipeline (Existing)	A 1,249-mile-long interstate natural gas pipeline with a design capacity of approximately 2.4 billion cubic feet of gas per day.	Montana, North Dakota, South Dakota, Minnesota, Iowa, Illinois, and Indiana.	Portions of this pipeline would be within the Project area in northeastern Montana and would be collocated with the proposed Project for approximately 21.5 miles.
Enterprise Product Onshore Pipeline System (Existing)			Portions of the system may intersect and be located within the Project corridor in Texas.
Northern Natural Gas (Existing)	Operates a network of approximately 15,141 miles of natural gas pipelines.	Minnesota, Wisconsin, Michigan, Iowa, South Dakota, Illinois, Nebraska, Kansas, Oklahoma, and Texas.	Portions of this pipeline network would be in the Project area in Nebraska, South Dakota, and Montana.
Natural Gas Pipeline of America (Existing)	Approximately 9,800 miles of natural gas transmission system	Illinois, Iowa, Nebraska, Kansas, Oklahoma, Texas, New Mexico, Missouri, and Arkansas.	Portions of this pipeline would be located within the Project corridor in Texas and Oklahoma.
Oklahoma Natural Gas Company System (Existing)	Approximately 2,500 miles of transmission pipeline.	Oklahoma.	Portions of the system may intersect and be located within the Project corridor in Oklahoma.
Lone Star Pipeline System (Existing)	Approximately 7,746 miles of gathering and transmission pipelines.	Texas.	Portions of the system may intersect and be located within the Project corridor, but a majority of the pipeline system would be located outside of the Project area.

TABLE 3.14.2-1 Existing, Under Construction or Proposed Projects That Could Cumulatively Impact Environmental Resources in the Project Area			
Project Name (Status)	**Description**	**States Crossed**	**Relationship to KXL**
Transco Pipeline System (Existing)	Approximately 10,560 miles of transmission pipeline with a system design capacity of approximately 8.1 billion cubic feet per day.	Texas, Louisiana, Mississippi, Alabama, Georgia, South Carolina, North Carolina, Virginia, Maryland, Pennsylvania, New Jersey, and New York.	Portions of the system may intersect with and be located in the Project corridor in Texas.
Gulf Crossing Pipeline (Existing)	Approximately 374-mile-long, 42-inch-diameter, interstate natural gas pipeline with a capacity of approximately 1.73 billion cubic feet per day.	Oklahoma, Texas, Louisiana, and Mississippi.	Portions of this pipeline would be within the Project area in Oklahoma and Texas and the Gulf Crossing Pipeline would be collocated with the proposed Project between Lamar County, Texas, and Bryan County, Oklahoma.
Golden Pass Pipeline (Existing)	Approximately 69 miles of 42-inch-diameter pipeline with a transportation capacity of approximately 2.5 billion cubic feet per day.	Texas, Louisiana.	Portions of the pipeline would be located within the Project corridor along the Gulf Coast Segment in Texas.
Bison Natural Gas Pipeline (Proposed)	Proposed 301-mile, 30-inch-diameter pipeline system, capacity 500 MMcf/d, The projected in-service date is late 2010.	Wyoming, Montana, and North Dakota.	Portions of the pipeline would be located within the Project corridor in Fallon County, Montana.
Bakken Formation connection pipeline to Keystone XL (Future)	Potential connection between the Bakken Formation and the proposed Project that would transport 50,000 to 100,000 barrels.	Montana, North Dakota	The location of this pipeline is unknown, but because it would connect to the proposed Project, a portion of the connection pipeline would be located in the Project corridor.
Carbon Dioxide Pipeline			
Green Pipeline (Under Construction)	Approximately 320–mile-long, 24-inch-diameter pipeline. Transport capacity will be 800 million standard cubic feet per day. Anticipated in-service date is late 2010.	Louisiana, Texas.	Portions of this pipeline would be within the Project area in Texas and would be collocated with the proposed Project for approximately 46 miles between Beaumont, Texas, to the start of the Houston Lateral.
Water Delivery Systems			
Dry Prairie Rural Water System (Under Construction)	The System will provide drinking water to approximately 27,434 people in eastern Montana. The water delivery system will consist of 12- to 15-inch-diameter PVC water delivery pipelines throughout the service	Montana.	Portions of the system may intersect and be located within the Project corridor in northeastern Montana.

TABLE 3.14.2-1 Existing, Under Construction or Proposed Projects That Could Cumulatively Impact Environmental Resources in the Project Area			
Project Name (Status)	**Description**	**States Crossed**	**Relationship to KXL**
	area.		
Electric Transmission Lines			
Mountain States Intertie Project (Proposed)	Approximately 430 miles of 500-kV line from Townsend, Montana to Midpoint, Idaho. Estimated in-service date is 2013.	Montana, Idaho.	Mountain States Intertie Project would be located in western Montana; therefore, the project would not be located in the Project area.
Nebraska Public Power District (Proposed)	Upgrade existing transmission system by building more than 140 miles of 345-kV and 115-kV transmission lines to increase system reliability, connect to new crude oil pumping stations, and interconnect proposed wind farms. Anticipated to be completed in the summer of 2012.	Nebraska, Kansas.	Potential transmission line would be located within the Project corridor. A portion of the expansion lines would be used to power some of the Project pump stations in Nebraska.
Zephyr and Chinook Projects (Proposed)	Two 500-kV power transmission lines that would each be over 1,000-miles-long in length. Completion of construction anticipated in 2015.	Montana, Wyoming, Idaho, Nevada	The Zephyr and Chinook Projects would likely be located in west central Montana; therefore, the project would not be located in the Project area.
Kansas V-Plan (Proposed)	Approximately 180 miles of 765-kV transmission line. Anticipated to be completed in 2013.	Kansas.	The Kansas V-Plan would be located west of Wichita, Kansas; therefore, the project would not be located in the Project area.

3.14.2.1 Cumulative Impacts from Oil Pipelines

The Project would contribute to regional cumulative impacts associated with currently operating oil pipeline systems, newly constructed and soon to be operating pipeline systems, and future oil pipeline systems that are more speculative in nature.

Currently Operating Oil Pipelines

A map of existing oil and gas pipeline systems of the U.S. is shown in Figure 3.14.2-1. Several existing pipelines transport petroleum products across Montana, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. For example, the Express and Platte pipelines deliver WCSB crude oil through central Montana and Wyoming and then travels east-southeast through eastern Wyoming, Nebraska, northeastern Kansas, and Missouri before it terminates at the Wood River refinery in western Illinois. These pipelines intersect the Project area in southern Nebraska.

Operation of existing oil pipeline systems, such as the Express and Platte Crude Oil Pipelines, have resulted primarily in alterations to land uses, terrestrial vegetation, and wildlife habitat. Cumulative

impacts associated with existing oil pipelines within the Project area would be primarily related to noise emanating from pump stations and the cumulative increases in the width of ROWs in areas where the proposed Project would be adjacent to existing ROWs. In those areas where the proposed Project is not directly adjacent to existing ROWs, but are located within the Project area, there would be a cumulative change in vegetative resources, wildlife habitat, and land uses associated with ROWs operation. The impacts of existing ROWs in the context of the proposed Project have largely been included in Section 3.0.

Newly Constructed Oil Pipelines

Construction on the Keystone Mainline Pipeline is completed and construction on the Keystone Cushing Extension Pipeline (Keystone Cushing Extension) is currently underway. These pipelines will transport crude oil from Canada to U.S. markets. The Keystone Mainline Pipeline crosses North Dakota, South Dakota, Nebraska, Kansas, Missouri, and Illinois and would overlap the proposed Project corridor near Steele City, Nebraska. The Keystone Cushing Extension will also be constructed from Steele City, Nebraska to Cushing, Oklahoma and will be completed in 2010. As part of the proposed Project, two new pump stations would be constructed along the Keystone Cushing Extension to support the increased crude oil flow rates. In the portions of the Project corridor where Project pump stations near the Keystone Cushing Extension would be located, local impacts created by the construction of the Cushing Extension would experience additive effects from Project pump station construction. Additionally, in the Steele City, Nebraska, area, a tank farm would be constructed to support the Project in an area already impacted by the upcoming construction of the Keystone Cushing Extension. Cumulative effects from the Keystone Cushing Extension and the proposed Project would primarily be additive and minor relative to the overall environmental resource base in the region. For the rest of the Keystone Cushing Extension alignment, because there is no overlap of the Keystone Cushing Extension project area with the Project corridor, potential cumulative impacts would be minimized.

Future (Speculative) Oil Pipelines

In addition, Keystone recently announced that it would consider an interconnection to the Project in eastern Montana that would allow transport of oil production from the Williston Basin in Montana, North Dakota, and Saskatchewan. The Williston Basin is experiencing increased oil production, particularly associated with the development of the Bakken shale formation. This currently speculative interconnection, should it become economically feasible in the future, would require that the crude oil producers construct an additional pipeline and appurtenant facilities, including:

- An interconnecting “on-ramp” pipeline including pump stations and valves would be required to transfer volumes from the oil production facilities to the pipeline injecting station. The pipeline would have a receive trap and a pressure control valve/skid located at the receipt facility in Montana;

- A receipt/injection facility (approximately 8 to 9 acres or larger, depending on final number of tanks) would be required, including the following equipment or facilities:

    - A custody transfer system (approximately 0.7 acres**)** that would include a meter bank with at least two meter runs, a static mixer, flow meters, strainers, flow control valves and associated piping; a meter prover complete with launching chambers, four-way valve, and associated piping and instrumentation; a pressure relief skid consisting of two nitrogen-loaded pressure safety valves and associated piping; a sump system complete with sump tank, sump pump, sump injection pump and associated piping; a quality

- Storage facilities (approximately 7 acres) would be required in Montana near the point of interconnection with the Project including one or two 300,000 barrel storage tanks to accumulate production received at the facility for batch preparation. Recommended minimum batch size to be injected into Keystone pipeline would be between 200,000 to 300,000 barrels thus allowing enough flexibility for mainline scheduling. Tanks would be supplied with an external floating roof and mixers for bottom sediment & water control.

- Booster pump system (approximately 0.6 acres) would be required including 3 in-line booster pumps to transfer product from the storage tank to the nearest Keystone pump station. These pumps would be sized to meet the base case pipeline flow rate of 700,000 BOPD.

- Electrical controls and instrumentation (approximately 0.2 acres) would be required to supply the expected additional 4 megavolt-ampere (MVA) demand for the injection facility which would require an electrical substation and a new electrical building that would provide power and would house: booster pumps, meter/prover skids, tank mixers, manifolds/tank (valves & instruments), and a cathodic protection system

In addition, Keystone would have to modify an existing Keystone XL Project pump station (no additional land anticipated) where the oil would be sent for injection into the Keystone XL Project pipeline. This would include a connection to the pump station, two block valves, and two check valves.

Potential impacts from this pipeline and oil storage system would be similar in nature to the impacts described previously for the Project, although the extent of impact would depend on the actual design and size of the facilities. Key issues would include visual resources in the vicinity of the storage tanks and pump stations, cultural resources, changes in land use, increased tax revenues, increased employment, and potentially accelerating the development of crude oil resources in Montana and North Dakota. An on-ramp project at some future time would require its own permits and environmental analysis. At the time of the publication of this DEIS, there were no active applications before any federal or state regulatory agencies in support of this potential pipeline and oil storage system. In addition, Enbridge, Inc. is considering a reversal of its existing Portal Link pipeline in North Dakota that would provide an on-ramp for Williston Basin oil production to its existing Enbridge Mainline pipeline in Saskatchewan. The “open season” for this proposed pipeline reversal is scheduled for the spring of 2010 to gauge shipper interest in the proposed project. Should this proposed project receive sufficient shipper support and become operational at a later date, it would potentially reduce interest in a Williston Basin on-ramp project in Montana.

No other proposed oil pipelines have been identified within the Project area. However, should additional oil pipelines be constructed within the Project area, they would likely contribute to potential cumulative impacts associated with habitat fragmentation, land use issues, and viewshed degradation.

3.14.2.2 Cumulative Impacts from Natural Gas and Carbon Dioxide Pipelines

A map of existing oil and gas pipeline systems of the U.S. is shown in Figure 3.14.2-1. Several existing pipelines transport natural gas across Montana, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. For example, the Williston Basin Intestate Pipeline System transports natural gas through southeastern

Montana and western South Dakota and would likely intersect the Project area in Montana and South Dakota.

Portions of the Northern Border Pipeline would be located within the Project area in northeastern Montana. The Project corridor would parallel the Northern Border Pipeline for approximately 21.5 miles along the Steele City Segment, beginning at the U.S./Canada border near Morgan, Montana. The Northern Border Pipeline is an existing natural gas pipeline that has been in service since 1982. The existing permanent ROW has been reclaimed and routine maintenance and refurbishment activities would continue along the ROW during construction and operation of the proposed Project. Parallel placement of the Project along the Northern Border ROW in this segment would potentially reduce ROW requirements and land disturbance. However, impacts such as habitat fragmentation and wetlands disruption would potentially be exacerbated with parallel pipeline placement.

The Gulf Crossing Pipeline would parallel the Project area along the Gulf Coast Segment between Bryan County, Oklahoma and Lamar County, Texas. The Gulf Crossing Pipeline is a recently completed, 374-mile-long, 42-inch-diameter, interstate natural gas pipeline extending from Grayson County, Texas and Bryan County, Oklahoma to Madison Parish, Louisiana. As construction of the Gulf Crossing Pipeline has been completed, many of the potential short-term cumulative impacts associated with concurrent construction schedules, such as demand for housing and services from the construction workers, construction traffic, and noise, would be avoided. Also, because the construction of the Gulf Crossing Pipeline has been completed, cumulative impacts of the proposed Project and the Gulf Crossing Pipeline would be limited to a cumulative long-term conversion of forested vegetation and land uses to herbaceous, open lands within each project's permanent ROWs.

