

## **APPENDIX Z**

### **Compiled Mitigation Measures**

## COMPILED MITIGATION MEASURES

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## ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit	HDD	horizontal directional drill
AC	alternating current	IIW	International Institute of Welding
ACVG	alternating current voltage gradient	ILI	inline inspection
API	American Petroleum Institute	IMP	Integrity Management Plan
ASME	American Society of Mechanical Engineers	IR	current (I) flowing through a resistance (R)
AUT	automated ultrasonic testing	Keystone	TransCanada Keystone Pipeline, LP
BGEPA	Bald and Golden Eagle Protection Act	LDS	leak detection system
BLM	Bureau of Land Management	MBTA	Migratory Bird Treaty Act
BMP	best management practice	MDEQ	Montana Department of Environmental Quality
BS&W	basic sediment and water	MFL	magnetic flux leakage
CE	carbon equivalent	MFWP	Montana Fish, Wildlife, and Parks
C-FER	Reliability Based Prevention of Mechanical Damage to Pipelines	MLV	mainline valve
CFR	Code of Federal Regulations	MOP	maximum operating pressure
CIS	close interval survey	MOV	manually operated valve
CMRP	Construction, Mitigation, and Reclamation Plan	MP	milepost
CMZ	channel migration zone	MSDS	Material Data Safety Sheet
CP	cathodic protection	NACE	National Association of Corrosion Engineers
CPS	contributory pipeline segment	NDEQ	Nebraska Department of Environmental Quality
CRM	control room management	NGPC	Nebraska Game and Parks Commission
CRP	Conservation Reserve Program	NPDES	National Pollutant Discharge Elimination System
CSA	Canadian Standards Association	NPS	National Park Service
CWA	Clean Water Act	NRCS	Natural Resources Conservation Service
DCVG	direct current voltage gradient	NRHP	National Register of Historic Places
Department	U.S. Department of State	NTSB	National Transportation Safety Board
DOI	U.S. Department of the Interior	NWP	Nationwide Permit
EFRD	emergency flow restricting device	PA	Programmatic Agreement
EI	environmental inspector	PAH	polycyclic aromatic hydrocarbon
EIS	Environmental Impact Statement	PFYC	Potential Fossil Yield Classification
ERP	Emergency Response Plan	PHMSA	Pipeline and Hazardous Materials Safety Administration
ESA	Endangered Species Act	PS	pump station
FBE	fusion bond epoxy	R-STRENG	remaining strength
FEIS	Final Environmental Impact Statement	RBWMD	Rainwater Basin Wildlife Management District
FERC	Federal Energy Regulatory Commission		
FPR	failure pressure ratio		
FRP	Facility Response Plan		
FSA	Farm Service Agency		
HCA	High Consequence Area		

ROW	right-of-way	TAPS	Trans-Alaska Pipeline System
RP	Recommended Practice	TPIC	Third Party Inspection Company
SCADA	Supervisory Control and Data Acquisition	USACE	U.S. Army Corps of Engineers
SDGFP	South Dakota Game, Fish, and Parks	USEPA	U.S. Environmental Protection Agency
SDSMT	South Dakota Schools of Mines and Technology	USFWS	U.S. Fish and Wildlife Service
SME	subject matter expert	USGS	U.S. Geological Survey
SMYS	specified minimum yield strength	UT	ultrasonic test
SOP	standard operating procedures	V	volt
T&E	threatened and endangered	WSRA	Wild and Scenic Rivers Act

## 1.0 INTRODUCTION

The analyses of potential impacts associated with construction and normal operation of the proposed Project suggest that significant impacts to most resources are not expected along the proposed Project route assuming the following:

- TransCanada Keystone Pipeline, LP (Keystone) would comply with all applicable laws and regulations;
- Keystone would, if the Presidential Permit is granted, incorporate into the proposed Project and into its manual for operations, maintenance, and emergencies, which is required by 49 Code of Federal Regulations (CFR) 195.402, the set of Project-specific Special Conditions developed by the Pipeline Hazardous Material Safety Administration (PHMSA);
- Keystone would incorporate the mitigation measures that are required in permits issued by environmental permitting agencies into the construction, operation, and maintenance of the proposed Project;
- Keystone would construct, operate, and maintain the proposed Project as described in this Final Supplemental Environmental Impact Statement (EIS); and
- Keystone would implement the measures designed to avoid or reduce impacts described in its application for a Presidential Permit and supplemental filings with the U.S. Department of State (the Department).

As discussed in Section 4.16, Summary of Impacts, presented in this appendix is a compiled summary of the mitigation measures discussed in resource specific sections of Chapter 4, Environmental Consequences, of this Final Supplemental EIS. These include the Special Conditions recommended by PHMSA, mitigation measures recommended in the Battelle and E<sup>x</sup>ponent risk reports, and additional mitigation measures discussed in Appendix B, Potential Releases and Pipeline Safety. Some of the mitigation measures described below are from the methods described in the proposed Project Construction, Mitigation, and Reclamation Plan (CMRP) presented in Appendix G. See the CMRP in Appendix G for the complete plan.

Additional mitigation measures may be identified and required by agencies during the permitting process beyond those described here.

The mitigation measures described below are organized by resource area, following the organizational structure of the Final Supplemental EIS.

## 2.0 GEOLOGY

Excavation activities, erosion of fossil beds exposed due to grading, and unauthorized collection could damage or destroy paleontological resources during construction. Because fossils might be discovered during trench excavation, a Paleontological Monitoring and Mitigation Plan would be prepared by Keystone prior to construction on federal and certain state and local government lands. Fossils or other paleontological resources found on private land would only be recovered with approval of the landowner, and, therefore, may be unavailable for scientific study. In

addition, appropriate regulatory agencies in each state would be consulted on the requirements for the Paleontological Monitoring and Mitigation Plan prior to excavation.

According to the guidelines provided in the Potential Fossil Yield Classification (PFYC) system, there are various mitigation measures that may be applied to geological units where the concern for paleontological resources is moderate to very high. These measures could include such actions as monitoring of excavations during construction to identify the presence of completely buried subsurface fossils, periodic spot-checking of impacts to significant fossils during construction activities, or avoidance of disturbance to the fossil-bearing unit of potential impact. Collaboration between Keystone, land managers, and knowledgeable researchers would be necessary to determine the appropriate action during construction of the proposed route.

Paleontological resources identified on federal lands are managed and protected under the Paleontological Resources Preservation Act as part of the Omnibus Public Land Management Act of 2009. This law requires the Secretaries of the Interior and Agriculture to manage and protect paleontological resources on lands under their jurisdiction using scientific principles and expertise. The Act affirms the authority for many of the policies the agencies already have in place such as issuing permits for collecting paleontological resources, curation of paleontological resources, and confidentiality of locality data. The statute also establishes criminal and civil penalties for fossil theft and vandalism on federal lands.

Both Montana and South Dakota have enacted legislation to manage and protect paleontological resources on state-managed lands. In Montana, Keystone has secured a certificate of compliance under the Major Facilities Siting Act from the Montana Department of Environmental Quality (MDEQ). MDEQ has the authority to require mitigation actions when significant paleontological resources are inadvertently discovered on any lands (i.e., public and privately owned land). The requirements are set forth in Appendix N, Supplemental Information for Compliance with the Montana Environmental Policy Act (within Appendix N, see Attachment 1, Appendix H, Paleontological Memorandum of Understanding). The requirements are designed to minimize and mitigate the adverse effects of pipeline construction activities on significant paleontological materials. The Montana Antiquities Act, as amended (1995), requires the Department of Natural Resources and Conservation and other state agencies to avoid or mitigate damage to important paleontological resources (when feasible) on state trust lands. The Montana Department of Fish, Wildlife and Parks has written rules for implementing the State Antiquities Act. The Montana State Historic Preservation Office (SHPO) also issues antiquities permits for the collection of paleontological resources on state-owned lands. The MDEQ has drafted a Memorandum of Understanding with Keystone in Montana for the identification, evaluation, and protection of paleontological resources. This Memorandum of Understanding has been fully signed and executed.

South Dakota requires a permit from the South Dakota Commissioner of School and Public Lands to survey, excavate, or remove paleontological resources from state land and to determine the repository or curation facility for paleontological collections from state lands. Condition 44 of the proposed Project's permit from the South Dakota Public Utilities Commission specifies the need for surveys in accordance with the procedures described for the South Dakota paleontological field surveys. Condition 44 also mandates the following mitigation measures:

- “Following the completion of field surveys, Keystone shall prepare and file with the Commission a paleontological resource mitigation plan. The mitigation plan shall specify

monitoring locations, and include Bureau of Land Management (BLM) permitted monitors and proper employee and contractor training to identify any paleontological resources discovered during construction and the procedures to be followed following such discovery. Paleontological monitoring will take place in areas within the construction ROW that are underlain by rock formations with high sensitivity (PFYC Class 4) and very high sensitivity (PFYC Class 5), and in areas underlain by rock formations with moderate sensitivity (PFYC Class 3) where significant fossils were identified during field surveys.

- If during construction, Keystone or its agents discover what may be a paleontological resource of economic or scientific significance, Keystone or its contractors or agents shall immediately cease work at that portion of the site and, if on private land, notify the affected landowner(s). Upon such a discovery, Keystone's paleontological monitor will evaluate whether the discovery is of economic or scientific significance. If an economically or scientifically significant paleontological resource is discovered on state land, Keystone will notify South Dakota Schools of Mines and Technology (SDSMT) and if on federal land, Keystone will notify the BLM or other federal agency. In no case shall Keystone return any excavated fossils to the trench. If a qualified and BLM-permitted paleontologist, in consultation with the landowner, BLM, or SDSMT determines that an economically or scientifically significant paleontological resource is present, Keystone shall develop a plan that is reasonably acceptable to the landowner(s), BLM, or SDSMT, as applicable, to accommodate the salvage or avoidance of the paleontological resource to protect or mitigate damage to the resource. The responsibility for conducting such measures and paying the costs associated with such measures, whether on private, state or federal land, shall be borne by Keystone to the same extent that such responsibility and costs would be required to be borne by Keystone on BLM-managed lands pursuant to BLM regulations and guidelines, including the BLM Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources, except to the extent factually inappropriate to the situation in the case of private land (e.g., museum curation costs would not be paid by Keystone in situations where possession of the recovered fossil(s) was turned over to the landowner as opposed to curation for the public). If such a plan will require a materially different route than that approved by the Commission, Keystone shall obtain Commission approval for the new route before proceeding with any further construction. Keystone shall, upon discovery and salvage of paleontological resources either during pre-construction surveys or construction and monitoring on private land, return any fossils in its possession to the landowner of record of the land on which the fossil is found. If on state land, the fossils and all associated data and documentation will be transferred to the SDSMT; if on federal land, to the BLM. To the extent that Keystone or its contractors or agents have control over access to such information, Keystone shall, and shall require its contractors and agents to, treat the locations of sensitive and valuable resources as confidential and limit public access to this information.”

To comply with Major Facilities Siting Act conditions in Montana and South Dakota Public Utilities Commission conditions in South Dakota, a paleontological monitor would be provided for each construction spread that includes an area assigned moderate-to-high fossil-bearing potential (PFYC 3, 4, and 5) and in areas where scientifically significant fossils were identified during surface surveys. The paleontological monitor would need to meet the qualifications established by the BLM for paleontological monitoring on federal lands.

No specific regulations have been identified concerning paleontological resources that would apply to the proposed Project in Nebraska. Even though Nebraska has no state laws to protect paleontological resources, areas underlain by geologic units with high or very high paleontological sensitivity (PFYC Class 5) would be continuously monitored during construction; areas underlain by geologic units with moderate sensitivity (PFYC Class 3a) where significant fossils were found during field surveys would be spot-checked during construction; and areas underlain by geologic units with low paleontological sensitivity (PFYC Class 1 or Class 2) would not be monitored. However, a standard stipulation for all areas of the proposed Project, including areas with low sensitivity geologic units (PFYC Class 1 or Class 2), would be that if any subsurface bones or other potential fossils are found by construction personnel anywhere within the proposed Project site, the Environmental Inspector would be notified; if in his/her opinion a paleontologist is needed, the paleontologist would be contacted to examine the discovery, evaluate its significance, and make further recommendations as appropriate.

Routine pipeline operations and maintenance activities are not expected to affect paleontological resources. Collection of paleontological resources for scientific or other purposes, however, would not be allowed by Keystone within the permanent ROW during proposed Project operations.

The proposed pipeline would be constructed to withstand probable seismic events within the seismic risk zones crossed by the proposed pipeline and in accordance with U.S. Department of Transportation regulations 49 Code of Federal Regulation (CFR) Part 195, Transportation of Hazardous Liquids by Pipeline (49 CFR 195), and all other applicable federal and state regulations. These regulations are designed to help prevent crude oil pipeline accidents and to provide adequate protection for the public.

In accordance with federal regulations 49 CFR 195, internal inspection of the proposed pipeline would occur if an earthquake, landslide, or soil liquefaction event were suspected of causing abnormal pipeline movement or rupture. If damage to the proposed pipeline was evident, the proposed pipeline would be inspected and repaired as necessary.

Implementation of temporary erosion control structures would reduce the likelihood of construction-triggered landslides. Potential erosion control measures would include trench breakers, slope breakers or water bars, erosion control matting, and mulching. In addition, areas disturbed by construction along the pipeline right-of-way (ROW) would be revegetated consistent with the CMRP (see Appendix G) and specific landowner or land manager requirements.

Revegetation would also help reduce the risk of landslides during the operational phase of the proposed Project. The proposed pipeline would be designed and constructed in accordance with 49 CFR Parts 192 and 193. These specifications require that pipeline facilities are designed and constructed in a manner to provide adequate protection from washouts, floods, unstable soils, landslides, or other hazards that could cause the proposed pipeline facilities to move or sustain abnormal loads. Proposed pipeline installation techniques, especially padding and use of rock-free backfill, are designed to effectively insulate the proposed pipeline from minor earth movements.

To reduce landslide risk during operations, erosion and sediment control and reclamation procedures would be employed as described in Section 4.11 of the CMRP (see Appendix G). These procedures are expected to limit erosion and maintain slope stability after the construction

phase. Additionally, landslide activity would be monitored during the proposed pipeline's operation through aerial and ground patrols and through landowner awareness programs designed to encourage reporting. Keystone's company-wide Integrated Public Awareness plan would be implemented. This plan is consistent with the recommendations of American Petroleum Institute (API) Recommended Practice (RP)-1162 (Public Awareness Programs for Pipeline Operators). The plan includes educational materials designed to inform landowners of potential threats associated with the proposed pipeline and teach landowners to identify threats to the proposed pipeline including the potential for landslides. Landowners would be provided a toll-free telephone number to report potential threats to the proposed pipeline and other emergencies.

To mitigate the potential risk of pipeline exposure to lateral and vertical scours, the pipeline would be buried below the calculated scour depth at active stream crossings. In addition, at some water crossings the pipeline would be installed using the horizontal directional drill (HDD) method, at depths greater than 8 feet below the stream bed, where it would not be affected by scouring events.

### **3.0 SOILS**

Special considerations and measures also would be undertaken in proposed Project areas in southern South Dakota and northern Nebraska where the soils are fragile (i.e., sandy soils that exhibit conditions similar to the Nebraska Department of Environmental Quality (NDEQ)-identified Sand Hills Region that are highly susceptible to erosion by wind), (see Soils Environmental Setting Sections 3.2.2.2, South Dakota, and 3.2.2.3, Nebraska).

The proposed CMRP (see Appendix G) includes construction procedures that are designed to reduce the likelihood and severity of proposed Project impacts. Proposed Project impacts on soils are assessed assuming these construction procedures and applicant-proposed environmental protection measures would be implemented.

Keystone's proposed construction methods to reduce soil erosion include installation of sediment barriers (silt fencing, straw or hay bales, and sand bags), trench plugs, temporary slope breakers, drainage channels or ditches, and mulching (see Appendix G, CMRP). These erosion control measures would be implemented wherever soil is exposed, steep slopes are present, or erosion potential is high. To enforce use of these methods, an environmental inspector (EI) would be assigned to each construction spread. The EI would have the authority to stop work and/or order corrective action in the event that construction activities deviate from the measures outlined in the CMRP, agreed landowner requirements, or conditions of applicable permits. Specifically, the EI would inspect temporary erosion-control measures daily in areas of active construction or equipment operation, weekly in proposed Project areas without active construction or equipment operation, and within 24 hours of continuous rainfall greater than half an inch along the ROW undergoing construction and in other construction ancillary areas where the rainfall occurred. The repair of any erosion control measures determined to be not functioning acceptably would be completed within 24 hours of detection where reasonably practicable. If substantial precipitation or snowmelt events create erosion channels in proposed Project areas where soil is exposed, additional sediment control measures would be implemented as soon as practical after the rain or snowmelt event. Potential erosion control measures are described in greater detail in the CMRP.

If soils impacted by potentially hazardous substances (such as hydrocarbons, pesticides, or herbicides) would be disturbed by pipeline construction, adverse impacts could result. These may include the potential spread of impacted soils, hazardous material exposure to workers or the public, or mobilization of contaminants through soil erosion or contaminant leaching from soils to groundwater or surface water, which could affect water quality. If contaminated soils are discovered during construction, Keystone would comply with all applicable federal and state requirements.

One potentially hazardous substance that could be disturbed due to the construction of the proposed Project is *Bacillus anthracis* (a bacterium that causes anthrax) that can remain viable in soils for years (up to 50 years). Anthrax spores are naturally occurring components of some soils, having a very strong bond onto soil; however, disturbance of the soil could uncover spores. There is very low risk of exposure from spores migrating to groundwater or surface water because spores are very short-lived in water. There could be potential risks associated with excavations in areas known to have experienced outbreaks of anthrax in the past. Mitigation measures such as dust control are often applied to reduce the potential exposure.

If soils are moist or wet during trenching and vehicle movement, topsoil would likely adhere to tires and/or tracked vehicles and be carried away (i.e., resulting in rutting of soil). Compaction control measures are described in the CMRP and include ripping (i.e., the loosening of the compacted soils with a dozer equipped with a ripper blade or a deep plow) to relieve compaction, particularly in proposed Project areas from which topsoil has been removed. For discussion of the effects of soil compaction on wetlands, see Section 4.4.3, Potential Wetland Impacts.

Depending on the amount of topsoil that is actually present, in non-forested agricultural proposed Project areas, the top 8 to 12 inches of topsoil would be removed and segregated during excavation activities. Stripped topsoil would be stockpiled in a windrow (i.e., a row of stripped topsoil) along the edge of the ROW. The work would be conducted to minimize the potential for mixing topsoil and subsoil. Topsoil would not be used to fill low-lying proposed Project areas and would not be used to construct ramps at road or waterbody crossings. Additional methodology detailed in the CMRP (see Appendix G) includes ripping to relieve compaction in proposed Project areas from which topsoil has been removed, removing all excess rocks exposed due to construction activity, and adding soil amendments to topsoil as warranted by conditions and agreed to by landowners and/or federal or tribal entities.

To be consistent with South Dakota Public Utilities Commission conditions, the proposed Project route in South Dakota was evaluated to identify areas where special handling and additional soil salvage techniques could be necessary to conserve agricultural capability. Physical (i.e., texture, organic matter content) and chemical (i.e., salinity, sodicity, pH) characteristics of individual soil horizons, as well as more general factors such as geographic setting, climate, and associated ecology, have been evaluated. These same characteristics also would be evaluated prior to construction in other proposed Project areas where soils with similar chemical and physical characteristics occur in low-precipitation portions of the Project route. Soils considered for special handling are those that contain suitable growing conditions in the topsoil horizon and upper subsoil horizon (horizons immediately underlying the topsoil), but contain undesirable soil conditions at greater depths. Excavation and replacement of these soils could potentially result in degradation of agricultural capability if not managed appropriately. The criteria for special handling of soils to conserve agricultural capability were developed in consultation with the Natural Resources Conservation Service (NRCS) to determine proposed

Project areas where special handling may be warranted. Meetings covering these criteria were held in Montana on March 1 and 2, 2011, in South Dakota on June 7 and 8, 2010, and in Nebraska on June 30, 2010. Characteristics that trigger consideration for special handling include soil with contrasting levels of salinity/sodicity, interbedded coarse soil layers, or shallow-to-moderate depths to bedrock that occur within cultivated fields or high-quality native prairie or rangeland. Candidate soils for special handling would be identified using publicly available NRCS soil survey data (Soil Survey Geographic Database) for all upper subsoil horizons within 24 inches of the surface. These data would be overlain on land-use mapping compiled from pedestrian and vehicle surveys and aerial photo-interpretation.

Using NRCS soil series data, the characteristics of the upper subsoil horizons would be compared to data from the lower subsoil horizons to identify soil series with characteristics meeting the special handling criteria. A soil series would be selected for special handling if it meets the criteria for both the upper and lower subsoil horizons. Additionally, the upper subsoil horizons must be at least 6 inches thick or thicker to be selected for special handling because of equipment limitations with how thin of a layer can be stripped. Each soil series meeting special handling criteria would be evaluated to determine the magnitude of the inter-horizon differences in relation to factors such as the physical or chemical characteristics of the other horizons within the soil profile. This case-by-case evaluation would be conducted by Keystone prior to construction. The exact locations of soils that require special soil handling would be mapped prior to construction and subsequently field-verified along the proposed Project route.

The proposed plan for the Project route is to salvage topsoil from the pipeline ROW and other construction sites where excavation or grading would occur. Topsoil stripping depths have been determined through a combination of field surveys along the proposed route and review of topsoil depths reported by NRCS soil surveys. Salvage depths would vary from 4 inches in shallow soils to 12 inches in highly productive soils. In general, recommended topsoil salvage depths would be designed to conserve the high organic content soils that do not contain physical or chemical conditions that could inhibit soil capability. Two primary means of salvaging soil in proposed Project areas that meet the criteria include *over-stripping* and *triple lift*.

In proposed Project areas recommended for over-stripping of topsoil, the soil salvage would extend below the surface horizon into the underlying subsurface soils (usually a B-horizon where iron, clay, aluminum, and organic compounds accumulate). This type of salvage would be used as a precautionary approach to conserve native seed and organics in the topsoil. In general, soils recommended for over-stripping of topsoil commonly are of low quality and support perennial grasses.

The triple lift soil salvage technique would be implemented in proposed Project areas where the topsoil to be excavated is deep/thick, primarily over the pipeline trench in cultivated fields. In these proposed Project areas, the topsoil (i.e., the first lift) would be salvaged across the entire proposed Project route ROW according to the depth determined during pre-construction surveys. The second-lift material would then be salvaged and windrowed next to the salvaged topsoil. The trench spoil material (i.e., the third lift) would then be placed adjacent to the second-lift material. Following construction, the soils would be replaced in the opposite order of extraction and would be feathered across the proposed Project route area. An example of this procedure is shown in Details 67 and 67A of the CMRP (see Appendix G).

On range, pastures, and other proposed Project areas not suitable for farming, construction and maintenance activities may lead to localized soil compaction in soils listed as hydric or compaction prone. This compaction could lead to slower or less successful vegetation re-establishment following construction. Productivity of range and pasture land along the proposed Project route would be restored consistent with easement agreements with landowners and agencies and compensation would be provided for demonstrated losses from decreased productivity resulting from pipeline operations. Additional environmental protection measures to be employed on pasture and range lands are summarized in the CMRP.

The CMRP includes methods to determine when to restrict or stop work due to wet weather, and describes methods to reduce impacts when construction activities are conducted in wet conditions. Work would be restricted or suspended during wet conditions when potential rutting could cause mixing of topsoil and subsoil, excessive buildup of mud or soil on tires, increased ponding of surface water in the work area, and the potential for severe soil compaction. However, topsoil mixing due to rutting would be avoided once the topsoil has been segregated from the work area. During excessive wet conditions, protection measures that could be implemented include limiting work to proposed Project areas that have adequately drained soils or have sufficient vegetation cover to prevent mixture of topsoil with subsoil, installing geotextile material or construction mats in saturated proposed Project areas, or using low-impact construction techniques such as using low-ground-weight or wide-track equipment. Additionally, a stop-work directive would be implemented when recommended by the EI.

As detailed in the CMRP, specific construction methods would be utilized to ensure that disturbed proposed Project areas are returned to conditions consistent with pre-construction use and capability. These methods include topsoil removal, segregation, and redistribution during backfilling, and off-site removal of excess rocks and rock fragments. The size threshold for rock removal would be consistent with that found in adjacent surface soils that are undisturbed off the ROW. Post-construction, Keystone has committed to remove from the construction area any rocks or rock fragments larger than those found in the adjacent undisturbed soils outside of the ROW.

Construction of the proposed pipeline would occasionally necessitate disruption of existing tile drainage and irrigation systems, which would be identified and avoided or, if necessary, repaired or replaced if damaged by pipeline construction. Adherence to these procedures should eliminate or compensate for any long-term impacts to drain tile function or irrigation systems; however, temporary impacts to drain tile and irrigation systems during construction could result in soils becoming saturated during wet weather conditions or during periods of continuous precipitation or in temporary disabling of irrigation systems. Any demonstrated agricultural losses resulting from temporary disruption of drain tile systems and/or irrigation systems would be compensated in accordance with landowner and land manager easement agreements.

Shelterbelts include planted tree and shrub stands and windbreaks typically located at field margins, near roadsides, or around residences. Construction of the proposed pipeline would occasionally necessitate the disruption of existing shelterbelts. Shelterbelts potentially impacted by the pipeline construction would be avoided by the pipeline construction where practicable, or measures would be implemented to mitigate or compensate for impacts, as specified in Appendix R, Construction/Reclamation Plans and Documentation. Where shelterbelts would be disrupted, the ROW would be revegetated and seeded, and wind fences would be installed across the ROW in areas where trees and/or shrubs have been removed. Adherence to these procedures

should minimize or mitigate long-term impacts to shelterbelts. Demonstrated losses from disrupted shelterbelts or windbreaks around residences, near roadsides, or agricultural field margins would be compensated in accordance with landowner and land manager easement agreements.

In southern South Dakota and northern Nebraska, the proposed Project route would enter an area with fragile soils (i.e., landscapes where the soil exhibits conditions similar to the NDEQ-identified Sand Hills Region and the soils are very susceptible to wind erosion; see Soils Environmental Setting Sections 3.2.2.2, South Dakota, 3.2.2.3, Nebraska, and Figure 3.2.2-2, Highly Wind Erodible Soils). To address concerns related to potential erosion in the region, specific construction, reclamation, and post-construction procedures have been developed, as described in Section 4.15 of the CMRP, Fragile Soil Clean Up and Reclamation/Revegetation, (see Appendix G). This document provides site-specific reclamation plans that itemize construction, erosion control, and revegetation procedures for these fragile areas. Additionally, Keystone would implement micro-routing adjustments where practicable and appropriate to minimize steep topography with fragile soils.

To reduce potential impacts related to severe wind and water erosion, the following provides a summary of proposed Project best management practices (BMPs) that would be implemented during construction, reclamation, and post-construction. These BMPs are included in the CMRP for fragile soil areas. Additional procedures are also described in Sandy Prairie Construction/Reclamation Unit Plan (see Appendix R, Construction/Reclamation Plans):

- Keystone would educate construction personnel regarding the necessity to strictly adhere to the proposed Project BMPs designed to minimize impacts to fragile soil landscape areas.
- Minor route re-alignments would be incorporated through these fragile areas to avoid particularly erosion-prone locations, such as ridgetops and existing blowouts as much as practicable.
- Keystone would avoid highly saturated areas, such as wetlands, to the maximum extent possible.
- Construction soil handling procedures would strive to reduce the width of disturbance to the native prairie landscape by adopting Trench-line or Blade-width stripping procedures where practicable.
- Topsoil conservation would be conducted on all areas where excavation occurs.
- Topsoil piles would be protected from erosion through matting, mulching, watering, or tackifying as deemed practicable.
- Traffic management limitations would be employed on specific areas possessing high erosion potential or sensitive habitat.
- Native seed mixes would be developed with input from the local NRCS offices and through collaboration with regional experts. All seed would be certified noxious weed-free and would be calculated on a pure live seed basis.
- Straw or native prairie hay may be used as mulch, applied to the ROW, and crimped into the soil to prevent wind erosion. All mulch would be documented as noxious weed-free.

- Land imprinting may be employed to create impressions in the soil, thereby reducing erosion, improving moisture retention, and creating micro-sites for seed germination. (Land imprinting adds a waffle-like texture to the soil, forming indentations that capture and absorb rainwater that otherwise runs off untreated land.)
- Sediment logs (barriers in the form of logs used to control soil erosion) or straw wattles would be used in place of slope breakers (short terraces) that are constructed of soil. Using sediment logs would result in less soil disturbance to the ROW.
- Photodegradable matting would be applied on steep slopes or areas prone to extreme wind exposure such as north- or west-facing slopes and ridge tops. Biodegradable pins would be used in place of metal staples to hold the matting in place.
- Keystone would work with landowners to evaluate fencing the ROW from livestock, or alternatively, provide compensation to rest a pasture until vegetation can become established.
- Management concerns such as livestock access to water or movement within a pasture would be addressed as necessary by Keystone working with the landowner.
- As part of post-construction monitoring and repair, Keystone would monitor reclamation on the ROW for several years and would repair erosion and reseed poorly revegetated areas as deemed necessary by Keystone. During monitoring, landowners would be informed of these efforts and intended actions going forward.
- A noxious weed management plan would be established based on consultation with state and county experts.

Operational maintenance of cleared proposed Project areas could lead to minor increases in soil erosion by wind or water; however, these impacts would be very localized in nature. These impacts are expected to be minor. If necessary, localized soil erosion would be reduced using measures outlined in the CMRP (see Appendix G). BMPs may include installation of sediment barriers (silt fencing, straw or hay bales, sand bags, etc.), trench plugs, temporary slope breakers, drainage channels or ditches, and mulching. These erosion control measures would be implemented wherever soil is exposed, steep slopes are present, or wherever erosion potential is high.

Maintenance activities could lead to localized compaction due to vehicular traffic during maintenance operations. These impacts are expected to be minor. In the event that agricultural productivity is impaired by vehicular compaction associated with the proposed Project, landowners and land managers would be compensated for demonstrated losses associated with decreased productivity.

The ROW would be monitored to identify any proposed Project areas where soil productivity has been degraded as a result of pipeline operation. Necessary reclamation measures would be implemented to rectify any such concerns. The Department understands that Keystone is negotiating easement agreements with landowners and land management agencies that would require Keystone to restore the productivity of the ROW and provide compensation for demonstrated losses from decreased productivity resulting from pipeline operations to the extent required by the easements or ROW agreements.

In the first year after construction, the ROW would be inspected to identify areas of erosion or settling. Subsequently, erosion and settling would be monitored through aerial patrols consistent

with an Integrity Management Plan and through landowner reporting. Landowner reporting would be facilitated through use of a toll-free telephone number that would be provided to all landowners and land managers along the proposed Project ROW (see Appendix G, CMRP).

To address concerns related to potential erosion in the fragile soil areas in southern South Dakota and northern Nebraska, specific construction, reclamation, and post-construction procedures have been developed as described in the Fragile Soils section within the CMRP (see Appendix G). This document provides a site-specific reclamation plan that itemizes construction, erosion control, and revegetation procedures for these fragile areas. Additional procedures are also described in Sandy Prairie Construction/Reclamation Unit Plan (see Appendix R, Construction/Reclamation Plans). The proposed Project ROW through this region would be monitored for several years to ensure that reclamation and revegetation efforts are successful. Any proposed Project areas where reclamation and revegetation efforts are initially unsuccessful would be re-evaluated and restored.

Proposed Project areas that have been revegetated would be attractive as cattle forage. Due to potentially warmer soils in the immediate vicinity of the proposed pipeline, early forage may be concentrated along the ROW over time. Additionally, animal trackways (i.e., a route of frequent travel by animals) can serve as incipient blowout areas. Keystone has agreed to inform landowners of this concern. Fencing of the ROW may be completed if required; however, fencing could be a serious impediment to landowner access. As described previously, Keystone would work with landowners to evaluate fencing the ROW from livestock, or alternatively, provide compensation to rest a pasture until vegetation can become established.

Also as previously indicated, Keystone would monitor reclamation on the ROW for several years and repair erosion and reseed poorly revegetated areas as necessary. Additionally, based on input received from the NRCS, Keystone would be required to employ a method of assessment of soil productivity such as yield comparison between ROW and non-ROW areas in areas where susceptible soils have been identified with the NRCS.