The Project would be collocated with the Golden Pass Pipeline in the Beaumont, Texas area. The Golden Pass Pipeline, which was completed in April of 2009, is a 42-inch-diameter pipeline that will transport natural gas approximately 69 miles from an LNG receiving terminal near Sabine Pass, Texas, to existing interstate natural gas pipeline interconnections near Starks, Louisiana. Construction of the Golden Pass Pipeline has been completed; therefore, many of the potential short-term cumulative impacts associated with concurrent construction schedules would be avoided. Also, because the construction of the Golden Pass Pipeline has been completed, cumulative impacts of the proposed Project and the Golden Pass Pipeline would be limited to a cumulative long-term conversion of forested vegetation and land uses to herbaceous, open lands within each project's permanent ROWs.

Multiple natural gas pipelines comprise the Enterprise Product Onshore Pipeline System, which is owned by Enterprise Product, LP. Portions of this pipeline system may parallel the Project corridor in Texas. In Oklahoma, Texas, Nebraska, South Dakota, and/or Montana, other existing pipeline systems of note are operated by Northern Natural Gas System, NGPL of America, Oklahoma Natural Gas Company System, and the Lone Star Pipeline System. Portions of these pipelines may parallel or cross the Project corridor in some areas, but most are well outside of the Project area, as shown in Figure 3.14.2.-2.

The Texas Intrastate System, which is operated by Enterprise Product LP, is a network of natural gas pipelines in Texas. These pipelines may intersect the Project corridor in southeastern Texas. The Transco Pipeline System is a 10,560-mile natural gas pipeline transportation and distribution system that extends from Texas up the east coast of the U.S. to New York. Portions of the Transco Pipeline System would likely be located within the Project corridor in eastern Texas.

The construction and operation of these existing pipeline systems has resulted in impacts to the human and natural environment typical for such linear facilities. Some older pipeline systems may have greater impacts to the natural environment than those recently constructed due to less stringent environmental regulation in the past. Cumulative impacts associated with existing natural gas pipelines are primarily

related to noise emanating from operating compressor stations and loss of vegetative cover and habitat fragmentation to the degree such fragmentation is not mitigated through ROW restoration.

The Steele City Segment of the Project would cross the proposed Bison Pipeline Project in Fallon County, Montana. The Bison Pipeline is a proposed 301-mile-long, 30-inch-diameter, natural gas pipeline extending from Campbell County, Wyoming to Morton County, North Dakota. The Bison Project is proposed to be constructed in 2010, pending federal and state permitting. The Bison Project would be built before the proposed Project, thereby avoiding a conflict of resources at the time of construction. However, in the areas where the Bison Pipeline would be located in the Project corridor in Fallon County, Montana, there would be sequential impacts to environmental resources in the crossing area. In the context of the regional resource base, it is likely that the local impacts from the close proximity of these two proposed pipelines would be minor.

The Green Pipeline would parallel the Project area in the Gulf Coast Segment. It is a proposed 320-mile-long, 24-inch-diameter pipeline that would transport carbon dioxide from Donaldsville, Louisiana to the Hastings Field, which is located south of Houston, Texas. The Green Pipeline and the Gulf Coast Segment of the Project would be roughly parallel for a distance of approximately 46 miles between Beaumont, Texas to the connection point with the Houston Lateral. Potential overlapping or successive construction timeframes would increase the time period over which short-term impacts would occur, resulting in cumulative impacts to some resources such as soils, wetlands, wildlife, vegetation, and land use. Along the Houston Lateral, the Project would roughly parallel the Green Pipeline for a distance of approximately 47 miles from Houston, Texas to the proposed Project's intersection point with the Gulf Coast Segment. As construction of the Green Pipeline would be completed in late 2010, and work on the Houston Lateral would not begin until 2012, most of the cumulative impacts from construction during the same time period would be avoided. However, successive construction timeframes would increase the time period over which short-term impacts would occur, resulting in cumulative impacts to some resources such as soils, wetlands, wildlife, vegetation, and land use.

Potential cumulative impacts associated with these proposed pipelines would be habitat fragmentation, land use issues and viewshed degradation. Should these or other unidentified pipelines be under construction at the same time as the Project, there may also be impacts to noise and air quality (see Section 3.14.3).

3.14.2.3 Cumulative Impacts from Electrical Power Distribution and Transmission Lines

The electrical power distribution and transmission grid in the Project area includes multiple existing interstate and local electric power distribution and transmission lines. These distribution and transmission lines represent existing linear facilities that transect each of the states that the Project would cross if permitted and constructed. Figure 3.14.2-3 is a map of the U.S. electrical power grid.

Due to advances in engineering, construction methods, and environmental regulation, the construction and operation of these existing electrical power lines typically encumber additional lands, compared to more recent projects and, therefore, the impacts from these lines may be greater than a line of similar length and energy capacity constructed in the recent past or future.

Table 3.14.2-1 includes planned electrical power distribution and transmission lines that may be constructed in the general Project area, but of these proposed transmission lines, only the Nebraska Public Power District would be located within the Project corridor. The proposed MSTI (Mountain States Intertie) Project which would run from Townsend, Montana to Midpoint, Idaho and the Zephyr and Chinook Projects would extend from west-central Montana to Nevada. The Nebraska Public Power District plans to build more than 140 miles of 345-kV and 115-kV power distribution lines in Nebraska

and Kansas to connect new crude oil pumping stations for the proposed Project pipeline and also to interconnect proposed wind farms and increase system reliability. The Kansas V-Plan is a proposed electrical power line to connect Marysville, Kansas and the Steele City Substation near Steele City, Nebraska. These proposed projects would contribute to cumulative impacts in the Project area as the proposed Project would require power distribution lines to serve pump stations and the tank farm associated with the Project. Cumulative impacts which may arise include impacts to avian wildlife and viewshed degradation. In addition, if the construction of future power distribution or transmission lines in the Project corridor overlaps with the proposed Project construction schedule, short-term cumulative impacts associated with noise, dust, and general construction activity could occur in those areas where they would be constructed within the proposed Project corridor.

3.14.2.4 Cumulative Impacts from Wind Power

Wind Power is increasing in the United States. Wind power accounted for 42 percent of all new electrical capacity added to the United States electrical system in 2008, although wind continues to account for a relatively small fraction of the total electricity-generating capacity (25.4 GW of a total of 1,075 GW) (AWEA 2009). The Global Wind Energy Council (2008) projected the possibility of a 17-fold increase in wind-powered generation of electricity globally by 2030.

Wind resources in the contiguous U.S., specifically in the central plains states, could accommodate as much as 16 times total current demand for electricity in the U.S. Potential wind-generated electricity available from onshore facilities on an annually averaged state-by-state basis is provided in Figure 3.14.2-4. It shows a high concentration of wind resources in the central plains region extending northward from Texas to the Dakotas, westward to Montana and Wyoming, and eastward to Minnesota and Iowa. The wind resources in this region could achieve significantly greater electricity production than current local demand (Lu et al. 2009). Exploitation of these wind resources would require significant extension of the existing power transmission grid. Expansion and upgrading of the grid will be required in any case to meet anticipated future growth in U.S. electricity demand (Lu et al. 2009). It is therefore reasonable to assume that there will be upgrades and extensions to the existing electrical power transmission grid to support wind power development within the Project area in the future. The magnitude of impacts from these transmission line extensions will be dependant somewhat upon the extent of new lines required to meet the needs of new and existing wind farms. Likely cumulative impacts from future construction and operation of transmission lines originating from wind farms may include viewshed degradation and disruption to land uses, vegetation, and avian wildlife. Should the construction of future transmission lines occur concurrent with the proposed Project construction schedule and within the Project corridor, short-term cumulative impacts associated with noise, dust, and general construction activity could occur.

3.14.2.5 Connected Actions to the Project

Several connected actions to the proposed Project would occur to provide electricity to the proposed Project pump stations. These actions would be a result of the proposed Project; therefore, the impacts of these actions have been incorporated in the environmental review described in Section 3.0.

Connected actions to the Project include:

- The construction and operation of electrical power distribution lines and substations by local power providers running from existing power delivery infrastructure along the route to power the pumps at each pump station location and to power the tank farm; and
- A major new approximately 70-mile-long 230-kV transmission line to be constructed and operated by Basin Electric Power Cooperative (BEPC) in South Dakota as a result of a system reliability study

Power Distribution Lines and Substations

The power requirements and line miles of each power distribution line for pump stations and tank farms are presented in Section 2.0 (Table 2.3.1-1 Summary of Power Supply Requirements for Pump Stations and Tank Farm). The duration of construction for these lines would be relatively short in any one location. Where possible, power lines would parallel other ROWs (i.e., roadways, pipeline corridors, and existing power lines). Power distribution lines would likely be installed along field edges or section lines to reduce the overall amount of habitat fragmentation and interference with agricultural operations. Limited clearing would be required along existing roads in native and improved grasslands and croplands. Some trees may be removed to provide adequate clearance between the conductors and underlying vegetation. Trimming instead of tree removal could be employed in some locations. Land disturbance and vegetation clearing for the electrical distribution lines and substations would affect only a small fraction of the native vegetation present in the region.

The most notable impacts associated with electrical power distribution line construction would be the effects on land use and visual quality. Proposed power distribution lines would cross a variety of land use types including developed land, agriculture/cropland, rangeland/grassland, forestland, and undeveloped greenfield areas. The largest permanent acreage impacts would be to rangeland/grassland areas (640 acres). Acreage impact totals would be less for agriculture/cropland (271 acres), forest land (105 acres) and developed areas (85 acres). Depending on location, size, and configuration, new electrical power distribution lines could negatively affect visual resources, especially in undeveloped areas with relatively high scenic values. Additional minor cumulative impacts to soils (compaction and erosion), vegetation, wetlands, and wildlife could also be expected. In addition, indirect air quality impacts are associated with the generation of electricity that would be transmitted through power lines to pump stations and the tank farm. Future electricity sources in the region would likely include renewable energy sources (e.g., wind power).

Lower Brule to Witten 230-kV Transmission Line

The new approximately 70-mile-long Lower Brule to Witten 230-kV transmission line in South Dakota would create a new power transmission corridor across terrain that is currently relatively undisturbed. The impacts of this transmission line would be additive to the impacts generated by the construction of the Project pipeline and appurtenant facilities, and additive to the impacts associated with existing linear facilities within the area. Primary impacts associated with construction and operation of the Lower Brule to Witten 230-kV transmission line would be to land use and visual quality, with minor impacts to soils, vegetation, wetlands and wildlife (potential impacts to raptors and other avian species would be of particular concern).

3.14.3 Cumulative Impacts by Resource

This section describes the potential cumulative effects of constructing the Project and other past, present and reasonably foreseeable projects on individual resources. Resources potentially sensitive to cumulative effects from existing and reasonably foreseeable future projects are addressed in this section. Table 3.14.3-1 below provides a summary of the impacts to each resource, which are discussed in more detail in the sub-sections that follow.

TABLE 3.14.3-1 Summary of Cumulative Impacts to Resources			
Resource Area	**Past Actions**	**Present Actions and Proposed Project**	**Future Actions**
Geology	Existing oil and natural gas ROWs limit the area available for extraction of mineral resources within their permanent ROW. In those areas where existing ROWs are present within the Project area, there would be a minor cumulative decrease in the access to mineral resources within the ROWs.	The proposed Project does not involve substantial long- or short-term alteration of topography. Potential cumulative impacts to paleontological resources during construction within the Project corridor include damage to or destruction of fossils due to excavation activities and/or blasting, erosion of fossil beds due to grading, and unauthorized collection of fossils by construction personnel or the public.	Due to the small area that would be impacted by the proposed and future projects, relative to available mineral resources within the proposed Project area, encumbered by the Project right-of-way, the proposed Project in conjunction with future actions would represent a minor cumulative effect on the accessibility of mineral resources in the Project area.
Soils and Sediments	Soils that have previously been subject to a one-time or frequent disturbance would be subject to a minor cumulative impact. Aboveground facilities that are located in prime farmland soils result in a cumulative decrease in the availability of prime farmland soils within the proposed Project area.	Construction activities (such as clearing, grading, trench excavation, backfilling, heavy equipment traffic) and restoration along the Project corridor may contribute to cumulative impacts on soil and sediment resources. Impacts may include: temporary and short-term soil erosion, loss of topsoil, permanent increases in the proportion of large rocks in the topsoil, and short-term to permanent soil/sediment contamination from accidental spills and short-term to long-term soil compaction. Soil compaction could reduce soil porosity and percolation rates, which can increase the potential of stormwater runoff. Soil erosion and revegetation best management practices would be applied to areas subject to soil disturbance to minimize construction-related erosion.	Most impacts to soils and sediments through the construction of future projects would be short-term and minor due to the implementation of best management practices to reduce soil erosion and the introduction of contaminants. However, long-term, cumulative soil compaction may occur in areas with repeated disturbance of soils in the Project area.
Surface Water	Previous construction of existing projects would tend to have had localized and short-term effects on surface waters. Where the Project area would contain existing ROWs, the selection of appropriate construction techniques and oversight by relevant regulatory authorities would reduce the short-term impacts	The effects from linear facility construction within the Project area are considered short-term. Major pipeline crossings of sensitive waterbodies along the route would utilize the HDD method, further limiting to these waterbodies. Open-cut crossings would have a cumulative effect on waterbodies that are crossed	No long-term diversions or installation of in-stream structures are proposed for the Project; therefore, the proposed Project would result in primarily temporary surface water impacts. If future projects were to cross within the same watershed or waterbody, there would be a minor cumulative impact to the

TABLE 3.14.3-1 Summary of Cumulative Impacts to Resources			
Resource Area	**Past Actions**	**Present Actions and Proposed Project**	**Future Actions**
	to acceptable levels and would result in a minor potential cumulative impact.	more than once or in multiple locations within the same watershed. Temporary cumulative impacts from the proposed Project could include increased TSS, increased sedimentation and reduced flow. In addition, channel stability may decrease in the short-term as waterbodies return to pre-construction conditions.	subject waterbody.
Wetlands	Past disturbance to herbaceous and scrub shrub wetlands in existing pipeline or transmission ROWs have primarily transitioned back to pre-construction wetland vegetation communities. Recovery of herbaceous vegetation in emergent wetlands where disturbance would occur again would be 3 to 5 years; recovery of forested wetlands would take longer (20 to 50 years) to regenerate into a mature wetland forest community. Past effects on wetlands in the Project area may still be evident if previous construction activity occurred within the past 5 to 10 years. Also, previously-installed linear pipeline or transmission projects would have resulted in a permanent conversion of forested wetland vegetation type in their permanent ROWs. Presently, cumulative impacts on wetlands would occur in locations where the Project area contains other linear ROWs that have resulted in the conversion of forested wetlands to herbaceous or scrub-shrub wetlands or in areas where wetlands have been permanently encumbered by facilities.	Construction would affect herbaceous and scrub-shrub wetlands and wetland functions primarily during and immediately following construction activities, but permanent changes could also occur. In most herbaceous and scrub-shrub areas, disturbed wetland vegetation would eventually transition back to a vegetation community similar pre-construction conditions, assuming such as elevation, grade, and soil structure are successfully restored. Forested wetlands located in the permanent ROW would be converted to a herbaceous or scrub-shrub wetland type and forested wetlands located outside of the permanent ROW would require a long time period to return to pre-Project conditions. Implementation of appropriate compensatory mitigation would ensure no net-loss of wetlands from the proposed Project.	Future projects, such as town expansions, future oil and gas pipelines, transmission lines, new roads and highways, and other industrial facilities could affect wetlands in the Project area. None of the wetlands crossed by the Project would likely be permanently filled or drained, and if they were, compensatory mitigation would be required. The contribution of the Project to future cumulative effects to wetlands in the Project area would be minor.
Terrestrial Vegetation	Past disturbance to terrestrial vegetation has resulted from previous linear and non-linear projects. The degree of cumulative impact from past projects depends upon the	Construction would effect terrestrial vegetation primarily through cutting, clearing, or removal of vegetation and the potential introduction of noxious weeds. The degree of	Future actions in the Project corridor that would result in greatest cumulative impact to vegetative resources would be in those portions of the Project corridor that would require a

TABLE 3.14.3-1 Summary of Cumulative Impacts to Resources			
Resource Area	**Past Actions**	**Present Actions and Proposed Project**	**Future Actions**
	type and amount of vegetation affected, the rate at which the removed vegetation regenerated after construction, and the frequency of vegetation maintenance conducted during operation.	impact would depend on the type and amount of vegetation affected, the rate at which removed vegetation would regenerate after construction, and the frequency of vegetation maintenance conducted on the ROW during pipeline operation. Impacts on pastures, rotated croplands, and open grasslands would generally be short-term with vegetation typically becoming reestablished within 1 to 5 years after construction is complete. Short-grass prairie and mixed-grass prairie areas often take 5 to 8 years to become reestablished due to poor soil conditions and low moisture levels. Construction in these areas would also remove woody shrubs in sagebrush grasslands. Although native grasslands would be restored, the effects of land clearing on previously untilled native prairies may be irreversible. Long-term to permanent loss of forested vegetation and a small increase in forest fragmentation would occur in non-herbaceous areas.	prolonged recovery time or would result in a permanent change in vegetation type. Land clearing in the Project area in northern Montana would impact native grasslands and would represent a cumulative loss of native grassland areas. The permanent ROW in this area would be kept free of woody vegetation, including sagebrush, with periodic mowing and brush clearing. Sagebrush vegetation can take 20 to 50 years to become reestablished to pre-construction levels; therefore, removal of sagebrush vegetation in the Project areas would be a long-term cumulative impact. Removal of trees in upland and riparian forest communities would result in long-term impacts on these vegetation communities because of the long time periods required for these vegetation communities to mature to pre-construction conditions, e.g., 20 to 50+ years for reestablishment of bottomland forests. The proposed Project and future projects would likely 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.
Wildlife	Prior fragmentation of sagebrush shrublands in Montana in conjunction with fragmentation of habitat from clearing could incrementally increase mortality rates for species dependent on sagebrush cover. Forestlands in the Project area along the Gulf Coast Segment and	Additional incremental habitat fragmentation from construction would be most pronounced in forested and shrubland habitats. Impacts to wildlife in these areas include: habitat loss, alteration, and fragmentation; direct morality during construction and operation; indirect mortality	Future actions in the Project corridor that would impact wildlife habitat would primarily be additive to wildlife habitat impacts associated with the proposed Project. Cumulative effects on wildlife in the Project area would include the incremental loss and alteration of grasslands, rangelands,

TABLE 3.14.3-1 Summary of Cumulative Impacts to Resources			
Resource Area	**Past Actions**	**Present Actions and Proposed Project**	**Future Actions**
	Houston Lateral have been previously fragmented by ROWs and would experience additional fragmentation from the proposed Project.	and reduced breeding success from stress and effects on feeding due to noise and human activity; and reduced survival or reproduction due to decreased abundance of forage species.	forested habitat, and wetland habitats; including portions of several habitat areas specifically set aside for wildlife conservation. Implementation of appropriate mitigation measures, including habitat restoration, would minimize most long-term cumulative impacts on wildlife. Long-term cumulative impacts on wildlife would occur in areas where habitat is not allowed to return to preconstruction conditions and in areas where long time periods are required for wildlife habitat to become re-established.
Fisheries	Prior removal of riparian vegetation and instream disturbance due to existing projects, have occurred at various capacities within streams crossed by the Project area. Potential cumulative effects on fisheries due to instream and riparian disturbance include habitat alteration resulting in potential disruption to feeding, breeding and other life stage habitats.	Contribution to cumulative Impacts on aquatic species would be avoided where the HDD crossing method is utilized. Impacts on aquatic species at stream crossing locations where non-HDD crossing methods are used would include additional alteration of bottom substrates, temporary increased sedimentation, and possible removal of riparian vegetation. While adult fish are likely to move away from areas of construction, younger fish would be more vulnerable to additional stream alteration impacts. General reclamation objectives to restore ecological function to pre-construction conditions would reduce cumulative effects during the construction and post-construction phases.	Future projects that would be constructed in the Project area shortly after the construction of the proposed Project may result in a small cumulative impact on fisheries resources. Those future projects that would occur after the streams in the Project area have recovered from activities associated with the proposed Project would not contribute to a significant cumulative impact on fisheries.
Threatened and Endangered Species	Habitat modifications through the alteration of threatened and endangered species habitat along existing projects in the Project area could have previously occurred. The proposed Project could cumulatively contribute to impacts on T&E species habitat in areas already impacted by existing projects. Of particular concern is the	Impacts in the Project area could result in a cumulative short-term disturbance to protected species and a potential long-term impact to habitat. Through coordination with the FWS, the proposed Project impact to protected species would be minimized through avoidance, minimization, and mitigation measures.	The potential for cumulative impacts on threatened and endangered species from the future projects could occur if they were to impact the same habitats as the proposed Project. Future projects would adhere to federal and state permitting and regulatory requirements; therefore, impacts to these species would be reduced or

TABLE 3.14.3-1 Summary of Cumulative Impacts to Resources			
Resource Area	**Past Actions**	**Present Actions and Proposed Project**	**Future Actions**
	area near the Red River where the Project would parallel the Gulf Crossing Pipeline. The FWS has recommended that a 300-foot-construction activity buffer be put in place at the Red River HDD crossing for the proposed Project to minimize impacts to nesting interior least terns (a federally-listed endangered bird) and the Arkansas river shiner (a federally-listed threatened fish). Gulf Crossing had also crossed the Red River via HDD to minimize the loss of riparian and aquatic T&E habitat in the area. The Louisiana black bear (a federally-listed endangered species) may also be present in southern Oklahoma and northeast Texas where the Project would contain other pipeline routes in the Project area. Project-related impacts to forested habitat in these areas may cumulatively contribute to a change in potential forested habitat.		eliminated through avoidance, minimization, and mitigation measures.
Noise	Cumulative increases in noise levels resulting from the operation of the pump stations and other existing noise generating infrastructure in the Project area would be minimal due to the spatial distance between pump station or tank farm locations.	Construction noise impacts would be localized, temporary, and short-term along each construction spread. Impacts on regional ambient noise levels resulting from operation of the pump stations would be minimal due to the spatial distance between pump station or tank farm locations.	Cumulative impacts on noise levels resulting from the operation of the pump stations for the Project and any future noise-producing projects in the Project area would depend upon the location, duration, and noise levels associated with future projects in the context of ambient noise levels at the proposed Project pump stations.
Land Use	Cumulative impacts on land use from existing projects are generally small. Herbaceous, agricultural, and scrub-shrub land uses are allowed to return to pre-project condition at the end of the construction period in existing ROWs. Long-term land use impacts have occurred in forested areas contained within permanent ROWs, which may result in the potential for cumulative land use impacts in portions of the	Construction could increase the temporary encumbrance of lands used for construction activities. The development of aboveground facilities and the conversion of land uses to industrial for the Project and other projects in the Project corridor would cumulatively contribute to a permanent change in land use.	Construction-related cumulative impacts on land use would be low because the temporary displacement of most land uses associated with the Project would have ended by the time future projects are implemented. Landowners may experience cumulative effects from having to accommodate multiple easements (temporary and permanent) across their land. The development of

TABLE 3.14.3-1 Summary of Cumulative Impacts to Resources			
Resource Area	**Past Actions**	**Present Actions and Proposed Project**	**Future Actions**
	Project area that is currently used as forest lands. Landowners may experience cumulative effects from having to accommodate multiple easements (temporary and permanent) across their land. The development of aboveground facilities for the past project would cumulatively contribute to permanent industrial land use conversion within the Project area. Development of the Project in conjunction with previous projects could contribute to a cumulative decline in lands participating in regional conservation programs, such as the CRP.		aboveground facilities for the Project would cumulatively contribute to permanent land use conversion impacts associated with future projects. Development of the Project and future projects could cumulatively contribute to a decline in lands participating in regional conservation programs, such as the CRP, resulting from future projects.
Visual Resources	Existing projects may have already altered the viewshed from within and outside of the Project corridor. Over the long-term, facilities could cumulatively contribute to an intensified industrial character in portions of the Project area with previous development.	Construction could have an impact on visual resources through the presence of construction equipment, electrical transmission lines, a loss of vegetation, and development of aboveground facilities for the proposed Project and current projects. These actions would result in the degradation of the visual quality of the area.	Future aboveground facilities for other projects in the Project area would cumulatively contribute to a minor degradation of visual resources. The addition of similar aboveground facilities from future projects to the Project area could contribute to an intensified industrial character.
Socio-economics	Past construction of pipelines and other industrial facilities likely would have required temporary construction workers, population, housing, municipal services, or traffic in the Project area.	Short-term, socioeconomic effect may occur. Due to the quick moving nature of most Project construction schedules, the socioeconomic impacts associated with construction would not result in a major impact to cumulative socioeconomic impacts in the Project area.	Operation of the proposed Project facilities would require relatively few permanent employees; thus, there would be minor long-term cumulative or additive impacts on population, housing demands, municipal services, or traffic in the Project area. The increased tax revenue paid to the state and local governments over the life of the proposed Project and future projects in the Project area would result in beneficial long-term cumulative economic impacts.
Cultural Resources	Cumulative impacts to cultural resources from past projects include disturbance to aboveground and belowground resources within the area of potential effect for existing projects. Most	Disturbance of belowground resources within the area of potential effect for the projects would occur. To limit effects to historic properties and cultural resources, the Project would be constructed in accordance	Future pipelines located in the Project corridor may potentially disturb currently known or unknown archaeological sites and historic properties. This may result in a negative cumulative impact on cultural

TABLE 3.14.3-1 Summary of Cumulative Impacts to Resources			
Resource Area	**Past Actions**	**Present Actions and Proposed Project**	**Future Actions**
	federally- or state-regulated project would be constructed in accordance with requirements under Section 106 NHPA and other relevant federal, state and local regulations. Additional disturbance to cultural resources from construction in the Project area would be limited through avoidance and mitigation when avoidance is not achievable.	with requirements under Section 106 NHPA and the associated programmatic agreements and other relevant federal, state and local regulations. Additional disturbance to cultural resources from construction in the Project area would be limited through avoidance and mitigation when avoidance is not achievable.	resources. However, cultural resources have been or are undergoing surveys and are being identified for the proposed Project. The proposed Project would be constructed in accordance with requirements under Section 106 NHPA and other relevant federal, state and local regulations. Additional disturbance to cultural resources from future projects in the Project area would likely be subject to federal or state regulations that would require surveys, avoidance, and mitigation be conducted prior to installation, so it is likely that portions of the Project corridor with cultural sites would be subject to mitigation and avoidance measures during future projects.
Air Quality	There would be no contribution to cumulative impacts generated by the Project from the construction of past projects since the impacts of these projects would have been short-term (e.g., dust and emissions from construction vehicles). Impacts from ongoing operations of past projects would be additive to short-term construction impacts of the Project. These are limited to emissions from vehicles and aircraft used during ROW inspection and inspection and maintenance of project facilities.	The primary impacts on air quality from the Project would be from construction activities that generate dust (e.g., excavation and materials handling) and air emissions (e.g., fueling and operation of construction equipment and open burning). Contractors would be required to implement dust-minimization practices to control fugitive dust emissions during construction, such as applying water sprays and surfactant chemicals, and stabilizing disturbed areas. Mitigation measures implemented during construction would limit dust and VOC emissions from fuel handling to minimize any localized impacts.	During operations, Project impacts would be limited to emissions from vehicles and aircraft used during ROW inspection and maintenance of pump stations. Since ROW and project facilities are inspected roughly twice monthly, the cumulative impacts from inspection and maintenance, in addition to impacts from future projects are considered minor. In addition, indirect impacts are associated with the generation of electricity that would be transmitted through power lines to pump stations and the tank farm. While much of the oil transported by the Project could be replacing dwindling supplies, there could be an incremental increase in emissions from the processing of heavy crude oil at refineries. However, all refining would be required to adhere to refinery-specific air permits designed to avoid significant cumulative impacts to air quality. Future electricity sources in the region would likely include renewable

TABLE 3.14.3-1 Summary of Cumulative Impacts to Resources			
Resource Area	**Past Actions**	**Present Actions and Proposed Project**	**Future Actions**
			energy sources (e.g., wind power).
Greenhouse Gases, and Climate Change	Crude oil delivered to PADD III refineries by the Project would likely be replacing heavy crude oil from other less reliable and diminishing sources. Assuming constant demand for refined oil products, the incremental impact of the Project on GHG emissions would be minor.	Indirect GHG-related emissions during operation would be associated with electrical generation for the pump stations (approximately 2.6 to 4.4 million tons of CO_2 per year for a proposed initial capacity of 700,000 bpd and a potential capacity of 900,000 bpd, respectively). In addition, refining the quantity of crude oil that would be delivered by the Project would produce an estimated 1.3 to 1.7 million tons of CO_2 per year. However, since the crude oil delivered by the Project would be replacing similar crude oils from other sources, the incremental impact of these emissions would be minor.	Future refinery upgrades and expansions could potentially increase the annual production of GHG in the PADD II and PADD III areas. Should such upgrades and expansions occur, generation of GHG in these areas could potentially increase. The cumulative impact of increased GHG emissions in this area would depend upon the potential for reductions in GHG emissions elsewhere, consistent with developing regulatory frameworks in the U.S., Canada and worldwide.