The Montana Department of Environmental Quality's Environmental Specifications include a Rehabilitation Plan (Erosion Control, Reclamation, and Revegetation Plan), which states that erosion control, reclamation, and revegetation procedures are to be followed as detailed in the Montana Storm Water Pollution Prevention Plan as well as other plans approved by the County Weed Control Boards for the proposed Project construction activities. Keystone has prepared the Montana Storm Water Pollution Prevention Plan and submitted seed mixes to the counties for review consistent with the Montana Department of Environmental Quality's Environmental Specifications.

Regular aerial patrols would occur and these patrols would look for evidence of differential settling or subsidence along the proposed Project route. Mitigation measures to address erosion in fragile soil areas due to cattle forage and reduction in crop productivity in problem areas are described above.

## **4.0 WATER RESOURCES**

Each state that would be crossed by the proposed pipeline route has different requirements for water well testing. In Nebraska, Keystone would be required by NDEQ to conduct baseline water quality testing for domestic and livestock water wells within 300 feet of the centerline of the

approved route upon the request of individual landowners who provide access to perform the testing. These baseline samples would be collected prior to placing the pipeline in service. In the event of a significant release, Keystone would conduct water well testing in the location where the release occurred, as required by NDEQ pursuant to Title 118, Nebraska Administrative Code. Keystone would also provide an alternate water supply for any wells where water quality was found to be compromised by a release or spill. In Montana, pre- and post-construction monitoring would be required. Appendix D (Monitoring Plan) of the MDEQ Major Facility Siting Act Certificate states: “In order to protect groundwater resources, Keystone shall conduct pre- and post-construction monitoring of any wells or springs within 100 feet of the ROW. The survey will be conducted by checking state well records, agency records, and personal communication with landowners and field review. Baseline field surveys of each well or spring will include a visual estimate of flow and water clarity, and field-measured temperature, electrical conductivity, and pH. The results of required surveys will be filed with the agencies before construction commences near these wells and springs.” In South Dakota, as a permit Condition in the South Dakota Public Utilities Commission Final Decision and Order document, Condition 46 (in Exhibit A) states “In the event that a person’s well is contaminated as a result of construction or pipeline operation, Keystone shall pay all costs associated with finding and providing a permanent water supply that is at least of similar quality and quantity; and any other related damages, including but not limited to any consequences, medical or otherwise, related to water contamination.” The South Dakota Public Utilities Commission Order also requires well water testing to be conducted where blasting would occur.

If a release from the proposed pipeline impacted groundwater wells, Keystone would be required to contact the applicable regulatory authorities and determine agency requirements for the most appropriate course of action (see Section 4.3.3.1 above for Nebraska, Montana, and South Dakota requirements). Those actions might include well abandonment, providing alternate water supplies, and site remediation. Nebraska has specifically required this notification as well as water supply replacement planning and commitment in the NDEQ Supplemental Environmental Report. South Dakota and Montana have similar requirements. These actions would be detailed in the Keystone spill response plan. Further, if during construction or operation activities an unregistered well is found, Keystone would provide the landowner with technical assistance to register the pre-existing, unregistered well at the landowner’s request.

The proposed Project route has been selected and modified to minimize the potential for impacts to surface water resources, as well as other sensitive environments, by avoiding them whenever possible and shifting the route to limit the area affected. The final pipeline route may be adjusted based on site conditions, at the request of landowners, or additional regulatory review. These adjustments may reduce impacts and eliminate crossings. For example, where the proposed Project parallels a stream reach and crosses several meanders, the pipeline may be offset during regulatory review and, as a result, not have any crossings in that stream reach.

Permitting requirements would vary based on crossing method, designated waterbody use, and regulatory jurisdiction. Where the HDD method is used for major waterbody crossings or for waterbody crossings where important fisheries resources could be impacted, a site-specific plan addressing proposed additional construction and impact reduction procedures would be developed (see Appendix G, CMRP). Prior to commencing any construction activities at regulated stream-crossings, permits would be required under Section 404 of the Clean Water Act (CWA) through the U.S. Army Corps of Engineers (USACE) and Section 401 Water Quality

Certification, per state regulations. Some crossings may require additional permitting under Section 10 of the Rivers and Harbors Act. The agencies responsible for this review could require additional measures to further limit potential project impacts. In addition, water resources projects on designated segments that are determined to have a direct and adverse effect on the free-flowing condition, water quality, or the values for which the rivers were established are prohibited unless impacts can be avoided or eliminated.

Permits required under Sections 401, 402, and 404 of the CWA could include additional site-specific conditions as determined by USACE and appropriate state regulatory authorities.

Additional review under Section 10 of the Rivers and Harbors Act could be required for some waterbodies. For navigable water crossings regulated under Section 10 (such as the Yellowstone and Missouri rivers), scour depth calculations would be required to show the maximum expected depth of scour at those locations. This evaluation would include the expected scour depth of the riverbed for a range of flows, including very high flows such as the 100-year and 500-year flows.

Temporary crossings would be designed and located to minimize damage to stream banks and adjacent lands. The use of temporary crossings could reduce the impacts to the waterbodies by providing access for equipment to specific locations. These crossings would be designed and constructed to provide unimpeded fish and aquatic organism passage during the period the crossing is in place.

Following completion of waterbody crossings, waterbody banks would preferably be restored to preconstruction contours or to a stable slope. Stream banks would be seeded for stabilization and mulched or covered with erosion control fabric in accordance with the CMRP and applicable state and federal permit conditions. Additional erosion control measures would be installed as specified in any permit requirements. Appropriate care in design and installation would be used with erosion control measures, as these have the potential to cause unintended adverse environmental impacts. For example, placement of rock along the bank at a crossing could induce bank failure further downstream.

Many of the rivers in the proposed Project ROW are unstable and have high sediment supply systems with dynamic active channel(s), depositional bars, and active bank margins. Some of the larger rivers crossed by the proposed Project, such as segments of the Yellowstone and Missouri Rivers in Montana, the Cheyenne River in South Dakota or the Platte River, Loup River, and Prairie Creek in Nebraska are all drainage systems capable of substantial lateral channel migration, bank retreat, and subsequent re-activation of historic floodplains and channels during the life of the proposed Project. All states affected by the proposed Project are prone to ice jams on their major rivers, which often cause substantial backwatering and lateral scour. Channel migration zones (CMZs) are defined by the corridor that each river is expected to occupy over a given timeframe and are based on physical geomorphic parameters and local geologic control. As an example, CMZs for the Yellowstone River in Montana have been mapped (Yellowstone River Conservation District Council 2009) as part of an effort by state and federal agencies to provide additional information for minimizing impacts to major surface water and natural resources, including avoidance of poor development decisions and subsequent damage or loss of infrastructure and property. The proposed Project would incorporate CMZ evaluations in the final design of waterbody crossings.

The minimum pipeline cover at crossings of waterbodies, ditches, drainages, and other similar features would be 5 feet. The proposed Project has stated this minimum cover depth in the

project CMRP (see Appendix G) and has further committed to this minimum cover depth in PHMSA Special Condition 19. Minimum cover depths would be measured to the top of pipe or any coatings and concrete weights applied to the pipe. The pipeline would be installed at the minimum water crossing depth for a distance of at least 15 feet beyond each side of the waterbody.

Where major waterbodies are crossed using the HDD method, the depth from the streambed to the top of the pipe would depend on a number of factors for each crossing design including the width of the crossing and potential scour depth of the waterbody being crossed. The proposed Project supplied HDD installation drawings for the FEIS evaluation (FEIS Volume 5, Appendix D, Site Specific Waterbody Crossing Plans). These plans indicate a typical minimum depth of 30 feet from lowest channel elevation to the top of pipe or coating. The plan supplied for the Niobrara River in Nebraska indicates a depth of over 60 feet from the lowest point in the channel to the top of pipe.

The implementation of appropriate measures to protect pipeline crossings from channel incision and channel migration can reduce the likelihood of washout-related emergencies, reduce maintenance frequency, and limit adverse environmental impacts. The design of the crossings also would include the specification of appropriate stabilization and restoration measures.

The proposed Project crosses the Niobrara River in Nebraska between two Wild and Scenic Rivers Act (WSRA)-designated segments on the Niobrara and Missouri Rivers. The Niobrara National Scenic River segment is approximately 12 miles upstream of the proposed Project Milepost (MP) 626.0, and the Missouri National Recreational River is approximately 46 miles downstream of the proposed Project. The proposed Project does not cross either of these Wild and Scenic River segments. There are several areas along the Niobrara and Missouri Rivers under study for Wild and Scenic designation, and these areas are avoided by the proposed project as well. The National Park Service (NPS) has regulatory authority for the U.S. Department of the Interior (DOI) on Wild and Scenic segments in accordance with Section 7(a) of the WSRA (16 United States Code § 1278). As required under WSRA, USACE would contact the DOI/NPS to determine the need for Section 7(a) evaluations for any Section 404 and 401 permit application initiated under the CWA at all pipeline river crossings, including those upstream, downstream, and on tributaries to the WSRA-designated segments of the Niobrara and Missouri Rivers..

In addition to the NPS requested sub-analysis, the DOI has specific requirements, recommendations, and comments related to HDD and open-cut crossing construction activities that are proposed for use upstream of National Wild and Scenic River segments or tributary rivers as well as streams of WSRA-designated rivers, including the associated floodplain areas (DOI 2012). The open-cut wet crossings pipeline installation method has a high potential to impact water resources during construction activities. This method would typically involve excavation of the channel bed and banks of a flowing stream. Construction equipment and excavated soils would be in direct contact with surface water flow. The degree of impact from construction activities would depend on flow conditions, stream channel conditions, and sediment characteristics.

For the types of crossings listed below, the following measures would be implemented on a site-specific basis:

- Contaminated or Impaired Waters – If required, specific crossing and sediment handling procedures would be developed with the appropriate regulatory agencies, and agency consultation and recommendations would be documented and implemented.
- Sensitive/Protected Waterbodies – If required, specific construction and crossing methods would be developed in conjunction with USACE and U.S. Fish and Wildlife Service (USFWS) consultation or other agencies as applicable. The appropriate method of crossing these waterbodies would be determined by the appropriate agency as applicable.
- HDD Crossings – A frac-out contingency plan would be developed in consultation with the regulatory agencies to address appropriate response and crossing implementation in the event of a frac-out during HDD crossings. Implementation of measures as described in the proposed Project CMRP (see Appendix G) and additional conditions from permitting agencies would reduce adverse impacts that would result from open-cut wet crossings. All contractors would be required to follow the identified procedures to limit erosion and other land disturbances. The CMRP describes the use of buffer strips, drainage diversion structures, sediment barrier installations, and clearing limits, as well as procedures for waterbody restoration at crossings. (See Chapter 2.0, Description of the Proposed Project and Alternatives, and Appendix G, CMRP, for a discussion of the proposed waterbody crossing methods.)

State-level permitting would also be required for pipeline crossings of state-regulated surface waters. Each state with waterbodies crossed by the proposed Project would have authority under CWA section 401 to protect water quality in waters of the state. This process will depend in part on the federal permitting process and what level of permitting is applied to the proposed Project. The CWA defines a state's role in the 401 Water Quality Certification process. Each state's acceptance or denial of the federal Nationwide Permit program dictates whether additional state level review and possible conditions may be required for a particular Nationwide Permit.

- In Montana, the MDEQ may issue state-wide permits for crossings. Some crossings may require location-specific permitting and conditions. This permitting process may also require that where open-cut methods are used, any flowing surface water would be diverted, pumped, or flumed around the trench at pipeline crossings. This would be required where water is present or where significant storm runoff may occur during the construction period. As a result, the non-flowing open-cut and flowing open-cut crossing methods may not be applicable for some regulated crossings under the Section 401 authority of the MDEQ. For CWA Permits, a separate Section 401 review by the MDEQ may be required.
- In South Dakota, the Department of Environment and Natural Resources is responsible for CWA permit certification and would review proposed stream and river crossings where necessary and may issue project-specific conditions. During project review, South Dakota may impose similar stipulations to conditions outlined for Montana.
- In Nebraska, the Department of Environmental Quality has issued a 401 certification or a significant number of Nationwide Permits; however, it has supplied general additions and modifications under its CWA 401 authority. Additionally the state has denied in part or added specific conditions to other Nationwide Permits. The state of Nebraska is likely to have additional regulatory conditions and permitting to that of Montana and South Dakota.

- Stream crossings would need to be protected from erosion and sedimentation. Keystone has submitted plans for erosion control and revegetation, which are provided in Appendix G, CMRP. Additional erosion control and revegetation documentation could be required under supplemental state or federal regulations. For example, MDEQ would require compliance with MEPA, under which Keystone would provide a Storm Water Pollution Prevention Plan. The South Dakota Public Commission Order includes specific measures for protecting stream crossings, such as restricting excavated soil placement, maintaining protective buffers around streams, and revegetating riparian areas with native plant species. In Nebraska, trenches through waterbodies that are dry or contain non-moving water at the time of crossing would not be left open for more than 24 hours to reduce sediment discharge from a sudden storm event resulting in runoff. This commitment would not apply where excavation of rock by blasting or mechanical means may be required in the waterbody.

In addition to pipeline crossings, the locations of pump stations were evaluated for potential impacts to surface waters. The National Hydrography Dataset indicates that three proposed pump station boundaries (Pump Station [PS]-9 in Phillips County, Montana; PS-10 in Valley County, Montana; and PS-20 in Tripp County, South Dakota) are currently located in areas that contain unnamed intermittent streams. Aerial imagery indicates these areas are tilled fields or fenced range locations crossed by grassy swales. Field surveys also indicated that PS-9 is located in tilled crop land and is not in an intermittent stream. Field surveys in the spring of 2009 and 2010 of PS-10 indicated a rill/drainage feature without water present. For PS-20, field surveys did not identify any intermittent streams at this location.

The initial location and design supplied for PS-24 in Nebraska near the Loup River, while not placed in a mapped floodplain, indicates that PS-24 may have limited or no access during periods of flood. It is possible for one or more access routes to be impassable during high water events. As the location and design for PS-24 is finalized, Keystone has indicated that the proposed Project would develop an access plan for this pump station that takes into account access issues during flood conditions. Any other pump stations located near known flood areas would also be evaluated for access during flood conditions.

The proposed Project CMRP Section 8 (see Appendix G) specifies the applicant's committed actions for securing pipeline hydrostatic test water. The Federal Energy Regulatory Commission (FERC) has developed criteria for the minimum separation distance for hydrostatic test manifolds from wetlands and riparian areas appropriate for natural-gas-pipeline construction. Although the proposed Project is not subject to FERC authority, hydrostatic test manifolds would be located more than 100 feet away from wetlands and riparian areas to the maximum extent possible, consistent with FERC criteria.

In an effort to avoid or minimize impacts to sensitive waterbodies, Keystone would take into account environmental conditions when developing plans and obtaining required permitting for water withdrawal from surface waterbodies such as stream crossings in already depleted and drought-prone watersheds.

During droughts, surface water withdrawal permits from larger rivers with existing water rights would be regulated by state regulatory agencies to preserve existing water rights and environmental requirements. If adequate water is not available from rivers, Keystone would use alternative water sources nearby such as local private wells or municipal sources for HDD operations, hydrostatic testing of the mainline, and dust control during these dry conditions.

Keystone has indicated that in the event surface water is unavailable, groundwater would be used for HDD operations, hydrostatic testing, and dust control. Water would be purchased from nearby willing sellers with available water rights.

Additionally, the proposed Project would cross the central Platte River using the HDD method at approximate MP 775. Activities associated with the proposed Project in that area include temporary water withdrawals for drilling fluids and hydrostatic testing. Lower Platte River Basin water depletions in Nebraska could affect resources by reducing the amount of water available in the Basin. The state of Nebraska in cooperation with the USFWS has developed plans to manage water depletions in conjunction with Section 7 Endangered Species Act (ESA) consultations. For the proposed Project, temporary water withdrawals during hydrostatic testing in the lower Platte River Basin would avoid impacts to resources since the volume of water needed would be returned to its source within a 30-day period. Temporary water withdrawals are considered to have no effect, as described by the USFWS Platte River species *de minimus* depletions threshold, which states “temporary withdrawals of water (e.g., for hydrostatic pipeline testing) that return all the water to the same drainage basin within 30 days’ time are considered to have no effect, and do not require consultation.” Sections 3.8 and 4.8 discuss potential impacts to threatened and endangered species and species of conservation concern.

Withdrawals from impaired or contaminated waterbodies would be avoided and only used if approved as a water source. All surface water resources used for hydrostatic testing would be approved by the appropriate permitting agencies prior to initiation of any hydrostatic testing activities. Planned withdrawal rates for each water resource would be evaluated and approved by these agencies prior to use. No resource would be used for hydrostatic testing without receipt of applicable permits. As stated in Section 8.2 of the proposed Project CMRP (see Appendix G), required water analyses would be obtained prior to obtaining any water for filling or any discharging operations associated with hydrostatic testing.

The water withdrawal methods described in the proposed Project CMRP would be implemented and followed. These procedures include screening of intake hoses to prevent the entrainment of fish or debris, keeping the hose at least 1 foot from the bottom or bed of the water resource, prohibiting the addition of chemicals into the hydrostatic test water, and avoiding discharging any hydrostatic test water that contains visible oil or sheen (from pipe or equipment) following hydrostatic testing activities. Any contaminated water would be disposed of in accordance with local, state, and federal regulations.

As a standard procedure and as part of its water withdrawal and discharge permits, Keystone would identify water rights, as per state requirements, that could be affected by temporary interruptions of water flow. Keystone would also abide by mitigation measures outlined in applicable water withdrawal and discharge permits to protect sensitive receptors, such as fisheries.

Hydrostatic test water would be discharged at an approved location along the waterway/wetland or to an upland area within the same drainage as the source water where it may evaporate or infiltrate. Discharged water would be tested for water quality prior to release in the environment to ensure it meets applicable water quality standards imposed by the discharge permits for the permitted discharge locations. Hydrostatic test water would be tested for water quality during storage or during transfer to storage prior to discharge. If needed, hydrostatic test water can be stored in the pipe following testing or in portable storage vessels or containment. Where

hydrostatic test water does not meet standards for discharge proper, treatment or disposal is required. The proposed Project CMRP incorporates additional measures designed to minimize the impact of hydrostatic test water discharge, including regulation of discharge rate, the use of energy dissipation devices, channel lining, and installation of sediment barriers as necessary.

Channel migration or streambed degradation could expose the pipeline, resulting in temporary, short-term, or long-term adverse impacts to water resources; however, protective activities such as reburial or bank armoring would be implemented to reduce these impacts. As described in the proposed Project CMRP (see Appendix G), a minimum depth of cover of 5 feet below the bottom of all waterbodies would be maintained for a distance of at least 15 feet to either side of the edge of the waterbody. General channel incision or localized headcutting could threaten to expose the pipeline during operations. In addition, channel incision could sufficiently increase bank heights to destabilize the slope, ultimately widening the stream. Sedimentation within a channel could also trigger lateral bank erosion, such as the expansion of a channel meander opposite a point bar. Bank erosion rates could exceed several feet per year. Not maintaining an adequate burial depth for pipelines in a zone that extends at least 15 feet beyond either side of the active stream channel could necessitate bank protection measures that would increase both maintenance costs and environmental impacts. Potential bank protection measures could include installing rock, wood, or other materials keyed into the bank to provide protection from further erosion or re-grading the banks to reduce the bank slope. Disturbance associated with these maintenance activities has the potential to create additional water quality impacts.

The proposed Project would use reasonable care and employ generally accepted engineering practices in the design phases of the proposed Project to insure the proper evaluation of the potential for channel aggradation/degradation and lateral channel migration. The level of assessment for each crossing would vary based on the best judgment of the design personnel. The proposed pipeline would be installed as determined to be necessary to address any hazards identified by the assessment. The pipeline would be installed at the design crossing depth, which may exceed the minimum cover depth of 5 feet over the top the pipe for waterbody crossings, and extend for at least 15 feet beyond each side of the waterbody being crossed. The design of the crossings would also include the specification of appropriate stabilization and restoration measures.

The measures to protect water resources during operations are specified in the CMRP (see Appendix G). In South Dakota, the water protection conditions that were developed by the South Dakota Public Utility Commission as part of its Amended Final Decision and Order (Notice of Entry HP09-001) would be implemented.

The proposed pipeline would cross mapped and unmapped floodplains in Montana, South Dakota, and Nebraska. The proposed pipeline would be constructed under many river channels with potential for vertical and lateral scour. In floodplain areas adjacent to waterbodies, the contours would be restored to as close to previously existing contours as practical, and the disturbed area would be revegetated following construction in accordance with the CMRP (see Appendix G). Therefore, after construction, the proposed pipeline would not obstruct flows over designated floodplains, resulting in only minor changes to topography, and thus would not affect local flood dynamics or flood elevations.

Ancillary features such as pump stations, mainline valves (MLVs), and access roads in mapped and unmapped floodplain areas would be assessed prior to permitting and designed to minimize

impacts to floodplains. These facilities would be constructed after consultation with the appropriate county agencies to ensure that the design meets county requirements and to obtain the necessary permits associated with construction in the 100-year floodplain zones.

The following mitigation measures are included in addition to those proposed or planned by Keystone:

- U.S. Environmental Protection Agency (USEPA) and other previous commenters have recommended consideration of ground-level inspections as an additional method to detect leaks. The PHMSA report (2007) on leak detection presented to Congress noted that there are limitations to visual leak detection, whether the visual inspection is done aerially or at ground-level. A limitation of ground-level visual inspections as a method of leak detection is that pipeline leaks may not come to the surface on the ROW and patrolling at ground level may not provide an adequate view of the surrounding terrain. A leak detection study prepared for the Pipeline Safety Trust noted: “A prudent monitor of a pipeline ROW would look for secondary signs of [spills] such as vegetation discoloration or oil sheens on nearby land and waterways on and off the ROW.” PHMSA technical staff concurred with this general statement and noted that aerial inspections can provide a more complete view of the surrounding area that may actually enhance detection capabilities. Also, Keystone responded to a data request from the Department concerning additional ground-level inspections and expressed concerns that frequent ground-level inspection may not be acceptable to landowners because of the potential disruption of normal land use activities (e.g., farming, animal grazing). Although widespread use of ground-level inspections may not be warranted, in the start-up year it is not uncommon for pipelines to experience a higher frequency of spills from valves, fittings, and seals. Such incidences are often related to improper installation or defects in materials.
- Dust suppression chemical runoff could adversely impact sensitive areas and areas of high water quality present in the proposed Project area. Many of these chemicals are salts of various formulations. Overuse could cause potential localized degradation of groundwater quality where groundwater is near the surface. Part 2.14 of the Revised CMRP mentions the use of calcium chloride as an element of the proposed Project’s dust control program with its application limited to roads only. Water-only dust suppression applications near sensitive surface and ground water resources would provide additional protection for these sensitive resources and eliminate the need for salt-based compounds in these areas. Additional protective measures may be required by the appropriate regulating agencies.
- This proposed Project could require authorization under the NDEQ National Pollutant Discharge Elimination System (NPDES) Construction Storm Water General Permit. Conditions of this permit may require modifications to the stabilization of disturbed ground procedure(s) as discussed within the CMRP. Namely, the Construction Storm Water General Permit requires that ground inactive for 14 days be stabilized (either permanent or temporary stabilization) where NPDES permit conditions would supersede any state-level regulation that is less stringent.
- Keystone has supplied a completed HDD design for the Yellowstone River crossing, which accommodates the 100-year CMZ and locates the entry and exit points outside that identified CMZ. Public sources for 100-year CMZ mapping is not readily available for the remaining rivers crossed by the proposed Project. For the stream crossings, designs where 100-year

CMZ data does not exist, Keystone referenced available sources including 100-year flood data, conducted additional scour analysis, performed a lateral migration analysis, and reviewed historic aerial imagery to evaluate scour and lateral migration based on the design life of the pipeline (50 years).

- Permitting agencies may require access structures such as culverts and bridges necessary for the proposed Project's long-term operation over regulated waterbodies to meet design and construction conditions that ensure unimpeded fish and aquatic organism passage during the lifetime of the structure. Many recent and reliable engineering manuals provide methods for designing and constructing fish-friendly, road-stream crossings. These methods could be used when road-stream crossings on fish-bearing streams require permitted design.
- For construction camps built along the proposed pipeline route, construction activities and pipeline testing would use water from surface waterbodies, imported water, or groundwater from a local well. Water would be used for drinking, dust suppression, vehicle washing, and other purposes. Water withdrawal from surface waterbodies or wells would need to be permitted and approved by various agencies and water rights owners. There are currently plans for four construction camps in Montana, three in South Dakota, and one camp in Nebraska. Waterbodies with habitats and species sensitive to or potentially impacted by flow reductions would be thoroughly analyzed to prevent adverse effects.

## **5.0 WETLANDS**

Keystone has developed a CMRP for the proposed Project (see Appendix G), which outlines procedures that would be implemented to minimize potential construction- and operations-related impacts at all wetlands crossings, and states that wetlands affected by construction activities would be restored to the extent practicable. Implementation of measures in the CMRP would avoid or minimize many impacts on wetlands associated with construction and operation activities and would help to ensure that potential effects would be primarily short-term. Tribal and regulatory agencies may require additional wetland avoidance, minimization, and mitigation measures in the event that the current CMRP does not meet the requirements of tribal, local, state, and federal permitting agencies.

Keystone has made numerous route modifications to avoid known wetland areas and to generally minimize wetland impacts. These modifications have been implemented based on aerial mapping, field surveys, and consultation with agencies. Involvement of the USACE and USFWS, as well as other federal and state agencies, during the early phases of project routing and siting identified high quality wetlands (such as the NDEQ-identified Sand Hills Region) or areas requiring additional protection to be avoided. Data reviewed to avoid and minimize impacts to wetlands to the extent possible included: National Wetland Inventory maps, aerial imagery, soil surveys, and field wetland surveys. In addition to the procedures outlined in the CMRP, wetland impacts were further avoided or minimized by the use of HDD to avoid impacts at some water crossings, locating the route next to existing utilities to minimize impacts, perpendicular crossing of riparian wetland features to minimize impacts where possible, and route variations to reduce the total length of the wetland crossing to minimize impacts.

Commitments described in the proposed Project CMRP (see Appendix G, Sections 6 and 7) and additional Keystone correspondence to protect and restore wetlands include the following general measures (refer to the CMRP for additional details and figures):

- Avoid placement of aboveground facilities in a wetland, except where the location of such facilities outside of wetlands would preclude compliance with U.S. Department of Transportation pipeline safety regulations or the Project-specific Special Conditions developed by the PHMSA (see Appendix G, CMRP).
- Reduce the width of the proposed construction ROW to 85 feet or less in Montana and Nebraska, and 75 feet or less in South Dakota in standard wetlands unless non-cohesive soil conditions require a greater width and unless the USACE or other regulatory authority authorizes a greater width.
- Avoid highly saturated areas, such as wetlands, to the maximum extent practicable.
- Develop emergency response procedures for all incidents (e.g., leaks, spills, fires, HDD frac-out) involving hazardous materials that could pose a threat to human health or the environment (including wetlands) prior to beginning work.
- Develop compensation for impacts to all wetland types according to tribal, local, state, and federal regulations. In addition, Keystone would develop compensation for impacts to non-jurisdictional forested wetland impacts in Nebraska.
- Clearly mark wetland boundaries with signs and/or highly visible flagging during construction and maintain markers until permanent seeding is completed.
- Minimize the construction of roads through wetlands. Other than the construction ROW, the only access roads that would be used in wetlands would be existing public and private roads. Locate extra work spaces at least 10 feet away from wetland boundaries, where topographic conditions permit.
- Apply specific construction methods for “dry wetland crossings” (wetlands that are dry enough to support equipment without supportive construction mats); “standard wetland crossings” (wetlands with saturated and non-cohesive soils); and “flooded wetlands” (wetlands with standing water over much of the surface area) to minimize disturbances based on site-specific conditions (see Section 6 of the CMRP [Appendix G]).
- Limit clearing of vegetation between extra work areas and the edge of the wetlands to the proposed construction ROW and limit the size of extra work areas to the minimum needed to construct the wetland crossing.
- Clear the construction ROW, dig the trench, fabricate and install the pipeline, backfill the trench, and restore the construction ROW using wide-track or low-ground pressure construction equipment and/or conventional equipment operating from timber and slash (riprap) cleared from the ROW, timber mats, or prefabricated equipment mats.
- Install and maintain sediment barriers at all saturated wetlands or wetlands with standing water across the entire construction ROW upslope of the wetland boundary and where saturated wetlands or wetlands with standing water are adjacent to the construction ROW as necessary to prevent sediment flow into the wetland.

- Limit the duration of construction-related disturbance within wetlands to the extent practicable.
- Use no more than two layers of timber riprap to stabilize the proposed construction ROW.
- Cut vegetation off at ground level leaving existing root systems in place and remove it from the wetland for disposal.
- Limit pulling of tree stumps and grading activities to directly over the trench line unless safety concerns require the removal of stumps from the working side of the construction ROW.
- Segregate and salvage all topsoil up to a maximum of 12 inches of topsoil from the area disturbed by trenching in dry wetlands, where practicable, and restore topsoil to its approximate original stratum after backfilling is complete.
- Dewater the trench in a manner to prevent erosion and to prevent heavily silt-laden water from flowing directly into any wetland or waterbody.
- Locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable.
- Prohibit storage of hazardous materials, chemicals, fuels, lubricating oils in wetlands, if possible. All storage tanks would have secondary containment structures that would provide 110 percent containment volume so potential spill materials are fully contained.
- Prohibit the performing of concrete coating activities within a wetland or within 100 feet of any wetland boundary, if possible.
- Avoid parking equipment overnight within 100 feet of a watercourse or wetland, if possible.
- Prohibit washing equipment in streams or wetlands.
- Install trench plugs and/or seal the trench to maintain the original wetland hydrology, where the pipeline trench may drain a wetland. Trench plugs would also be used at wetland and waterbody crossings, at the direction of the Environmental Inspector, to prevent diversion of water into upland portions of the pipeline trench and to keep any accumulated trench water out of the waterbody. Perform all equipment maintenance, repairs, and refueling of all construction equipment in an upland area at least 100 feet from a wetland boundary, if possible. Where this is not possible (e.g., trench dewatering pumps), the equipment would be fueled by designated personnel with special training in refueling, spill containment, and cleanup. Keystone would prepare a Spill Prevention, Control, and Countermeasure Plan prior to introducing the subject fuel, oil, or hazardous material to a given location.
- Stationary equipment would be placed within a secondary containment if it would be operated or require refueling within 100 feet of a wetland or waterbody boundary.
- Avoid sand blasting in wetlands to the extent practicable; if unavoidable, place a tarp or suitable material to collect as much waste shot as possible, clean up all visible wastes, and dispose of collected waste at an approved disposal facility.
- Prior to the application of epoxy powder, urethane epoxy, or other approved pipe coatings, place a tarp underneath the pipe in wetlands to collect any overspray of epoxy powder and

liquid drippings. Excess powder, liquid, or other hazardous materials (e.g., brushes, roller, gloves) would be continuously collected and removed from the area and appropriately disposed of.

- Remove all construction debris, excess spoil, timber riprap, and prefabricated equipment mats upon completion of construction.
- Replace topsoil and restore original contours with no crown over trench to the greatest extent practicable.
- Stabilize wetland edges and adjacent upland areas by establishing permanent erosion control measures and revegetation, as applicable, during final cleanup.
- For each standard wetland crossed, install a permanent slope breaker at the base of slopes near the boundary between the wetland and adjacent upland areas. The trench breaker would be located immediately upslope of the slope breaker.
- Apply seeding requirements for agricultural lands or as required by the landowner, or relevant land managing agency, for farmed wetlands.
- Mulch adjacent upland areas within 100 feet of waterbodies and wetlands with weed-free mulch at an approximate rate of 3 tons per acre to reduce erosion and weed infestation potential.
- Use no application of fertilizer, lime, or mulch unless required by the appropriate land management or resource agency and with land owner permission.
- Prohibit use of herbicides or pesticides within 100 feet of any wetland (unless allowed by the appropriate land management, tribal agency, or state agency). See Section 2.13 of the CMRP (Appendix G) for weed management procedures in adjacent upland areas.
- Restore wetland areas within conservation lands or easements to a level consistent with any additional criteria established by the relevant managing agency.
- Monitor the pipeline ROW and all stream crossings for erosion and other potential problems that could affect the integrity of the pipeline. Address problems as expediently as practicable.
- Repair trench depressions on the ditch line that may interfere with natural drainage, vegetation establishment, or land use as expediently as practicable.
- Conduct post-construction monitoring inspections after the first growing season to determine success of revegetation, unless otherwise required by a permit. If, after the first growing season, revegetation is successful, no additional monitoring would be conducted unless otherwise required by a permit.
- Determine restoration to be successful if the surface condition is similar to adjacent undisturbed communities.
- Implement weed control measures as required by any applicable plan and in conjunction with the landowner and applicable agencies.