3.14.3.1 Geology

The proposed Project would cross deposits of sand, gravel, clay, stone, and coal bearing formations in multiple states, such as South Dakota and Oklahoma. Existing oil and natural gas ROWs limit the area available for extraction of mineral resources within their permanent ROW. In those areas where existing ROWs are present within the Project area, there would be a minor cumulative decrease in the access to mineral resources within the ROWs. The proposed Project would limit the extraction of these mineral resources in the permanent ROW; therefore, the proposed Project would represent a small decrease in area available for mineral extraction. The quantity of land containing mineral resources that would be encumbered by the proposed Project would be minimal when compared to the quantity of mineral extraction sites that are located outside of the permanent ROW throughout the Project area. Extraction of oil and gas resources would not be affected by operation of the proposed pipeline. The proposed Project would have minor effects on mineral resources; mineral extraction would also be limited in existing ROWs that are within the Project area, but cumulatively, the quantity of lands containing mineral resources encumbered by permanent ROWs would be minor compared to the overall quantity of lands available.

The proposed Project does not involve substantial long- or short-term alteration of topography. Most of the proposed route is within areas where bedrock is buried by unconsolidated sediments consisting of glacial till, alluvium, colluvium, loess and/or aeolian deposits. In these areas, impacts to bedrock are expected to be minimal, and limited to areas where bedrock is within 8 feet of the surface. Over the entire proposed project route, approximately 9 miles cross areas identified as potential blasting locations and approximately 166 miles cross areas identified as potential ripping locations (areas that contain dense material). Accordingly, the proposed Project would have a minor effect on potential impacts to existing

bedrock, but it would contribute to a minor cumulative effect on bedrock in those portions of the Project corridor that would be subject to bedrock that would require blasting.

Potential impacts to paleontological resources during construction of the proposed Project and foreseeable projects may occur. During construction, damage to or destruction paleontological resources due to excavation activities and/or blasting, erosion of fossil beds due to grading, and unauthorized collection of fossils by construction personnel or the public may occur. Consultation with appropriate state and federal agencies during proposed Project planning has minimized the potential for the proposed Project crossing scientifically-significant paleontological resources. As stated in Section 3.1.2.2, operation of the proposed Project is not expected to affect paleontological resources; however, collection of these resources for scientific purposes would not be possible within the permanent ROW. Therefore, the proposed Project combined with past, present, and foreseeable actions would have a minor effect on the potential loss of the availability of paleontological data for scientific purposes.

3.14.3.2 Soils and Sediments

Potential cumulative effects to soils and sediments could occur where soils are subject to a one-time or frequent disturbance if construction disturbances overlap or are located adjacent to each other. The Project area has already experienced the effects of the construction and operation of numerous pipeline and transmission line projects. These areas may have experienced disruption to soils and sediments through clearing, grading, trench excavation, backfilling, heavy equipment traffic and restoration. Most impacts to soils and sediments through construction of oil pipelines and transmission lines would be short-term, with no impacts outside of the permanent ROW. Limited impacts to soils or sediments have been identified from past activities in the Project area.

Construction activities associated with Project pipeline and appurtenant facilities such as clearing, grading, trench excavation, backfilling, heavy equipment traffic, and restoration along the construction ROW may adversely affect soil resources. Potential impacts include temporary and short-term soil erosion, loss of topsoil, short-term to long-term soil compaction, permanent increases in the proportion of large rocks in the topsoil, and short-term to permanent soil contamination from accidental spills. Soil compaction can reduce soil porosity and percolation rates, which can increase the potential of stormwater runoff. Additional impacts could include reduced productivity in disturbed farmland and rangeland areas until soil reclamation efforts are successful. Over the long-term, soil productivity of the proposed Project is not expected to be significantly impaired due to the use of soil erosion control methods during construction and post-construction restoration.

Most impacts to soils and sediments through construction of future oil and gas pipelines, transmission lines or other projects would be short-term, with limited cumulative impacts in the Project corridor. However, long-term soil compaction may occur through repeated disturbance of soils in the immediate area, resulting in reductions in soil porosity and percolation rates, increasing the potential of stormwater runoff.

3.14.3.3 Surface Water

Previous construction of pipelines would typically be localized and short-term. Cumulative effects could occur where projects cross waterbodies more than once or where multiple crossings occur in the same watershed from the Project may occur in waterbodies that are crossed more than once or where multiple crossings occur in the same watershed. Where the Project area would contain multiple crossings of the same waterbody, the selection of appropriate construction techniques and oversight by relevant regulatory authorities would reduce short-term cumulative impacts to acceptable levels.

Streams that would be crossed by the proposed Project in Montana, South Dakota, and Oklahoma are listed as impaired for siltation, TSS and turbidity, respectively. Where conditions warrant the use of the HDD crossing method, waterbody impacts of construction will be minimal since no direct contact would occur with stream banks, channel bed or waters. Where non-HDD crossing methods are used, or in the event that a frac-out were to occur, the simultaneous construction of other projects within the proposed Project corridor would temporarily result in a cumulative increase in sediment loads delivered to the crossed waterbodies. The proposed Project and the other projects that may result in cumulative impacts to water resources would adhere to applicable local, state, and federal regulations and permitting that would require the use of appropriate best management practices to minimize the introduction of sediments and impacts to waterbodies within the proposed Project corridor. After construction, channel stability may decrease and aquatic habitat may be degraded in the short-term as waterbody systems return to pre-construction conditions. Non-HDD crossings in sensitive systems may aggravate contaminated or impaired conditions or negatively impact protected waterbodies. The impacts to surface waters from routine pipeline operation are limited to accidental crude oil spills as described in Section 3.13.

Future pipeline construction activities are not likely to contribute to cumulative impacts if they occur after Project construction is complete. Long-term cumulative impacts would occur if stream channels cannot return to pre-construction conditions before future construction takes place, particularly where channel stability has been adversely affected. In areas where the Project area would contain either existing or proposed new pipeline systems, the selection of the appropriate construction technique and oversight by relevant local, state, and federal regulatory authorities would reduce short-term impacts to acceptable levels.

3.14.3.4 Wetlands

Past and current wetland disturbance in the project area includes farmed wetlands and wetlands within grazed rangelands (Keystone 2009c). Past pipeline construction in the Project area that has impacted herbaceous or scrub-shrub wetland resources would have affected wetland functions, but most areas, the wetlands have transitioned back to pre-construction vegetation communities. Recovery time required for herbaceous or scrub-shrub vegetation in wetlands where disturbance would occur again is 3-5 years. Where vegetation would not be continually affected during Project operations, forested wetlands would have regeneration periods of 20 to 50 years to accommodate tree species height potential. Depending on the vegetation types, past effects on wetlands in areas where the Project area contains previously-completed projects may still be evident. Also, previously-installed linear pipeline or transmission projects would have resulted in a permanent conversion of forested wetland vegetation type in their permanent ROWs. Presently, cumulative impacts on wetlands would occur in locations where the Project area contains other linear ROWs that have resulted in the conversion of forested wetlands to herbaceous or scrub-shrub wetlands or in areas where wetlands have been permanently encumbered by facilities.

The proposed Project would encumber approximately 554 acres of wetland (Section 3.4.3). The majority of cumulative wetland impacts would occur in those areas where the proposed Project and other planned projects would impact the same wetland features within the Project corridor. Applicable local, state, and federal permitting would be completed in support of the proposed Project and other projects in the Project corridor. Under the current applicable regulations, mitigation for any permanent loss or conversion of wetland resources would be required.

None of the wetlands crossed by the Project would likely be permanently filled or drained, and the proposed Project's temporary and permanent impact on wetland resources would be accounted for through compensatory mitigation. Therefore, the contribution of the Project on cumulative effects to wetlands in the Project area would be minor. Additional provisions for maintaining wetland areas of concern and thus reducing cumulative impacts are included in the Project CMR Plan (Appendix B).

3.14.3.5 Terrestrial Vegetation

Past disturbance to terrestrial vegetation has resulted from previous pipeline and/or electrical power transmission and distribution line construction and maintenance of low-height vegetation. The degree of cumulative impact from past projects depends upon the type and amount of vegetation affected, the rate at which the removed vegetation regenerated after construction, and the frequency of vegetation maintenance conducted on the ROW during project operation.

The primary Project contribution to cumulative impacts on vegetation would be the cutting, clearing, or removal of vegetation within construction work areas, the maintenance of herbaceous vegetation in the permanent ROW, and the potential introduction of noxious weeds in cleared areas. The degree of Project impact would depend on the type and amount of vegetation affected, the rate at which removed vegetation would regenerate after construction, and the frequency of vegetation maintenance in the permanent ROW. In non-agricultural areas, construction of the proposed Project would result in the permanent loss of forested and scrub-shrub vegetation. Also, this clearing would cause a small incremental increase in forest fragmentation in forested areas.

Clearing of native grasslands along portions of the Project area along the Steele City Segment would contribute to the cumulative decline of native grasslands. Although native grasslands would be restored, the effects of land clearing on previously untilled native prairies may be irreversible. Short-grass prairie and mixed-grass prairie areas often take 5 to 8 years to become reestablished due to poor soil conditions and low moisture levels. Construction areas along this segment would also remove woody shrubs in sagebrush grasslands. The permanent ROW would be kept free of woody vegetation. Sagebrush vegetation can take 20 to 50 years to become reestablished to pre-construction; therefore, removal of sagebrush vegetation would be a long-term cumulative impact.

Cumulative vegetation impacts within the Gulf Coast and Houston Lateral segments of the Project corridor would result from clearing activities that would affect upland forests, riparian areas, and bottomland forests. Removal of trees in upland and riparian forest communities would result in long-term impacts because of the long periods required for these vegetation communities to mature to pre-construction conditions. Long-term cumulative impacts to vegetation would occur within permanent ROW areas where cleared vegetation would be prevented from becoming reestablished. Vegetation regrowth in these areas would be controlled by periodic mowing and brush clearing within a 30-foot-wide permanent easement in upland areas and a 10-foot-wide permanent easement in riparian areas. Clearing of forest vegetation along these segments would represent a long-term cumulative impact.

Cumulative impacts on annually tilled croplands would be short-term and limited to the current growing season, provided that topsoil segregation was maintained and soils were not compacted during construction. Cumulative impacts on pastures, croplands, and open grasslands would generally be short-term and minor with vegetation typically becoming reestablished within 1 to 5 years after construction is complete. Long-term impacts on these types of vegetation would be minimal because these areas would be allowed to recover following construction and typically would not require maintenance mowing.

The total amount of vegetation that may be affected by all of the reasonably foreseeable projects, including the Project, is relatively small compared to the abundance of similar vegetation in the Project area. Cumulative impacts would result in the long-term and permanent loss of non-herbaceous vegetation, which would cause a small incremental increase in fragmentation of forested areas. Future projects would likely implement mitigation measures designed to minimize the potential for erosion, revegetate disturbed areas, implement site stabilization procedures, and control the spread of noxious weeds, which would minimize the degree and duration of the cumulative impact on vegetation from these projects.

3.14.3.6 Wildlife

The Project area contains a diversity of wildlife, including big game animals, small game animals and furbearers, waterfowl and game birds, and other nongame animals. Wildlife habitats in these areas include: grasslands/rangelands, shrublands, croplands/pasturelands, upland forests and wetlands. These vegetation communities provide a wide variety of foraging, cover, and breeding habitats for wildlife. Migratory birds also use many of these habitat types for nesting, migration, and overwintering. Large numbers of bird species nest in the Project area in northern Montana and winter in the vicinity of the Project area in south Texas.

Past disturbance to habitats contribute to potential cumulative impacts to wildlife including habitat loss, alteration, and fragmentation; direct mortality during construction and operation; indirect mortality and reduced breeding success from stress and effects on feeding due to noise and human activity; and reduced survival or reproduction due to decreased abundance of forage species. Cumulative effects on wildlife include the incremental loss and alteration of grasslands, rangelands, forested habitat, and wetland habitats; including portions of several habitat areas specifically set aside for wildlife conservation.

Many grasslands/rangelands and shrubland habitats in the Project area have not been previously fragmented by road and/or electrical power line networks. However, forestlands and croplands in many areas along the Gulf Coast Segment and Houston Lateral have been previously fragmented by road and electrical power line networks. Additional incremental habitat fragmentation from pipeline construction would be most pronounced in forested and shrubland habitats. Prior fragmentation of sagebrush shrublands in Montana in conjunction with fragmentation of habitat from clearing could incrementally increase mortality rates for species dependent on sagebrush cover. Forestlands in the Project area along the Gulf Coast Segment and Houston Lateral have been previously fragmented by ROWs and would experience additional fragmentation from the proposed Project.

Construction and operation of the proposed Project, along with the reasonably foreseeable projects, would result in short-term disturbance to wildlife species and long-term wildlife habitat modification. The Project 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 in the Project corridor. 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.

Long-term cumulative impacts on wildlife would occur in areas where habitat is not allowed to return to preconstruction conditions and in areas where long time periods are required for wildlife habitat to become re-established. Implementation of appropriate mitigation measures, including habitat restoration, would minimize most long-term cumulative impacts on wildlife.

3.14.3.7 Fisheries

Prior removal of riparian vegetation and instream disturbance due to existing projects, have occurred at various levels within streams crossed by the Project area. Potential cumulative effects on fisheries due to instream and riparian disturbance include habitat alteration resulting in potential disruption to feeding, breeding and other life stage habitats.

Several portions of the Project area would cross streams or rivers that contain known or potential habitat for special-status fish species. Special-status fish species include those listed by a state or listed under the federal ESA as threatened, endangered, or as species of conservation concern. Special-status fish species

are known to be present in the Red River on the Oklahoma/Texas border. Special-status fish species are also present in the Trinity River and San Jacinto River along the Houston Lateral. Impacts to special-status fish species in these locations would be avoided where the HDD crossing method is utilized. Other streams in these areas would be surveyed to determine species presence, or species presence would be assumed and construction timing or other methods would be developed to minimize cumulative impacts.

Current disturbance to fisheries resources from projects in the Project area include sediment release during instream construction and loss of overhead shade and nutrient input. For the currently proposed Project in non-HDD stream crossings, these conditions can cause short-term changes to downstream aquatic life and their habitats (Levesque and Dube 2007, Wood and Armitage 1997). Other potential effects from construction include alterations to streambed conditions; reductions in the abundance and diversity of benthic invertebrate communities; and reductions in the abundance of fish populations in cases of large-scale sediment releases. Impacts to fisheries would be greater in areas where important fish spawning or rearing habitat would be altered by construction. While adult fish are likely to move away from areas of construction, younger fish would be more vulnerable to stream alteration impacts. Small-scale effects are typically non-residual, and recovery of streambeds and benthic invertebrate productivity to pre-construction conditions is expected within approximately 1 year (Crabtree et al. 1978, Tsui and McCart 1981, Gowdy et al. 1994, Anderson et al. 1998). Larger scale disturbances that include post-construction impacts can take longer to recover (Crabtree et al. 1978).

Future projects that would be constructed in the Project area shortly after the construction of the proposed Project may result in a small cumulative impact on fisheries resources. Those future projects that would occur after the streams in the Project area have recovered from activities associated with the proposed Project would not contribute to a significant cumulative impact on fisheries. These impacts would likely be short-term and minor due to implementation of mitigation measures and the requirements of any individual state permits to minimize impacts while crossing waterbodies.

3.14.3.8 Threatened and Endangered Species

In general, past cumulative impacts to threatened and endangered species potentially occurring in the Project corridor have included loss of habitats, habitat fragmentation, effects on water quality from agriculture and stormwater runoff, and riparian area encroachment for development or vegetation management purposes. Such cumulative impacts could lead to species decline in some cases.

Federally-protected threatened or endangered species potentially occurring in the Project area include seven birds, four mammals, three fish, one mollusk, and four plants (Section 3.8). Most of the identified species would not be present in areas where the Project area would contain other potential new or existing pipeline routes. One exception is the area near the Red River where the Project would parallel the Gulf Crossing Pipeline. The FWS has recommended that a 300-foot construction activity buffer be put in place at the Red River HDD crossing to minimize impacts to nesting Interior least terns (a federally-protected bird) and the Arkansas river shiner (a federally-protected fish). The Gulf Crossing Pipeline Project crossed the Red River via HDD and the proposed Project has committed to use a similar crossing method.

Current disturbances to federally-listed threatened and endangered species from projects in the Project area include temporal and localized disturbances that would have displaced wildlife and fish species through construction noise, terrain or vegetation disturbance or water quality impacts. The required construction buffer at the Red River crossing for the Project would benefit other sensitive species known to be in the area, including the Quachita Rock Pocketbook (a federally protected freshwater mussel found in the area) and Whooping Crane (a federally protected species). The Louisiana Black Bear (a federally

protected species) may also be present in southern Oklahoma and northeast Texas where the Project area would contain other pipeline routes.

Construction activities near the Red River would be completed before the bird nesting season. If construction occurs in these areas during the breeding season, additional surveys for nesting Interior Least Terns would be conducted. If active nests are discovered, USFWS would be notified and appropriate mitigation measures would be taken, such as creating a 0.25-mile-wide buffer zone around each active nest to minimize impacts to nesting birds.

The Project pipeline would parallel other linear facilities; therefore, many of the state- and federally-listed threatened and endangered species could potentially be affected by construction (future) and operation (existing and future) of these projects. Implementation of appropriate mitigation measures for the Project and for future projects, including habitat restoration, would avoid or minimize most long-term cumulative impacts. In addition, 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. The species analysis for the Project included species impacts from previous projects as a baseline condition. Since Project reclamation requirements include restoring native vegetation and soil conditions except in places where vegetation height is managed either for inspection or safety purposes, future projects that occur 5 years from the present will encounter conditions in some areas where shrub type habitats have been restored and future projects that occur longer than 20 years from the present will encounter conditions in some areas where trees have re-established.

3.14.3.9 Noise

Cumulative increases in noise levels resulting from the operation of the pump stations and other existing noise generating infrastructure in the Project area would be minimal due to the spatial distance between pump station or tank farm locations.

Construction equipment during Project construction and pump stations during Project operations would be the primary sources of noise from the Project. Project construction noise impacts would be localized, temporary, and short-term along each construction spread. The Project would be constructed after other pipeline projects in the vicinity have been completed; therefore, cumulative effects on ambient noise levels would be avoided. Impacts on regional ambient noise levels resulting from the Project pump stations would be minimal given the long distances between pump stations and associated facilities.

Cumulative impacts on noise levels resulting from the operation of the pump stations for the Project and any future noise-producing projects in the Project area would depend upon the location, duration, and noise levels associated with future projects in the context of ambient noise levels at the proposed Project pump stations.

3.14.3.10 Land Use

In locations where linear projects have already been constructed and are operational in the Project corridor, the potential for short-term Project-related cumulative impacts on land use is low. For example, there would be a negligible cumulative impact of the Project on agricultural production as farmland affected by past projects has most likely already been reclaimed and is back in production.

Construction of the Project would result in a range of temporary land use impacts including the displacement of agricultural, forest and rangeland production within the Project corridor; potential

damage to agricultural infrastructure (e.g., drain tiles or irrigation systems) that would diminish agricultural productivity; and indirect effects on surrounding land uses along the pipeline route from construction-related nuisances (e.g., increased noise and dust). Most acreage disturbed during construction would be returned to preconstruction uses. Generally, agricultural land would become productive during the next planting season. Disturbed pastures and rangelands would require revegetation that may take 1 to 5 years to recover to preconstruction levels. Forestland could take 20 or more years to recover. Permanent conversion of forest land uses would occur within the permanent ROW and at aboveground facilities. Aboveground facilities (e.g., pump stations and valves) required for operations would permanently convert the land associated with these facilities to an industrial use. In addition, some agricultural lands currently enrolled in the Conservation Reserve Program (CRP) or other conservation programs may not qualify for continued participation in these programs potentially resulting in the land converting back to active agricultural uses.

Longer term cumulative impacts are possible for land uses that require a longer time period to return to their original use, such as forest land. For reasonably foreseeable projects, the temporary displacement of most land uses, other than forested land uses, associated with the Project would have ended by the time future projects are implemented. Easement restrictions associated with the Project may be unique, and therefore cumulative, to existing and/or anticipated land use restrictions imposed by easements from other projects within the Project area. These types of cumulative effects are not expected to be substantial because linear projects typically impose similar long-term land use restrictions as part of easement negotiations with landowners.

Construction of aboveground facilities for the Project would cumulatively contribute to permanent land use conversion impacts. For example, losses in land available for agricultural production may be exacerbated by additional constraints on agricultural production imposed by other projects in the Project area. The development of pump stations and valves as part of the Project would represent an industrial land use conversion that is cumulative to similar facilities that would be built as part of future projects. The cumulative effect would be a permanent conversion of land to industrial uses.

Depending on the location of other past and future projects and the conservation status of affected lands, development of the Project could cumulatively contribute to the decline in lands participating in regional conservation programs, such as the CRP. Reduction in conservation lands represents a potential long-term cumulative impact of the Project.

3.14.3.11 Visual Resources

Cumulative impacts on visual resources could occur in areas where multiple projects remove large swaths of vegetation and in areas where permanent aboveground facilities are constructed. In portions of the Project area where existing projects have already altered the viewshed, the additional impact resulting from belowground pipeline construction of the proposed Project would be minor. In those areas where the Project would add new aboveground visual components (e.g., pump stations, tank farm, MLVs) cumulative visual impacts would include contributions to an intensified industrial character.

Visual impacts due to Project construction activities would be temporary and would include removal of existing vegetation, exposure of bare soils, earthwork and grading scars, and landform alterations. In addition, the visual quality of the area surrounding the Project corridor may be temporarily degraded due to the presence of construction crews and equipment. During operations, the presence of aboveground facilities that are industrial in character could also diminish the visual quality of the affected area depending on surrounding land uses. The Project would implement mitigation measures to reduce long-term visual impacts.

Over the long-term, Project aboveground facilities would cumulatively contribute, in the presence of similar facilities from future projects, to an intensified industrial character within the Project corridor that would adversely affect the visual quality of the area. Project aboveground facilities would be dispersed along a linear corridor, when combined to future changes in the visual character of the Project area could lead to a general cumulative impact on visual resources throughout the Project area.

3.14.3.12 Socioeconomics

Past construction of pipelines and other industrial facilities likely would have required temporary construction workers in the Project area. Therefore, the proposed Project would not contribute to cumulative change in population, housing, municipal services, or traffic in the Project area.

The Project area is predominantly rural and sparsely populated, with the population tending to increase from north to south along the Project corridor. The population density in northern Montana is less than one person per square mile. In the southern Oklahoma/northeastern Texas area, population density ranges from 35 to 40 people per square mile. In areas in southern Texas, population densities range from 50 to 280 people per square mile along the Gulf Coast Segment to nearly 2,000 people per mile in the urbanized areas at the western end of the Houston Lateral. Concentrations of minority populations in Jefferson, Lamar and Harris Counties in Texas and Bryan County in Oklahoma are more than 50 percent higher than the corresponding state-wide averages. However, no area exceeds the 50 percent benchmark under the Environmental Justice Executive Order #12898 for minority or poor populations.

The presence of construction workers requiring housing and other services is the primary socioeconomic impact of the proposed Project. Construction workers are expected to utilize the closest available local rental, motel/hotel, RV and camping facilities during the construction of each spread. Adequate temporary housing and services appear to be present along the Gulf Coast Segment and the Houston Lateral, but shortages exist along portions of the Steele City Segment. Housing inadequacy in Montana and South Dakota would be mitigated through the construction and operation of 4 temporary construction camps.

Potential short-term socioeconomic impacts from the Project would include temporary changes in population levels or local demographics, changes in the demand for housing and public services, disruption of local transportation corridors, increased employment opportunities and related labor income benefits, and increased government revenues associated with sales and payroll taxes. The primary long-term socioeconomic impacts in these areas would include limited employment and income benefits resulting from a very small permanent Project operations staff and some local Project expenditures, as well as an increased property tax base and associated tax revenues. Operation of the Project would require relatively few permanent employees; thus, there would be no long-term cumulative impacts on population, housing, municipal services, or traffic in the Project area. The increased tax revenue paid to the state and local governments over the life of the spectrum of projects in the Project vicinity would result in beneficial long-term cumulative economic impacts. Keystone estimates that $138.4 million in annual property tax revenues would be generated by the Project in the region of influence. This estimate is based on 2006 tax rates and an estimated $7.0 billion of capital costs.

3.14.3.13 Cultural Resources

Cumulative impacts to cultural resources from past projects include disturbance to aboveground and belowground resources within the area of potential effect (APE) for those projects that would be contained within the Project corridor. The proposed Project would be constructed in accordance with requirements under Section 106 NHPA and other relevant federal, state and local regulations. Additional

disturbance to these resources from construction of the Project would be limited through avoidance and mitigation when avoidance is not achievable.

The types of impacts to cultural resources that could occur from the Project include the physical destruction or damage to historic properties; introduction of visual, atmospheric, or audible elements that would diminish the integrity of a historic property's significant historic features; and changes to the character of the historic property's use or changes to physical features within the historic property's setting that contribute to its significance. To limit effects to historic properties within the Project area, the Project would avoid impacts to historic properties that have been found eligible for listing in the NRHP or that are unevaluated. Cultural resource avoidance would be achieved through pipeline route variations, avoiding NRHP-eligible properties, or digging underneath the cultural deposits by boring or HDD construction methods. Additionally, a Programmatic Agreement (PA) is being negotiated between the Consulting Parties under Section 106 NHPA. The PA would provide the methodology to provide protection of historic resources during Project construction.

New pipelines located within the Project area may potentially disturb currently mitigated or unidentified archaeological sites and historic properties. This may result in a negative cumulative impact on cultural resources. However, cultural resource areas have been surveyed and identified or will be surveyed and identified prior to the publication of the final EIS or later under the Programmatic Agreement for this Project, so it is likely that these areas would be subject to mitigation and avoidance measures during future projects.

3.14.3.14 Air Quality, Greenhouse Gases, and Climate Change

Potential cumulative impacts to air quality associated with construction and operation of the Project in addition to other large-scale projects in the Project area are discussed. In addition, potential cumulative impacts to air quality associated with refining the heavy crude oil that would be transported via the Project and the air quality impacts associated with the end use of the refined product are also discussed.

Air Quality

Pipeline Construction & Operation

The primary impacts on air quality from the Project would be from construction activities that generate fugitive dust (e.g., excavation and materials handling) and air emissions (e.g., fueling and operation of construction equipment and open burning). The majority of pipeline construction activity would generally pass by a specific location within a 30-day period before final grading, seeding, and mulching takes place, thereby resulting in short-term and temporary impacts in any one area. Contractors would be required to implement dust-minimization practices to control fugitive dust emissions during construction, such as applying water sprays and surfactant chemicals, and stabilizing disturbed areas. Additional dust control measures may be required by state or local ordinances. All fossil-fueled construction equipment would be maintained in accordance with manufacturer's recommendations to minimize construction-related emissions.