Proposed pipeline construction through wetlands must also comply with Executive Order 11990 (the “no net loss” wetland policy), USACE Section 404 permit conditions, and applicable state and local regulations. Under the authority of Section 404 of the CWA, USACE permits are

required for the discharge of fill material into waters of the United States. As noted in Section 3.4.4, Federal and State Regulatory Setting, waters of the United States include the area below the ordinary high water mark of stream channels and lakes or ponds connected to the tributary system, and wetlands adjacent to these waters, including wetlands that have a “significant nexus” to these waters. Isolated waters and wetlands, as well as man-made channels and ditches, may be waters of the U.S. in certain circumstances, which must be determined on a case-by-case basis by the USACE. Under the authority of Section 10 of the Rivers and Harbors Act, USACE permits are required for structures or work in, over, under or affecting navigable Waters of the United States.

All wetlands and waterways crossed by the proposed Project would be evaluated under the preliminary jurisdictional determination process. Under this process, all wetlands are tentatively considered jurisdictional until an approved determination is made by USACE (Regulatory Guidance Letter No. 08-02). A more detailed explanation of wetland regulatory framework can be found in Section 3.4.4, Federal and State Regulatory Setting. Compensatory mitigation, where required by USACE or state agencies, would be provided for permanent losses of jurisdictional wetlands and water resources. Compensatory Mitigation Plans would be developed and carried out in accordance with Title 33 of the CFR Part 332 (Compensatory Mitigation for Losses of Aquatic Resources) or applicable state standards. All non-permanent wetland fills due to construction activities would be restored in accordance with the proposed Project CMRP (see Appendix G).

The USACE Omaha District and applicable state and local agencies would be consulted to determine the additional mitigation that would be required for impacts to and losses of wetlands and water resources, including the permanent conversion of forested wetland to herbaceous wetland. The USACE would determine whether a Nationwide Permit (NWP) (such as an NWP12) or an individual permit is more appropriate for the proposed Project. In general, NWPs are only applicable for projects that would have minor environmental impacts and valid only if the proposed activities comply with all the terms and conditions of the permit. If the conditions cannot be met, then a regional or individual permit would be required. Individual permits require a full 30-day public interest review where the final decision of the permit is generally based on the results of the public review balanced with the benefits and impacts of the project. An individual permit cannot be issued if the proposed activity is contrary to the public interest. Under Section 401, states and Indian tribes can review and approve, condition, or deny all Federal permits or licenses that might result in a discharge to state or tribal waters, including wetlands.

Mitigation requirements, general conditions, and regional conditions vary between NWPs. Mitigation requirements for individual permits are evaluated on a case-by-case basis by the USACE and are generally more rigorous than those required by the NWPs. In general these permits would require the following:

- Thorough delineation of all project area wetlands to determine which wetlands are jurisdictional (and therefore regulated under the CWA), which wetlands are non-jurisdictional (and therefore exempt from CWA requirements), and which wetlands may be regulated by other policies or agencies.
- Detailed construction and operations plans with updated wetland impact estimates. An updated detailed wetland avoidance, minimization, and mitigation plan would be submitted

and evaluated for Section 404(b)1 compliance to ensure the proposed Project is the most Least Environmentally Damaging Practicable Alternative. Pre-construction notification packages would include the mitigation plans agreed upon with the USACE, states, and Indian tribes.

- Final restoration for all jurisdictional wetlands, and other wetlands of tribal, state, or federal concern, according to the USACE and other agencies and tribal entities as required.
- Compensation for wetland loss as required by tribal, local, state, or federal agencies. At a minimum, jurisdiction wetland loss would be compensated at a 1:1 ratio to ensure no net loss but higher ratios are often required.
- Approval by appropriate agencies for all seed mixes and revegetation materials used to restore wetlands or agricultural farmed wetlands.
- Monitoring of wetland mitigation sites for success according to applicable permit conditions.

More permit specific mitigation measures are described in the following USACE nationwide and individual permit resource documents. Note that many of the mitigation measures included in the CMRP (see Appendix G) are already tailored after Nationwide Permit 12 for Utility Line Activities:

- USACE 2012 Nationwide Permits Summary;
- USACE 2012 Nationwide Permits, Conditions, and Definitions, with Corrections;
- 2012 Nationwide Permits Regional Conditions Omaha District State of Montana;
- 2012 Nationwide Permits Regional Conditions Omaha District State of South Dakota;
- 2012 Nationwide Permits Regional Conditions Omaha District State of Nebraska; and
- USACE 2012 Individual permit application form and guidelines. Additionally, Keystone would follow state-specific impact reduction, mitigation, and reclamation plans as outlined in the following Project-related publicly available documents:
- Montana—Keystone XL Project: Supplemental Information for Compliance With the Montana Environmental Policy Act and Support for Decisions Under the Major Facility Siting Act (signed March 30, 2012) (see Appendix N, Supplemental Information for Compliance with MEPA);
- South Dakota—South Dakota Public Utilities Commission Final Decision and Order (2010); and
- Nebraska—2012 Nebraska Supplement Environmental Report.

In addition to the state and federal mitigation requirements noted above, the proposed Project would also need to comply with any additional mitigation required by other permitting agencies such as the USACE. In addition and as required under the Wild and Scenic Rivers Act, USACE will contact the NPS to determine the need for Section 7(a) evaluations at all pipeline river crossings including those upstream, downstream, and on tributaries to the Niobrara River for both the Niobrara National Scenic River and the Missouri National Recreational River. During the public comment review period several agencies had recommended additional mitigation

measures for the proposed Project. Some or all of these additional recommended mitigation measures could be required during federal and state permitting.

## **6.0 TERRESTRIAL VEGETATION**

Keystone proposes to reduce impacts on vegetation within the construction and permanent ROW and to improve the probability of successful revegetation of disturbed areas by implementing the following measures as described in the proposed Project CMRP (see Appendix G) in accordance with applicable permits:

- Limit construction traffic to construction of the ROW, existing roads, newly constructed roads, and approved private roads.
- Clearly stake construction ROW boundaries, including pre-approved temporary workspaces, to prevent disturbance to unauthorized areas.
- Mow or disc crops if present to ground level unless an agreement is made for the landowner to remove for personal use.
- Prohibit burning on cultivated lands, as well as on rangelands and pastures when recommended by regulatory agencies.
- In South Dakota, limit the width of the construction ROW at timber shelterbelts in agricultural areas to the minimum necessary to construct the pipeline.
- Strip topsoil in cultivated and agricultural lands to the actual depth of the topsoil (to a maximum depth of 12 inches).
- Stockpile stripped topsoil in a windrow along the edge of the ROW, such that the potential for subsoil and topsoil mixing is reduced.
- Ensure all temporary mulch materials are weed-free.
- Limit soil compaction by prohibiting access by certain vehicles, using only machinery with low ground pressure (tracks or extra-wide tires), limiting access and minimize frequency of all vehicle traffic, digging ditches to improve surface drainage, using timber riprap, matting or geotextile fabric overlain with soil, and stopping construction when necessary.

To restore disturbed areas to pre-construction use and vegetation cover, the following reclamation and revegetation measures as described in the proposed CMRP (see Appendix G) would be implemented in accordance with applicable permits:

- Test topsoil and subsoil for compaction at regular intervals in agricultural and residential areas.
- Relieve soil compaction on all croplands by ripping a minimum of three passes at least 18 inches deep, and on all pastures by ripping or chiseling a minimum of three passes at least 12 inches deep.
- Relieve subsoil compaction on areas stripped for topsoil salvage by ripping a minimum of three passes at 18 inches or less followed by grading and smoothing if necessary (disc or harrow) to avoid topsoil mixing.

- Replace topsoil to pre-existing depths (up to a maximum of 12 inches) once ripping and discing of subsoil is complete in order to alleviate compaction on cultivated fields.
- Consult with the NRCS if there are any disputes between landowners and Keystone as to areas where compaction should be alleviated.
- Plow under organic matter, including wood chips or manure, or plant a new crop such as alfalfa to decrease soil bulk density and improve soil structure; or conduct any other measures in consultation with the NRCS if mechanical relief of compaction is deemed unsatisfactory.
- Inspect the ROW in the first year following construction to identify areas of erosion or settling.
- If soil quality has been deteriorated, the application of soil amendments such as fertilize and soil pH modifiers may be required in accordance with written recommendations from local soil conservation authorities and land management agencies and authorized by the landowners.
- Reseed the reclaimed construction ROW following cleanup and topsoil replacement as closely as possible using seed mixes based on input from the local NRCS and specific seeding requirements as requested by the landowner or the land management agency. Keystone would retain local rangeland experts who would coordinate area-specific seed mixes as appropriate in all states. Use certified seed mixes to limit the introduction of noxious weeds within 12 months of seed germination testing, and adjust seeding rates based on test results.
- Remove and dispose of excess mulch prior to seedbed preparation to prevent seed drills from becoming plugged and to ensure that seed incorporation can operate effectively.
- Re-apply and anchor temporary mulch, such as erosion control blankets, on the construction ROW following seeding.
- Seed at a rate appropriate for the region and for the stability of the reclaimed surface based on pure live seed.
- Use seeding methods appropriate for weather conditions, construction ROW constraints, site access, and soil types using drill seeding unless the ROW is too steep. Broadcast temporary cover crop seed.
- Delay seeding until soil is in an appropriate condition for drill seeding.
- Use Truax or an equivalent-type drill seeder equipped with a cultipacker that is designed and equipped to apply grass and grass-legume seed mixtures with mechanisms such as seed box agitators to allow even distribution of all species in each seed mix and with an adjustable metering mechanism to accurately deliver the specified seeding rate and depth.
- Operate and calibrate drill seeders so that the specified seeding rate is planted using seed depths consistent with local or regional agricultural practices and row spacing that does not exceed 8 inches.

- Use broadcast or hydro-seeding in lieu of drilling at the recommended seeding rates and use a harrow, cultipacker, or other equipment immediately following broadcasting to incorporate the seed to the specified depth and to firm the seedbed.
- Delay broadcast seeding during high wind conditions and when the ground is frozen.
- Hand rake all areas that are too steep or otherwise cannot be safely harrowed or cultipacked to incorporate broadcast seed to the specified depth.
- Use hydro-seeding on a limited basis, where the slope is too steep or soil conditions do not warrant conventional seeding methods.
- Work with landowners to the extent practicable to discourage intense livestock grazing of the construction ROW during the first growing season by using temporary fencing, deferred grazing, or increased grazing rotation frequency.

The following measures, as identified in the proposed CMRP (see Appendix G), would be implemented to minimize impacts specifically to native grasslands:

- Develop noxious-weed-free native seed mixes with input from the local NRCS offices and through collaboration with regional experts.
- Seed disturbance areas in native range with a native seed mix after topsoil replacement.
- Mulch and crimp into the soil noxious-weed-free straw or native prairie hay to prevent wind erosion.
- Imprint the land surface to create impressions in the soil to reduce erosion, improve moisture retention and create micro-sites for seed germination.
- Reduce soil disturbance by using sediment logs or straw wattles in place of slope breakers that are constructed of soil.
- Apply photodegradable matting anchored with biodegradable pins on steep slopes or areas prone to extreme wind exposure such as north- or west-facing slopes and ridge tops.
- Work with landowners to prevent overgrazing of the newly established vegetation.
- Monitor reclamation, repair erosion, and reseed poorly revegetated areas as necessary until success criteria has been met or as required by specific permit conditions.
- Monitor the ROW to determine the success of revegetation after the first growing season, and for areas in which vegetation has not been successfully re-established, reseed the area.
- Incorporate minor route alterations to avoid particularly erosion-prone locations where practicable.
- Avoid highly saturated areas to the maximum extent possible.
- Strive to reduce width of disturbance to the native prairie landscape by adopting trench-line or blade-width stripping procedures where practicable.
- Conserve topsoil to a maximum of 12 inches in depth in all areas where excavation occurs.
- Protect topsoil piles from erosion to the degree practicable.
- Manage vehicle traffic in areas with high erosion potential or sensitive habitat.

- Any areas with unsuccessful revegetation would be monitored until adequate vegetation cover is achieved. In addition, the pipeline route would be monitored continually during operations to identify areas of erosion.

These measures for forested uplands and wetlands, as identified in the CMRP (see Appendix G), would be implemented:

- Salvage timber or allow landowner to salvage timber as requested by landowners.
- Grub tree stumps to a maximum of 5 feet on either side of the trench line and where necessary for grading a level surface for construction equipment using bulldozers equipped with brush rakes to preserve organic matter.
- Dispose of trees, brush, and stumps as per landowners' requirements as stated in the easement agreement. Fell trees toward the center line of the ROW to avoid damage to nearby trees and branches and recover trees and slash falling outside of the ROW.
- Prune any broken or damaged branches and branches hanging over the ROW as necessary.
- Burn, chip, or remove tree wastes, incorporating chips into soil such that revegetation is not prevented.
- Establish staging areas, approximately 2,000 feet apart in timbered areas, on sites located on approved temporary workspaces in existing cleared areas, and size them appropriately to accommodate the loading equipment.
- Remove unwanted timber from the construction ROW and transport it to a designated all-weather access point or mill.

In order to control the introduction and spread of noxious weeds, Keystone (in coordination with appropriate local, state, and federal agencies) would implement the following construction and restoration procedures as detailed in the CMRP (see Appendix G):

- Mark all areas of the ROW that contain infestation of noxious weeds.
- Use pre-construction treatment such as mowing prior to seed development or herbicide application (in consultation with county or state regulatory agencies, and landowners) for areas of noxious weed infestations prior to clearing grading, trenching, or other soil disturbing work to weed infestation locations identified on construction drawings. Keystone would implement BMPs for conducting vegetation control where necessary before and after construction. Agricultural herbicides used would be developed in consultation with county or state regulatory agencies and would not be used within 100 feet of a wetland or waterbody. Herbicides applied prior to or during construction would be non-residual.
- Strip and store topsoil contaminated with weed populations separately from clean topsoil and subsoil.
- Use mulch and straw or hay bales that are free of noxious weeds for temporary erosion and sediment control.
- Clean all construction equipment, including timber mats, with high-pressure washing equipment prior to moving equipment to the next job site; clean the tracks, tires, and blades of equipment by hand or compressed air to remove excess soil prior to movement of

equipment out of weed infested areas, or use cleaning stations to remove vegetative materials with high pressure washing equipment.

- Limit the potential for spread of weeds by providing weed control by a state-licensed pesticide applicator at valve sites, metering stations, and pump stations.
- Reimburse adjacent landowners when they must control weeds that are determined to have spread from the proposed Project's aboveground facilities.
- Implement weed control measures as required by any applicable plan and in conjunction with the landowner.

## **7.0 WILDLIFE**

The proposed pipeline has been carefully designed to avoid most state, federal, and local managed habitat. To reduce potential construction- and operations-related effects where habitat is crossed, procedures outlined in the proposed Project CMRP (see Appendix G) would be implemented. Measures to minimize adverse effects to wildlife habitats, including shelterbelts, windbreaks, and living snow fences, are identified in the CMRP. Pipeline construction would be conducted in accordance with required permits. The following measures to minimize impacts to wildlife, as identified in the CMRP or as required by the USFWS, state, or other federal agency, would be implemented:

- Immediately remove shavings produced during pipe bevel operations to ensure that livestock and wildlife do not ingest this material.
- Collect and remove litter and garbage that could attract wildlife from the construction site at the end of the day's activities.
- Prohibit feeding or harassment of livestock or wildlife.
- Prohibit construction personnel from having firearms or pets on the construction ROW.
- Ensure all food and wastes are stored and secured in vehicles or appropriate facilities.
- Reseed disturbed native range with native seed mixes after topsoil replacement.
- If site-specific conditions warrant, and if agreed to by the landowner, ensure that the Contractor applies amendments (i.e., fertilizer and soil pH modifier materials and formulations) commonly used for agricultural soils in the area and in accordance with written recommendations from the local soil conservation authority, land management agencies, or landowner. Amendments would be incorporated into the normal plow layer as soon as possible after application.
- Control unauthorized off-road vehicle access to the construction ROW through use of signs, slash and timber barriers, pipe barriers, boulders, or planted conifers or other appropriate trees or shrubs in accordance with landowner or manager request.
- To prevent unauthorized access, and to the extent permitted by landowners, secure/lock temporary gates when construction activities are not occurring. Also to the extent permitted by landowners, make reasonable efforts to restrict access to the pipeline corridor via access roads after construction to minimize increased human use in formerly inaccessible areas.

- Work with landowners to discourage intense livestock grazing of the construction ROW during the first growing season by utilizing temporary fencing or deferred grazing, or increased grazing rotation frequency. Where forested areas would be reclaimed, request landowners to discourage intensive grazing in the construction ROW during the first five growing seasons.
- Develop and implement a conservation plan, in consultation with the USFWS, consistent with the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) and consistent with provisions of Executive Order 13186 by providing avoidance and mitigation measures for migratory birds and bald and golden eagles and their habitats within the states where the proposed Project would be constructed, operated, and maintained.
- Develop construction timing restrictions and buffer zones, such as those described in Table 1, through consultation with regulatory agencies for the proposed Project.
- If construction would occur during the April 15 to July 15 grassland ground-nesting bird season, complete nest-drag surveys to determine the presence or absence of nests on federal lands located in Phillips County, Montana.
- If construction would occur during the raptor nesting season during January to August, complete pre-construction surveys to locate active nest sites to allow for appropriate construction scheduling and buffer restrictions.

**Table 1 Seasonal Timing Restrictions<sup>a</sup> and Buffer Distances for Big Game Animals, Game Birds, Snakes, Wading Birds, and Raptors**

<b>Animal and Habitat Type</b>	<b>State</b>	<b>Buffer Distance</b>	<b>Seasonal Timing Restrictions<sup>b</sup></b>
White-tailed deer–winter range	Montana	NA <sup>c</sup>	December 1 to March 31 (MFWP) & December 1 to May 15 (BLM)
Mule deer–winter range	Montana	NA	December 1 to March 31 (MFWP) & December 1 to May 15 (BLM)
Antelope–winter range	Montana	NA	December 1 to March 31 (MFWP) and December 1 to May 15 (BLM)
Snakes–hibernacula	Montana	NA	October 1 to May 1 (MFWP)
Sharp-tailed Grouse–active lek and nesting habitat	Montana South Dakota	0.25 mile (MFWP & BLM)	March 1 to June 15
Rookeries–Great Blue Herons or Double Crested Cormorants	Montana	0.31 mile (MFWP)	May 1 to July 31 (MFWP)
Raptors and Herons–active nests and rookeries	Entire ROW	0.5 mile (MFWP) 0.25 mile no surface occupancy (MFWP & BLM) 0.5 mile timing limitations (BLM)	March 1 to August 1 (MFWP) March 1 to July 31 (BLM) February 1 through August 15 (USFWS)

<sup>a</sup> Timing restrictions for federal threatened, endangered, proposed and candidate species, species under consideration, BLM sensitive species, state threatened and endangered species, and species of conservation concern are discussed in Section 4.8, Threatened and Endangered Species and Species of Conservation Concern.

<sup>b</sup> BLM restrictions only apply to federal lands, MFWP restrictions apply throughout Montana, and USFWS restrictions apply nationwide.

<sup>c</sup> NA = not applicable

In Montana, the proposed Project would employ the wildlife mitigation measures included in Appendix A, Governor Approval of the Keystone XL Project in Nebraska, to the Environmental Specifications developed for the Project by the Montana Department of Environmental Quality (MDEQ) (see Appendix N, Supplemental Information for Compliance with MEPA). In South Dakota, the proposed Project would employ mitigation measures to satisfy the conditions that were developed by the South Dakota Public Utility Commission and attached to its Amended Final Decision and Order, Notice of Entry HP09-001. Additional wildlife mitigation measures would include the following:

- In Montana, conduct surveys of sharp-tailed grouse leks prior to construction using approved methods to detect lek locations that could be seen from the construction ROW (MDEQ and MFWP).
- From March 1 to June 15, prohibit construction and routine maintenance activities within 0.25 mile of an active sharp-tailed grouse lek that could be seen from the construction ROW (MDEQ, MFWP, and BLM).
- Avoid construction and reclamation activities within 0.62 mile of active raptor nests between March 15 and July 15 (MDEQ and MFWP).
- Avoid great blue heron rookeries by at least 500 feet (MDEQ and MFWP).
- Minimize tree clearing through a narrowing of the construction ROW and final centerline location near certain stream crossings to minimize impacts to bats and other wildlife associated with riparian habitats (MDEQ and MFWP).
- Within winter ranges for pronghorn and mule deer in Montana, develop construction timing restrictions after November 15 in consultation with MFWP biologists based on the severity of winter conditions (MDEQ and MFWP).
- To protect small animals from entanglement, do not use erosion materials that incorporate plastic netting with openings less than 2 inches across (MDEQ and MFWP).

## **8.0 FISHERIES**

To minimize potential impacts to fisheries resources, Keystone would implement a CMRP (see Appendix G), which contains measures for use at and near waterbody crossings to reduce potential effects on fish and aquatic/stream bank habitat.

To reduce the potential for transfer of aquatic pathogens, temporary vehicle bridges would be used to cross waterbodies in order to limit vehicle contact with surface waters and sediments. During open-cut pipeline installation, in-stream activities would be conducted outside of the waterbody channel as much as practical and would limit the use of equipment within waterbodies. Workspaces would be located at least 10 feet from waterbodies and would implement erosion-control measures to reduce suspended sediment loading in waterbodies. These measures would also limit waterbody contact with vehicles and mud that could potentially serve as vectors for invasive species and whirling disease. Construction vehicles would be washed to remove mud and dirt that may collect on equipment. Washing would be accomplished in specified areas and washwater would not be allowed to enter any waterbody, wetland, or irrigation canal or ditch per the CMRP (see Appendix G).

The degree of construction-related impacts to fisheries resources within waterbodies that would be crossed by the proposed Project route would depend on the crossing method, site-specific streambed conditions at each crossing, the duration of instream construction-related activity, and application of impact reduction measures. Crossing techniques for waterbodies would depend on stream size, the presence of sensitive resources, protection status, classification of the waterbody, and permit requirements (see Section 2.1, Overview of the Proposed Project, for construction method details). The proposed Project would cross waterbodies along the proposed Project route using one of the following techniques as described in detail in the CMRP (see Appendix G):

- Non-flowing open-cut crossing method;
- Flowing open-cut crossing method;
- Dry flume open-cut crossing method;
- Dry dam-and-pump open-cut crossing method; and
- HDD crossing method.

Keystone proposes to use HDD techniques at 13 of the perennial waterbody crossings<sup>1</sup> and various open-cut methods at the remaining 43 perennial stream crossings. Aquatic surveys in those waterbodies where open-cut methods have been proposed have been conducted since 2008, and surveys for the proposed Nebraska reroute were conducted in summer and fall 2012 and are continuing in summer 2013. Site-specific crossing plans would be developed for waterbodies that would be crossed by the proposed pipeline, if required by the applicable regulatory agencies during the permitting process. Several site-specific crossing plans for HDD crossings have been developed and are presented in the CMRP. Further, state agencies would be consulted and relevant USACE permitting and consultation and USFWS consultation would be completed to determine specific open-cut crossing and construction methods to reduce proposed Project impacts to fishery resources. As an example, the State of Montana noted in their Environmental Specifications (see Appendix N, Supplemental Information for Compliance with the Montana Environmental Policy Act) that no flowing open-cut crossing methods would be allowed in Montana.

To minimize the amount of sediment from stream bank and upland erosion entering waterbodies, the BMPs described in the CMRP (see Appendix G) would be implemented, as well as any additional measures mandated within stream crossing permits issued by state and federal regulatory agencies. Measures specified in the CMRP include the following:

- Installation of sediment barriers immediately after initial disturbance of waterbodies or adjacent uplands;
- Minimization of grading and grubbing along stream banks; and
- Prompt removal of plant debris or soil that is inadvertently deposited at or below the high water mark.

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<sup>1</sup> One additional HDD crossing would be made at Bridger Creek, which is an intermittent stream, for a total of 14 HDD waterbody crossings.

Implementation of these and other similar measures to reduce suspended sediment loads would result in proposed Project impacts to fisheries resources that would be short term and temporary.

To further reduce the potential impacts to fisheries habitat caused by removal of riparian cover, grading and grubbing of waterbody banks would be minimized. For the most part, grubbing would be limited to the proposed pipeline trench and vehicle access areas. Additional workspace would be located at least 10 feet from waterbodies to minimize riparian disturbance. The banks of the waterbodies would be stabilized with temporary sediment barriers within 24 hours of completing proposed construction activities, if practicable, and most open-cut waterbody crossings would be completed within 2 to 3 days. Where conditions allow, riparian vegetation would be restored with native plants; in wetlands where no standing water is present, the construction ROW would be seeded to supplement regenerated growth from root stock from original excavation of soils, in accordance with the recommendations of the USACE, local soil conservation authorities, or land management agency. In the event that a waterbody crossing would be located within or adjacent to a wetland crossing, wetland crossing impact reduction measures would be implemented to the extent practicable.

Compliance with mitigation measures mandated in permit conditions established by state and federal agencies would occur in addition to the measures included in the CMRP (see Appendix G) to protect fisheries resources. In Montana, compliance with fisheries and waterbody protection measures (as described in Appendix N, Supplemental Information for Compliance with the Montana Environmental Policy Act) would be required. On federal lands in Montana, compliance with fisheries mitigation measures attached to the federal grant of ROW would be required. Also required would be compliance with conditions in South Dakota that were developed by the South Dakota Public Utility Commission and attached to its Amended Final Decision and Order, Notice of Entry HP09-001.

Impacts and mitigation measures for specific waterbody crossing methods are described in the following sections. As required by the Montana Department of Environmental Quality (MDEQ) for Nationwide Permits, water must be diverted, pumped, or flumed around the trench at pipeline crossings where water is present. Accordingly, either the dry dam-and-pump or the dry flume open-cut crossing method would be used in Montana if water is present at the time of construction. For Standard Permits, separate Section 401 verification from the MDEQ would be required.

Planned mitigation measures for potential impacts associated with open-cut crossing methods include revegetation of riparian areas upon construction completion (see Section 4.5, Terrestrial Vegetation), limiting the extent of riparian vegetation loss during construction, maintaining a narrow ROW width, and using dry-ditch techniques at crossings where the timing of construction does not adequately protect environmentally sensitive waterbodies, as determined by the appropriate regulatory authority. These mitigation measures would reduce the potential impacts associated with all open-cut crossing methods.

Typical mitigation measures for non-closing open-cut crossings would include installation of sediment barriers, temporary slope breakers (water bars), mulching, stabilization of slopes including initiation of revegetation of disturbed soils within 24 hours of pipeline crossing completion, at steep slopes the installation of rip rap or rock gabions, grading to keep sediments from entering the water course, and restoration of the banks to as close to the original slope and contours as practicable. Rip rap is a type of constructed rock bank revetment typically placed

along a channel margin in order to stabilize the bank and inhibit or reduce erosion. Similarly, rock gabions are typically heavy gage wire rectangular baskets that are filled with rock to form a stable foundation or toe of the bank slope. These mitigation measures are discussed in greater detail in the CMRP (see Appendix G).

Implementation of the mitigation measures would result in temporary impacts to fisheries and aquatic organisms associated with this crossing technique. The primary potential impact would be an increase in sedimentation to downstream habitats. As water returns to the dry streambed, however, a naturally occurring increase in sedimentation would be expected as dry sediments are re-suspended and carried downstream with the flow. The potential increase in sediment load from the trenching activities would likely be negligible as it mixes with natural streambed materials, provided that bank stabilization methods have been employed such that there is not a significant increase in bank erosion.

As described in the CMRP (see Appendix G), instream trenching and backfill work periods would be carried out quickly (24 hours for minor, 48 hours for intermediate, and in accordance with the site-specific plan for major waterbodies, as practical) to minimize the time period in which sediment could be suspended by construction activities. BMPs would be implemented, as described in the CMRP, to minimize sediment from stream bank and upland erosion entering waterbodies. Based on the implementation of the measures described in the CMRP and additional measures mandated by state and federal permit agencies, elevated suspended sediment from proposed Project construction would be short term and temporary. Potential longer-term impacts after construction could include scouring of downstream areas or streambed disturbance if streambed modifications occur.

To address potential impacts associated with the dry flume and dry dam-and-pump open-cut crossing method, a pump capable of maintaining 1.5 times the ambient flow rate at the time of construction would be used (see Appendix G, CMRP). Additionally, at least one backup pump would be available on site, and dams would be constructed with materials that prevent sediment and other pollutants from entering the waterbody (e.g., sandbags or clean gravel with plastic liner). Intake hoses would be screened to prevent entrainment of fish, although microinvertebrates (invertebrates of microscopic size, too small to be seen with the naked eye) may be transferred through the pump. In summary, the dam-and-pump open-cut crossings have a potential to temporarily affect fishery resources. Dam-and-pump crossings may block or delay normal fish movements. Short-term delays in movements of spawning migrations could have adverse impacts on fisheries; however, most crossings of streams less than 100 feet would be completed in less than 48 hours, and potential impacts would be temporary.

To minimize the potential for these impacts associated with HDD crossings, a contingency plan would be implemented to address an HDD frac out. This plan would include preventive and response measures to control the inadvertent release of drilling fluids. The contingency plan would also include instructions for downstream monitoring for any signs of drilling fluid during drilling operations, and would describe the response plan and impact reduction measures in the event a release of drilling fluids occurred. Drill cuttings and drilling mud would be disposed of according to applicable regulations; disposal/management options may include spreading over the construction ROW in an upland location or hauling to an approved off-site, licensed landfill or other approved sites.

Water withdrawal rates would be controlled to be less than 10 percent of the baseflow of the source waterbody at the time of testing. Generally waterbodies would not contain sufficient water for use in hydrostatic testing. Surface water withdrawal permits from larger rivers with existing water rights would be regulated by state regulatory agencies to preserve existing water rights and environmental requirements. If inadequate water is available from rivers, Keystone would use alternative water sources nearby such as local private wells or municipal sources for HDD operations, hydrostatic testing the mainline, and dust control, as allowed by regulatory agencies. Keystone has indicated that in the event surface water is unavailable, groundwater would be used for HDD operations, hydrostatic testing, and dust control. Water would be purchased from nearby willing sellers with available water rights and would not increase overall groundwater use. Volume, duration, and/or frequency of groundwater use is administered and regulated by respective State agency(s) and/or local irrigation districts. Additional discussion of water sources is provided in Section 4.3.3.2, Surface Water.

Water withdrawal from well sources adjacent to stream and river can influence stream flows. This would only occur if the well is hydraulically connected to the stream or river and associated with a shallow aquifer. Reductions in streamflows can reduce aquatic habitat quantity and quality including reduced spawning, egg development, and juvenile rearing habitats, and increased water temperature. The potential for increased water temperature may result from reduced streamflow, as flow rates may have a direct effect on water temperatures. As flow decreases, the amount of energy required to change water temperature also decreases. Mitigation for this potential impact include limiting water withdrawals to wells that are not hydraulically connected to the adjacent stream or river and limiting the water withdrawal such that less than 10 percent of the flow of the stream is effected (this is only applicable to rivers with substantial flows). Further, aquatic resources would be protected as withdrawal rates could be limited by conditions mandated by applicable local, state, and federal permits.

If water is withdrawn from a surface water source during a low-flow period or at a time when particular flow ranges are needed for other uses, habitat reductions for fisheries and aquatic invertebrates could occur. If construction permits are granted, Keystone would equip the hydrostatic test water intake structure (often a large box-type structure) with fine mesh wire screens to prevent the entrainment of fish and reduce the entrainment of invertebrates as described in the CMRP (see Appendix G). Although some eggs, ichthyoplankton (drifting fish eggs and larvae), and drifting invertebrates could still be entrained, eggs would not be captured if water is withdrawn outside of the spawning and egg development timing window. In addition, the abundance and rapid reproduction rate of invertebrates would limit impacts to these species.

To reduce the potential for transfer of aquatic invasive species resulting from hydrostatic testing, hydrostatic test waters would not be discharged to watersheds outside of the withdrawal basins (i.e., no inter-basin transfers). In some locations, hydrostatic test water would be discharged to upland locations within the same basin, relying on infiltration for eventual return to the basin. In other locations, water would be returned to its waterbody of origin. Proportionally high discharge volumes to source areas could displace fish or disrupt spawning, rearing, or foraging behavior (Manny 1984). Discharged water may dislodge sediment, leading to an increase in suspended sediment. The discharge of large volumes of hydrostatic test waters into surface waters could 1) temporarily cause a change in the water temperature and dissolved oxygen levels, 2) increase downstream flows, and 3) increase stream bank and substrate scour. Energy dissipating devices and dewatering structures would be used to dissipate and remove sediment from hydrostatic test

water discharges. Guidelines for water discharge in overland areas and absorption back through the ground would allow water temperatures to reach pre-withdrawal conditions prior to entering streams. No chemicals would be used in hydrostatic test water. The test water would be generally the same quality as the source water because there are no additives to the water. All permits required by federal, state, and local agencies for procurement of water and for the discharge of water used in the hydrostatic testing operation would be acquired prior to hydrostatic testing. Any water withdrawal or discharge would be performed consistent with permit notice requirements and with sufficient notice to make water sample arrangements prior to obtaining or discharging water. Water samples would be taken prior to obtaining water from a water source and before test water is discharged, as required by state and federal permits. NPDES permits are required for the discharge of both hydrostatic testing fluids and any water obtained during construction dewatering. Both of these activities can be authorized under an NPDES General Permit for Hydrostatic Testing and an NPDES General Permit for Dewatering. EPA Regions 7 and 8 would issue a Section 402, CWA NPDES permit for the discharge of hydrostatic test water.

The USFWS has adopted a policy that water-related activities in the Platte River basin resulting in less than 0.1 acre-foot per year of depletions in flow to the nearest surface water tributary to the Platte River system do not affect the Platte River target species, and thus do not require consultation with USFWS for potential effects on those species. Similarly, detention basins designed to detain runoff for less than 72 hours and temporary withdrawals of water (e.g., for hydrostatic pipeline testing) that return all the water to the same drainage basin within 30 days' time are considered to have no effect, and do not require consultation. These thresholds were established to minimize the time and effort expended by USFWS, by project proponents, and by lead federal agencies in the review of projects that are not expected, either individually or collectively, to have any appreciable effect on the success or failure of the Platte River species-recovery efforts. One-tenth of 1 acre-foot roughly equates to the annual consumptive use of one residential water user in the Platte River basin.

The proposed construction of new access roads could cross waterbodies that contain fish species of recreational or commercial significance. Depending on site-specific conditions, bridges or culverts may need to be installed to cross the waterbodies. Construction of these structures would cause an increase in sediment load due to work directly in the waterbody (culvert placement) or disturbance to the banks (bridge installation). Impacts to the aquatic resources from these activities would be similar to those described above for open-cut crossings. Potential impacts to the resources would be short term and minor if similar mitigation measures for open-cut crossings, including implementation of the mitigation measures outlined in the CMRP, are used. Furthermore, all bridge and culvert installations would require specific permits from respective state agencies, with each permit containing specific stipulations to protect aquatic resources. Most access to the proposed Project ROW is along existing roads where waterbody crossings are established. The proposed Project would cause an increase in traffic along existing roads, but impacts from increased traffic would not add to impacts on aquatic resources.

During operation of the proposed Project, non-forested vegetation would be maintained along the permanent ROW. The reduction of trees in the permanent ROW could result in a permanent loss of shading, nutrients, and habitat enrichment features for fish at some waterbody crossings. Impacts associated with the permanent removal of riparian vegetation would be similar to those described in Section 4.7.3.2, Construction Impacts. A permanent ROW would not be maintained

in those areas that would be crossed using the HDD method; therefore, no permanent riparian vegetation impacts are anticipated in these areas. Herbicides would be used to control weeds during proposed Project operation. The use of herbicides near a waterbody could harm aquatic organisms, including fish. Herbicides could enter a waterbody through runoff, seepage through the soil, and direct introduction to water during application through overspray or wind drift. In accordance with the CMRP, no herbicides would be used within 100 feet of a wetland or waterbody, and all herbicide application would be performed by applicators appropriately licensed or certified by the state in which work is conducted.

Restored stream banks could be vulnerable to erosion during the first few years after revegetation and stabilization, potentially leading to sediment entering waterbodies and impacting fisheries habitat. The restoration and revegetation measures presented in the CMRP would be implemented to minimize soil erosion, including in riparian areas.

Routine aerial and ground surveillance inspections would be used to identify areas of erosion, exposed pipeline, and nearby construction activities. These practices would allow for early identification of bank stability problems and would minimize the potential for continuing environmental effects during proposed pipeline operation.

To reduce potential impacts to sensitive aquatic resources as a result of maintenance activities, the appropriate state agency would be consulted prior to initiation of maintenance activities beyond standard inspection measures.

Due to the elevated temperature of the oil in the proposed pipeline, water temperatures at stream crossings could potentially increase. The potential for water temperature increases would be mitigated, but not eliminated, by burying the proposed pipeline at greater depths (60 inches minimum) at stream crossings compared to lesser average pipeline depths across the entire route. Appendix S presents a pipeline temperature effects study. This study focused on the potential effects to soil temperatures as a result of the buried pipeline. The study concluded that the proposed pipeline would increase soil temperature; therefore, it is reasonable to conclude that the proposed pipeline could also elevate stream temperatures. Studies along the Trans-Alaska Pipeline System (TAPS)<sup>2</sup> indicate that groundwater temperatures are elevated by the heat from the pipeline, although comparisons of effects between TAPS and the proposed Project are limited in that the TAPS pipeline has different flow rates and is routed through a colder climate.

The degree of heating would depend upon river discharge. Temperature impacts would likely only occur in streams with very low flows or isolated pools, and would be more likely to occur in spring and fall based on the soil temperature profiles presented in Appendix S, Pipeline Temperature Effects Study. Increases in water temperature can affect fish by decreasing oxygen supply, causing premature movements of juvenile fish, and reduced food supply. Aquatic insects could mature more rapidly and be less available as food for the local fish population outside the immediate vicinity of the crossing.

The burial depth of the proposed pipeline could mitigate these potential temperature impacts. Typical pipeline burial depth is 48 inches; however, Keystone has indicated that burial depth under streams would be a minimum of 60 inches. Additionally, HDD installation would locate the pipeline well below the river bottom, further mitigating potential impacts. If impacts were to occur, they would be expected to be isolated due to the likelihood of few fish in the stream

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<sup>2</sup> TAPS is a pipeline that is buried in several river drainages.

reaches. Larger rivers would not be affected by temperature changes because the volume of water flowing over the proposed pipeline would be great enough to compensate for any increases in the local temperature profile.

## **9.0 THREATENED AND ENDANGERED SPECIES AND SPECIES OF CONSERVATION CONCERN**

Restoration of construction areas would include revegetation of the ROW using seed mixes specified by the landowner, land management agency, or U.S. Department of Agriculture Natural Resources Conservation Service recommendations as described in Appendix G, CMRP.

Working closely with USFWS, the Department developed a 2012 BA (see Appendix H, 2012 Biological Assessment [BA], 2013 USFWS Biological Opinion, and Associated Documents), which includes assessments of potential impacts of the proposed Project to federally protected and candidate species, recommended conservation measures, and effect determinations. Additional information requests and conservation measures were developed during consultation meetings.

The USFWS provided input relative to the ESA, the Fish and Wildlife Coordination Act, the MBTA, the BGEPA, and the National Environmental Policy Act. USFWS-approved surveys were initiated in the summer and fall of 2008, spring through fall 2009, and spring and summer 2010. Supplemental filing data from July 2009 and June 2010 included survey reports for piping plover (*Charadrius melodus*), interior least tern (*Sternula antillarum*), American burying beetle, and western prairie fringed orchid. Additional surveys for various species were conducted in 2011 and 2012, including surveys for the American burying beetle in the summer of 2012 for the proposed reroute in Nebraska. Additional surveys were conducted along the proposed Project route for special-status plant species and special-status fish species during the summer of 2013. Potential impacts and mitigation measures that were identified during these surveys and through consultations with federal and state agencies are discussed below.

The USFWS issued a Biological Opinion (see Appendix H, 2012 BA and Associated Documents) in May 2013 regarding potential impacts of the proposed Project to seven federally protected species and included conservation measures for two federal candidate species. The American burying beetle was the only species likely to be adversely affected by the proposed Project. However, the USFWS has determined that the proposed Project is not likely to jeopardize the continued existence of the American burying beetle. The USFWS concurred with and acknowledged the effect determinations presented in the 2012 BA (Appendix H, 2012 BA and Associated Documents). Section 7 formal consultation with the USFWS has been completed for the proposed Project.

The Department, the USFWS, and Keystone in coordination with other federal and state agencies developed avoidance and conservation measures as well as compensatory mitigation for species included in the 2013 USFWS Biological Opinion. Four implementing agreements (appendices to the 2013 USFWS Biological Opinion) would go into effect if and only if the Department determines to issue a permit for the proposed Project. These implementing agreements concern: 1) an American burying beetle habitat conservation trust, 2) a compliance monitoring program for the American burying beetle, 3) an American burying beetle habitat reclamation performance bond, and 4) a western prairie fringed orchid habitat conservation trust.

Although the USFWS is not requiring additional surveys in South Dakota, pre-construction surveys would be conducted to determine the presence of black-footed ferrets in this habitat before any construction activity occurs, at the request of the South Dakota Game, Fish, and Parks (SDGFP).

In Montana, surveys are still required and mitigation measures would be adopted and implemented by Keystone to prevent potential direct or indirect impacts to the black-footed ferret population in Montana from construction activities should they occur close enough to the proposed Project to be potentially impacted. The following mitigation measures are listed below:

- Provide the USFWS with the results of Montana prairie dog colony surveys, and continue coordination with Montana USFWS Ecological Services Office to determine the need for black-footed ferret surveys in accordance with the Black-footed Ferret Survey Guidelines.
- Complete surveys to identify prairie dog colonies in Fallon County, Montana, consistent with the Final EIS to determine if any Category 3 colonies or complexes occur and could be avoided.
- Prohibit workers from keeping domestic pets in construction camps and/or worksites.
- Educate workers how canine distemper and sylvatic plague diseases are spread (domestic pets and fleas).
- Prohibit workers from feeding wildlife.
- Report concentrations of dead and/or apparently diseased animals (prairie dogs, ground squirrels, others) to the appropriate state and federal agencies.

Keystone would use the HDD method to cross major and sensitive rivers, thereby avoiding most riparian vegetation used by the northern long-eared bat. In addition, the USFWS has determined that critical habitat for the northern long-eared bat is not determinable at this time, so no impacts to critical habitat for the northern long-eared bat would occur. The Department has contacted the USFWS regarding the recent proposed listing of the northern long-eared bat and will coordinate with the USFWS on whether the proposed Project could have impacts on the species.

Based on preliminary estimates, noise from the pump stations would attenuate to approximately 55 A-weighted decibels during a 24-hour period at 0.5 mile from the proposed pump stations and would not be expected to cause disturbance to greater sage-grouse leks. Keystone would observe the EPA standard of 55 decibels on the A-weighted scale (dBA) day-night sound level measured at the nearest sensitive receptor (see Section 4.12, Air Quality and Noise, for additional discussion of noise impacts and mitigation). Communication towers associated with the proposed pump stations could lead to increased collision hazard and increased predation by raptors by providing vantage perches.

Several conservation measures, such as limiting construction in active lek areas to periods outside the breeding season, were designed to avoid, minimize, and compensate for impacts to the sage-grouse. Many of these measures were described in *An Approach for Implementing Mitigation Measures to Minimize the Effects of Construction and Operations of the Keystone XL Pipeline Project on Greater Sage-Grouse* and *An Approach for Implementing Mitigation Measures to Minimize the Effects of Construction and Operation of the Keystone XL Pipeline Project on Greater Sage-Grouse in South Dakota*, which are appendices to Appendix H, 2012 BA and Associated Documents. In South Dakota, Keystone worked with SDGFP to develop

supplemental compensatory mitigation, which was finalized in 2013. These measures, as well as measures identified in Appendix H, 2012 BA and Associated Documents, include the following:

- Conduct surveys of greater sage-grouse leks prior to construction using approved methods to determine lek locations and peak number of males in attendance within 3 miles of the facility, unless the facility is screened by topography; also survey leks identified by MFWP, BLM, and SDGFP more than 3 miles from the facility for use as a baseline to determine construction effects on sage-grouse abundance.
- Implement a conservation plan developed in consultation with MFWP, SDGFP, USFWS, and BLM to address impacts to greater sage-grouse, including construction timing restrictions, habitat enhancement, and any mitigation measures that would be necessary to maintain the integrity of Core Areas or Preliminary Priority Habitat/Protection Priority Areas, which encompasses lek habitats as well as other important habitat necessary for greater sage-grouse to meet life requisites.
- Follow all protection and mitigation efforts as identified by USFWS, MFWP, and SDGFP including identify all greater sage-grouse leks within the buffer distances from the construction ROW set forth for the greater sage-grouse by USFWS, and avoid or restrict construction activities as specified by USFWS within buffer zones between March 1 and June 15, unless the facility is screened by topography.
- Prohibit construction during March 1 to June 15 within 3 miles of active greater sage-grouse leks in suitable nesting habitat not screened by topography, with an allowance made for one-time equipment movement during midday hours through ROW areas with a timing restriction that does not require grading for equipment passage to lessen disturbance to greater sage-grouse leks.
- Prohibit construction within 2 miles of active greater sage-grouse leks on federal land during March 1 to June 15.
- Reduce the mound left over the trench in areas where settling would not present a path for funneling runoff down slopes in sagebrush habitat; additional measures would be taken to compact backfilled spoils to reduce settling.
- Establish a compensatory mitigation fund for use by the Montana Department of Environmental Quality (MDEQ), MFWP, and BLM to enhance and preserve sagebrush communities for greater sage-grouse and other sagebrush-obligate species in eastern Montana (size of the fund to be based on both acreage of silver sagebrush and Wyoming big sagebrush habitat disturbed during pipeline construction within sage-grouse core habitat mapped by MFWP as well as important habitat between approximate Mileposts 97 to 123).
- Limit inspection over-flights to afternoons from March 1 to June 15 during operations as practicable in sagebrush habitat designated by MFWP.
- Fund a 4-year study under the direction of MDEQ, MFWP, and BLM that would show whether the presence of the facility has affected greater sage-grouse numbers based on the peak number of male sage-grouse in attendance at leks.
- Implement restoration measures (i.e., application of mulch or compaction of soil after broadcast seeding, and reduced seeding rates for non-native grasses and forbs) that favor the

establishment of silver sagebrush and big sagebrush in disturbed areas where compatible with the surrounding land use and habitats unless otherwise requested by the affected landowner.

- Prior to construction, conduct studies along the route to identify areas that support stands of silver sagebrush and big sagebrush and incorporate these data into restoration activities to prioritize reestablishment of sagebrush communities.
- Monitor and report on establishment of sagebrush on reclaimed areas, unless otherwise requested by the landowner, annually for at least 4 years to ensure that sagebrush plants become established at densities similar to densities in adjacent sagebrush communities, and implement additional sagebrush seeding or planting if necessary.
- Establish criteria in conjunction with MDEQ, MFWP, and BLM to determine when restoration of sagebrush communities has been successful based on pre- and post-construction studies in addition to revegetation standards.
- Use locally adapted sagebrush seed collected within 100 miles of the areas to be reclaimed, unless otherwise requested by the affected landowner (seed would be collected as close to the proposed Project as practicable as determined by regional seed production and availability).
- Monitor cover and densities of native forbs and perennial grasses exclusive of noxious weeds on reclaimed areas and reseed with native forbs and grasses where densities are not comparable to adjacent communities.
- Work in conjunction with the landowner to appropriately manage livestock grazing of reclaimed areas until successful restoration of sagebrush communities has been achieved (livestock grazing in restored sagebrush communities may promote establishment of sagebrush).
- Implement measures to reduce or eliminate colonization of reclaimed areas by noxious weeds and invasive annual grasses such as cheatgrass to the extent that these plants do not exist in undisturbed areas adjacent to the ROW (noxious weed management plans would be developed and reviewed by appropriate county weed specialists and land management agencies for each state crossed by the proposed Project).
- Establish a compensatory mitigation fund in consultation with SDGFP, managed by a third party, for temporary and permanent impacts to greater sage-grouse habitat. The fund would be used by SDGFP to enhance and preserve sagebrush communities within the sagebrush ecosystem in South Dakota, which is found within the following counties: Butte, Custer, Fall River, Harding, Perkins, and Meade counties.
- As part of the compensatory mitigation fund, implement a research fund in consultation with SDGFP, which would be managed by a third party to evaluate the effects of pipeline construction on greater sage-grouse.
- Monitor leks that are within 3 miles of the proposed Project footprint in South Dakota and are within the viewshed of the construction ROW if construction were to take place between March 1 and June 15.
- In consultation with SDGFP, implement a modified 3-mile buffer between March 1 and June 15 around active greater sage-grouse leks. The buffer would be modified on a lek-by-

lek basis to account for differences in topography, habitat, existing land uses, proximity of the proposed Project to the lek, and line-of-sight between the proposed Project and each lek.

- Restrict construction equipment activity in South Dakota to occur only between 10 a.m. and 2 p.m. to avoid impacts to breeding greater sage-grouse from March 1 through June 15 in areas where a lek is either within 3 miles of the ROW and visible from the ROW or within 1 mile of the ROW.

The project would cross the central Platte River using the HDD method at Milepost 775. Activities associated with the proposed Project in that area include temporary water withdrawals for drilling fluids and hydrostatic testing. Platte River Basin water depletions in Nebraska could affect habitat for the endangered interior least tern, whooping crane, and pallid sturgeon, as well as the threatened piping plover by reducing the amount of water available in the lower Platte River Basin. The state of Nebraska in cooperation with the USFWS has developed plans to manage water depletions in conjunction with Section 7 ESA consultations known as the Platte River Recovery Implementation Program.<sup>3</sup> For the proposed Project, temporary water withdrawals during hydrostatic testing in the Platte River Basin would avoid impacts to species including interior least terns since the volume of water needed would be returned to its source within a 30-day period. Temporary water withdrawals are considered to have no effect, as described by the USFWS Platte River species *de minimus* depletions threshold: “temporary withdrawals of water (e.g., for hydrostatic pipeline testing) that return all the water to the same drainage basin within 30 days' time are considered to have no effect, and do not require consultation”. The one-time water use for hydrostatic testing, the low volume of water used (compared to daily flows in the river basin), and the return of water to its source would not be expected to impact least tern nesting or feeding habitats.

The following USFWS conservation measures would apply to the interior least tern if construction-related activities, including HDD and hydrostatic testing, were to occur during the interior least tern nesting season (May 1 to September 1):

- Conduct pre-construction surveys within one-quarter mile of suitable breeding habitat at the Platte, Loup, and Niobrara rivers in Nebraska; the Cheyenne River in South Dakota; and the Yellowstone River in Montana during the nesting season (May 1 to September 1) to ensure that there are no nesting terns within one-quarter mile of the construction area. Daily surveys for nesting terns would be conducted during the nesting season when construction activities occur within one-quarter mile of potential nesting habitat.
- Cross major rivers that contain interior least tern habitat including the Platte, Loup, and Niobrara rivers in Nebraska; Cheyenne River in South Dakota; and Yellowstone and Missouri rivers in Montana, using the HDD method.
- Use HDD boring under the Platte, Loup, and Niobrara rivers in Nebraska; Cheyenne River in South Dakota; and Yellowstone River in Montana with a pipeline burial depth of 25 feet or greater below the river bed.

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<sup>3</sup> The Platte River Recovery Implementation Program (<http://platteriverprogram.org>) is a basin-wide effort undertaken by the DOI and the States of Colorado, Nebraska, and Wyoming to provide benefits for the endangered interior least tern, whooping crane, and pallid sturgeon as well as the threatened piping plover ([http://dnr.ne.gov/PRRIP/docs/PRRIP\\_handout\\_2010.pdf](http://dnr.ne.gov/PRRIP/docs/PRRIP_handout_2010.pdf)). See also the Platte River Recovery Implementation Program - *Endangered Species Act Consultations with the U.S. Fish & Wildlife Service* (<http://www.fws.gov/platteriver/index.htm>).

- If interior least tern nests are found at the crossings, then Keystone would: 1) adhere to the quarter-mile buffer of no pipeline construction activity and 2) continue to monitor nests if any are within one-quarter mile of the construction footprint until young have fledged.
- Keystone commits to making minor adjustments to the pipeline corridor to avoid impacts to nesting interior least terns in coordination with USFWS. This may involve shifting the pipeline corridor away from nests to avoid disturbances to interior least tern nests or other modifications depending on the circumstances.
- Down-shield lights should HDD occur at night if the HDD site lacks vegetative screening, and an active interior least tern nest is located within one-quarter mile from the HDD site.
- Perform all equipment maintenance and repairs in upland locations at least 100 feet from waterbodies and wetlands.
- Park all equipment overnight at least 100 feet from a watercourse or wetland.
- Keystone would not wash equipment in streams or wetlands.
- Conduct construction and restoration activities to allow for prompt and effective cleanup of spills of fuel and other hazardous materials.
- Keystone would verify that each construction crew and cleanup crew would have on-hand sufficient tools and materials to stop leaks, including supplies of absorbent and barrier materials that would allow for rapid containment and recovery of spilled materials.
- Keystone would refuel and lubricate construction equipment in upland areas at least 100 feet away from streams and wetlands.
- Keystone would mark and maintain a 100-foot area from river crossings, free from hazardous materials, fuel storage, and vehicle fuel transfers. These buffers would be maintained during construction except when fueling and refueling the water pump near a river edge that is required for the HDD crossing and hydrostatic test water withdrawal. Water pump fueling would be completed by trained personnel using secondary containment, and a spill kit would be onsite.

The project would cross the central Platte River using the HDD method; activities associated with the proposed Project in that area include temporary water withdrawals for drilling fluids and hydrostatic testing. As discussed above in the section regarding interior least terns, temporary water withdrawals during hydrostatic testing in the Lower Platte River Basin would avoid impacts to species including the piping plover since the volume of water needed would be returned to its source within a 30-day period.

The following conservation measures were developed in consultation with the USFWS, and would apply if construction-related activities including HDD and hydrostatic testing were to occur in suitable habitat during the piping plover nesting season (April 15 through September 1):

- If construction were to occur during the piping plover nesting season, Keystone would conduct pre-construction surveys within one-quarter mile of suitable nesting habitat at the Platte, Loup, and Niobrara rivers in Nebraska to ensure that there are no nesting pairs within one-quarter mile of the construction area. Daily surveys for nesting piping plovers would be conducted when construction activities occur within one-quarter mile of potential nesting habitat during the nesting season.

- If a piping plover nest(s) is found at the crossings, Keystone would: 1) adhere to the one-quarter-mile buffer of no construction activity and 2) continue to monitor the nest(s) if it is within quarter-mile of the construction footprint until the young have fledged.
- Keystone commits to making minor adjustments to the pipeline corridor to avoid impacts to nesting piping plovers in coordination with the USFWS. This may involve shifting the pipeline corridor away from nests to avoid disturbances to piping plover nests or other modifications depending on the circumstances.
- If an active piping plover nest is located within one-quarter mile of an HDD site, down-shielding of lights would be used during nighttime activities if the HDD site lacks vegetative screening.

To reduce impacts to native grasslands and wildlife associated with the Sprague's pipit, the following measures would be implemented:

- Seed disturbance areas in native range with native seed mix after topsoil replacement.
- Monitor the ROW to determine the success of revegetation after the first growing season and, for areas in which vegetation has not been successfully re-established, reseed the area.
- Control unauthorized off-road vehicle access to the construction ROW through the use of signs; fences with locking gates; slash and timber barriers, pipe barriers, or boulders lined across the construction ROW; or plant conifers or other appropriate trees or shrubs in accordance with landowner or manager request.
- Develop and implement a migratory bird conservation plan in consultation with the U.S. Fish and Wildlife Service, consistent with the MBTA and the BGEPA and consistent with provisions of Executive Order 13186. The conservation plan would include avoidance and mitigation measures for migratory birds and bald and golden eagles and their habitats within the states where the proposed Project would be constructed, operated, and maintained.
- If construction would occur during the April 15 to July 15 grassland ground-nesting bird nesting season, complete nest-drag surveys to determine the presence or absence of nests on federal land in eastern Montana.
- Delay construction activity from April 15 to July 15 within 330 feet of discovered active nests in eastern Montana (MDEQ and MFWP).

Bird diverter devices (such as FireFly™ bird diverters) may reduce crane collisions and mortality from power lines by alerting whooping cranes to the presence of power lines in their flight path. Primary threats to the whooping crane are habitat loss and alteration. Habitat alteration through water diversion is a major threat along the Platte River and other large riverine migration stopover habitats.

The project would cross the central Platte River using the HDD method, and activities associated with the proposed Project in that area include temporary water withdrawals for drilling fluids and hydrostatic testing. As discussed above in the section regarding interior least terns, temporary water withdrawals during hydrostatic testing in the lower Platte River Basin would avoid impacts to species including whooping cranes since the volume of water needed would be returned to its source within a 30-day period. The following conservation measures, developed in consultation

with USFWS, would apply if pipeline construction-related activities were to occur in close proximity to migrating whooping cranes:

- During spring and fall whooping crane migration periods, environmental monitors would complete a brief survey of any wetland or riverine habitat areas potentially used by whooping cranes in the morning before starting equipment and following the Whooping Crane Survey Protocol previously developed by the USFWS and Nebraska Game and Parks Commission (NGPC). If whooping cranes were sighted during the morning survey or at any time of the day, the environmental monitor would immediately contact the USFWS and respective state agency in Nebraska, South Dakota, North Dakota, and/or Montana for further instruction and require that all human activity and equipment start-up be delayed or immediately cease. Work could proceed if whooping crane(s) leave the area. The environmental monitor would record the sighting, bird departure time, and work start time on the survey form. The USFWS would notify the environmental compliance manager of whooping crane migration locations during the spring and fall migrations through information gathered from the whooping crane tracking program.
- Lights would be down-shielded should HDD occur at night during the spring and fall whooping crane migrations in areas that provide suitable habitat.

Potential impacts to pallid sturgeon would be reduced as a result of using the HDD crossing method at the Milk, Missouri, and Yellowstone rivers. The proposed minimum depth for HDD pipeline sections is 25 feet below the streambed, which would provide a substantial margin of safety during potential river scour during peak flood events. The HDD method avoids direct disturbance to the river, channel bed, or banks. While the HDD method poses a small risk of frac-out (i.e., release of bentonite-based drilling fluids), potential releases would be contained by BMPs that would be described within the HDD Contingency Plans required for drilled crossings. Most leaks of HDD fluids occur near the entry, exit locations for the drill, and are quickly contained and cleaned up. Frac-outs that may release drilling fluids into aquatic environments are difficult to contain primarily because bentonite readily disperses in flowing water and quickly settles in standing water. Should this type of release occur, bentonite is non-toxic but in sufficient concentration may physically inhibit respiration of adult fish and eggs.

The Platte, Missouri, and Yellowstone rivers have been identified as potential water sources for hydrostatic testing. Surface water depletions associated with the Platte River Basin in Nebraska may affect pallid sturgeon habitats by reducing the amount of water available for this species in the lower Platte River. The project would cross the central Platte River using the HDD method, and activities associated with the proposed Project in that area include temporary water withdrawals for drilling fluids and hydrostatic testing. As discussed above in the section regarding interior least terns, temporary water withdrawals during hydrostatic testing in the Platte River Basin would avoid impacts to species including the pallid sturgeon since the volume of water needed would be returned to its source within a 30-day period. Larval life stages could be entrained (captured in the pumps) through water withdrawals for both HDD and hydrostatic testing in the Missouri and Yellowstone rivers, and would not likely survive. Newly emerged pallid sturgeon larvae drift with currents for many days and over large distances before they achieve any volitional movements.

The following conservation measures would avoid or minimize potential impacts to the pallid sturgeon:

- Keystone would use HDD to cross the Missouri, Yellowstone, and Milk rivers where pallid sturgeons are known to occur.
- Keystone would ensure that HDD boring would result in a burial depth of 25 feet or greater below the river bed in the Missouri, Yellowstone, and Milk rivers.
- Keystone would ensure that the intake end of the pump would be screened to prevent entrainment of larval fish or debris, and the intake screens would be periodically checked for fish entrainment when pumping from the Missouri, Yellowstone, and Milk rivers in Montana. Mesh size of the screen will be 0.125-inch and have an intake velocity of less than 0.5 foot/second to avoid larval entrainment and juvenile fish impingement and entrapment. Should a sturgeon become entrained, impinged, or entrapped, all pumping operations would immediately cease and the environmental compliance manager for Keystone would immediately contact the USFWS to determine if additional protection measures would be required. The conservation measure is in effect for pumping operations, including HDD and hydrostatic testing.
- Keystone would maintain at least a 100-foot setback from the water's edge for the HDD drill pads at the HDD crossings on the Yellowstone, Missouri, and Milk rivers in Montana.

Direct impacts to American burying beetles could occur as a result of proposed Project construction during vegetation clearing, site grading, and trench excavation, which could result in temporary habitat loss, potential alteration of suitable habitat to unsuitable habitat, temporary habitat fragmentation where the pipeline is not already located next to other utilities, and potential mortality to eggs, larvae, and adults through construction vehicle traffic and exposure during excavation. In addition, artificial lighting has the potential to disrupt American burying beetle feeding behavior and increase mortality through predation. Most normal construction would take place during daylight hours, and construction areas would use artificial lighting infrequently. Activities that could potentially require artificial lighting include critical pipeline tie-ins, HDD crossings, and certain work required after sunset due to weather, safety, or other requirements. HDD crossings may require 24-hour operation until the crossing is completed.

Burying beetles, including the American burying beetle, are sensitive to soil moisture and die quickly when desiccated. During construction, soil moisture may be reduced across the ROW as the site is prepared by removing topsoil and grading. Equipment operations within the ROW could compact the substrate. During reclamation, subsoil and topsoil would be de-compacted and vegetation cover would be re-established within both the temporary and permanent ROW. Subsoil and topsoil compaction would be relieved by discing, or chiseling using a disc or harrow pulled by a tractor. A seed mix that corresponds to the appropriate Construction/Reclamation unit for that property would be used unless otherwise directed by landowners, land managers, or regulatory agencies with jurisdiction. These actions would prevent compaction of the soil and would allow vegetation types beneficial to the beetle to establish.

The activity period for the American burying beetle across its range is generally late April through September and is associated with air temperature. Peak activity occurs when temperatures are 60 degrees Fahrenheit (°F) or greater at midnight. The American burying beetle overwinters as an adult by burrowing in soil. Schnell et al. found that in Arkansas, surviving American burying beetles overwintered at an average depth of 6 centimeters (2.4 inches) with some as deep as 20 centimeters (6 inches). Thermal models indicate that heat generated by the proposed Project pipeline could warm soil surface temperatures by as much as 10°F in northern

regions (South Dakota and Nebraska) during January to April (Appendix S, Pipeline Temperature Effects Study). The thermal models indicate that heat dissipation effects would occur primarily within approximately 3.5 feet of the pipeline compared to background temperatures (Appendix S, Pipeline Temperature Effects Study). Soil heating associated with proposed Project operation could increase American burying beetle mortality by triggering early emergence at a time when prey are scarce and cold air temperatures cause emergent adult mortality; elevated temperatures could also increase metabolic rates such that overwintering beetles starve prior to emergence, and they could also cause drying of soils, causing beetles to desiccate.