There would be no contribution to cumulative impacts from the construction of past projects since the impacts of these projects would have been short-term (e.g., dust and emissions from construction vehicles). Impacts from ongoing operations of past projects would be additive to short-term construction impacts of the Project as well as impacts from ongoing operations of the Project. Existing oil and natural gas pipeline impacts would likely be limited to emissions from vehicles and aircraft used during ROW inspection and inspection and maintenance of project facilities. During operations, Project impacts would be limited to emissions from vehicles and aircraft used during ROW inspection and maintenance of pump

stations. Since ROW and project facilities are inspected roughly twice monthly, the cumulative impacts from inspection and maintenance, in addition to impacts from foreseeable future projects are considered minor. Emissions for the Project from construction and operational sources are provided in Table 3.14.3-2 below. The construction emissions represent a 3-year combined total of emissions from construction of the 17 spreads.

TABLE 3.14.3-2
Estimated Direct Emissions for the Project

Emission Source	NOx (tons)	CO (tons)	VOC (tons)	SO_2 (tons)	PM (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	CO_2-e[a] (tons)
Construction emissions								
Construction Camps[b]	494.40	432.56	46.39	33.04	24.72	24.72	24.72	109915.79
On-road vehicles	37.40	229.67	12.75	0.17	1.36	1.36	1.36	18623.42
Non-road equipment	590.92	391.34	43.35	24.65	24.65	24.65	24.65	80519.11
Open burning	19.72	1157.87	85.00	--	185.64	132.43	112.54	26319.70
Fugitive dust	--	--	--	--	1474.92	737.46	110.67	--
Paved road dust	--	--	--	--	116.79	18.36	1.87	--
Total construction emissions (3-year combined)	**1142.44**	**2211.44**	**187.49**	**57.86**	**1828.08**	**938.98**	**275.81**	**235378.02**
Operating emissions								
Tank farm	--	--	21.03	--	--	--	--	N/A
Pump station fugitives[c]	--	--	6.82	--	--	--	--	84.63
On-road vehicles[d]	6.7E-05	1.5E-03	7.2E-05	8.0E-07	3.7E-02	5.8E-03	5.7E-04	4.3E-02
Total operating emissions (annual)	**6.7E-05**	**1.5E-03**	**27.85**	**8.0E-07**	**3.7E-02**	**5.8E-03**	**5.7E-04**	**84.63**

[a] CO_2 equivalent is conservatively estimated by assuming all total organic compounds are methane and multiplying by 21 for the global warming potential (GWP) for methane.
[b] Construction camp emission estimates include four construction camps with four, 400-kW generator engines per camp operating for 2 years.
[c] Pumping station emissions include combined emissions from 30 pumping stations along the Steele City and Gulf Coast Segments.
[d] The operational emissions noted from onroad vehicles include mobile emissions from the Steele City Tank Farm only and do not include the preliminary estimated VOC emissions from the storage tanks.

Notes:
NOx = Oxides of nitrogen.
CO = Carbon monoxide.
VOC = Volatile organic compounds.
SO_2 = Sulfur dioxide.
PM = Particulate matter.
PM_{10} = Particulate matter less than 10 microns in diameter.
$PM_{2.5}$ = Particulate matter less than 2.5 microns in diameter.
CO_2-e = Carbon dioxide equivalents.
Source: Keystone 2009c.

Refineries

The proposed Project would serve as a crude oil common carrier pipeline system. While the refineries that could receive crude oil are not part of the Project, refinery operations could potentially result in cumulative impacts to air quality in the general Project area or beyond if changes in the type or quantity of emissions occurred in the future. While it is not possible to meaningfully estimate, much less quantify, the specific volumes of oil that would be delivered to specific refineries over time, deliveries of oil via the

Project could theoretically either replace dwindling oil processed at these refineries, supplant existing supplies that are less stable or more costly, increase the total volume of oil processed, or result in a combination of these scenarios. The availability of additional heavy crude oil could theoretically result in expansion of existing refineries or even the construction of new refineries. DOS thinks that any attempt to quantify how the availability of this new source of oil may influence actions and subsequent emissions at existing, expanded, or future refineries is in many ways speculative and not required as part of this NEPA analysis; however, the potential for replacement and additional oil volumes as well as refinery expansions are discussed below to provide some context as to possible effects.

Oil pipeline infrastructure, deliveries, and refining in the U.S. are geographically categorized into Petroleum Administration for Defense Districts (PADDs). There are five PADDs in the U.S. and the proposed Project would deliver oil to two of them, PADD II and PADD III. Deliveries at the Cushing terminal in Oklahoma would generally serve refineries in PADD II, which includes 15 states in the Midwest from North Dakota to Oklahoma and east to Ohio. Table 3.14.3-3 identifies the crude oil refineries in those 15 states including the crude oil capacity for each refinery.

TABLE 3.14.3-3
PADD II Refinery Crude Capacity: 2008

Refineries	Crude Oil Capacity (thousand bpd)
ExxonMobil, Joliet, IL	250
Marathon, Robinson, IL	214
PDV Midwest Refining, Lemont, IL	171
WRB Refining, Wood River, IL	322
BP Whiting, IN	420
Countrymark, Mount Vernon, IN	27
Coffeyville Resources, Coffeyville, KS	120
Frontier, El Dorado, KS	135
NCRA, McPherson, KS	88
Marathon, Catlettsburg, KY	250
Somerset. Energy, Somerset, KY (idle)	0
Marathon, Detroit, MI	114
Flint Hills, Saint Paul, MN	330
Marathon, Saint Paul, MN	84
Tesoro, Mandan, ND	60
BP-Husky, Toledo, OH	160
Lima Refining, Lima, OH	170
Marathon, Canton, OH	85
Sunoco, Toledo, OH	175
ConocoPhillips, Ponca City, OK	210
Sinclair, Tulsa, OK	75
Sunoco, Tulsa, OK	90
Valero. Ardmore, OK	92

TABLE 3.14.3-3 PADD II Refinery Crude Capacity: 2008	
Refineries	**Crude Oil Capacity (thousand bpd)**
Ventura, Thomas, OK (idle)	0
Wynnewood Refining, Wynnewood, OK	75
Premcor, Memphis, TN	182
Murphy Oil, Superior, WI	35
PADD II GRAND TOTAL	**3,934**

Source: U.S. Energy Information Administration (EIA), Refining Capacity 2009.

Deliveries to the Gulf Coast would likely serve refineries in PADD III, which covers six states from New Mexico to Alabama. Delivery points of the proposed Project in PADD III are in Texas and would likely serve refineries in Texas and possibly Louisiana. Table 3.14.3-4 identifies the crude oil capacity for each refinery in PADD III, and specifies those refineries directly accessible to the Project, those refineries without direct access to the Project, and those refineries with possible pipeline connection to the Project. In general, the information provided on refineries was obtained from EIA (2009).

TABLE 3.14.3-4 PADD III Refinery Crude Capacity: 2008	
Refineries	**Crude Oil Capacity (thousand bpd)**
Gulf Coast Refineries with Direct Pipeline Access to the Proposed Project	
Motiva Enterprises LLC; Port Arthur, TX	285
Total Petrochemicals; Port Arthur, TX	232
Valero Energy Corp.; Port Arthur, TX	289
Exxon Mobil; Beaumont, TX	349
Pasadena Refining; Pasadena, TX	100
Houston Refining (Lyondell); Houston, TX	271
Valero Energy Corp.; Houston, TX	83
Deer Park Refining; Deer Park, TX	330
Exxon Mobil; Baytown, TX	567
BP; Texas City, TX	478
Marathon Oil; Texas City, TX	76
Valero Energy Corp.; Texas City, TX	200
Calcasieu Refining; Lake Charles, LA	53
CITGO; Lake Charles, LA	430
ConocoPhillips; Lake Charles/Westlake, LA	239
Sub-Total Group I	**3,981**
Gulf Coast Refineries in PADD II Without Direct Pipeline Access to the Proposed Project	
Hunt Refining Co.; Tuscaloosa, AL	35

TABLE 3.14.3-4 PADD III Refinery Crude Capacity: 2008	
Refineries	**Crude Oil Capacity (thousand bpd)**
ConocoPhillips; Belle Chasse, LA	247
Exxon Mobil; Baton Rouge, LA	503
Valero Energy Corp.; Krotz Springs, LA	80
Valero Energy Corp.; St. Charles, LA	185
Marathon Oil; Garyville, LA	256
Chalmette Refining; Chalmette, LA	193
Murphy Oil; Meraux, LA	120
Motiva Enterprises LLC; Norco, LA	236
Motiva Enterprises LLC; Convent, LA	235
Placid Refining; Port Allen, LA	56
Shell Chemical; Saint Rose, LA	55
ChevronTexaco; Pascagoula, MS	330
ConocoPhillips; Sweeny, TX	247
CITGO; Corpus Christi, TX	156
Valero Energy Corp.; Three Rivers, TX	96
Flint Hills Resources; Corpus Christi, TX	288
Valero Energy Corp.; Corpus Christi, TX	142
Sub-Total Group 2	**3,460**
Inland PADD III Refineries with Possible Pipeline Connection to the Proposed Project	
Navajo Refining; Artesia, NM	84
WRB Refining; Borger, TX	416
Valero Energy Corp.; Sunray/McKee, TX	171
Alon USA; Big Spring, TX	67
Delek; Tyler, TX	58
Sub-Total Group 3	**526**
Inland PADD III Refineries without Pipeline Access to the Proposed Project	
Other Refineries without Access	449
Sub-Total Group 4	**449**
PADD III GRAND TOTAL	**8,416**

Source: U.S. Energy Information Administration (EIA), Refining Capacity 2009.

The Project would supply up to 200,000 bpd to the Cushing terminal in PADD II and 700,000 bpd to customers along the Gulf Coast in PADD III. The exact proportion of heavy crude oil in these deliveries is not certain, but Keystone representatives have indicated it to be approximately 2/3 of the total volume (Purvin & Gertz 2009). In addition, there are no commitments for deliveries to specific refineries, although there are some refineries or geographic areas proximal to the Project that would be more likely

to receive the oil. There are 27 refineries in PADD II that have a capacity to process over 3.9 million bpd of crude oil (Table 3.14.3-3). The heavy crude oil deliveries to these refineries totaled at least 900,000 bpd in 2008. The majority of the heavy crude oil supply to PADD II is provided via pipelines from Canada.

The Project would supply up to 500,000 bpd of crude oil to PADD III, an area that includes the U.S. Gulf Coast and extends from New Mexico to Alabama. There are 58 refineries in PADD III with a refining capacity of 8.4 million bpd (Table 3.14.3-4). Currently, over 3/4 of this volume is imported and the proportion of imported oil to PADD III is expected to increase by 600,000 bpd by 2020 as domestic production decreases (Purvin & Gertz 2009). Heavy crude oil accounts for approximately 2.5 million bpd of the crude oil refined in PADD III and the proportion of heavy crude oil refined is expected to grow as the availability of light crude decreases. As described in Section 1.2.2, the availability and supply of domestic and foreign light crude oil to the U.S. and PADD III has decreased and will continue to decrease, which has resulted in an increase in the proportion of heavy crude oil imported. However, the imports of heavy crude oil from three of the top four foreign suppliers to PADD III are decreasing or unstable. As of early 2010, Canada provides less than 2 percent of the crude oil supply to PADD III.

As identified in Table 3.14.3-4, a total of 15 refineries in PADD III would be connected directly to the Project, and they have a total crude oil capacity of almost 4 million bpd including over 1.4 million bpd of heavy crude oil (EIA 2009, Purvin & Gertz 2009). Oil transported via the proposed Project could be delivered to other refineries in PADD III, but it would require a secondary mode of transportation (e.g., other pipelines, ships, etc). These other refineries in PADD III have a total crude oil refining capacity of 4.4 million bpd including approximately 1.1 million bpd of heavy crude oil.

The existing refineries processing heavy crude oil in PADD II and PADD III are designed and permitted to refine heavy crude oil and the processing of heavy crude oil transported via the proposed Project is not expected to influence the exceedance of any permitted thresholds. EPA is the federal agency with the authority to implement and enforce requirement of the Clean Air Act. State agencies with approved State Implementation Plans (SIPs), including Texas and Louisiana, have been delegated authority by the EPA to administer an air quality permitting program. The permitting process is designed to avoid significant cumulative impacts to regional air quality associated with emissions.

While there are some recent, current, or planned refinery expansions occurring in PADD II and PADD III, there is no indication that the availability of oil transported via the Project would directly result in specific expansions of existing refineries and development of new refineries (none have been built in the U.S in 30 years). Refinery expansions and upgrades are primarily focused on increasing the capacity to refine heavy crude oil as the availability of light crude supplies to the U.S. decreases.

In recent years, a variety of refineries in PADD II and PADD III have initiated expansions or upgrades to increase their capacity for refining heavy crude oil. In PADD II, expansions and upgrades have been proposed or implemented in Oklahoma (Sinclair), Illinois (WRB Refining and ConocoPhillips Refinery), Michigan (Marathon), and Indiana (Whiting). There are several current or planned expansions of refineries in PADD III including Motiva (Port Arthur, Texas), Valero (Houston, Texas), Total (Port Arthur, Texas), Marathon (Garyville, Louisiana), and WRB (Borger, Texas) among other smaller expansions. Of these, the Motiva, Valero, and Total refineries would be directly connected to the Project. Valero has announced that they expect to be one of the largest recipients of heavy crude oil transported by the Project.

It is not possible to predict with certainty how refining the heavy crude oil transported via the proposed Project would impact air quality, or even where those impacts would occur. The potential refinery expansions are in various stages of planning and implementation, and each refinery is unique in regard to

the size and type of expansion or upgrade, the type of best available control technology (BACT) that has been or would be implemented, the status of the expansions, the availability of air emissions modeling, and the resulting impact of associated emissions relative to existing conditions. It is possible to assess, however, the potential emissions of additional refining of oil transported by the proposed Project by evaluating a cross-section of available information on air emissions associated with refinery upgrades/expansions to increase the capacity for processing heavy crude oil.