During operations, lights associated with aboveground facilities may attract American burying beetles, particularly if the lights emit wave lengths in the ultraviolet spectrum. Keystone has committed to use sodium vapor lighting and/or down shielding at pump stations located in American burying beetle habitat. Facilities in American burying beetle habitat would use a single light above pump station doors as well as a single low output light at the main entrance gate for public safety. At all pump stations, station access gates and equipment shelters would incorporate a single photocell controlled light, which provides for safe access by operating personnel during hours of darkness. One pump station in Holt County, Nebraska occurs in habitat within the known or suspected range of the American burying beetle. Use of sodium vapor-type lights and down-shielding lessens the likelihood that American burying beetles would be attracted to lights.

It is likely that all direct impacts to the American burying beetle may not be avoided during construction activities. In consultation with the USFWS, Keystone has committed to provide monetary compensation that would be used by a third-party non-profit organization for habitat acquisition or other conservation measures as part of a habitat conservation trust.

General conservation measures developed during consultation between USFWS, the Department, state agencies, and Keystone that would avoid or minimize potential impacts to the American burying beetle include:

- Build the construction camp near Winner, South Dakota, on agricultural land in coordination with USFWS.
- Place two pipe yards planned for Tripp County on agricultural land in coordination with USFWS.
- When working in suitable American burying beetle habitat in Tripp, Keya Paha, and Holt counties, pre-locate all parking and staging areas within the approved construction footprint.
- Confine vehicle traffic used in support of preconstruction activities to approved access roads.
- Use construction methods involving sequential replacement of topsoil and re-establishment of natural vegetation to restore natural soil hydrology within the construction ROW and avoid long-term impacts to American burying beetle habitat.
- Prior to construction disturbance and grading for the ROW, implement trapping and relocating of American burying beetles only in Nebraska where access is available to remove adult beetles from the construction ROW in accordance with the Nebraska American Burying Beetle Trapping Protocol. Trapping and relocating American burying beetles is not authorized in South Dakota.

- Implement protective measures at the relocation site such as creating a tunnel in moist soil for each released American burying beetle with a light cover (e.g., a leaf), and not releasing more than 50 American burying beetles at any one site to increase the survivability of relocated American burying beetles.
- Conduct mowing and windrowing of vegetation during the trap and relocate period to temporarily reduce habitat suitability by drying out the soil surface. Mowing would be done so that vegetation is at most 8 inches in height. Windrowing would be done to remove vegetation residue. Mowing and windrowing would be implemented only in Nebraska. Mowing and windrowing cannot be used in South Dakota as an avoidance and minimization measure.
- In Nebraska, after the trap and relocate efforts are completed, disturb (grade) the ROW prior to the next June American burying beetle active period (e.g., trap and relocate efforts take place during the August active period, and the ROW disturbance would take place prior to the following June active period). June and August active periods are times when American burying beetles are active and above ground. Adult, reproductive American burying beetles are active and above ground in June; adult and offspring American burying beetles are active and above ground in August.
- In areas in Nebraska where the ROW could not be disturbed (graded) before the next active period, repeat trap and relocate efforts (e.g., trap and relocate efforts would be repeated during the June active period, and the ROW would be disturbed in August before the following active period).
- After trap and relocate efforts are completed in Nebraska, a biologist would travel the ROW every couple of days during the American burying beetle active period (June through September) to remove any carcasses that may be present within the ROW.
- Keystone would train all workers operating in American burying beetle habitat and would include discussion of American burying beetle habitat, biology, reasons for their decline, and responsibilities of all workers for the protection of the American burying beetle (including removing food wastes from the ROW each day, reporting any American burying beetle sightings to an environmental inspector, and avoiding bringing dogs and cats to the ROW). Keystone would produce a full color Endangered Species Card with a picture of the American burying beetle and all of this information summarized on the card. The card would be handed out to all construction workers operating in American burying beetle habitat.
- Post signs at all access points to the ROW highlighting the areas as American burying beetle habitat and reminding workers to follow special restrictions in the area.
- Keystone would down-shield lighting and install sodium vapor-type lights or equivalent in coordination with USFWS in instances when construction activities would occur in suitable habitat areas in Keya Paha, Holt, and Tripp counties to avoid attracting the species to the construction site. Keystone would down-shield lighting and install sodium vapor-type lights or equivalent in coordination with USFWS at ancillary facilities within areas occupied by the American burying beetle.
- Keystone would provide compensation for temporary construction and permanent operations impacts to the American burying beetle as part of a habitat conservation trust in areas where

the species is likely to be impacted, including: southwest of Highway 18 in Tripp County, South Dakota, and west of Highway 281 in Keya Paha and Holt counties in Nebraska. The trust would be managed by a nongovernment organization experienced in the management of funds for habitat projects. Funds would be used to acquire land through purchase by fee title or through perpetual conservation easements. Funds could also be used for habitat restoration projects. Compensation would be based on total acres impacted where American burying beetle presence was confirmed in Nebraska. Compensation would be calculated based on total acres impacted and would be modified by habitat quality rating multipliers with prime habitat compensation at three times the total impact acres; good habitat at two times the total impact acres; fair habitat at one times the total impact acres; and marginal habitat at 0.5 times the total impact acres. No compensation would be provided for poor habitat. In Nebraska only, no compensation would be provided for habitat where American burying beetles have not been found.

- In South Dakota, provide compensation based only on habitat quality rating multipliers and not American burying beetle survey information. Temporary habitat impacts would be scaled for the period of time anticipated for recovery of vegetation cover at 4 years over the 50-year life of the proposed Project or 8 percent of total calculated impacts. All compensation would be based on habitat ratings and compliant with agreements between the Department, USFWS, and Keystone.
- Keystone would provide funding for compliance monitoring if the Department were to issue a Presidential Permit and prior to initiating proposed Project construction in South Dakota and Nebraska. The Department would designate a third-party contractor that would monitor American burying beetle habitat restoration efforts, as agreed between the Department, USFWS, and Keystone, or as a possible wider project-level monitoring program.
- Keystone would reseed disturbed areas in prime, good, fair, and marginal American burying beetle habitats with a seed mix that corresponds to the appropriate Construction/Reclamation unit for that property. Reclamation measures and seed mixes for each Construction/Reclamation are provided in Appendix R, Construction/Reclamation Plans and Documentation. Should a landowner-directed seed mix be determined to not result in full restoration as stipulated in the reclamation performance bond, then the subject acreage amount reseeded would be removed from temporary American burying beetle habitat impacts and added to permanent American burying beetle habitat impacts, and the total amount of the American burying beetle trust would be recalculated.
- Keystone would set aside funds for a reclamation performance bond. The bond would be applied to supplemental vegetation restoration that could be necessary if restoration for American burying beetle habitat failed and Keystone fails to take corrective action, as agreed during consultation between the Department, USFWS, and Keystone.

In Nebraska, state statutes do not provide for the incidental take of state-protected endangered species. The combined guidance plan of the NGPC and the USFWS Grand Island Field Office requires the implementation of two conservation measures: a measure entitled *Capture and Relocation Conservation Measures* and a measure entitled *Maintaining Clear Activities*. These measures would be implemented prior to construction through areas occupied by the American burying beetle as directed to reduce the incidental *take* of the species in Nebraska. In addition, to

offset unavoidable impacts to American burying beetles, compensatory mitigation for species take would be provided.

Pipeline construction could potentially disturb western prairie fringed orchids when vegetation is cleared and graded. Construction of permanent ancillary facilities could displace plant communities for the lifetime of the proposed Project. Revegetation of the proposed pipeline ROW could introduce or expand invasive species, especially leafy spurge, Kentucky bluegrass, and Canada thistle into the proposed Project area, potentially contributing to the decline of western prairie fringed orchid. Weed and vegetation monitoring plans would be implemented to prevent the spread of invasive species as a consequence of proposed Project construction and operation (see Appendix G, CMRP).

The species could be impacted through disturbance to its habitat. This plant may also be impacted by alterations to the hydrology of sub-irrigated wetland habitat areas along the Platte River resulting from depletions to the Platte River system. Operation of the proposed Project would not be expected to result in impacts to the western prairie fringed orchid. Clearing of trees and some shrubs in the permanent ROW may be required for operational monitoring. However, since this species inhabits open native prairie, no tree or shrub clearing would occur within habitat suitable for the species. If herbicides must be used for noxious weed control, application would be conducted by spot spraying. Populations of western prairie fringed orchid would be identified prior to herbicide application, and herbicides would not be used in these areas.

The following mitigation measures would be implemented where suitable western prairie fringed orchid habitat is present in the proposed Project area:

- Complete habitat suitability surveys prior to construction. Survey results would be submitted to the USFWS for review.
- Keystone would re-route the pipeline around individual plants or populations within the proposed Project footprint to the extent practicable and/or allowed by the landowner. Compensation through a habitat conservation trust would be provided in areas that cannot be avoided.
- Keystone would transplant individual plants that would be affected by construction activities to other locations where suitable habitat is available, when feasible and/or when approved by the land owner if on private land. This action would be done in coordination with USFWS.
- Keystone would reduce the width of the construction ROW (i.e., the amount of reduction dependent on the circumstances) in areas where orchid populations have been identified. This would be done in coordination with USFWS.
- Keystone would salvage and segregate topsoil appropriately where populations have been identified to preserve native seed sources in the soil for use in revegetation efforts in the ROW.
- Keystone would provide compensation for suitable western prairie fringed orchid habitat in a habitat conservation trust. Areas along the proposed Project where the species is likely to occur include: southwest of Highway 18 in Tripp County, South Dakota, and Keya Paha, Holt, Rock, Antelope, and Boone counties in Nebraska. The trust would be managed by a nongovernment organization experienced in the management of funds for habitat projects. Funds would be used to acquire land through purchase by fee title or through perpetual

conservation easements. Funds could also be used for habitat restoration projects. Compensation would be based on total acres impacted where suitable western prairie fringed orchid habitat is present regardless of presence/absence survey results. Habitat surveys would be used to evaluate western prairie fringed orchid habitat. Compensation would be calculated based on total acres impacted multiplied by 31 percent, which is the probability of encountering a western prairie fringed orchid during the course of survey work. A 3:1 habitat mitigation ratio would be applied to the habitat expected to contain western prairie fringed orchid to offset temporal loss of habitat from between the time construction began to the time orchid habitat is fully restored and that figure would be multiplied by the value of an acre of land.

- Keystone would restore and monitor construction-related impacts to wet meadow habitats identified as suitable for the western prairie fringed orchid consistent with USACE guidelines as follows. The disturbed areas shall be reseeded concurrent with the proposed Project or immediately upon completion. Revegetation would be acceptable when ground cover of desirable species reaches 75 percent. If this seeding cannot be accomplished by September 15 the year of proposed Project completion, then an erosion blanket would be placed on the disturbed areas. The erosion blanket would remain in place until ground cover of desirable species reaches 75 percent. If the seeding can be accomplished by September 15, all seeded areas would be properly mulched to prevent additional erosion.

Construction through prairie dog towns or other suitable breeding and nesting habitats in Montana could affect nesting mountain plovers if they are present and if construction occurs during the nesting season. Nests, eggs, and young could be lost during construction; disturbance could lead to nest abandonment resulting in loss of eggs or young. In Montana, mountain plover surveys are recommended within suitable habitats in Valley and Fallon counties during the May 1 to June 15 breeding season.

To avoid impacts to mountain plovers, the following measures would be implemented on BLM-managed lands:

- Prohibit construction, reclamation, and other ground disturbing activities from April 10 to July 10 to minimize destruction of nests and disturbance of breeding mountain plovers unless surveys consistent with the Plover Guidelines or other methods approved by the USFWS find that no plovers are nesting in the area. Potential mountain plover habitat must be surveyed three times between April 10 and July 10, with each survey separated by at least 14 days. The earlier date will facilitate detection of early-breeding plovers.
- Schedule routine maintenance activities outside the April 10 to July 10 period in mountain plover nesting habitat unless surveys were conducted that indicate that no plovers were nesting in the area and that flightless chicks were not present.
- Delay construction activities within one-quarter mile of active nests for 37 days (i.e., the typical incubation and fledging duration) or until fledging, whichever is sooner.
- Delay construction activities in the vicinity of a brood of flightless chicks for at least 7 days or until fledging, whichever is sooner.

All states crossed by the proposed Project, except Montana and North Dakota, maintain listings of endangered and threatened species and afford protections to these species. Montana maintains a listing of species of concern; those species that are only listed in Montana are discussed in

Appendix N, Supplemental Information for Compliance with MEPA. Those species that are listed in Montana and are also state-protected in other states are presented here. The protections afforded animals and plants on these lists are established within the statutes for each state. Further, each state that would be crossed by the proposed Project route maintains a comprehensive wildlife conservation strategy (including a state wildlife action plan), as charged by Congress. These wildlife action plans identify the condition of each state's wildlife and habitats (including low and declining populations) and identify the challenges to these resources and long-term conservation strategies.

State-protected animals and plants that are also federally protected or candidates for federal protection are discussed in Section 4.8.3.1, ESA Federally Protected, Proposed, and Candidate Species. State-protected species (not including species designated solely as Montana species of concern) potentially occurring along the proposed Project route include five mammals, six birds, one reptile, ten fish, one invertebrate, and two plants. Potential proposed Project-related impacts to state-protected animals and plants, in addition to the proposed conservation measures, would be similar to impacts and mitigation discussed in Section 4.6, Wildlife, and Section 4.5, Terrestrial Vegetation. Additional occurrence information, impact discussions, and conservation measures for state-listed species are presented in the following sections.

River otters are likely to occur throughout the proposed Project area along large rivers. To reduce impacts to river otters, the following measures would be implemented:

- Conduct river otter surveys prior to proposed Project construction along the Bad River, the White River, and the Cheyenne River in South Dakota and along the Niobrara River, the Loup River, the main stem of the Elkhorn River, and the Platte River in Nebraska (if suitable den habitat occurs near the river crossings and if construction would occur during the denning period).
- Restrict construction activities within one-quarter mile of active natal dens.
- Use the HDD method to cross under all of the rivers identified as potentially supporting river otters. This would avoid impacts to shoreline habitats that could potentially be used by denning river otters.

To reduce impacts to swift foxes, the following measures would be implemented:

- Revegetate the ROW to support small mammal and insect prey.
- Conduct surveys of potential den sites on federal land and within suitable habitat in the proposed Project footprint in South Dakota.
- Restrict construction activities within one-quarter mile of active natal dens between April 1 and August 31.

Additional mitigation measures recommended by Montana state agencies include:

- Conduct surveys of potential den sites between February 15 and July 31 in suitable habitat in the proposed Project footprint Phillips, Valley, Prairie, Dawson, and Fallon counties in Montana (MDEQ and MFWP).
- Restrict construction activities within 0.31 mile of active dens from February 15 to July 31 in Montana on state or federal land (MDEQ and MFWP).

Two state-protected birds that are not federally listed could occur in the proposed Project area: peregrine falcon (*Falco peregrinus*) and bald eagle (*Haliaeetus leucocephalus*). Occurrence information, impact discussions, and conservation measure descriptions are presented in the following section. Both species are considered migratory and are protected under the MBTA. In addition, bald eagles are also protected under the BGEPA. A migratory bird conservation plan is being developed, in consultation with the USFWS, consistent with the MBTA and the BGEPA and consistent with provisions of Executive Order 13186. The conservation plan would include avoidance and mitigation measures for migratory birds and bald and golden eagles and their habitats within the states where the proposed Project would be constructed, operated, and maintained.

To reduce impacts to bald eagles, the following measures would be implemented:

- Conduct additional nest/roost surveys within 1 mile of the ROW prior to construction. Aerial surveys (preferably by helicopter) would be conducted between March 1 and May 15, before tree leaf-out to ensure nests are more visible. These aerial surveys would use helicopters instead of fixed-wing aircraft when possible because helicopters have the ability to hover and facilitate ground observations.
- Regardless of aircraft, whenever possible, two observers would conduct the surveys. Experienced observers may only find 50 percent of nests on a flight; therefore, two flights would be performed prior to any on-the-ground activities of the proposed Project, including other biological surveys.
- Record observations of any eagles and/or nest sites using geographic positioning system equipment. The date, location, nest condition, activity status, raptor species, and habitat would be recorded for each sighting.
- Submit the biologist(s) qualifications, survey methods, and survey results to the USFWS.
- Report the location of any active bald eagle nests identified during nest/roost surveys to the USFWS and appropriate state agencies; if possible, reroute the pipeline to avoid any nests that occur within 600 feet of the proposed ROW.
- Maintain a no-disturbance buffer of at least 600 feet around active nests during the nesting season (January 1 through August 15).
- Consult with USFWS under the BGEPA regarding required buffers and construction activities within 600 feet of active winter roost sites during the winter roosting season (November 1 through April 1) and the ability to conduct construction activities within 600 feet of active winter roosts between 10 a.m. and 3 p.m.

The above measures would be implemented on a site-specific basis in consultation with the USFWS and states that list bald eagles as threatened, including South Dakota and Kansas. BLM would be consulted for any bald eagle nest or roost sites that occur within 0.5 mile of the proposed Project route on federal lands in Montana. Additional mitigation measures in Montana recommended by MFWP include:

- Implement measures in the Montana Bald Eagle Management Plan if applicable, or apply current guidance from the USFWS.

- Restrict construction activities within 0.62 mile of all active territories from March 15 to July 15, including documented sites within 0.5 mile of the proposed Project route on the Missouri River in Montana.

The massasauga (*Sistrurus catenatus*), or pygmy rattlesnake, has suitable habitat known to occur along the proposed Project route within Jefferson County, Nebraska, along waterbody shorelines. To reduce impacts to the massasauga in Nebraska, the following measures would be implemented:

- Complete surveys of suitable habitats to identify areas potentially containing the massasauga along the proposed Project route in Jefferson County, Nebraska, to clear the area for the massasauga prior to construction.
- Continue consultations with the NGPC.
- Locate the power line to Pump Station 26 in Jefferson County, Nebraska next to a road.

The blacknose shiner (*Notropis heterolepis*) potentially occurs within suitable habitat in waterbodies crossed by the proposed Project route in South Dakota and Nebraska. There are five known populations in Nebraska. Occurrence and habitat surveys completed in 2009 identified four previously proposed stream crossings containing marginally suitable habitat, one currently proposed stream crossing with good habitat in Nebraska, and two proposed stream crossings containing suitable habitat in South Dakota. In May and June 2013, surveys were conducted along the proposed Project route in Nebraska and southern South Dakota. These studies were conducted in four streams that were selected for their potential to contain suitable habitat for the blacknose shiner as well as the finescale dace (*Phoxinus neogaeus*), northern redbelly dace (*Phoxinus eos*), and pearl dace (*Margariscus margarita*), and no species or suitable habitat was identified. Three additional streams in Nebraska—selected due to their potential for suitable habitat—will be surveyed once access is granted. In addition, pre-construction surveys for this will be conducted in Nebraska per the request of the NDEQ.

As discussed in the above section regarding the blacknose shiner, additional surveys were conducted in May and June 2013 for the finescale dace along the proposed Project route in Nebraska and southern South Dakota and no finescale dace were observed. Additional surveys in Nebraska will be conducted once access is granted. In addition, pre-construction surveys for this species will be conducted in Nebraska per the request of NDEQ.

As discussed in the above section regarding the blacknose shiner, additional surveys were conducted in May and June 2013 for the northern redbelly daces along the proposed Project route in Nebraska and southern South Dakota and no northern redbelly dace were observed. Additional surveys in Nebraska will be conducted once access is granted. In addition, pre-construction surveys for this species will be conducted in Nebraska per the request of NDEQ.

As discussed in the above section regarding the blacknose shiner, additional surveys were conducted in May and June 2013 for the pearl dace along the proposed Project route in Nebraska and southern South Dakota and no pearl dace were observed. Additional surveys in Nebraska will be conducted once access is granted. In addition, pre-construction surveys for this species will be conducted in Nebraska per the request of NDEQ.

Pre-construction surveys for sturgeon chub will be conducted in Nebraska per the request of NDEQ.

For general minnow species discussed above, construction through streams during spawning periods could result in disruption of spawning and loss of eggs and young. Additionally, construction methods that lead to increased siltation and turbidity (cloudiness in the water) could temporarily displace these fish. Construction conservation measures to reduce fine sediment would minimize displacement of feeding minnows. Water withdrawals for use in the HDD crossing method or for hydrostatic test purposes could lead to fish entrainment. Water withdrawal would be performed consistent with permit requirements, and intake hoses would be screened to prevent entrainment of fish. Protections for aquatic life during water withdrawal for HDD and hydrostatic testing would be implemented for all proposed water sources. Construction timing considerations and BMPs for maintaining water quality and flow would reduce potential impacts on state-protected minnows.

Mitigation measures for these fish may vary from state to state. In South Dakota, the following conservation measures would apply:

- Suitable habitat determinations along the route would be made by SDGFP.
- Conduct presence/absence surveys if suitable habitat is present.
- If survey results are negative for these minnows, no further conservation measures would be required.
- If survey results are positive for these minnows, exclude construction activities during the spawning period (to be provided by SDGFP), and/or salvage and relocate the minnows.

In addition to the mitigation measures detailed above, surveys have been recommended in South Dakota for the blacknose shiner, northern redbelly dace, and pearl dace in tributaries of the Keya Paha River that would be crossed by the proposed Project route in South Dakota. In response to these survey recommendations by the SDGFP, presence/absence and habitat surveys were completed in tributaries to the Keya Paha River for blacknose shiner, northern redbelly dace, finescale dace, and pearl dace. As described above, none of these minnows were found during the survey, but two proposed stream crossings in South Dakota (i.e., Lute Creek and Buffalo Creek in Tripp County) contained habitat suitable for blacknose shiner, northern redbelly dace, and pearl dace.

In Nebraska, NGPC recommended surveys for the blacknose shiner, northern redbelly dace, and finescale dace in tributaries of the Niobrara and main stem Elkhorn rivers that would be crossed by the proposed Project route. NGPC has requested that Keystone re-consult to identify additional conservation measures if any of these species are found within any streams surveyed for the proposed Project. In accordance with NGPC's recommendation, presence/absence and habitat surveys for these species were conducted in 2009 at several previously proposed Project waterbody crossings. These species were not identified in any of the surveyed streams, but potential habitat for the blacknose shiner was identified at five proposed waterbody crossings along the previously proposed Project route. As discussed in the above discussion regarding the blacknose shiner, surveys were conducted in 2013 along the proposed Project route in Nebraska and southern South Dakota. Additional surveys in Nebraska will be conducted once access is granted.

Pipeline crossing method selection for non HDD streams would be based on site-specific fish surveys during the year of construction, as it is difficult to predict future stream flow conditions and appropriate construction techniques.

The use of HDD stream crossing technology would avoid impacts to these minnows and their habitats. Most large rivers along the pipeline corridor would be crossed using HDD technology. In Nebraska, NGPC has recommended HDD methods for any stream crossings occupied by these minnows, as open-cut crossings typically cause effects from increased turbidity and suspended sediment (such as avoidance and gill irritation). However, following completion of field surveys, Keystone would continue to coordinate with NGPC and may use alternative crossing methods if site conditions warrant alternative crossing methods.

Potential impacts to the small white lady's slipper include habitat disturbance, trampling, and excavation disturbance. Surveys would be conducted for presence/absence within suitable habitat prior to the proposed Project construction in Antelope, Boyd, Holt, Keya Paha, Nance, and Merrick counties in Nebraska. If this plant is observed within the proposed Project ROW in Nebraska, appropriate mitigation measures would be developed and implemented in consultation with the NGPC.

Animals and plants identified during consultations with resource agencies as species of conservation concern that potentially occur along the proposed Project route, but that are not federal- or state-listed species, BLM sensitive species, or Montana species of concern discussed in Appendix N, Supplemental Information for Compliance with MEPA, are evaluated in the table below.

**Table 2 Species of Conservation Concern**

<b>Species</b>	<b>Threats</b>	<b>Potential Impacts</b>	<b>Proposed Mitigation</b>
Birds			
Golden eagle ( <i>Aquila chrysaetos</i> )	Illegal killing, power line electrocution, poison intended for coyotes, habitat loss due to conversion to agriculture or suburbs.	Eight nest sites identified along proposed Project route: 2 in Montana and 6 in South Dakota, nesting and prey habitat loss or alteration, disturbance to breeding, foraging areas during construction, electrocution or collision mortality from proposed Project associated power lines.	Pre-construction raptor surveys. Pre-construction survey prior to March 15; restrict activity within 0.62 mile of active nests from March 15 to July 15 in Montana (MDEQ, MFWP).
Great blue heron ( <i>Ardea herodias</i> )	Nest habitat destruction; human disturbance of rookeries; aquatic habitat degradation.	Eleven rookeries identified along proposed Project route: 1 in Montana, 1 in South Dakota, 1 in NE; nesting and prey habitat loss or alteration, disturbance to breeding, foraging areas during construction, electrocution or collision mortality from proposed Project associated power lines.	Pre-construction surveys; adjust route to avoid rookery by 500 feet in Montana (MFWP).

Species	Threats	Potential Impacts	Proposed Mitigation
Raptor nests (except eagles)	Nest habitat destruction; human disturbance; prey habitat loss or alteration.	~230 nest structures, 38% active along proposed Project route; nesting and prey habitat loss or alteration, disturbance to breeding and foraging areas during construction; electrocution or collision mortality from proposed Project associated power lines.	Pre-construction surveys. Restrict activity with 0.62 mile from active nests during March 15 to July 15 in Montana (MFWP).
Fish			
Plains topminnow ( <i>Fundulus sciadicus</i> )	Impoundment, channelization, agricultural runoff, dewaterers, siltation, introduction and competition from western mosquitofish ( <i>Gambusia affinis</i> ).	Concern in northwestern two-thirds of Nebraska; dewatering of habitat, mortality during construction, spread of mosquitofish.	Pre-construction surveys completed. Occurrence at one crossing location in SD. Surveys for plains topminnows and other fish species are planned for 2013, to determine if this species occurs in suitable habitat along the proposed Project route in Nebraska.

## 10.0 LAND USE

Temporary and permanent changes in vegetation due to the clearing of trees and shrubs, pipeline excavation, and general construction activity are expected within the ROW. It is estimated that disturbed pastures, croplands, and grassy rangelands may take 1 to 5 years to recover to preconstruction levels. Herbaceous vegetation, prairie grasses, low shrubs, and forest lands are estimated to take from 1 to 20 or more years to recover, depending upon the species. The permanent pipeline ROW would require occasional trimming to remove woody vegetation and trees from the permanent easement/ROW to facilitate aerial inspection. Landowners would be permitted to cultivate crops in the permanent easement. Easement agreements would typically include monetary compensation to landowners for long-term land use losses (e.g., property use during construction, operation, and maintenance), and for temporary land use losses (e.g., crop production impairment and private road damage or obstruction). Easements would also address restoration of land or compensation to landowners for any unavoidable construction-related damage to property.

The construction ROW would be accessed by public and existing private roads. State transportation agencies would be consulted prior to construction to assess road infrastructure (e.g., bridges) to determine if it is suitable for potential construction loads. If infrastructure is insufficient to transport projected loads, a plan would be developed to avoid or reinforce the infrastructure. No improvement or maintenance is likely to be required for paved roads before or during construction, although gravel and dirt roads may require maintenance during that time. Private roads and temporary access roads would only be used with the permission of the affected landowner or land management agency. In the event that oversized or overweight loads would be

needed to transport construction materials to the proposed Project work spreads, separate permit applications would be submitted to the appropriate state or local regulatory agencies.

Impacts to soil profiles could include topsoil degradation, soil compaction, and rock introduction or redistribution. According to the proposed Project CMRP (see Appendix G), pipeline construction would not stop or obstruct active irrigation ditches except during the short (typically 1 day or less) time period needed to install the pipeline beneath the ditch. Additionally, drain tiles and fences would be repaired or restored using either original material or high quality new material, and farm terraces would be restored to their preconstruction functions. Construction could also cause temporary loss of crops and/or forage on affected lands.

Impacts to crops from operation of the proposed Project would be less than from construction because the ROW width would be reduced from 110 feet to 50 feet for the permanent ROW. The top of the proposed pipeline would be buried at least 48 inches below the ground surface in cultivated agricultural areas (at least 42 inches in all other areas), pursuant to Special Condition 19 (the Special Conditions are presented in Appendix B, Potential Releases and Pipeline Safety). Therefore, agricultural land use would be able to continue for the most part across the permanent ROW.

Pipeline construction and operation would have no effect on landowner participation in the Conservation Reserve Program (CRP). Low level grasses and plants would be allowed to regrow on the ROW; however, moderate to large vegetation would continue to be cleared from the permanent ROW and would not be allowed to re-establish. Affected landowners would be required to contact their local Farm Service Agency (FSA) offices as part of their contractual agreement for participation in the program. FSA would require that landowners, prior to pipeline construction, notify the FSA of the planned construction activities. Assuming the disturbance would have a minimal effect on the CRP and land would be restored to its pre-construction condition (i.e., vegetated), and that construction would not occur during primary nesting season, landowners would not lose their eligibility for participation in the CRP.

The proposed action may affect a number of existing NRCS financial assistance conservation program agreements. The conservation agreements may need to be modified, and the landowner may need to refund some or all of the financial assistance received, depending on 1) the type of conservation practice for which cost-share is received by the program participant, 2) the location of the practice relative to the pipeline ROW, and 3) the timing of construction. NRCS program participants are responsible for filing a written request with NRCS and receiving the State Conservationist's approval before allowing disturbance of a conservation practice implemented or maintained with NRCS financial assistance. When approval is received, the land must be returned to its pre-construction condition, or to conditions agreed upon by NRCS, the state conservationist, and the landowner as a result of the consultation described above, including restoration of any affected conservation practices.

The number and types of structures within 25 and 500 feet of the proposed Project's construction ROW are described in Section 3.12.3, Noise. Residences (i.e., homes, mobile homes, and cabins) within 25 feet of the proposed ROW would likely experience many temporary inconveniences during the construction period (typically 7 to 30 days), including disruptions to privacy and property ingress or egress. Homes within 500 feet of the ROW could experience temporary inconveniences such as construction dust and noise during the construction period. However,

local noise restrictions would apply, and the CMRP (see Appendix G) includes BMPs to address dust suppression.

During construction, trees would be removed from the ROW. Landowners would be consulted to determine if timber within the ROW has a commercial or salvage value. Any timber with commercial or salvage value would be salvaged according to landowner wishes; provisions related to such timber would be negotiated prior to removal, and would be recorded in the easement agreement. Tree removal and disposal would be accomplished consistent with all local, state, and federal permit requirements. Trees would be allowed to regrow only in the temporary ROW after construction and consistent with U.S. Department of Transportation pipeline safety standards and Keystone requirements for aerial pipeline safety inspections. Trees would not be allowed to regrow within the 50-foot permanent ROW.

To mitigate potential impacts to land use, Keystone has committed to implement the procedures included in the CMRP (see Appendix G) to reduce potential construction and operation impacts on land use. Procedures relevant to overall land use impacts include:

- General BMP measures, including worksite appearance, maintenance, and noise and dust control;
- Specific procedures that would be followed during construction within agricultural, forest, pasture, rangeland, grasslands, wetland crossings, waterbodies, and riparian lands; and
- Measures to avoid or minimize potential damage to drain tile systems.

As detailed in the CMRP, specific landowner requirements could occasionally supersede the procedures in the CMRP. However, the conditions of applicable federal, state, and local permits would apply in all cases. The remainder of this section describes mitigation measures that are applicable to specific land uses.

Keystone would take reasonable steps to identify organic farms along the proposed Project route. Where Keystone is made aware of the presence of certified organic farms along the proposed Project route prior to construction, Keystone would work with those organic farm operations to ensure that pipeline construction does not impair the farm's organic status. If the proposed Project would cross an organic farm, Keystone would work with the landowner to take steps to avoid mixing organic farm soil and non-organic farm soil.

Construction could cause the temporary loss of crop production or forage on affected lands. According to the CMRP, landowners would be compensated for any construction-related crop or forage loss. To minimize potential impacts to agricultural lands (including prime farmland), the CMRP commits Keystone to measures that would protect the soil profile, including:

- Segregating the upper 12 inches of topsoil during construction and replacing it during site restoration (Section 4.2, Soils, describes the topsoil segregation methods that would be used);
- Using soil ripping or chiseling to alleviate soil compaction and to return the soil to pre-construction conditions;
- Plowing wood chips, manure, or other organic matter into the soil to further enhance soil aeration, if required; and
- Removing excess rock that is greater than 3 inches in diameter from the top 12 inches of soil in all active agricultural fields, pastures, and hayfields.

If pipeline construction crosses active irrigation ditches, the ditches would not be stopped or obstructed except during the typical one day or less time period needed to install the pipeline beneath the ditch. Drain tiles and fences would be repaired or restored using either original material or high quality new material, and farm terraces would be restored to their preconstruction functions.

To minimize potential impacts to rangelands, the CMRP includes measures that would reduce impacts, including:

- Restoring disturbed areas with custom seed mixes (approved by landowners and/or land managers) to match the native foliage;
- Providing access to rangeland during construction when practicable;
- Installing temporary fences with gates around construction areas to prevent injury to livestock or workers;
- Leaving hard plugs (short lengths of unexcavated trench) or installing soft plugs (areas where the trench is excavated and replaced with minimally compacted material) to allow livestock and wildlife to cross the trench safely;
- Removing litter, garbage, and any pipeline shavings at the end of each construction day to protect livestock and wildlife from accidental ingestion;
- Prohibiting construction personnel from feeding or harassing livestock or wildlife;
- Prohibiting construction personnel from carrying firearms or pets into the construction area;
- Securing rangeland fences to prevent drooping;
- Closing any openings in the fence at the end of each day to prevent livestock from escaping;
- Maintaining all existing improvements such as fences, gates, irrigation ditches, cattle guards, and reservoirs to the degree practicable; and
- Returning damaged improvements to at least their condition prior to construction.

Potential adverse impacts to forest land would be reduced through protection, restoration, and remediation measures in the CMRP. Examples of protective or restorative measures on forest lands would include:

- Routing the proposed pipeline along existing ROWs in forest lands, when practicable;
- Felling trees toward the pipeline centerline to minimize additional tree disturbance;
- Recovering all trees and slash that fall outside of the ROW;
- Depositing all tree materials according to specific protection measures and in accordance with the landowner, land manager, and/or permit requirements;
- Removing stumps using equipment that helps preserve organic matter; and
- Reversing effects on windbreaks, shelterbelts, and living snow fences to the degree practicable.

To minimize potential impacts to developed lands, the CMRP includes the following measures:

- Prior to construction, surveys would be conducted to confirm the locations of buildings near or within the proposed ROW and to ascertain whether the buildings are occupied residences or businesses.
- Site-specific protective constructions plans would be developed for residential and commercial/industrial structures within 25 feet of the construction ROW.
- Noise levels would be controlled around residential and commercial/industrial areas during non-daylight hours, consistent with applicable noise regulations.
- If noise levels are expected to exceed regulatory limits, advance notice would be provided to all residences within 500 feet of the construction ROW.
- High noise level activities would be limited in duration and coordinated to expedite the construction work through the area, reducing the length of time that receptors (e.g., churches, hospitals, homes, etc.) are exposed to noise.
- Siting of permanent components of the proposed Project that could generate noise (e.g., pump stations) would be based upon negotiations with landowners.
- Construction shielding would be provided for certain land improvements (e.g., fences and sheds) and to preserve landscaping and mature trees.
- Workspaces would be fenced off from residential areas.
- Traffic and vehicle access control would be provided in construction areas.
- Trash and debris would be removed and disposed from the construction site each day.
- Plating would be used to cover open trenches during non-construction times in developed areas.
- During construction, measures such as maintenance of unexcavated areas, or gaps in spoil piles and strung pipe, would be taken to allow livestock passage across the ROW.
- For areas in which the pipeline is within 25 feet of a residential structure, excavation of the pipeline trench would be delayed until the pipe was ready to be installed. The trench would be quickly backfilled after installation.
- Following installation of the pipeline and backfilling, all fences, landscaping improvements, shrubs, lawn areas, and other structures would be restored to pre-construction conditions (or as otherwise negotiated with the landowner).
- Knowledgeable individuals, such as local landscape restoration contractors, and consultants with “specialty expertise in restoration and revegetation” would be retained to assist with landscape restoration.

To minimize potential impacts to public services, Keystone would implement the following mitigation measures:

- Prior to construction, Keystone’s contractors would develop detailed traffic plans that address all applicable laws, regulations, and ordinances. Keystone would take into account minimizing impacts to school bus routes in developing these traffic plans.

- Keystone would ensure that underground and overhead utilities have been located, and that Keystone avoids contact and damage during construction.
- Keystone would ensure that contactors have Site Specific Safety Plans in place before commencing work that would address locating, avoiding, and protecting utilities.
- Keystone would dispose of construction camp trash (solid waste) from all camps at approved facilities.

Disturbed agricultural land and rangeland would be returned to approximate pre-construction use and capability. For agricultural land and rangeland requiring reseeding, an inspection after the first growing season would determine if additional revegetation would be required. Keystone would work with the landowner regarding the type of vegetation that would be re-established when tilled fields are disturbed. If the landowner performs the required reseeding, monetary compensation would be provided. Revegetation would be considered successful when crop yields or vegetation are similar to those in adjacent undisturbed portions of the same field.

Landowners would be compensated—as specified in Appendix R, Construction/Reclamation Plans and Documentation—for crop yields less than those on unaffected lands where it could be demonstrated that the lesser yields are a result of the proposed Project. For the purpose of determining compensation for lesser yields, crop values would be assessed based upon the values of the affected crops in the specific area, as well as local crop prices at grain elevators. Landowners would be compensated for proposed Project-related crop yield effects over 3 years as follows: during the year of construction, 100 percent of calculated losses would be compensated; in the second year, 75 percent of calculated losses would be compensated; in the third year, 50 percent of calculated losses would be compensated. If landowners demonstrate that proposed Project-related crop yield losses persist beyond 3 years, additional compensation would be negotiated.

Should CRP participants be required by the U.S. Department of Agriculture to leave the CRP because of the proposed Project, they would be compensated by Keystone. Compensation would be for any lost CRP payments, including retroactive forfeit payments.

Commercial and industrial landowners would be compensated for any construction-related impacts based upon land values determined by local professional appraisers. Any damaged infrastructure would be repaired or replaced, or the owner would be compensated (pursuant to Appendix G, the CMRP) for the damage.

Section 4.13, Potential Releases, discusses the potential impacts to recreational activity due to potential releases, as it relates to species and land use overall. The evaluation of impact severity on land use is also applicable to recreation: large releases are less likely, but would include a broader and more severe set of potential effects. As described in the CMRP (see Appendix G), compensation for damages associated with disruptions to recreational use, activity, and revenue would be negotiated with affected landowners.

Most of the landscape changes caused by the proposed Project would be visible as linear changes to vegetation patterns. The proposed Project route has been selected to reduce adverse aesthetic impacts where possible, and measures to reduce long-term visual impacts to insignificant levels would be implemented as described in the CMRP (see Appendix G). Aboveground facilities would be painted in accordance with standard industry painting practices to further reduce visual impacts. Landowners would be consulted to address visual aesthetic issues that arise as a result

of construction activities. Where restoration and revegetation result in returning the ROW to visual conditions similar to existing conditions, there would be either no impact or only minor impacts to visual resources during operation. For those segments of the proposed Project route on BLM-managed lands in Montana, consistency with the CMRP would require that the Project remains consistent with the respective Visual Resource Management Class Objectives and applicable Resource Management Plans for BLM and other federal lands (see Section 3.9.2.3, Visual Resources).

Mitigation measures in the CMRP associated with visual resources (see Appendix G) are included along with those applicable to land use (see also Section 4.9.3.2, Land Use).

## 11.0 SOCIOECONOMICS

Most of the proposed Project area counties do not have sufficient temporary housing to house all the necessary construction personnel. Keystone proposes to construct eight temporary construction camps to meet the housing needs in Montana, South Dakota, and northern Nebraska (see the table below); approximately one camp per spread for construction spreads 1 through 8.

**Table 3 Proposed Construction Camp Locations**

County	State	Number of Construction Camps
Valley	Montana	2
McCone	Montana	1
Fallon	Montana	1
Harding	South Dakota	1
Meade	South Dakota	1
Tripp	South Dakota	1
Holt	Nebraska	1

Source: Keystone 2012d

Keystone states that each of the construction camps would typically house approximately 900 to 1,300 workers, including sleeping areas with shared or private baths. Approximately 100 of the workers would use on-site recreational vehicles, and the remainder would be housed in camp buildings. The need for public services would be reduced due to the eight construction camps. The camps would have recreation facilities, media rooms, kitchen/dining facilities, laundry facilities, a security/infirmery unit, offices, and wastewater treatment facilities. Minor medical needs of workers would be handled in these camps, thus reducing the potential need for medical services from the surrounding communities. These temporary construction camps would be permitted, constructed, and operated consistent with applicable county, state, and federal regulations.

Keystone states that it has established a camp *Code of Conduct* to control and manage behavior in all proposed Project camps. All camp residents must agree to abide by the conditions of the *Code of Conduct* or risk losing their camp residency status. The *Code of Conduct* addresses camp access control procedures, bringing weapons into the camp, disruptive or abusive behavior, alcohol use, and criminal/illegal activities.

Keystone states that each camp site would be fully fenced and have a guard house at a single entrance. A contract security officer manning the guard house would be provided on a 24/7 basis. In addition, at all times there would be at least one additional roving security officer supplemented with off-duty law enforcement personnel, as needed. Local law enforcement agencies would also respond to violent, criminal, or illegal activities.

In addition to avoidance and mitigation measures that Keystone proposes to minimize negative impacts to populations in the proposed Project area, specific mitigation for environmental justice communities would involve ensuring that adequate communication in the form of public awareness materials regarding the construction schedule and construction activities is provided. Materials would be in appropriate languages and would contain information on how to seek needed services in the event of a health or other social service disruption related to construction activities.

With respect to employment opportunities for all minority and low-income populations, Keystone is committed to employee and supplier diversity; has in place continuing Affirmative Action plans for females, minorities, individuals with disabilities and covered veterans; and supports a policy of equal opportunity for Minority and Women-Owned Business Enterprises and Historically Underutilized Businesses.

In addition, Keystone has worked with Hispanic leaders, communities, and organizations in order to keep minority and other special interest communities informed about the proposed Project and to seek the input of these communities. The relationship among Keystone, community leaders, and interest groups facilitates community education on the proposed Project and its potential relevance to members; and establishes communications so that proposed Project contractors can quickly and efficiently communicate available jobs. Specific outreach efforts to Hispanic communities to date have included publishing and circulating a proposed Project brochure and other materials in Spanish and English, and steps are being taken to publish information in the media through relationships with the National Association of Hispanic Publications and other primarily Hispanic media. In addition, the Keystone U.S. Landowner Operations Hotline is staffed with bilingual personnel, the Integrated Public Awareness program would utilize bilingual English/Spanish print materials, and the design package would utilize bilingual warning signage in appropriate locations.

The influx of construction workers into local communities has the potential to generate additional demands on local public services (e.g., emergency response, medical, police, and fire protection services). The Department understands that Keystone would work with local law enforcement, fire departments, and emergency service providers, including medical aid facilities, to establish appropriate and effective emergency response measures. This information would be included in the emergency response plan developed prior to implementation of the proposed Project with special emphasis on considerations of low-income and minority communities in those preparedness efforts. Keystone states that it would:

- Reach out to Local Emergency Planning Committee during and after the development of its emergency response plan and produce public awareness materials with special emphasis on considerations of low-income and minority communities in those preparedness efforts.

- Ensure that existing underground and overhead utilities services would be uninterrupted and that Keystone would avoid contact and damage during construction.
- Ensure that contractors have Site-Specific Safety Plans in place before commencing work, and that these plans would address locating, avoiding, and protecting utilities.

During construction, Keystone and the pipeline contractor would maintain roads used for construction in a condition that is safe for both the public and the workforce. Keystone would cross paved roads and railroads by boring beneath the roads, allowing traffic activity to continue. After construction of the proposed Project is complete, Keystone would restore the roads to their preconstruction conditions or better.

Keystone's construction contractors would be required to submit a road use plan prior to mobilization and to coordinate with the appropriate state and county representatives to develop a mutually acceptable plan. This plan, along with monitoring of road activity related to the proposed Project, would establish measures to reduce or avoid traffic and transportation impacts on local communities.

To mitigate potential impacts on traffic and transportation, Keystone has committed to implement the procedures included in its CMRP (see Appendix G) to reduce potential construction and operation impacts. As detailed in the CMRP, specific landowner requirements could occasionally supersede the procedures in the CMRP; however, the conditions of applicable federal, state, and local permits would apply in all cases.

Keystone has committed to a program that would include inspection of roadways and roadway structures, repair of damage that may occur to those facilities, establishment of an approved Traffic Management Plan, and coordination with state and local transportation agencies. Keystone states that before construction begins, its contractors would develop detailed traffic plans that address all applicable laws, regulations, and ordinances. Keystone states it would take into account minimizing impacts to school bus routes in developing these traffic plans.

## **12.0 CULTURAL RESOURCES**

Avoidance could be achieved by moving the proposed Project corridor or the location of proposed Project facilities. Avoidance could also be achieved by keeping construction activities away from National Register of Historic Places (NRHP)-eligible properties, limiting the effect to existing demonstrated disturbance areas, or avoiding the cultural resources by boring or HDD, depending on the nature of the resource.

If the proposed Project could not avoid a particular cultural resource, the Department would consult with the Advisory Council on Historic Preservation, SHPOs, consulting Indian tribes, and other federal and state consulting parties to determine those measures to be implemented by Keystone to minimize and mitigate adverse effects on affected historic properties identified in the APE. If the Department determines that the adverse effect could not be avoided, Keystone would draft a comprehensive Treatment Plan for each adversely affected historic property. The Treatment Plan would describe the measures to minimize and mitigate the adverse effect of proposed Project construction activities on historic properties, the manner in which these measures would be carried out, and a schedule for their implementation.

Keystone would submit the draft Treatment Plan at least 30 days prior to construction commencing in the area. Keystone would address timely comments and recommendations submitted by the Advisory Council on Historic Preservation, SHPOs, consulting Indian tribes, and other federal and state consulting parties in preparation of the Final Treatment Plan. Once it addressed all of the timely comments and recommendations, Keystone would submit the Final Treatment Plan to the Department for review and approval. Once the Department approves the Final Treatment Plan, mitigation would be conducted prior to construction following the Final Treatment Plan and the protocols outlined in the amended Programmatic Agreement (PA).

A PA has been prepared in order to provide a process for the Department and the Section 106 consulting parties to implement the avoidance, if possible, or mitigation of adverse effects on historic properties. For those historic properties where avoidance is not possible, a Treatment Plan would be prepared consistent with the stipulations of the amended PA. Cultural resources that are considered *pending* have not been sufficiently assessed at this time to finalize an eligibility determination for the NRHP. These sites must either be further assessed through NRHP evaluation procedures or would be treated by the Department as a historic property, and mitigation plans would be developed.

### **13.0 AIR AND NOISE**

State and local agencies also regulate emissions of particulate matter arising from fugitive dust. Typically, the regulations require measures to prevent particulates from becoming airborne, such as application of dust suppressants. Specific requirements could also include development and approval of a fugitive dust control plan. Keystone would ensure that contractors employ water trucks, sprinklers, or calcium chloride solution as necessary in order to reduce dust to acceptable levels, particularly in areas where work approaches dwellings, farm buildings, other areas occupied by people, as well as when the proposed pipeline parallels an existing road or highway. The speed of all contractor vehicles would be controlled in these areas. Use of calcium chloride solution would be limited to roads and as permitted by local regulations. Contractors would place curtains of suitable material, as necessary, to prevent wind-blown particles as a result of sand blasting operations from reaching any residence or public building. Additional dust control measures may be required by state or local ordinances.

Gasoline and diesel engines must comply with the USEPA mobile source regulations in Title 40 of the CFR Part 86 for on-road engines and 40 CFR 89 and 90 for non-road engines. USEPA has established rules in 40 CFR 80 that require significant reductions in the sulfur content of diesel fuel used in on-road and off-road (non-road) engines. As of December 1, 2010, USEPA requires that all on- and off-road diesel fuel not exceed 15 parts per million sulfur (i.e., ultra-low-sulfur fuel).

Emissions from construction equipment combustion would be controlled to the extent required by state and local agencies through the permitting process.

The burning of slash materials (e.g., hay/grass, tree tops/stump) could occur along the proposed route. However, the quantities and locations cannot be determined prior to construction because actual slash materials may be burned, chipped, or hauled for disposal in a suitable landfill depending on construction conditions, landowner requirements, or local regulations. Keystone would acquire necessary permits for slash burning prior to construction and would follow open-

burning regulations, including restrictions on burn location, material, and time, as well as consideration of local air quality. Required burning would be done within the ROW in small piles to avoid damage to trees or structures. Emissions from open burning would be controlled to the extent required by state and local agencies through the permitting process.

Emissions from temporary fuel transfer systems would be controlled to the extent required by state and local agencies through the permitting process.

HDD activities would be conducted consistent with any applicable local noise ordinances.

If blasting is required to clear the ROW and fracture rock within the pipeline trench, Keystone would follow strict safety precautions and exercise extreme care to avoid damage to underground structures, cables, conduits, pipelines, and underground watercourses or springs. To protect property and livestock, Keystone would notify adjacent landowners or tenants in advance of blasting. Blasting activity would be performed during daylight hours and in compliance with federal, state, and local codes and ordinances as well as manufacturer-prescribed safety procedures and industry practices.

Noise from blasting (if necessary) would be periodic or impulsive (not continuous or steady) and would only occur during daylight hours when increases in noise levels are more tolerable. To minimize noise impacts associated with construction blasting such as acoustic trauma (if blasting becomes necessary), blast site locations should be at least 1,800 feet away from sensitive receptors such as residential and institutional areas.

Conventional noise control measures described in Section 2.12 of the CMRP (see Appendix G) would be employed. Pipeline construction noise levels would comply with any applicable municipal regulation. In areas near residences and businesses where construction activities or noise levels may be considered disruptive, pipeline work schedules would be coordinated with those parties to minimize disruption.

There are no regulations in rural areas along the proposed pipeline route applicable to construction noise, including noise from construction camps. In municipal areas, pipeline construction noise levels would comply with any applicable municipal regulations (there are no numerical state noise limits for construction activities in any of the five affected states). In areas near residences and businesses where construction activities or noise levels may be considered disruptive, pipeline work schedules would be coordinated to minimize disruption. The contractor would minimize noise during non-daylight hours and within 1 mile of residences or other noise-sensitive areas such as hospitals, motels, campgrounds, or National Historical Trails. Keystone would give advance notice to landowners within 500 feet of the ROW prior to construction, limit the hours during which construction activities with high decibel noise levels are conducted, coordinate work schedules, and ensure that construction proceeds quickly through such areas. Using the noise control measures identified above, the contractor would minimize noise in the immediate vicinity of herds of livestock or poultry operations, which are particularly sensitive to noise. Keystone would set up a toll-free telephone line for landowners to report any construction noise-related issues and follow-up on appropriate mitigation measures, as necessary.

To avoid community annoyance and activity interference, Keystone would implement a three-step noise control plan in a progressive order: 1) install pipe lagging for all pipe suction pipes and discharge pipes; 2) install acoustic blankets for all pumps; and 3) upgrade enclosure for all motors, which would provide 3 decibels noise attenuation for each motor compared with a

standard motor enclosure. Each step produces an incremental reduction in the overall noise emission level. If the three-step noise control plan is insufficient to bring the stations into compliance, then Keystone would install sound barriers, which could take the form of free-standing walls or earth berms. The location and dimensions of the proposed sound barriers/earth berm would vary with site specification (i.e., relative elevation and distance between the proposed pump stations and nearest receptors). The barrier wall panel would have sufficient transmission loss such that sound passing through it would not contribute to the noise level at the receptor.

Noise modeling results indicate that noise reductions of approximately 14 to 20 dBA could be required for Pump Stations 13, 21, 25, and 27 (located 0.25 to 0.5 miles away from receptors) to ensure they do not exceed the recommended criterion for each affected state, the USEPA Ldn criterion of 55 dBA, the recommended 10 dBA increase above baseline limit, and the recommended 6.5 percent increase in %HA limit. For receptors located 1 mile away from any pump station, a noise reduction of approximately 8 dBA could be required to ensure that the recommended 10 dBA increase above baseline limit is not exceeded. These noise reductions are expected to be achieved by applying the Keystone's three-step noise control plan described above and installing the sound barriers as necessary. After implementation of Keystone's planned noise control measures, the controlled pump stations would be expected to have a minimal impact on nearby residences and businesses (i.e., pump station noise at nearest receptors would be reduced to an acceptable level).

For pump stations related to National Historic Trails, the implementation of Keystone's three step noise control plan in a progressive order and installation of sound barriers as necessary at nearest pumps stations (including Pump Station 24) would reduce noise levels to acceptable levels (i.e., below 10 dBA increase above baseline levels). Therefore, the pump station noise would have minimal impact on potential trail users in the vicinity.

Keystone has indicated that it would comply with all state and local regulations concerning noise control. Keystone is also identifying noise-sensitive receptors that are in close proximity to HDD locations to develop site-specific measures in order to abate noise impacts to landowners. Keystone would confer with landowners along the construction ROW prior to construction to 1) identify any noise-related concerns they may have and 2) develop mutually agreeable solutions. For all pump station operations, Keystone would identify all noise sensitive receptors within 1.5 miles of each pump station. Ambient noise measurements would be taken at these receptors prior to operations to determine the incremental noise impact that pump station operations may have. As indicted earlier, Keystone would implement a three-step noise control plan in a progressive order and install sound barriers as necessary to avoid community annoyance and activity interference.

## **14.0 POTENTIAL RELEASES**

The following table includes special conditions recommended by PHMSA. The table also includes a comparison to requirements in 49 CFR 195, and benefits of the proposed conditions.

**Table 4 Special Conditions Recommended by PHMSA**

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
1	<b>Steel Properties:</b> Skelp/plate must be micro-alloyed, fine grained, fully killed steel with calcium treatment and continuous casting.	Less prescriptive; references API 5L standard, which does not require latest steel making properties.	These properties help ensure high quality carbon steel which may reduce the chance of a pipeline release.
2	<b>Manufacturing Standards:</b> Pipe must be manufactured according to API Specification 5L, Specification for Line Pipe (API 5L 44th Edition), product specification level 2, supplementary requirements for maximum operating pressures (MOPs) and minimum operating temperatures. Pipe carbon equivalents (CE) must be at or below 0.23 percent based on the material chemistry parameter, CE (Pcm) formula (Ito-Bessyo formula), or 0.40 percent based on the C-IIW formula (International Institute of Welding formula).	Less prescriptive; references API 5L standard.	Help ensure the steel is weldable when the pipe joints are joined together in the field using manual and mechanized welding processes based on the various alloys used to make up the chemical nature of the high strength carbon steel.
3	<b>Fracture Control:</b> API 5L and other specifications and standards addressing the steel pipe toughness properties needed to resist crack initiation and crack propagation, and to ensure crack arrest during a pipeline failure caused by a fracture must be followed. Keystone must prepare and implement a fracture control plan addressing the steel pipe properties necessary to resist crack initiation and crack propagation. The plan must include acceptable Charpy Impact and Drop Weight Tear Test values, which are measures of a steel pipeline's toughness and resistance to fracture. The fracture control plan must be in accordance with API 5L (44th Edition) and include the following tests: a) Fracture Toughness Testing for Shear Area: Test results must indicate at least 85 percent minimum average shear area per test for all X-70 heats and 85 percent minimum shear area for all X-80 heats with a minimum result of 80 percent shear area for any single test. The test results must also ensure a ductile fracture and arrest; b) Fracture Toughness Testing for Absorbed Energy in accordance with Annex G and a minimum of 50 feet-pound per heat on a full sized specimen at -5 degrees Celsius/23 degrees F; and c) Fracture Toughness Testing by Drop Weight Tear Test for All New Pipeline Segments or Pipe Replacements: Test results must be at least 85 percent of the average shear area for all heats with a minimum result of 60 percent of the shear area for any single test. The test results must also ensure a ductile fracture and arrest.	Less prescriptive; references API 5L standard.	Helps ensure that the pipe is resistant to initiation of and propagation of a flaw and that, if a failure does occur, the steel has adequate properties so that the pipe will not have a running fracture over multiple joints of pipe.

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	<p>The above fracture control plan must account for the entire range of pipeline operating temperatures, pressures and product compositions planned for the pipeline diameter, grade, and operating stress levels, including maximum pressures and minimum temperatures for shut-in conditions. Where the use of stress factors, pipe grade, operating temperatures, and product composition make fracture toughness calculations non-conservative, correction factors must be used.</p>		
4	<p><b>Steel – Plate, Coil, or Skelp Quality Control and Assurance:</b> Keystone must prepare and implement an internal quality management program at mills involved in producing steel plate, coil, skelp, and pipe to be operated in the pipeline. These programs must be structured to detect and eliminate defects, inclusions, non-specification yield strength, and tensile strength properties, and chemistry affecting pipe quality.</p> <p>A mill inspection program or internal quality management program must include the following:</p> <ul style="list-style-type: none"> <li>a) Non-destructive test of the ends and at least 35 percent of the surface of the plate, coil, or pipe must be performed to identify imperfections such as laminations, cracks, and inclusions that may impair serviceability; 100 percent of the pipe sections must be tested. Surface ultrasonic must be done in accordance with American Society of Testing and Materials A578/A578M Level B or equivalent, to acceptance Level B. Pipe ends must be inspected by ultrasonic, magnetic particle or liquid penetrant methods, with acceptance criteria as outlined in Clause 9.10.4 or API 5L (44th Edition).</li> <li>b) A macro etch test or other equivalent method must be performed to identify inclusions that may form centerline segregation during the continuous casting process. Use of sulfur prints is not an equivalent method. The test must be carried out on a slab from the first heat of each sequence, and graded with an acceptance criteria of one or two on the Mannesmann scale or equivalent;</li> <li>c) A quality assurance monitoring program implemented by the operator must include evaluations of: <ul style="list-style-type: none"> <li>i. All steelmaking and casting facilities;</li> <li>ii. Quality control plans and manufacturing procedure specifications;</li> <li>iii. Equipment maintenance and records of conformance;</li> <li>iv. Procedures for controls on superheat and casting speeds, steel rolling temperatures and cooling temperatures;</li> </ul> </li> </ul>	<p>General, less prescriptive in Code Section 195.112 and references API 5L.</p>	<p>These properties help ensure high quality carbon steel.</p>

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
	<ul style="list-style-type: none"> <li>v. Additional mechanical and chemical properties tests based on steel grade, plate, or coil, and must be selected based on knowledge of patterns of property variability in the coils and plate based on the steel making process and rolling and cooling temperatures to assure that steel properties are not variable;</li> <li>vi. A verification program to ensure the pipe mill is taking into account all yield and tensile strength losses that may occur in the coiling and pipe rolling processes to ensure that the finished pipe has yield and tensile strengths that meet API 5L specifications;</li> <li>vii. Coils and plate with casting and rolling process deviations that may affect steel properties must have a re-verification of mechanical and chemical properties on the pipe heat conducted at pipe location to ensure there is no variability in the pipe;</li> <li>viii. The pipe supplier must notify Keystone of all instances that do not meet the above items before supplying the pipe to Keystone; and</li> <li>ix. Procedures for centerline segregation monitoring to ensure mitigation of centerline segregation during the continuous casting process.</li> </ul> <p>d) Pipe end tolerances must be applied so that there are no flat spots on the pipe that could affect welding quality. From each pipe mill, the end tolerances on pipe diameter must not exceed the range given in API 5L, Forty-Fourth (44th) Edition, Table 10, for any given pipe wall thickness. Keystone must demonstrate compliance with API 5L 44th Edition, Table 10 by providing to the appropriate Pipeline and Hazardous Materials Safety Administration (PHMSA) Region Director(s), Central, Western, and Southwest Region, a histogram of end tolerance and wall thickness data representing physical evidence of compliance for a minimum of 10 percent of the pipe manufactured by each pipe mill facility.</p> <p>e) During construction, if pipe supplied from varying pipe mills cannot be preferentially strung, histograms and field weldability tests should be conducted to ensure that excessive high low is not in production or field welds.</p>		
5	<p><b>Pipe Seam Quality Control:</b> Keystone must prepare and implement a quality assurance program for pipe weld seams. The pipe weld seam tests must meet the minimum requirements for tensile strength in API 5L for the appropriate pipe grade properties.</p> <p>A pipe weld seam hardness test using the Vickers hardness testing of a</p>	<p>General, less prescriptive in Code Section 195.112 and references API 5L.</p>	<p>These properties help ensure that welded seams (helical and straight) are an equivalent or stronger strength to the pipe.</p>

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	cross-section from the weld seam must be performed on one length of pipe from each heat. The maximum weld seam and heat affected zone hardness must be a maximum of 280 Vickers hardness (Hv10). The hardness tests must include a minimum of 3 readings for each heat affected zone, 3 readings in the weld metal and 2 readings in each section of pipe base metal for a total of 13 readings. The pipe weld seam must be 100 percent ultrasonic tested (UT) inspected after expansion and hydrostatic testing per APL 5L.		
6	<b>Monitoring for Seam Fatigue from Transportation:</b> Keystone must inspect the double submerged arc welded seams of the delivered pipe using properly calibrated manual or automatic ultrasonic testing techniques. For each lay down area, a minimum of one pipe section from the bottom layer of pipes of the first five rail car shipments from each pipe mill must be inspected. For longitudinal weld seams, the entire seam must be tested. For helical seam submerged arc welded pipe, the weld seam in the area along the transportation bearing surfaces and all other exposed welded areas during the test must be tested. All the results must be appropriately documented. Each pipe section test record must be traceable to the pipe section tested.	General, less prescriptive in Code Sections 195.200 and 195.204.	This condition may result from a National Transportation Safety Board (NTSB) failure analysis finding from a historical pipeline failure. This spot-check—post-rail transportation to site—is an added check that no damage is present on pipe after rail transport.
7	<b>Puncture Resistance:</b> Steel pipe must be puncture resistant to an excavator weighing up to 65 tons with a general purpose tooth size of 3.54 inches by 0.137 inches. Puncture resistance will be calculated based on industry established calculations such as the Pipeline Research Council International's <i>Reliability Based Prevention of Mechanical Damage to Pipelines</i> calculation method.	General, less prescriptive; no defined requirement.	Additional steel properties to resist external mechanical damage, the most common cause of pipeline failure.
8	<b>Mill Hydrostatic Test:</b> The pipe must be subjected to a mill hydrostatic test pressure of 95 percent specified minimum yield strength (SMYS) or greater for 10 seconds. The 95 percent stress level may be achieved using a combination of internal test pressure and the application of end loads imposed by the hydrostatic testing equipment as allowed by API 5L, Clause 10.2.6.6.	Sections 195.3 and 195.112.	Validates mainline pipe and seam integrity in the plant prior to final hydrotest in field.
9	<b>Pipe Coating:</b> The application of a corrosion-resistant coating to the steel pipe must be performed according to a coating application quality control program. The program must address pipe surface cleanliness standards, blast cleaning, application temperature control, adhesion, cathodic disbondment, moisture permeation, bending, minimum coating thickness, coating imperfections, and coating repair. All pipe must be protected against external corrosion by non-shielding:	Less prescriptive, Code Section 195.004 requires inspection.	Detailed application process requirements help to ensure quality control of coating process.