It should be noted that federal regulations require that refineries that undergo substantial modification must integrate BACT into their design and methods and emission offsets, which may increase, decrease, or have little influence on baseline emission rates even though the volume of oil increases. That is that expansions in the volume of oil that can be refined may decrease overall emissions, which is especially true for older refineries that use outdated emission controls.

DOS (2009) provided a review of various refinery expansions and upgrades in PADD II associated with increasing the capacity of heavy crude oil processing. Specifically, DOS quantitatively reported on the change in emissions of criteria pollutants associated with proposed refinery expansions in Illinois, Indiana, and Michigan. While these locations are geographically removed from the Project area, the oil transported by the Project could be transported to remote refineries, and any refinery expansions or upgrades at refineries that would receive crude oil from the Project would likely be required to adhere to the same or comparable regulatory standards. As a result of improvements in control technologies and the use of offsets, these refinery upgrades and expansions generally resulted in an overall increase in carbon monoxide, and a decrease in emissions of particulate matter, sulfur dioxide, and nitrogen dioxides. Volatile organic emissions tended to decrease slightly, but not consistently. These results indicate that current BACT requirements for expansion of existing refineries with outdated control technologies can actually result in an overall reduction in emissions relative to baseline conditions for some criteria pollutants.

In PADD III, the largest permitted refinery expansion for processing heavy oil in recent years is for the Motiva refinery in Port Arthur, Texas. This expansion would increase the heavy oil refining capacity of Motiva by 325,000 bpd (from 275,000 to 600,000 bpd). The Motiva refinery would have direct access to the Project and would have the largest heavy oil refining capacity in PADD III. This expansion would result in increases in most criteria pollutants, although there would be a reduction in VOCs (Table 3.14.3-5). The likely reasons that this expansion would result in net increases in most emissions include the overall size of the expansion and the fact that the existing refinery was already using relatively modern emission controls. Any modification to the existing refining processes would therefore not produce emission reductions in the same proportion as those for more outdated refineries. We do not have any specific emission estimates for other refinery expansions under consideration in PADD III.

TABLE 3.14.3-5
Net Emissions for the Motiva Refinery Expansion

NO_x (tons)	CO (tons)	VOC (tons)	SO_2 (tons)	PM (tons)	C_6H_6 (tons)	H_2SO_4 (tons)	H_2S (tons)	NH_3 (tons)	Cl_2 (tons)
592.74	1,489.53	-116.73	1679.73	464.37	-0.47	22.24	4.33	125.69	3.77

NOx = Oxides of nitrogen.
CO = Carbon monoxide.
VOC = Volatile organic compounds.
SO_2 = Sulfur dioxide.
PM = Particulate matter.
C_6H_6 = Benzene.
H_2SO_4 = Sulfuric acid.
NH_3 = Ammonia.

Cl_2 = Chlorine.

Source: TCEQ 2009.

While there are no new refineries proposed within about 500 miles of a proposed delivery point for the Project, there is one refinery proposed in the northern portion of PADD II: the Hyperion Energy Center in South Dakota. While no new refinery has been permitted and built in the U.S. in the past 30 years, the permitting process for the proposed Hyperion project can be referenced to allow quantification of potential emissions from a potential refinery that would use modern technology to process up to 400,000 bpd of heavy crude oil. The calculated emissions from the proposed Hyperion refinery are generally comparable to those calculated for the 325,000-bpd Motiva expansion. The calculated emissions for the proposed Hyperion refinery (SDNR 2008) are:

- 773 tons of NO_X;
- 1,999 tons of CO;
- 863 tons of SO_2;
- 828 tons of VOCs; and
- 1,046 tons of particulate matter (PM).

Commercial, economic, and political forces would largely determine the quantity, type, and processing destination of the oil transported via the Project. These forces are likely to evolve on a day-to-day basis and from year-to-year for the life of the Project. It is expected that most of the oil transported by the Project would replace historic crude oil supplies or supplant supplies from less stable or more costly sources for the following reasons:

- The volume of oil that would be transported by the Project (900,000 bpd) represents 7.5 percent of the overall crude oil refining capacity of PADD II and PADD III (over 12 million bpd);
- The supply of domestic crude oil is substantially diminished and depleting rapidly;
- The supply of heavy crude oil delivered to PADD III from overseas sources is either depleting or at risk for political reasons; and
- There is a well developed regional and local infrastructure to facilitate distribution of Project crude oil among existing regional refineries.

Since light crude supplies are decreasing, refinery upgrades and expansions that allow for the refining of heavy crude oil, especially along the Gulf Coast, are occurring and would continue to occur whether or not the Project is constructed. If the Project is not constructed, shipment of heavy crude oil to the region could occur through other pipelines or through tanker shipments from other oil producing areas. If the Project is constructed, it is likely that some oil transported by the Project could be transported to expanded or upgraded refineries. As stated previously, the emissions associated with upgrades to existing refineries currently using older technologies may result in a decrease in some types of emissions based on refinery-wide improvements in refining processes and emission controls. However, recent and future refinery expansions that implement BACT could result in an incremental increase in emissions above relevant baseline conditions even though those emissions would likely be less on a barrel-to barrel basis than those at older refineries.

It is highly unlikely under any reasonable scenario that all of the crude oil transported through the Project would be received by recently upgraded or new refineries in the PADD II and PADD III areas. It is also

expected that approximately 1/3 of the volume transported by the project will not be heavy crude oil. However, assuming that the entire volume is heavy crude oil and that it would be refined at upgraded or new refineries can be used to develop a hypothetical worst case scenario for the incremental increase in emissions related to the Project. In this hypothetical worst case scenario, the maximum volume of the proposed Project (900,000 bpd) would be multiplied by the emission rates per barrel reported for Motiva or Hyperion since these are assumed to be typical for new or recently upgraded refineries implementing BACT. In this hypothetical case, worst case total annual emissions of NO_X would range between about 1,639 and 1,736 tons, worst case CO emissions would range between about 4,114 and 4,500 tons; worst case SO_2 emissions would range between about 1,941 and 4,654 tons, worst case particulate matter emissions would range between 1,286 and 2,353 tons, and worst case VOC emissions would be about 1,061 tons. Even in this scenario, the emissions would be distributed across portions of PADD II and PADD III, and required air permitting for any upgraded or new refining facilities would avoid significant cumulative impacts to air quality.

The most realistic scenario for the disposition of oil transported by the Project is that some of the oil would replace declining feedstock at existing refineries in PADD II and PADD III, and some of the oil would supply newly upgraded or expanded facilities in PADD II and PADD III that have implemented BACT. The type and volume of oil refined in PADD II and PADD III are market driven. The refinery air emissions are regulated through air permits that define acceptable emission rates. There would potentially be some increase in air emissions associated with crude oil refined in PADD II and PADD III, but the increases would not likely be major.

Depending upon the source, heavy crude oils may contain higher concentrations of heavy metals, nitrogen, and sulfur compared to light oil. Processing the heavy crude oil may require upgrades to the refineries' wastewater treatments systems to meet discharge limitations of the NPDES permits under which wastewater discharges are permitted.

Recent refinery upgrades have required reassessment of NPDES permits, which has included expansion of stormwater capacity, installation of water strippers, more efficient final water filters, and other wastewater reduction projects. These measures are designed to ensure that wastewater and stormwater discharges meet NPDES permit limitations and protect the quality of the receiving waters.

As a result, existing refineries that upgrade to increase their capacity to refine heavy crude oil can do so without increasing pollutants in water discharges. New refineries or other existing refineries that propose upgrades would be required to satisfy NPDES discharge requirements to avoid significant impacts to water quality.

End Use

The end use of refined petroleum products could include combustion (e.g., vehicles, power generation, or other industrial facilities) or non-combustion uses (e.g., motor oils, lubricants, or other industrial uses). The volume of crude oil that would be transported to PADD III via the Project would total about 8.3 percent of the crude oil refining capacity in the PADD III region. The destination of the crude oil and the products refined from it are not determined by the Project. It is expected that neither the source nor the volume of oil transported via the Project would influence the ultimate type(s) of petroleum products refined. As a result of the refining process, the emissions associated with the end use of the oil by the consumer are not expected to be influenced by the source oil. Thus, the emissions associated with the ultimate use of the refined product would not differ from those end use emissions from other source oils. Independent of source, the criteria pollutant emissions from consumer and manufacturing use of refined petroleum products are regulated under permits for some uses (e.g., mass transportation vehicles and

petrochemical processing) and not for others (e.g., private vehicles) beyond standard quality rules designed to reduce pollutants (e.g., oxygenated fuels and low-sulfur diesel).

The Corporate Average Fuel Economy (CAFE) regulations in the United States, first enacted by Congress in 1975, are federal regulations intended to improve the average fuel economy of cars and light trucks (trucks, vans and sport utility vehicles) sold in the U.S. In 2011, the standard will change to include many larger vehicles. In addition, while there is no basis to expect that GHG emissions by end users would be influenced by the source oil, GHG emissions from end uses of refined products are not yet regulated by the federal government or most states.

Greenhouse Gases and Climate Change

The principal GHGs are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone, and water vapor. CO_2 is the reference gas for climate change; therefore, measures of non-CO_2 GHGs are converted into CO_2-equivalent values based on their potential to absorb heat in the atmosphere. The principal GHG of concern related to crude oil pipeline construction and operation is CO_2, which enters the atmosphere through the burning of fossil fuels (e.g., oil, natural gas, and coal), solid waste, and trees and wood products, and as a result of other chemical reactions (e.g., manufacture of cement). CO_2 is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.

Climate change is defined by the United Nations Framework Convention on Climate Change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (EPA 2008). Natural processes (including changes in the sun's intensity, slow changes in the Earth's orbit around the sun, or changes in ocean circulation) and human activities (including fossil fuel combustion, deforestation, reforestation, and urbanization) emit GHGs. The accumulation of GHGs in the atmosphere affects the Earth's temperature; however, emissions from human activities have caused the concentrations of heat-trapping GHGs to increase significantly in the atmosphere. These gases prevent heat from escaping to space, somewhat like the glass panels of a greenhouse. This accumulation has contributed to an increase in the temperature of the Earth's atmosphere and to climate change. If GHGs continue to increase, climate models predict that the average temperature at the Earth's surface could increase from 3.2 to 7.2 ºF above 1990 levels by the end of this century. Most scientists agree that human activities are changing the composition of the atmosphere, and that increasing the concentration of GHGs affects climate change. The rate, intensity, and effects of climate change continue to be assessed.

The increased concentration of CO_2 in the atmosphere has also increased ocean acidity since pre-industrial times (EPA 2009). The extent of ocean acidification is correlated with atmospheric CO_2 concentration. Ocean acidification affects future climate change by diminishing the ocean's capacity to absorb increasing atmospheric CO_2.

Regulations relating to Greenhouse Gases

On September 22, 2009 the EPA promulgated the first comprehensive national system for reporting emissions of carbon dioxide and other GHGs produced by major sources in the United States. Through this new reporting, EPA will have comprehensive and accurate data about the production of GHGs in order to confront climate change. Approximately 13,000 facilities, accounting for about 85 to 90 percent of GHGs emitted in the United States, would be covered under the proposed reporting system. The new reporting requirements would apply to suppliers of fossil fuel and industrial chemicals, manufacturers of motor vehicles and engines, and large direct emitters of greenhouse gases with emissions equal to or greater than a threshold of 25,000 metric tons per year. This threshold is roughly equivalent to the annual GHG emissions from just over 4,500 passenger vehicles. The direct emission sources covered under the

reporting requirement would include energy intensive sectors such as cement production, iron and steel production, and electricity generation, among others. The gases covered by the proposed rule are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), sulfur hexafluoride (SF_6), and other fluorinated gases, including nitrogen trifluoride (NF_3) and hydrofluorinated ethers (HFE). The first annual report would be submitted to EPA in 2011 for the calendar year 2010, except for vehicle and engine manufacturers, which would begin reporting for model year 2011.

According to the preamble of the rule, the U.S. petroleum and natural gas industry encompasses hundreds of thousands of wells, hundreds of processing facilities, and over a million miles of transmission and distribution pipelines. Crude oil is commonly transported by barge, tanker, rail, truck, and pipeline from production operations and import terminals to petroleum refineries or export terminals. Typical equipment associated with these operations includes storage tanks and pumping stations. The major sources of CH_4 and CO_2 fugitive emissions include releases from tanks and marine vessel loading operations. EPA does not propose to include the crude oil transportation segment of the petroleum and natural gas industry in this rulemaking due to its small contribution to total petroleum and natural gas fugitive emissions, accounting for much less than 1 percent, and the difficulty in defining a facility. The responsibility for reporting will instead be placed on the processing plants and refineries.

In addition, on September 30, 2009, EPA announced a proposal that is focused on large facilities emitting over 25,000 tons of greenhouse gases a year. These facilities would be required to obtain permits that would demonstrate they are using the best practices and technologies to minimize GHG emissions. The rule proposes new thresholds for GHG emissions that define when the Clean Air Act (CAA) permits under the New Source Review (NSR) and the Title V operating permits programs would be required for new or existing industrial facilities. The proposed thresholds would "tailor" the permit programs to limit the facilities that would be required to obtain NSR and Title V permits. The program would cover nearly 70 percent of the national GHG emissions that come from stationary sources, including those from the nation's largest emitters (e.g., power plants, refineries, and cement production facilities).

On April 2, 2007, in Massachusetts v. EPA, 549 U.S. 497 (2007), the Supreme Court found that GHGs are air pollutants covered by the CAA. The Court held that the EPA Administrator must determine whether or not emissions of GHGs from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. In making these decisions, the Administrator is required to follow the language of section 202(a) of the CAA. The Supreme Court decision resulted from a petition for rulemaking under section 202(a) filed by more than a dozen environmental, renewable energy, and other organizations. As a result of this decision, on April 24, 2009, the EPA proposed the Endangerment and Cause or Contribute Findings for Greenhouse Gases under the CAA to find that the current and projected concentrations of the mix of six key GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) in the atmosphere threaten the public health and welfare of current and future generations. This is referred to as the endangerment finding. The Administrator is further proposing to find that the combined emissions of CO_2, CH_4, N_2O, and HFCs from new motor vehicles and motor vehicle engines contribute to the atmospheric concentrations of these key greenhouse gases and hence to the threat of climate change. This is referred to as the cause or contribute finding. This proposed action, as well as any final action in the future, would not itself impose any requirements on industry or other entities. An endangerment finding under one provision of the CAA would not by itself automatically trigger regulation under the entire Act.