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	<p>coatings, repair coatings, and protective material used to protect the pipe from rock damage. Holiday detection must include appropriate calibration of jeeping equipment on a holiday that extends through the coating to the metal of the pipe to be jeeped prior to use each working day. Jeeping voltages must be set at a minimum of 2,500 volts (V) for fusion bond epoxy (FBE), with higher voltages to be considered based on the coating type, thickness (maximum and minimum), grounding, and field conditions that day. For other coatings, minimum voltage settings need to be established by determining the nominal coating thicknesses and coating type. The pipe should be free of any excess debris prior to running the jeeping equipment over the area. Visual inspection for holidays and coating damage should complement the use of jeeping equipment.</p> <p>All pipe coating must be checked with holiday detection equipment prior to backfill and FBE-coated pipe must be checked with holiday detection equipment set at a minimum of 2500V prior to backfill. All coating defects must be repaired and rechecked prior to backfill. To the extent practical, Keystone must jeep the coating at the same voltage in the coating mill as in the field.</p>		
10	<p><b>Field Coating:</b> Keystone must implement field girth weld joint coating application specification and quality standards to ensure pipe surface cleanliness, application temperature control, adhesion quality, cathodic disbondment, moisture permeation, bending, minimum coating thickness, holiday detection, and repair quality. Field joint coatings must be non-shielding to cathodic protection (CP). Field coating applicators must use valid qualified coating procedures and be trained to use these procedures. Holiday detection must include appropriate calibration of jeeping equipment on a holiday that extends through the coating to the metal of the pipe to be jeeped prior to use each working day. Jeeping voltages must be set at a minimum of 2,500V for FBE, with higher voltages to be considered based on the grounding and field conditions that day. For other coatings such as for girth weld coatings, minimum voltage settings need to be established by determining the nominal coating thicknesses (maximum and minimum) and type of coating used for application. The pipe should be free of any excess debris prior to running the jeeping equipment over the area. Visual inspection for holidays and coating damage should complement the use of jeeping equipment.</p>	Less prescriptive; Code Section 195.204 requires inspection, does not require level of specificity.	Helps ensure that personnel are trained and aware of the requirements when applying field joint corrosion protection.
11	<p><b>Coatings for Trenchless Installation:</b> Coatings used for directional bore, slick bore, and other trenchless installation methods must be capable of</p>	Less prescriptive, Code Section 195.202 and 195.246 require	Helps ensure that corrosion protection coating is not

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	resisting abrasion and other damage that may occur due to rocks and other obstructions encountered in this installation technique.	specification, does not require level of specificity.	damaged during installation using trenchless methods.
12	<b>Bends Quality:</b> Keystone must obtain and retain certification records of factory induction bends and factory weld bends. Bends, flanges, and fittings must have CE equal to or below 0.42 or a pre-heat procedure must be applied prior to welding for CE above 0.42 on the CE-IIW formula.	Less prescriptive, Code Section 195.118 requires specifications, does not require level of specificity.	Helps ensure that pipeline materials are traceable for the life of the pipeline and weldable.
13	<b>Fittings:</b> Pressure-rated fittings and components (including flanges, valves, gaskets, pressure vessels, and pumps) must be rated for a pressure rating commensurate with the pipeline's MOP.	Less prescriptive, Code Section 195.118 requires specifications, does not require level of specificity.	Helps ensure that correct components are used that match the pipeline design pressure.
14	<p><b>Pipeline Design Factor – Pipelines:</b> Pipe installed must comply with the 0.72 design factor in 49 CFR 195.106.</p> <p>a) At least 6 months before starting the Keystone XL pipeline construction, Keystone must review with the appropriate PHMSA Regional Directors in Central, Western, and Southwest Regions how High Consequence Areas (HCAs) which could be affected, as defined in 49 CFR 195.450 (commercial navigable waterways, high population areas, other populated areas, and unusually sensitive areas including aquifers as defined in 49 CFR 195.6), were determined, and the pipeline design associated with those segments. Keystone must identify piping and the design of piping within pump stations, MLV assemblies, pigging facilities, measurement facilities, road crossings, railroad crossings, and segments operating immediately downstream and at lower elevations than a pump station. Keystone must also provide an overland spread analyses in accordance with Section 195.452(f) to support could-affect determinations for water bodies more than 100 feet wide from high-water mark to high-water mark.</p> <p>b) Post-construction, Keystone must conduct a yearly survey, not to exceed 15 months, to identify changes on the pipeline system that would affect its designation or design.</p>	Less prescriptive, Code Section 195.106 requires 0.72 design factor, does not specify timing for review prior to and post-construction. Code Section 195.452 has additional requirements for pipeline integrity management in HCAs.	Provides regulatory oversight of design compliance to federal codes and standards and helps ensure that encroachments near the pipeline such as urban development or new wellhead protection areas are factored into integrity management plans.
15	<p><b>Temperature Control:</b> Normal pump discharge temperatures should remain at or below 120°F. If the temperature exceeds 120°F, Keystone must prepare and implement a coating monitoring program in these areas, using ongoing direct current voltage gradient (DCVG) surveys or alternating current voltage gradient (ACVG) surveys, or other testing to demonstrate the coating integrity.</p> <p>Non-continuous discharge temperature spikes above 120°F for less than</p>	General, less prescriptive in Code Sections 195.400, 195.401, 195.402, 195.559, and 195.561.	Helps provide protective measures are in place for corrosion coating protection.

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	<p>½-day duration will not be a cause for implementing the procedure, but Keystone must inform the appropriate PHMSA Regional Director if regular operation above 120°F at pump station discharges will occur. Under no circumstances may the pump station discharge temperatures exceed 150°F without sufficient justification that Keystone’s long-term operating tests show that the pipe coating will withstand the higher operating temperature for long-term operations, and approval from the appropriate PHMSA region(s).</p> <p>Pump Station Discharge Temperature – operating above 120°F and up to 150°F maximum, FBE coating:</p> <ul style="list-style-type: none"> <li>a) Keystone must monitor coating performance in areas where operating temperatures have exceeded or will exceed 120°F to provide additional data on the long-term durability and integrity of FBE coatings at these temperatures. Cathodic protection current requirements and coating surveys with DCVG (soil cover) and ACVG (pavement cover) will indicate if there is deterioration in the coating at the higher temperatures.</li> <li>b) The DCVG and ACVG coating evaluation survey results will be addressed as follows: The threshold survey indication values are 35 percent IR<sup>b</sup> for DCVG and 50 decibel-microvolts for ACVG. These values represent the mid-range of the <i>Minor</i> category in the severity classification used to characterize survey indications in an External Corrosion Direct Assessment program.</li> <li>c) Keystone must excavate and remediate all indications found above the threshold values: Minor, Moderate, and Severe categories.</li> <li>d) Keystone must conduct a calibration dig on at least two anomalies of each classification that are classified as Minor, Moderate, and Severe to ensure that findings not in the remediation plan are not detrimental to the pipeline.</li> <li>e) Keystone must perform Holiday voltage tests (jeep), coating adhesion, and coating cure tests at excavations.</li> <li>f) Keystone must remove disbanded or blistered coating (with cracking and other damage that will compromise CP) found during excavations and must apply new coating.</li> <li>g) Keystone must perform baseline DCVG 2½ years and 5 years after operating above 120°F, and in concert with future in-line inspection (ILI) and close-interval (CIS) surveys, both initial and second ILI tool runs, not to exceed 90 days before or past the schedule interval.</li> </ul>		

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	<p>h) Keystone must monitor surface temperatures of the pipe during winter and summer operating conditions at '0' miles and at a downstream mileage to assure that the surface temperatures do not exceed 120°F. If it is determined that the temperature at this point exceeds 120°F, the survey distance will be increased to the point where the temperature is below 120°F. Keystone must survey based on temperature measurements or a minimum of 20 miles downstream of each pump station operating above 120°F.</p> <p>i) Keystone must make repairs to FBE coatings with a compatible coating system that will bond together, be resistant to soil stresses, and not shield CP.</p>		
16	<p><b>Overpressure Protection Control:</b> Keystone must limit mainline pipeline overpressure protection to a maximum of 110 percent MOP during surge events consistent with 49 CFR 195.406(b). Before commencing operation, Keystone must perform a surge analysis showing how the pipeline will be operated to be consistent with these overpressure protection conditions.</p> <p>Keystone must equip the pipeline with field devices to prevent overpressure conditions. Remotely actuated valves should be fitted with devices that will stop the transit (intentional or uncommanded) of the MLV should an overpressure condition occur or an impending overpressure condition is expected. Sufficient pressure sensors, on both the upstream and downside side of valves, must be installed to ensure that an overpressure situation does not occur. Sufficient pressure sensors must be installed along the pipeline to conduct real time hydraulic modeling, which can be used to conduct a surge analysis to determine whether pipeline segments have experienced an overpressure condition.</p>	Required in Section 195.406(b), but less prescriptive on surge analysis.	Helps provide additional assurance that overpressure protection measures are in place.
17	<p><b>Construction Plans and Schedule:</b> At least 90 days prior to the anticipated construction start date, Keystone must submit its construction plans and schedule to the appropriate PHMSA Directors in Central, Western, and Southwest Regions for review. Subsequent plans and schedule revisions must also be submitted to the appropriate Directors, PHMSA Central, Western, and Southwest Regions on a monthly basis.</p>	Part 195 Code does not require the operator to notify PHMSA of construction plans and schedule.	Provides that PHMSA is fully aware of construction plans prior to construction.
18	<p><b>Welding Procedures for New Pipeline Segments or Pipe Replacements:</b> For automatic or mechanized welding, Keystone must use the 20<sup>th</sup> Edition of API 1104, <i>Welding of Pipelines and Related Facilities</i>, for welding procedure qualification, welder qualification, and weld acceptance criteria. Keystone must use the 20<sup>th</sup> Edition of API 1104 for other welding processes. At least twenty-one (21) days prior to the beginning of any</p>	Nondestructive tests required in Code Sections 195.228, 195.230, and 195.234 but not same detail-general, less prescriptive. Only requires 10 percent of	This condition, and Keystone's normal practices, help ensure that every weld is inspected.

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	<p>welding procedure qualification activities, Keystone must notify the appropriate PHMSA Directors in Central, Western, and Southwest Regions. Keystone must submit automated or manual welding procedure documentation to the same PHMSA regional office.</p> <ul style="list-style-type: none"> <li>a) Should nondestructive testing of field girth welds be conducted by automated ultrasonic testing (AUT) API 1104 Appendix A, Keystone must conduct stress analysis for the welding procedures as required in API 1104, Appendix A, Paragraph A.2.</li> <li>b) Should API 1104, Appendix A, be used for welding, Keystone must conduct steel suppliers.</li> <li>c) All welding procedures, AUT procedures and pipe lifting procedures for field construction crews must be documented in construction procedures and field construction crews must be trained in the procedure requirements prior to conducting welding and girth weld AUT in accordance with API 1104, Appendix A.</li> <li>d) Keystone must nondestructively test girth welds in accordance with 49 CFR Sections 195.228, 195.230, and 195.234.</li> </ul>	<p>each welder’s girth welds made each day to be nondestructively tested.</p>	

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19	<p><b>Depth of Cover:</b> Keystone must construct the pipeline with soil cover at a minimum depth of 48 inches in areas, except in consolidated rock. The minimum depth in consolidated rock areas is 36 inches. Keystone must maintain a depth of cover of 48 inches in cultivated areas and a depth of 42 inches in other areas. In cultivated areas where conditions prevent the maintenance of 48 inches of cover, Keystone must employ additional protective measures to alert the public and excavators of pipeline presence. The additional measures must include:</p> <ul style="list-style-type: none"> <li>a) Placing warning tape and additional line-of-sight pipeline markers along the affected pipeline segment,</li> <li>b) In areas where threats from chisel plowing or other activities are threats to the pipeline, the top of the pipeline must be installed and maintained at least 1 foot below the deepest penetration above the pipeline, not to be less than 42 inches of cover.</li> </ul> <p>If a routine patrol (ground and/or aerial) or other observed conditions during maintenance, where farming, excavation, or construction activities are ongoing, or after weather events occur, indicate the possible loss of cover over the pipeline, Keystone must perform a depth-of-cover study and replace cover as soon as practicable, not to exceed 6 months, to meet the minimum depth of cover requirements specified herein.</p> <p>In addition to any depth-of-cover maintenance activities that may take place as a result of routine patrols, Keystone must perform a detailed depth-of-cover survey along the entire Keystone XL pipeline as frequently as practicable, not to exceed once every 10 years, and replace cover as soon as practicable, not to exceed 6 months, to meet the minimum depth-of-cover requirements specified herein.</p>	<p>Code Section 195.248 requires 36 inches of cover and 30 inches of cover in rock. Code does not require future cover maintenance as required in XL Condition 19 a and b.</p>	<p>Helps reduce the probability of mechanical damage through deeper pipeline burial. Requires depth of cover to be maintained at prescribed levels for life of pipeline.</p>
20	<p><b>Construction Tasks:</b> Keystone must prepare and follow an Operator Qualification Program for construction tasks that can affect pipeline integrity. The Construction Operator Qualification Program must comply with 49 CFR 195.501 and must be followed throughout the construction process for the qualification of individuals performing tasks on the pipeline.</p> <p>If the performance of a construction task can affect the integrity of the pipeline segment, the operator must treat that task as a <i>covered task</i>, notwithstanding the definition in 49 CFR 195.501(b), and must implement the requirements of Subpart G. Keystone must retain qualification records for each individual performing covered tasks during and after the construction of the pipeline, whether company or contract employee.</p>	<p>General, less prescriptive. Construction personnel training, such as reading project specifications.</p>	<p>Helps ensure that girth weld inspection and repair, and other tasks related to pipeline construction, are performed by qualified individuals.</p>

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
	<p>Keystone must prepare and follow a Construction Quality Assurance Plan, to ensure quality standards and controls of the pipeline, throughout the construction phase. Such a plan must include, at a minimum, provisions for the following: pipe inspection (at the last pipe shipping or storage location prior to stringing on the construction ROW, whether rail yard or pipe yard), hauling and stringing, field bending, welding, nondestructive examination of girth welds, applying and testing field applied coating, lowering of the pipeline into the ditch, padding and backfilling, and hydrostatic testing. These tasks can affect the integrity of the pipeline segment and must be treated as covered tasks. The individuals driving the pipe stringing trucks to the pipeline ROW would not need to be Operator Qualification Program qualified, unless they are responsible for the pipe unloading.</p> <p>Other tasks that can affect pipeline integrity which must be treated as covered tasks include, but are not limited to, surveying, locating foreign lines, one-call notifications, ditching, alternating current (AC) interference mitigation and mitigation, CP system surveys, mitigation and installation, conducting directional drills, anomaly evaluations and repairs, ROW cleanup (including installing line markers), and quality assurance monitoring.</p> <p>Keystone must provide its construction Operator Qualification Program plan to the appropriate PHMSA Regional Director for review before beginning construction.</p> <p>Girth welds must be inspected, repaired, and nondestructively examined in accordance with 49 CFR 195.228, 195.230, and 195.234. The NDE examiner must have required and current certifications.</p>		
21	<p><b>Interference Currents Control:</b> Control of induced AC from parallel electric transmission lines and other interference issues that may affect the pipeline must be incorporated into pipeline design and addressed during the construction phase. Issues identified and not originally addressed in the design phase must be brought to the attention of the applicable PHMSA Director(s) in Central, Western, and Southwest Regions. Within 6 months after placing the pipeline in service, Keystone must develop and implement an induced AC program to protect the pipeline from corrosion caused by stray currents.</p>	Related to 49 CFR 195.577.	May minimize occurrence of corrosion caused by stray currents.

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
22	<b>Pressure Test Levels:</b> The pre-in-service hydrostatic test must be to a pressure producing a hoop stress of a minimum 100 percent SMYS for mainline pipe and 1.39 times MOP for pump stations for 8 continuous hours. The hydrostatic test results from each test must be submitted in electronic format to the applicable PHMSA Directors in PHMSA Central, Western, and Southwest Regions after completion of each pipeline.	Less prescriptive. Code Section 195.304 requires pressure test 1.25 times, or more, of MOP for at least 4 continuous hours and for pipeline that is not visually inspected for leakage during the test, for at least an additional 4 continuous hours at a pressure equal to 1.1 times or more of MOP.	Helps provide final proof test of the pipeline including testing at greater pressure than required by Code at pump stations prior to placing in-service.
23	<b>Assessment of Test Failures:</b> Pipe failure occurring during the pre-in-service hydrostatic test must undergo a root cause failure analysis to include a metallurgical examination of the failed pipe. The results of this examination must preclude a systemic pipeline material issue and the results must be reported to PHMSA headquarters and the applicable PHMSA Director(s) in Central, Western, and Southwest Regions within 60 days of the failure.	Part 195 Code does not require operator to conduct assessment of test failures of hydrotest failures prior to placing in-service.	Help provide no systemic issues are present should a pre-in-service hydrotest failure be experienced.
24	<b>Supervisory Control and Data Acquisition (SCADA) System:</b> Keystone must develop and install a SCADA system to provide remote monitoring and control of the entire pipeline system.	General, less prescriptive. Code Section 195.134 states that a leak detection system must comply, but does not directly state a SCADA system is required.	Helps provide state-of-the-art monitoring and control of the pipeline.
25	<b>SCADA System – General:</b> a) Scan rate must be fast enough to minimize overpressure conditions (overpressure control system), provide very responsive abnormal operation indications to controllers, and detect small leaks within technology limitations. b) Must meet the requirements of regulations developed as a result of the findings of the NTSB, SCADA in Liquid Pipelines, Safety Study, NTSB/SS-05/02 specifically including: i. Operator displays must adhere to guidance provided in API 1165 (First Edition), Recommended Practice for Pipeline SCADA Displays. This must be implemented and performed at any location on the Keystone XL system where a SCADA system is used and where an individual is assigned the responsibility to monitor and respond to SCADA information (tanks terminals or facilities also).	General, less prescriptive, although most items are either explicitly listed or inferred as part of the Control Room Management (CRM) regulations through Code Section 195.446.	Provides NTSB findings are included from previous pipeline failure investigations.

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
	<ul style="list-style-type: none"> <li>ii. Operators must have a policy for the reviewing and auditing alarms for false alarm reduction and near-miss or lessons-learned criteria. This alarm review must be implemented and performed at any location on the Keystone XL system where a SCADA system is used and where an individual(s) is assigned the responsibility to monitor and respond to alarm information (tanks terminals or facilities also).</li> <li>iii. SCADA controller training must include simulator for controller recognition of abnormal operating conditions, in particular leak events. A generic simulator or simulation must not be allowed by itself as a means to meet this requirement. A full simulator (console screens respond and react as actual console screens) must be required and used for training of abnormal operating conditions wherever possible.</li> <li>iv. See item 29(b) below on fatigue management.</li> <li>v. Install computer-based leak detection system on all lines unless an engineering analysis determines that such a system is not necessary.</li> <li>c) Develop and implement shift change procedures for a controller that are scientifically based, set appropriate work and rest schedules, and consider circadian rhythms and human sleep and rest requirements in line with guidance provided by NTSB recommendation P-99-12 issued June 1, 1999.</li> <li>d) Verify point-to-point display and SCADA system inputs before placing the line in service. This must be implemented and performed at locations on the Keystone XL system where a SCADA system is used and where an individual(s) is assigned the responsibility to monitor and respond to alarm information (tanks terminal or facilities also).</li> <li>e) Implement individual controller log-in provisions.</li> <li>f) Establish and maintain a secure operating control room environment.</li> <li>g) Establish and maintain the ability to make modifications and test these modifications in an off-line mode. The pipeline must have controls in place and be functionally tested in an off-line mode prior to changes being implemented after the line is in service and prior to beginning the line fill stage.</li> <li>h) Provide SCADA computer process load information tracking.</li> </ul>		

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
26	<p><b>SCADA – Alarm Management:</b> Alarm Management Policy and Procedures must address:</p> <ul style="list-style-type: none"> <li>a) Alarm priorities determination.</li> <li>b) Controllers’ authority and responsibility.</li> <li>c) Clear alarm and event descriptors that are understood by controllers.</li> <li>d) Number of alarms.</li> <li>e) Potential systemic system issues.</li> <li>f) Unnecessary alarms.</li> <li>g) Controller’s performance regarding alarm or event response.</li> <li>h) Alarm indication of abnormal operating conditions.</li> <li>i) Combination abnormal operating conditions or sequential alarms and events.</li> <li>j) Workload concerns.</li> <li>k) This alarm management policy and procedure review must be implemented and performed at locations on the Keystone XL system where a SCADA system is used and where an individual(s) is assigned the responsibility to monitor and respond to alarm information (such as for tanks, terminals, or other associated facilities).</li> </ul>	<p>General, less prescriptive, although most items are explicit as part of the CRM regulations through Code Section 195.446.</p>	<p>Helps provide state-of-the-art monitoring and control of the pipeline.</p>
27	<p><b>SCADA – Leak Detection System (LDS):</b> The LDS Plan must include provisions for:</p> <ul style="list-style-type: none"> <li>a) Implementing applicable provisions in API Recommended Practice 1130, Computational Pipeline Monitoring for Liquid Pipelines (API RP 1130, 1st Edition 2007).</li> <li>b) Addressing the following leak detection system testing and validation issues: <ul style="list-style-type: none"> <li>i. Test routinely to ensure degradation has not affected functionality.</li> <li>ii. Validate the ability of the LDS to detect small leaks and modify the LDS as necessary to enhance its accuracy to detect small leaks.</li> <li>iii. Conduct a risk analysis of pipeline segments to identify additional actions that would enhance public safety or environmental protection.</li> </ul> </li> <li>c) Developing data validation plan (ensure input data to SCADA is valid)</li> <li>d) Defining lead detection criteria in the following areas:</li> </ul>	<p>General, less prescriptive Code Section 195.134 and 195.444, not as detailed.</p>	<p>Helps provide state-of-the-art monitoring and control of the pipeline.</p>

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
	<ul style="list-style-type: none"> <li>i. Minimum size of leak to be detected regardless of pipeline conditions (slack, transient, etc., as related to the Keystone XL pipeline configuration).</li> <li>ii. Leak location accuracy for various pipeline conditions.</li> <li>iii. Response time for various pipeline conditions.</li> <li>e) Providing redundancy plans for hardware and software and a periodic test requirement for equipment to be used live (also applies to SCADA equipment).</li> </ul>		
28	<p><b>SCADA – Pipeline Model and Simulator:</b> The Thermal-Hydraulic Pipeline Model/Simulator including pressure control system must include a Model Validation/Verification Plan.</p>	<p>General, less prescriptive, although measure is inferred as part of the CRM regulations through Code Section 195.446.</p>	<p>Helps provide state-of-the-art monitoring and control of the pipeline.</p>
29	<p><b>SCADA – Training:</b> The training and qualification plan (including simulator training) for controllers must:</p> <ul style="list-style-type: none"> <li>a) Emphasize procedures for detecting and mitigating leaks.</li> <li>b) Include a fatigue management plan and implementation of a shift rotation schedule that minimizes possible fatigue concerns and that is scientifically based, sets appropriate work and rest schedules, and considers circadian rhythms and human sleep and rest requirements in line with NTSB recommendation P-99-12 issued June 1, 1999.</li> <li>c) Define controller maximum hours of service limitations.</li> <li>d) Meet the requirements of regulations developed as a result of the guidance provided in the American Society of Mechanical Engineers Standard B31Q, Pipeline Personnel Qualification Standard (ASME B31Q, September 2006), for developing qualification program plans.</li> <li>e) Include and implement a full training simulator capable of replaying for training purposes near-miss or lesson learned scenarios.</li> <li>f) Implement tabletop and field exercises no less than five times per year that allow controllers to provide feedback to the exercises, participate in exercise scenario development, and be active participants in the exercise.</li> <li>g) Include field visits for controllers accompanied by field personnel who will respond to call outs for that specific facility location.</li> <li>h) Provide facility specifics regarding the position to which certain equipment devices will default upon power loss.</li> <li>i) Include color blind and hearing provisions and testing if these are required to identify alarm priority or equipment status. This review</li> </ul>	<p>General, less prescriptive, although most items are either explicitly listed or inferred as part of the CRM regulations through Code Section 195.446.</p>	<p>Helps provide state-of-the-art monitoring and control of the pipeline.</p>

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
	<p>must be implemented and performed at any location on the Keystone XL system where a SCADA system is used and where an individual(s) is assigned the responsibility to monitor and respond to alarm information (such as for tanks, terminals, or other associated facilities).</p> <p>j) Task-specific abnormal operating conditions and generic abnormal operating conditions training components.</p> <p>k) If controllers are required to respond to “800” calls, include a training program conveying proper procedures for responding to emergency calls, notification of other pipeline operators in the area when affecting a common pipeline corridor, and education on the types of communications supplied to emergency responders and the public using API RP 1162, Public Awareness Programs for Pipeline Operators (1st edition, December 2003, or the most recent version incorporated in 49 CFR 195.3).</p> <p>l) Implement on-the-job training component intervals established by performance review to include thorough documentation of all items covered during oral communication instruction.</p> <p>m) Implement a substantiated qualification program for requalification intervals addressing program requirements for which circumstances will result in qualifications being revoked; implementing procedure documentation regarding how long a controller can be absent before a review period, shadowing, retraining, or re-qualification is required; and addressing interim performance verification measures between requalification intervals.</p>		
30	<p><b>SCADA – Calibration and Maintenance:</b> The calibration and maintenance plan for the instrumentation and SCADA system must be developed using guidance provided in API RP 1130, Computational Pipeline Monitoring for Liquid Pipelines (1<sup>st</sup> Edition 2007). Instrumentation repairs must be tracked and documentation provided regarding prioritization of these repairs. Controller log notes must be periodically reviewed for concerns regarding mechanical problems. This information must be tracked and prioritized.</p> <p>Maintenance of field related instrumentation repairs affecting SCADA data (local or remote) must also be tracked, prioritized, and documented at any location on the Keystone XL system where a SCADA system is used and where an individual(s) is assigned the responsibility to monitor and respond to alarm information (such as for tanks, terminals, or other associated</p>	<p>General, less prescriptive, although measure is essentially required as part of the CRM regulations through Code Section 195.446 (c) (2) that requires point-to-point verification between SCADA displays and related field equipment</p>	<p>Helps provide state-of-the-art monitoring and control of the pipeline through fully functional SCADA system.</p>

Condition	Keystone XL <sup>a</sup> facilities).	49 CFR 195	Benefits
31	<b>SCADA – Leak Detection Manual:</b> The Leak Detection Manual must be prepared using guidance provided in Canadian Standards Association (CSA), Oil and Gas Pipeline Systems, CSA Z662-03, Annex E, Section E.5.2, Leak Detection Manual.	General, less prescriptive. Many elements inferred through Code Sections 195.134 and 195.444 for leak detection, but code references API 1130 specifically.	Helps provide state-of-the-art monitoring and control of the pipeline reflecting exacting standards.
32	<b>Mainline and Check Valve Control:</b> Keystone must design and install mainline block valves and check valves on the Keystone XL system based on the worst-case discharge as calculated by 49 CFR 194.105. Keystone must locate valves in accordance with 49 CFR 195.260 and by taking into consideration elevation, population, and environmentally sensitive locations to minimize the consequences of a release from the pipeline. Mainline valves must be placed based on the analysis above or no more than 20 miles apart, whichever is less. Mainline valves must contain transit inhibit switches that prevent the valves from shutting at a rate (and in conjunction with pumps being shutdown) so that no pressure surges can occur, or other damage caused by unintended valve closures or by closures that are too rapid.  Valves must be remotely controlled and actuated, and the SCADA system must be capable of closing the valve and monitoring the valve position, upstream pressure, and downstream pressure so as to minimize the response time in the case of a failure. Remote power backup is required to ensure communications are maintained during inclement weather. Mainline valves must be capable of closure at all times. If it is impracticable to install a remote-controlled valve, Keystone must submit a valve design and installation plan to the appropriate PHMSA Region Director(s), Central, Western, and Southwest Region to confirm the alternative approach provides an equivalent safety level. For valves that cannot be remotely actuated, Keystone must document on a yearly basis not to exceed 15 months that personnel response time to these valves will not take more than an hour.	General Valve Requirements in Code Section 195.260.	Helps provide more instrumentation feeding back data to reduce leak detection times, helps reduce potential spill volumes though prescriptive valve spacing, and helps ensure that valves can close when loss of primary power is experienced. Also helps ensure prompt response time to non-automated valve locations.
33	<b>Pipeline Inspection:</b> The entire Keystone XL pipeline (not including pump stations and tank farms) must be capable of passing ILI tools. Keystone must prepare and implement a corrosion mitigation and integrity management plan for segments that do not allow the passage of an ILI device.	ILI required in Code Section 195.120, but no requirements for station piping inspection.	Provides pipeline capable of internal inspection and requires direct assessment plan for pump stations and other facilities.

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
34	<p><b>Internal Corrosion:</b> Keystone must limit basic sediment and water (BS&amp;W) to 0.5 percent by volume and report BS&amp;W testing results to PHMSA in the annual report. Keystone must also report upset conditions causing BS&amp;W level excursions above the limit.</p> <p>a) Keystone must run cleaning pigs twice in the first year and as necessary in succeeding years based on the analysis of oil constituents, liquid test results, weight loss coupons located in areas with the greatest internal corrosion threat, and other internal corrosion threats. At a minimum in the succeeding years following the first year Keystone must run cleaning pigs once a year, with intervals not to exceed 15 months.</p> <p>b) Liquids collected during the cleaning pig runs, such as BS&amp;W, must be sampled, analyzed and internal corrosion mitigation plans developed based upon the lab test results.</p> <p>c) Keystone must review the program at least quarterly based on the crude oil quality and implement adjustments to monitor for, and mitigate the presence of, deleterious crude oil stream constituents.</p>	General, less prescriptive in Code Section 195.579, which requires mitigation of internal corrosion.	Helps provide management of internal corrosion threat during operations.
35	<p><b>Cathodic Protection:</b> The initial CP system must be operational within 6 months of placing a pipeline segment in service.</p>	Required in Code Sections 195.563–within 1 year.	Helps provide early management of external corrosion threat during operations.
36	<p><b>Interference Current Surveys:</b> Keystone must perform interference surveys over the entire Keystone XL pipeline within 6 months of placing the pipeline in service to ensure compliance with applicable National Association of Corrosion Engineers (NACE) International RPs 0169 (2002 or the latest version incorporated by reference in Section 195.3) and 0177 (2007 or the latest version referenced through the appropriate NACE standard incorporated by reference in 49 CFR 195.3) (NACE RP 0169 and NACE RP 0177) for interference current levels. If interference currents are found, Keystone must determine if there have been adverse effects on the pipeline and mitigate such efforts as necessary. Keystone must report the results of any adverse effects finding and the associated mitigative efforts to the applicable Director(s), PHMSA Central, Western, and Southwest Regions within 60 days of the finding.</p>	Required in Code Sections 195.575 and 195.577–no timing guidelines.	Helps provide early management of external corrosion threat during operations.

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
37	<p>Corrosion Surveys: Keystone must complete corrosion surveys within 6 months of placing the respective CP system(s) in operation to ensure adequate external corrosion protection per NACE RP 0169. The survey must also address the proper number and location of CP test stations as well as AC interference mitigation and AC grounding programs per NACE RP 0177. At least one CP test station must be located within each HCA with a maximum spacing between test stations of one-half mile.</p> <p>If placement of a test station is not practical within an HCA, the test station must be placed at the nearest practical location. If any annual test station reading fails to meet 49 CFR 195, Subpart H requirements, remedial actions must occur within 6 months. Remedial actions must include a CIS on each side of the affected test station to the next test station and all modifications to the CP system necessary to ensure adequate external corrosion control.</p>	Required in Code Sections 195.571 and 195.573—timing of 2 years.	Helps provide early management of external corrosion threat during operations.
38	<p><b>Initial Close Interval Survey (CIS):</b> A CIS must be performed on the pipeline within 1 year of the pipeline in-service date. The CIS results must be integrated with the baseline ILI to determine whether further action is needed. Keystone must remediate anomalies indicated by the CIS data including improvements to CP systems and coating remediation within 6 months of completing the CIS surveys. CIS along the pipeline must be conducted with current interrupted to confirm voltage drops in association with periodic ILI assessments under 49 CFR 195.452 (j)(3).</p>	Part 195 Code does not require operator to conduct CIS to confirm CP systems are performing to protect the pipeline from corrosion.	Helps provide management of external corrosion threat during operations.
39	<p><b>Coating Condition Survey:</b> Keystone must perform a DCVG or ACVG survey within 6 months after operation to verify the pipeline coating conditions and to remediate integrity issues. Keystone must remediate damaged coating indications found during these assessments that are classified as Minor (i.e., 35 percent IR and above for DCVG or 50 dB<math>\mu</math>V and above for ACVG), Moderate, or Severe based on NACE International RP 0502-2002 Pipeline External Corrosion Direct Assessment Methodology, or the latest version incorporated by reference in Section 195.3. A minimum of two coating survey assessment classifications must be excavated, classified, and/or remediated per each survey crew and pump station discharge section.</p>	Part 195 Code does not require operator to conduct coating surveys after the pipe has been backfilled and graded.	Helps provide early management of external corrosion threat during operations.
40	<p><b>Pipeline Markers:</b> Keystone must install and maintain line-of-sight markings on the pipeline except in agricultural areas or large water crossings such as lakes where line-of-sight signage is not practical. The marking of pipelines may also be subject to environmental permits and local restrictions. Additional markers must be placed along the pipeline in</p>	Required in Code Section 195.410, but does not require same level of markers or marker replacement program.	May reduce probability of mechanical damage threat and public awareness of high pressure utility.