Programs for GHG emissions are being adopted by some states along the Project corridor. Montana is a member of the Western Climate Initiative (WCI). The WCI is a collaborative effort of seven U.S. states and four Canadian provinces to identify, evaluate, and implement measures to reduce GHG emissions in participating jurisdictions. The WCI has a regional GHG target of 15 percent below 2005 levels by 2020

that will be met through a regional market-based multi-sector mechanism, as well as other policies. The recommended cap-and-trade program has a broad scope that includes six GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6) and will cover 90 percent of GHG emissions from the region when fully implemented. The cap-and-trade program will begin January 1, 2012.

The Governor of Nebraska, along with ten other Midwestern Governors and one Canadian province Premier, is a member of the Energy Security and Climate Stewardship Platform for the Midwest. The Platform lists goals for energy efficiency improvements, low-carbon transportation fuel availability, renewable electricity production, and carbon capture and storage development. In addition to goals related to energy efficiency, renewable energy sources, and biofuel production, the Platform lays out objectives with respect to carbon capture and storage (CCS). Members agree to have in place a regional regulatory framework for CCS by 2010, and by 2012 to have sited and permitted a multi-jurisdiction CO_2 transport pipeline and have in operation at least one commercial-scale coal-powered integrated gasification combined cycle (IGCC) power plant with CCS, with additional plants to follow in succeeding years. By 2020, all new coal plants in the region will capture and store CO_2 emissions. Numerous policy options are described for states to consider as they work towards these goals. The Platform also lays out six cooperative regional agreements. These resolutions establish a Carbon Management Infrastructure Partnership, a Midwestern Biobased Product Procurement System, coordination across the region for biofuels development, and a working group to pursue a collaborative, multi-jurisdictional transmission initiative. States adopting all or part of the Platform include Wisconsin, Minnesota, South Dakota, Illinois, Indiana, Iowa, Kansas, Michigan, Missouri, Nebraska, North Dakota, and Ohio, as well as the Canadian Province of Manitoba.

Kansas, on November 15, 2007, joined five other states and one Canadian province to establish the Midwestern Regional Greenhouse Gas Reduction Accord. Under the Accord, members agree to establish regional GHG reduction targets, including a long-term target of 60 to 80 percent below current emissions levels, and develop a multi-sector cap-and-trade system to help meet the targets. Participants also establish a GHG emissions reductions tracking system and implement other policies, such as low-carbon fuel standards, to aid in reducing emissions.

In South Dakota, on February 21, 2008, Governor Mike Rounds signed into law HB 1272, which established a voluntary Renewable Portfolio objective of 10 percent by 2015. Oklahoma and Texas currently do not have state initiatives addressing the reduction in greenhouse gases, although Senate Bill 184 calls on the Texas Commission on Environmental Quality (TCEQ) to develop and present a report to the legislature by December 31, 2010, recommending strategies to reduce the greenhouse gas emissions by businesses and consumers of the state.

Environmental Consequences and Mitigation

Neither the federal government nor states crossed by the proposed Project have established thresholds for determining the significance of GHG emissions. While no thresholds currently exist, this assessment of GHG emissions was conducted in accordance with CEQ guidance including CEQ's draft guidance for GHG (CEQ 2010).

There is a general scientific consensus that the cumulative effects of GHG have led to climate change on a global scale, which is considered a significant cumulative effect. As demonstrated in Table 3.14.3-2, GHG emissions during construction of the Project would total approximately 235,378.0 tons of CO_2-equivalent over the 3-year construction period, primarily associated with the operation of diesel-powered equipment (indirect emissions cannot be meaningfully quantified). GHG construction emissions estimates for each state that would be crossed by the Project are presented in Table 3.14.3-6.

As demonstrated in Table 3.14.3-2, direct GHG emissions during operation of the Project would total approximately 85 tons per year of CO_2-equivalent.

TABLE 3.14.3-6
Estimated GHG Emissions for the Project

State	3-Year Construction CO2-e a (tons)
Montana	67787.85
South Dakota	93419.58
Nebraska	22251.18
Kansas	0
Oklahoma	7417.06
Texas	44502.36
Total	**235378.02**

[a] CO_2 equivalent is conservatively estimated by assuming all total organic compounds are methane and multiplying by 21 for the global warming potential (GWP) for methane.

CO_2-e = Carbon dioxide equivalents.

Source: Keystone 2009

Indirect GHG-related emissions during operation would be associated with electrical generation for the pump stations (approximately 2.6 to 4.4 million tons of CO_2 per year for a proposed initial capacity of 700,000 bpd and a potential capacity of 900,000 bpd, respectively, as calculated using EPA's AP-42 emission factor for large diesel engines and assuming 30 pump stations with 79 to 132 pumps rated at 6,500 hp).

Refining of the oil transported by the Project would also indirectly emit GHGs. Refining at existing refineries that are not upgrading to increase their capacity for processing heavy crude oil would not be expected to cause a substantial increase in GHG emissions relative to those associated with currently permitted heavy crude oil refining. GHG emissions from upgraded refineries or new refineries would represent an incremental increase in GHG. Comprehensive information on GHG emissions from refineries in general is not available, but there is some information on the relative magnitude of incremental GHG emissions associated with refinery upgrades and literature on the carbon emissions for refining a barrel of oil.

For the BP Whiting Indiana Refinery in PADD II, BP reports that the 260,000 bpd upgrade project will result in a 30- to 40-percent increase in CO_2 emissions for the refinery, resulting in an incremental increase in CO_2 emissions up to 0.5 million tons per year. The Motiva Refinery in PADD III is expanding to increase its capacity by an additional 325,000 bpd. Although specific emissions would vary among refinery expansions, the expansion of the Motiva Refinery could be expected to increase emissions by 0.6 million tons per year if it resulted in the same rate of emissions per barrel as the BP Whiting refinery upgrade. Further, applying this value to the volume transported by the Project (initial capacity of 700,000 bpd and a potential capacity of 900,000 bpd) indicates that the incremental increase in GHG emissions represented by the Project could be approximately 1.3 to 1.7 million tons of CO_2 per year. This also assumes that the entire volume of oil transported by the Project would be heavy crude oil. As mentioned previously, emission estimates are refinery specific, and emission rates at different refineries could vary broadly.

Information is also available on the total GHG emissions associated with refining a single barrel of heavy crude oil independent of a specific refinery. A report by the University of Toronto (2008) estimates that

refining one barrel of heavy crude oil from oil sands emits a total of 47.4 kilograms of CO_2, including the refining process itself and energy generation for the refining process. Applying these values to the volume transported by the Project indicates that CO_2 emissions from refining could total 13.3 to 17.2 million tons per year. Similarly, preliminary estimates by the Natural Resources Defense Council (NRDC 2008) indicate that GHG emissions from refining heavy crude oil from oil sands would range from approximately 9.4 to 31.5 kilograms per barrel. Applying these values to the Project and assuming that the entire volume was heavy crude oil indicates that total GHG emissions for refining the volume transported by the Project could range from 2.6 to 8.9 million tons of CO_2 per year at 700,000 bpd and from 3.4 to 11.4 million tons of CO_2 per year at 900,000 bpd. As a third example, Marathon reports that GHG emissions for all their refining operations total approximately 33 kilograms per barrel of oil (Marathon 2006), which falls between the range of values reported by the University of Toronto and NRDC. Applying the Marathon value to the Project volume indicates that GHG emissions could total 9.3 to 11.9 million tons of CO_2 per year.

Based on these values, refining the oil transported by the Project would result in total emissions in the range of 1.3 to 17.2 million tons of CO_2 per year. In reality, the incremental increase in GHG emissions due to refining the oil transported by the Project would likely be much less since it is expected to be primarily replacing the existing supply of heavy crude oil from other sources as the availability of oil from those sources continues to diminish. If, however, the heavy crude oil transported by the project replaced existing light crude oil, there could be some incremental increases in emissions and emission rates would be dependent on refinery-specific permitted thresholds, potential upgrades, and implementation of BACT. From a global perspective, it is expected that the oil sands in Canada would continue to be developed and the refinery emissions from that oil would still occur whether the oil was refined or used in the Canada, the United States, or overseas even if the Project were not built. In that case, the Canadian oil would produce emissions during transportation whether by rail, ship, or truck. The impacts associated with oil transportation and refining outside the United States would not be regulated by the United States nor analyzed under NEPA.

The total GHG emissions for the United States (CO_2 equivalents from anthropogenic activities) totaled 7,054 million tons in 2006, and global CO_2 emissions totaled 28,193 million tons in 2005 (CO_2 equivalents from fuel combustion) (EPA 2008). Indirect and direct annual operations activities associated with the proposed Project represent 0.06 to 0.31 percent of the national and 0.01 to 0.08 percent of the global GHG emissions. Construction activities associated with the proposed Project for each year represent less than 0.002 percent and 0.0005 percent of the national and global GHG emissions, respectively. While the EPA has released proposed regulations that would require approximately 13,000 facilities nationwide to monitor and report their carbon dioxide and other greenhouse gas emissions, the proposed Project would not satisfy the definition of these regulated facilities and there are no federal regulations or guidance to definitively identify the significance of the GHG emissions associated with operation of the Project. It is estimated that the amount of GHG emissions from Project construction and operations should not constitute a substantial contribution to the U.S. or global emissions due to the low percentage emission presented above, as compared with national and global emissions.

The mitigation measures implemented as part of the Project as discussed in the draft CMR Plan (Appendix B) would serve to offset some of the GHG emissions associated with the proposed Project. These measures would include revegetation of the construction work areas, restoration of wetland functions, and compensatory wetland mitigation for wetland impacts. Specific revegetation measures would be coordinated with land managers, NRCS, and landowners. Minimal direct GHG emissions would be associated with operation (e.g., vehicle operation and fugitive emissions), and indirect emissions would be associated with electrical generation for the pump stations and refineries.

The potential impacts of climate change would not be expected to affect the proposed Project. An increase in temperatures may increase wildfires in the Project area. An increased intensity of storm events, should this occur, may result in additional flooding in some areas near the Project, particularly in the Gulf Coast Segment and Houston Lateral should hurricane activity increase as a result of oceanic temperature conditions. The Project would be designed and constructed to be consistent with applicable federal, state, and local standards, and therefore should be resistant to forces associated with reasonably likely climate conditions during the lifetime of the pipeline system. Other effects of climate change, such as air quality degradation, health effects, reduced snow pack, and agricultural issues, would not likely impact the proposed Project.

3.14.4 Extraterritorial Concerns

While the Project analyzed in this draft EIS begins at the international boundary where the pipeline would exit Saskatchewan, Canada and enter the United States through Montana, the origination point of the pipeline system would be in Alberta, Canada. Neither DOS regulations (22 CFR 161.12) nor Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, require this draft EIS to analyze the environment or activities outside of the United States. As a matter of policy, however, DOS has included information in this draft EIS regarding the environmental analysis conducted in Canada.

The analysis of environmental effects from the proposed Project is occurring on both sides of the international border under the appropriate regulatory authorities, as discussed in Section 1 of this DEIS. In Canada, the Canadian National Energy Board (NEB) conducted that analysis, held public hearings in September 2009, and issued its findings in March 2010.

The NEB identified the nine key issues listed below relative to the proposed Project:

- The need for the proposed facilities;
- The economic feasibility of the proposed facilities;
- The potential commercial impacts of the proposed Project;
- The potential environmental and socio-economic effects of the proposed facilities, including those to be considered under the Canadian Environmental Assessment Act (the Scope of which is set out in Appendix R);
- The appropriateness of the general route of the pipeline;
- The method of toll and tariff regulation;
- The suitability of the design of the proposed facilities;
- The terms and conditions to be included in any approval the Board may issue; and
- Potential impacts of the project on Aboriginal interests.

Relative to impacts to aboriginal or indigenous peoples, the NEB granted intervener status to the following aboriginal groups in Canada:

- Moosomin First Nation;
- Neekaneet First Nation No. 380;
- Red Pheasant Band No. 108; and
- Sweetgrass First Nation.

In the March 2010 finding, the NEB determined that the proposed Project is required in Canada to meet the present and future public convenience and necessity, provided that the NEB terms and conditions outlined in the Project certificate are met, including all commitments made by Keystone during the hearing process.

Due to the limitations on available data at this time, cumulative impacts to Canadian resources are confined to the above discussion. However, as both the NEPA and NEB processes proceed, additional information on potential cross international boundary cumulative impacts would likely become available and would be assessed to the degree possible for inclusion in the FEIS. Pertinent NEB documents are provided in Appendix R.

3.14.5 Summary of Cumulative Impacts

The Project area includes numerous existing, under construction, and planned linear energy transportation systems, including natural gas pipelines, crude oil pipelines, and electric transmission lines. Additionally, the Project area supports a major water delivery project and a number of energy development projects, including wind power facilities. In some cases, these existing facilities either transect or are located within the proposed Project corridor. Additional oil and natural gas pipelines and electricity transmission lines are proposed or are known to be in the planning or permitting stage and may cross the Project corridor. It is also reasonably foreseeable that additional linear facilities would be considered in the future given the national focus on the reconfiguration of the electrical grid system to access stranded renewable energy resources, particularly with regard to wind power in the central plains region. Construction and operation of the Project would result in additional environmental impacts to those associated with these existing and future projects, although the majority of these would be localized and short-term. Short-term construction impacts could be additive to other proposed construction projects depending on the actual construction timing of individual projects, although at this time, proposed construction schedules would not coincide in the Project corridor. The overall contribution of cumulative impacts associated with existing and future facilities is considered minor. In addition, long-term cumulative economic benefits would be realized in communities that receive tax revenues from the Project and other projects in the area.

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