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
	<p>areas where the pipeline is buried less than 48 inches. Keystone must replace removed or damaged line-of-sight markers during pipeline patrols and maintenance on the ROW. Keystone, at a minimum, must identify and replace any missing or damaged line-of-sight markers during pipeline patrols (Condition 41). If pipeline patrolling for Condition 41 is performed via aerial patrolling and cannot consistently identify areas with missing or damaged line-of-sight markers, then Keystone must, on a calendar year basis, not to exceed 15 months, conduct ground patrols.</p>		
41	<p><b>Pipeline Patrolling:</b> Patrol the ROW at intervals not exceeding 3 weeks, but at least 26 times each calendar year, to inspect for excavation activities, ground movement, unstable soil, wash outs, leakage, or other activities or conditions affecting the safe operation of the pipeline.</p>	<p>Required in Code Section 195.412, ROW patrols every 3 weeks and 26 times per year, but is less prescriptive on items to look for during surveys.</p>	<p>May reduce probability of mechanical damage threat, erosion control, and other threats.</p>
42	<p><b>Initial ILI:</b> Within 3 years of pipeline segment in service, Keystone must perform a baseline ILI using a high-resolution magnetic flux leakage (MFL) tool. Keystone must perform a baseline geometry tool run after completion of the hydrostatic strength test and backfill of the pipeline, but no later than 6 months after placing the pipeline in service.</p>	<p>Required in Code Section 195.452 within 5 years of placing in-service.</p>	<p>Helps provide early management of external and internal corrosion threat during operations.</p>
43	<p><b>Deformation Tool:</b> Keystone must run a deformation tool through mainline piping prior to putting the product in the pipeline and remediate expanded pipe in accordance with PHMSA’s <i>Interim Guidelines for Confirming Pipe Strength in Pipe Susceptible to Low Yield Strength for Liquid Pipeline</i> dated October 6, 2009, or subsequent PHMSA update to this guideline.</p>	<p>Not required in Part 195 Code, but PHMSA has issued advisory bulletin on low strength pipe.</p>	<p>Helps provide identification of construction damage and manufacturing defects.</p>
44	<p><b>Future ILI:</b> Future ILI inspection must be performed on the entire pipeline on a frequency consistent with 49 CFR 195.452 (j) (3) assessment intervals or on a frequency determined by fatigue studies of actual operating conditions.</p> <ul style="list-style-type: none"> <li>a) Conduct periodic CIS along the entire pipeline with current interrupted to confirm voltage drops in association with periodic ILI assessments under Section 195.452(j) (3).</li> <li>b) CIS must be conducted within 3 months of running ILI surveys when using a 5-year ILI frequency, not to exceed 68 months, in accordance with 49 CFR 195.452 (j) (3) assessment intervals.</li> <li>c) CIS findings must be integrated into ILI Tool findings.</li> </ul>	<p>Required in Code Section 195.452(j)(3), but does not require a, b, and c.</p>	<p>Helps provide enhanced management of external and internal corrosion threat during operations while overlapping data sets to cross check for issues.</p>

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
45	<p><b>Verification of Reassessment Interval:</b> Keystone must submit a new fatigue analysis to validate the pipeline reassessment interval annually for the first 5 years after placing the pipeline into service. The analysis must be performed on the segment experiencing the most severe historical pressure cycling conditions using actual pipeline pressure data. The fatigue analysis must be submitted to the appropriate PHMSA Director(s) in Central, Western, and Southwest Regions.</p>	<p>General, less prescriptive in Code Section 195.452, which requires reassessment intervals to be considered in high consequence areas.</p>	<p>Helps provide enhanced management of fatigue threat during operations and PHMSA review.</p>
46	<p><b>Flaw Growth Assessment:</b> Two years after the pipeline in-service date, Keystone must use data gathered on the pipeline section experiencing the most severe historical pressure cycling conditions to determine effect on flaw growth that passed manufacturing standards and installation specifications. This study must be performed by an independent party agreed upon by Keystone and PHMSA.</p> <p>Furthermore, Keystone must share this study with PHMSA and the appropriate Director(s), PHMSA Central, Western, and Southwest Regions within 60 days of its completion, and before baseline assessment is begun. These findings must determine if an ultrasonic crack detection tool must be launched in that pipeline section to confirm crack growth. The study must also define when follow-up review and analysis will occur, not to exceed 5 years, or sooner as determined by the study.</p>	<p>General, less prescriptive in Code Section 195.452, which requires reassessment intervals to be considered in high consequence areas.</p>	<p>Helps provide enhanced management of fatigue threat during operations.</p>
47	<p><b>Direct Assessment Plan:</b> Headers, MLV bypasses, and other sections that cannot accommodate ILI tools must be part of a Direct Assessment Plan or other acceptable integrity monitoring method using External and Internal Corrosion Direct Assessment criteria.</p>	<p>General, less prescriptive in Code Section 195.452, but not as detailed.</p>	<p>Helps provide enhanced management of corrosion threat during operation for non-pigable sections of piping inside facilities.</p>
48	<p><b>Damage Prevention Program:</b> Keystone must incorporate the Common Ground Alliance’s damage prevention best practices applicable to pipelines into its damage prevention program.</p>	<p>General, less prescriptive in Code Section 195.442, operator is not required to meet Common Ground Alliance’s damage prevention best practices.</p>	<p>Helps provide enhanced public awareness as part of damage control programs.</p>

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
49	<p><b>Anomaly Evaluation and Repair:</b> Anomaly evaluations and repairs must be performed based upon the following:</p> <ul style="list-style-type: none"> <li>a) Immediate Repair Conditions: Follow 49 CFR 195.452(h)(4)(i) except designate the calculated remaining strength failure pressure ratio (FPR) <math>\leq 1.16</math> for anomaly repairs;</li> <li>b) 60-day Conditions: Follow 49 CFR 195.452 (h)(4)(ii) except designate a FPR <math>\leq 1.25</math> for anomaly repairs;</li> <li>c) 180-day Conditions: Follow 49 CFR 195.452 (h)(4)(iii) with exceptions for the following conditions which must be scheduled for repair within 180 days:               <ul style="list-style-type: none"> <li>i. Calculated FPR = <math>&lt; 1.39</math>;</li> <li>ii. Areas of corrosion with predicted metal loss greater than 40 percent;</li> <li>iii. Predicted metal loss is greater than 40 percent of nominal wall that is located at crossing of another pipeline and;</li> <li>iv. Gouge or groove greater than 8 percent of nominal wall.</li> </ul> </li> <li>d) Each anomaly not repaired under the immediate repair requirements must have a corrosion growth rate and ILI tool tolerance assigned per the Integrity Management Program to determine the maximum reinspection interval.</li> <li>e) Anomaly Assessment Methods: Keystone must confirm the remaining strength (R-STRENG) effective area method, R-STRENG-085dL, and ASME B31G assessment methods are valid for the pipe diameter, wall thickness, grade, operating pressure, operating stress level, and operating temperature. Keystone must use the most conservative method until proper method confirmation is made to PHMSA headquarters.</li> <li>f) Flow Stress: Remaining strength calculations for X-80 pipe must use a flow stress equal to the average of ultimate (tensile) strength and SMYS.</li> <li>g) Dents: For initial construction and the initial geometry tool run, Keystone must remove dents with a depth greater than 2 percent of the nominal pipe diameter unless the dent is repaired by a method that reliable engineering tests and analyses show can permanently restore the serviceability of the pipe. For the purposes of this condition, a dent is a depression that produces a gross disturbance in the curvature of the pipe wall without reducing the pipe wall thickness. The depth of the dent is measured as the gap between the lowest point of the dent</li> </ul>	<p>General, less prescriptive. Required in Code Section 195.452, except Code does not require immediate repair when FPR is less than 1.16 (Code requires less than 1.0, which is less than MOP with no safety factor) and does not require 180-day repair if wall loss is less than 50 percent.</p>	<p>Helps provide timely investigation and prompt repair of anomalies in the pipeline reported via in-line inspection.</p>

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
	and the prolongation of the original contour of the pipe.		
50	<b>Reporting – Immediate:</b> Keystone must provide immediate notification of reportable incidents in accordance with 49 CFR 195, and must notify the appropriate PHMSA regional office within 24 hours of non-reportable leaks occurring on the pipeline.	General, less prescriptive. Required in Code Sections 195.50, 195.52, 159.54, 195.55, and 195.56, except nonreportable leaks do not require reporting.	Provides enhanced transparency to PHMSA.
51	<b>Reporting – 180 day:</b> Within 180 days of the pipeline in-service date, Keystone must report on its compliance with these conditions to the PHMSA Associate Administrator and the appropriate PHMSA Directors in Central, Western, and Southwest Regions.	Part 195 Code does not require operator to give PHMSA a 180-day overview of operations on new pipelines.	Provides enhanced transparency to PHMSA.
52	<p><b>Annual Reporting:</b> Keystone must annually report by February 15<sup>th</sup> each year the following to the PHMSA Associate Administrator and the appropriate Directors, PHMSA Central, Western, and Southwest Regions:</p> <ul style="list-style-type: none"> <li>a) The results of an ILI run or direct assessment results performed on the pipeline during the previous year;</li> <li>b) The results of internal corrosion management programs: <ul style="list-style-type: none"> <li>i. BS&amp;W analyses</li> <li>ii. Report of plant upset conditions where elevated levels of BS&amp;W are introduced into the pipeline</li> <li>iii. Corrosion inhibitor and biocide injection</li> <li>iv. Internal cleaning program</li> <li>v. Wall loss coupon tests</li> </ul> </li> <li>c) New integrity threats identified during the previous year;</li> <li>d) An encroachment in the ROW, including the number of new residences or public gathering areas;</li> <li>e) HCA changes during the previous year;</li> <li>f) Reportable incidents that occurred during the previous year;</li> <li>g) Leaks on the pipeline that occurred during previous year;</li> <li>h) A list of repairs on the pipeline made during the previous year;</li> <li>i) On-going damage prevention initiatives on the pipeline and an evaluation of their success or failure;</li> <li>j) Changes in procedures used to assess and monitor the pipeline; and</li> <li>k) Company mergers, acquisitions, asset transfers, or other events affecting regulatory responsibility of company operating the pipeline.</li> </ul>	Part 195 Code does not require operator to give PHMSA an annual overview of operations on new pipelines.	Provides enhanced transparency to PHMSA.

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
53	<p><b>Threat Identification and Evaluation:</b> Keystone must develop a threat matrix consistent with 49 CFR 195.452 to accomplish the following:</p> <ul style="list-style-type: none"> <li>a) Identify and compare increased risks of operating the pipeline; and</li> <li>b) Describe and implement procedures used to mitigate the risk.</li> <li>c) Where geotechnical threats exist that may impact operational safety, Keystone must run a geospatial tool and assess procedures to implement for conducting mitigative measures along the affected pipeline.</li> </ul>	Part 195 Code does not require operator to develop a threat matrix on locations outside high consequence areas.	Helps provide state-of-the-art integrity management practices employed across the entire pipeline system that would identify risks and develop plans.
54	<p><b>Right of Way Management Plan:</b> Keystone must develop and implement a right-of-way management plan to protect the Keystone pipeline from damage due to excavation, third party, and other activities. In areas where increased activities or natural forces could lead to increased threats to the pipeline beyond the initial threat conditions, the management plan must include increased inspections. The management plan must also include ROW inspection activities to complement the following:</p> <ul style="list-style-type: none"> <li>a) Depth of Cover (Condition 19)</li> <li>b) Pipeline Markers (Condition 40)</li> <li>c) Pipeline Patrolling (Condition 41)</li> <li>d) Damage Prevention Program (Condition 48); and</li> <li>e) Threat Identification and Evaluation (Condition 53).</li> </ul> <p>The Right-of-Way Management Plan and all the above-listed ROW inspection activities, Conditions 19, 40, 41, 48, and 53, must be reviewed for effectiveness and procedures updated as required on a periodic basis as conditions change, but not longer than once per calendar year not to exceed 15 months.</p>	Part 195 Code does not require operator to develop a Right-of-Way Management Plan for threats along the pipeline. This requirement is similar to the natural gas pipeline, Part 192 – Alternative Maximum Allowable Operating Pressure Rule, 80 percent SMYS.	Helps provide increased right-of-way inspections and protects against external damage to pipeline.
55	<p><b>Records:</b> Keystone must maintain records demonstrating compliance with the conditions herein for the useful life of the pipeline.</p>	Part 195 Code does not require operators to maintain compliance records for life of the pipeline.	Maintains compliance records for the life of the pipeline.

Condition	Keystone XL <sup>a</sup>	49 CFR 195	Benefits
56	<p><b>Certification:</b> A senior executive officer of Keystone must certify the following in writing:</p> <ul style="list-style-type: none"> <li>a) That Keystone has met the conditions described herein;</li> <li>b) That the written design, construction, and operating and maintenance plans and procedures for the Keystone pipeline have been updated to include additional requirements herein;</li> <li>c) That Keystone has reviewed and modified its damage prevention program relative to the Keystone pipeline to include additional elements required herein.</li> </ul> <p>Keystone must send a copy of the certification with the required senior executive signature and date of signature to PHMSA Associate Administrator and the Directors, PHMSA Central, Western, and Southwest Regions at least 90 days prior to operating the Keystone Pipeline.</p>	<p>General less prescriptive, Part 195 Code does not require senior executive to certify compliance prior to operations at a certain pressure level.</p>	<p>Helps ensure senior management accountability and visibility to aspects of the project’s design, construction, and operations.</p>
57	<p>Within 1 year of the in-service date, Keystone must provide a detailed technical briefing, in person, to the appropriate PHMSA Directors in Central, Western, and Southwest Regions. The briefing must cover the implementation of the requirements of the conditions herein, including information required by Condition 52. On the basis of PHMSA’s review of the Condition 52 Annual Report and additional information provided at the briefing, PHMSA may require additional information.</p>	<p>Part 195 Code does not require 1-year technical briefing of pipeline operations by operator to PHMSA.</p>	<p>Provides yearly in person reporting to PHMSA, increasing visibility and transparency to pipeline safety regulator.</p>

Notes:

<sup>a</sup> PHMSA recommends that the State Department require Keystone to include the Special Conditions in its written design, construction, and operating and maintenance plans and procedures.

<sup>b</sup> IR = current (I) flowing through a resistance (R).

In addition to the 57 Special Conditions listed above, two additional Special Conditions include:

1. Keystone would develop and implement a Quality Management System that would apply to the construction of the entire Keystone XL project in the U.S. to ensure that this pipeline is—from the beginning—built to the highest standards by both Keystone personnel and its many contractors; and
2. Keystone would hire an independent Third Party Inspection Company (TPIC) to monitor the construction of the Keystone XL project. PHMSA must approve the TPIC from among companies Keystone proposes. Keystone and PHMSA would work together to develop a scope of work to help ensure that all regulatory and technical EIS conditions are satisfied during the construction and commissioning of the pipeline project. The TPIC would oversee the execution and implementation of the DOS-specified conditions and the applicable pipeline safety regulations and would provide monitoring summaries to PHMSA and Keystone concurrently. Keystone would address deficiencies or risks identified in the TPIC's assessments.<sup>4</sup>

The following summarizes mitigation recommendations from the Battelle and E<sup>x</sup>ponent risk assessment reports. Keystone has committed to implement the following mitigation recommendations, including specifically addressing several issues in its Emergency Response Plan and Oil Spill Response Plan (and its risk analysis that is used in the development of those plans). The recommendations are grouped under numbered themes. Where recommendations were duplicate or very similar, the recommendations were combined and summarized under the theme. Acronym definitions are listed at the end of this summary.

1. The Facility Response Plan (FRP), Integrity Management Plan (IMP), and other related plans would be updated to include more frequent inspections or the use of advanced or improved leak prevention/detection tools, technology, or resources based on demonstrated need, environmental sensitivity, and/or changing conditions identified during pipeline operation.
  - a. Preventing leaks is a primary goal because any leak could release product into potentially sensitive ecosystems or into critical resources. Flexibility is recommended in the inspection plan and requirements to ensure that prevention is effective over the lifecycle of the proposed Project.
  - b. A risk-based integrity management system would be used whereby the frequency and accuracy requirements of in-line inspection (ILI) are based on a quantitative risk assessment indicated by conditions found after each inspection.
  - c. Inspection for mechanical damage using other technologies would also be considered in selected areas where the chance for such damage is locally higher.

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<sup>4</sup> In response to a data request regarding this TPIC condition, Keystone responded: “Keystone agrees to hire an independent Third Party Inspection Company (TPIC) to monitor field construction activities of the Keystone XL project. Keystone understands that it will work jointly with PHMSA to define the scope of work, identify qualified companies and prepare a Request for Proposal. PHMSA will select the qualified TPIC and manage the work of the TPIC. PHMSA will retain authority for its mandate on the project, while the TPIC will provide supplementary resources to PHMSA staff to field monitor, examine, audit and report conditions as specified by DOS and applicable pipeline safety regulations. Keystone will address deficiencies as directed by PHMSA.”

- d. Use of in-line leak detection technology on a selected basis may be appropriate in more environmentally sensitive areas, in areas where third-party damage is more likely, and on segments after significant corrosion is indicated.
- e. In-line leak detection also could be considered in the future for line segments that have experienced significant corrosion or on segments where excavation equipment may have impacted the pipeline.
- f. In-line leak detectors would also be deployed as part of the pig trains run under the integrity management programs. Leaks are not expected to be frequent; however, because many failures are the result of human activities, it is recommended that Keystone assess in its ERP/Spill Response Plan (SRP) the efficacy of increasing aerial surveys and/or ground patrol frequency to once a week.
- g. Analysis by E<sup>x</sup>ponent indicates that leaks larger than about 20 barrels could be detectable aboveground (visually or by other sensor) within a reasonable timeline. Spills of about 1,400 barrels could be detected within 2 hours under Keystone's<sup>5</sup> current detection commitment. Reasonable expectations based on unpublished data suggest that this volume could be reduced to several hundred barrels detected within 45 minutes. Though encouraging, smaller leaks are still a concern. Given that leaks of less than 20 barrels are not easily detectable aboveground, consideration would be given to the use of automated leak detection technologies. These technologies could complement continuous pipeline monitoring (CPM) and the other schemes currently adopted, with the survey frequency matched to the specific technology considered.
- h. Given that E<sup>x</sup>ponent's work indicates that leaks of more than 20 barrels could be recognized within a reasonable timeframe aboveground (detectable visually or by other sensor), the use of detection technologies would be considered, along with a patrol frequency that is matched to such technologies.
- i. Given that E<sup>x</sup>ponent's work indicates that large leaks could be recognized within a reasonable timeframe aboveground (detectable visually or by other sensor), consideration would be given to the use of detection technologies that complements computational pipeline modeling/monitoring CPM and the other schemes currently adopted, and to a patrol frequency that is matched to such technologies.
- j. E<sup>x</sup>ponent recommends that Keystone consider how to improve upon external leak detection through more frequent inspections and property owner education for wells within these areas of sensitive groundwater resources.
- k. If significant corrosion is detected by the lower-cost ILI tools, then high-resolution magnetic flux leakage (MFL) tools, more frequent inspection, or better tools are recommended.
- l. In their original (January 2012) and final (June 2013) reports, Battelle recommended increased aerial pipeline surveillance beyond what is currently required by PHMSA regulations. Battelle believes this recommendation is a valid one. Survey/patrol frequency even at the nominal two-week interval is largely ineffective based on the following analyses:

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<sup>5</sup> TransCanada Keystone Pipeline, LP (Keystone).

- i. Analyses done by Battelle over the years indicate that the likelihood of missing an encroachment action at a 2-week patrol frequency was high.
  - ii. Work done by C-FER (Reliability Based Prevention of Mechanical Damage to Pipelines) likewise indicates about a 90 percent chance of non-detection at 2-week intervals.
2. The IMP and other related plans would consider new developments in leak prevention and detection tools as these new technologies mature and demonstrate viable improvement.
  - a. No matter how effectively pipeline systems are designed and constructed, there will always be a finite chance that a leak will occur. Therefore, leak detection is essential across the range of potential release components of the pipeline. Because facility risks are significant, it is recommended that leak detection efforts be placed on both the mainline pipe sections and facilities (including tanks). As new leak detection technologies emerge and start to be deployed in the field, Keystone would continue evaluating these technologies and consider implementing them if they represent a significant increase in leak detection sensitivity.
  - b. Regarding small leak detection, Keystone would plan to consider those developments and aggressively move to implement viable technology as time passes and technology evolves and matures. Based on responses to inquiries made over the course of the work that show Keystone investing through ongoing industry activities, such actions would be a part of Keystone's change management practices. Alternative approaches to prevent leaks would also be considered.
  - c. Four types of emergency flow restricting devices exist: remote controlled valves, check valves, automatic control valves, and manually operated valves. There is evidence that all but automatic control valves are involved in the proposed Project (note that the manually operated valves are placed in conjunction with and just downstream of the check valves). Automatic control valves respond automatically to pipeline flow conditions, which poses the chance for anomalous response. Yet, an automatic control valve conceptually represents a simple leak detection system (LDS) and an emergency flow restricting device in one package. As the technology matures, consideration would be given to such devices as these become reliable and can be programmed to close and minimize surge.
3. The FRP, IMP, and other related plans would include periodic revisions throughout the lifecycle of the proposed Project as new information becomes available from Keystone's observations, inspections, and lessons learned, particularly in the context of updating equipment, tools, and standard operating procedures. Also, the FRP, IMP, and other related plans would include regular monitoring of all aspects of prevention, protection, and mitigation to ensure that operations are conducted in accordance with the current plans.
  - a. Equipment-related concerns represent a viable threat, which would either be addressed, or demonstrated through analysis or trending that they can be ignored.
  - b. Incorrect operations would be included as a threat unless demonstrated that it is not relevant. Concern exists in this context regarding human error, failure to follow standard operating procedures (SOPs), and/or the existence of outdated SOPs.
  - c. Leak prevention is a primary goal because any leak could release product into potentially sensitive ecosystems or into critical resources. Flexibility is recommended in the

inspection plan and requirements to ensure that prevention is effective over the lifecycle of the proposed Project.

- d. Finally, all aspects of prevention, protection, and mitigation would be monitored to ensure that plans and commitments remain viable and are implemented as outlined to date. Care would also be taken to heed the guidance that is emerging from recent efforts to avoid potential incidents<sup>6</sup> built in during construction.
4. The IMP and other related plans would require that in-line leak detection be considered as part of a pig train run to assess the pipeline for corrosion.
    - a. It is recommended that in-line leak detection be considered as part of the pig train that would be run to assess the pipeline for corrosion. This helps ensure that no small leaks have developed and that any leaks missed by other schemes have minimal environmental impact, while also minimizing the impact to operations (as the pipeline throughput is already reduced during pigging).
  5. The IMP and other related plans would require that consideration be given to the selective use of concrete-coated line pipe or other unique approaches (like concrete pads and berms) to protect location-specific elements, such as facilities sited in sensitive ecosystems.
    - a. Depending on the nature of the terrain, aspects of the water table, and other factors, consideration would be given to the selective use of concrete-coated line pipe, or an equivalent that, unlike concrete coating, can be field-bent and cathodically protected (CP).
    - b. For location-specific elements, like facilities that are currently sited in sensitive ecosystems or resources, Keystone would also consider unique approaches to protect those sites, such as containment of facility leaks through the use of concrete pads and berms.
  6. The IMP and other related plans would include proactive performance of in-line inspections (ILIs) prior to the start of operations in addition to inspections during operations. ILIs along the mainline pipe could be performed proactively prior to the start of operations to detect major defects in welds and the pipe wall, as well as defects caused by pipe placement in the ground. Defects detected could be repaired before the start of operations, thereby reducing the probability that a leak would occur soon after the start of operations.
    - a. The objective of this task was to quantify the effectiveness of the current design, construction, and operation practices in preventing leaks. Along the mainline pipe, leak prevention focuses on detection of defects in the pipe itself, on the longitudinal welds made during fabrication, and on the girth welds that connect the line pipe across the right-of-way. Battelle's evaluation of leak prevention considered the effectiveness of wall thickness, controls for steel and longitudinal seams, and the external coating placed on the pipe and on the girth welds, as well as on the CP system. It is recommended that ILIs be performed proactively before starting operations. These inspections are capable of detecting major defects in welds and in the pipe wall, as well as defects caused by placing the pipe in the ground. Any detected defects could be repaired before starting operations

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<sup>6</sup> The terms *incident* and *accident* can be used interchangeably or with specified definitions in various agency reports and databases. For the purposes of this report, the term *incident* has been selected for consistency.

- and thereby would reduce the probability that a leak would occur soon after the start of operations.
7. The FRP and other related plans would require response resources to comply with the 12-hour regulatory requirement under all circumstances and commit to a response time significantly less than the maximum response time required by 49 CFR 194, at all locations along the pipeline, as feasible. Keystone's Emergency Response Plan would identify the resources required and dispatch of these resources to satisfy this commitment and minimize impact to the public and sensitive ecological areas.
    - a. During the construction phase, response team and equipment needs would be identified based on the scope of transported products and their potential interaction with the ecosystems that the pipeline traverses. Keystone has recently stated concurrence with this action and has indicated that they would target response plans to the ecosystems and resources traversed and would commit to a response time significantly less than the maximum response time required by 49 CFR 194, at all locations along the pipeline, as feasible.
    - b. E<sup>x</sup>ponent recommends that the ERP consider the possibility that spilled oil may be entrained into sediments and that these types of conditions (sediment/oil mix) be anticipated as part of response and cleanup.
    - c. The ERP would also take into account the sensitive areas identified in our review (e.g., Rainwater Basin, small stream crossings associated with ecologically sensitive areas, and special downstream water bodies). For example, wildlife habitat for special status species, within close proximity of the pipeline could be designated as *special and/or unique areas* for purposes of the ERP.
  8. The IMP and other related plans would require that defect tolerance of girth welds is assessed and achieved, subject to the PHMSA process.
    - a. Regarding axially-oriented anomalies, analysis of anomaly response and trending of the incident causes as a function of the diameter clearly shows, according to the Battelle/E<sup>x</sup>ponent risk assessment, that the lineal portion of the proposed Keystone XL Project is robust from a preventive perspective. Regarding girth welds, care would be taken to ensure that similar analyses are considered, and that related defect tolerance is assessed and achieved, subject to the PHMSA process.
  9. The FRP and other related plans would consider groundwater monitoring wells inside and outside high consequence areas (HCAs). The location for the monitor wells would take into consideration distance, elevation, population, environmentally sensitive locations, and geotechnical threats, all of which would be documented.
    - a. E<sup>x</sup>ponent does not recommend monitoring non-HCA clusters of wells or installing additional monitoring wells prior to an oil release. However, E<sup>x</sup>ponent recommends that non-HCA clusters of wells be considered while evaluating response plans.
  10. The IMP and other related plans would validate safe valve closure times (e.g., 12 minutes) for the pipeline.
    - a. Valve response times for liquid lines are limited by the potential of fluid hammer and related overpressure surge. The published literature points to issues regarding times of

about 10 minutes, and much more in some cases. Therefore, concern exists regarding the closure interval, noted currently at 12 minutes. If this process transitions to the PHMSA, care would be taken to validate the underlying dynamic analysis and related plans.

11. The IMP and other related plans would consider more frequent scheduled maintenance for valves and other equipment, pre-service offsite leak checks, and equipment testing when inspection and maintenance data indicate an increased service need.
  - a. Since pipeline areas where seals and seats are present have a higher potential for spills (e.g., on equipment and pumps), Keystone would be diligent about material selection for seals and seats, from both the design and maintenance perspectives, over the lifecycle of the equipment. They would also consider more frequent scheduled maintenance for valves and other equipment, at least initially, and use pre-service offsite leak checks and equipment testing where plausible.
12. The risk assessment required by PHMSA in 49 CFR 195.452 would include the reasoning as to why other threats, which are included in American Society of Mechanical Engineers (ASME) B31.8S, are excluded. Keystone has used the threat categories in the guidance available in ASME B31.8S, which are similar, but not the same as those categories listed in ASME B31.8S. *Other threats* include those other than the following nine categories: external corrosion, internal corrosion, stress corrosion cracking, materials related, construction related, equipment, excavation, hydraulic events, and natural hazards.
  - a. A rationale would be provided for the exclusion of other threats included in ASME B31.8S.
13. The risk assessment required by PHMSA in 49 CFR 195.452 would include the use of a typical spill volume of 33 barrels, as calculated by Battelle for the system's mainline pipe section based on the geometric mean for reported incidents between January 2002 and December 2012.<sup>7</sup>
  - a. The PHMSA Liquid Hydrocarbon Incident Database should continue to be used, but the analysis should be limited to crude oil spills and should consider the very different spill performance data for major systems (i.e., mainline pipe). The results should be presented without the use of engineering adjustment factors. A conservative performance range could be presented if an updated spill frequency estimate is needed for the entire pipeline. Appendix K, Historical Pipeline Incident Analysis, of the Final Supplemental Environmental Impact Statement (EIS) should be used as the starting point for such an updated analysis. Until that re-evaluation is performed, it is recommended that, for planning purposes, a medium spill volume of 100 barrels be used. A larger volume may have to be used in locations where the terrain produces a hydraulic gradient.
  - b. The Final EIS (FEIS)<sup>8</sup> discusses the typical spill volume to be expected should a release occur from the Keystone XL pipeline. In the FEIS, TransCanada recommended 3 barrels; in the Independent Engineering Assessment, Battelle suggested 100 barrels as a typical spill volume. The TransCanada value was based on the median and the Battelle value was

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<sup>7</sup> This RFI (request for information) was generated based on a recommendation in Battelle's DRAFT October 16, 2013 letter, which supersedes the earlier recommendation in Battelle's June 2013 Independent Engineering Report to use a typical spill volume of 100 barrels.

<sup>8</sup> Published August 26, 2011.

based on the arithmetic mean. Battelle has indicated the spill distribution to be lognormal, and the value for the typical spill should be the geometric mean. The geometric mean value for all spills that occurred between January 2002 and December 2012 is 33 barrels for the mainline pipe section of the system. The discussions on pages ES-3 and ES-4 and in Section 3.3 of the Engineering Assessment should now be based on the geometric mean value.

14. The risk assessment required by PHMSA in 49 CFR 195.452 would include a threat-based sensitivity analysis including scope and results. Battelle suggests that such a sensitivity analysis could help identify localized threats, but sensitivity analysis apparently was not used to understand underlying drivers for incidents when estimating spill frequencies.
  - a. Sensitivity analysis apparently was not used to understand underlying drivers for incidents by Keystone when estimating spill frequencies. Such analysis could help identify localized threats. Further, although Keystone might have relied on subject matter experts (SMEs) to help quantify infrequent events like flash floods, general flooding, landslides, etc., the scope and results of such activity are not clearly evident.
15. The risk assessment required by PHMSA in 49 CFR 195.452 would include incident likelihood related to applying alternative preventive, protective, and mitigative features along the pipeline, considering the importance of potentially large localized spill events and/or smaller periodic spill events.
  - a. Regarding expressions of average risk, care should be taken when stating a U.S. threat rate or a state-level incident rate because this downplays the absolute importance of potentially large localized and/or periodic events. This practice does not help focus preventive, protective, or mitigative actions at specific locations along the pipeline, so an alternative risk assessment approach should be adopted if the PHMSA approves construction. At that time, Keystone should assess incident likelihood considering the benefits of alternative, preventive, protective, and mitigative features in place.
16. The risk assessment required by PHMSA in 49 CFR 195.452 would include additional quantitative analyses of transport and fate processes similar to the modeling and analysis presented in E<sup>x</sup>ponent's report, as well as assessing overland flow (spreading) and transport along the new route, particularly for specific pipeline sections that intersect identified sensitive habitats.
  - a. Consideration should be given to additional quantitative analyses of transport and fate processes similar to the modeling and analysis presented in E<sup>x</sup>ponent's report. Proactive measures could help limit the likelihood of a spill to sensitive areas, as well as leak detection systems, which could limit the amount, and hence the spread, of crude oil released.
17. The risk assessment required by PHMSA in 49 CFR 195.452 would include additional modeling as part of a final design of the proposed Project to further refine appropriate downgradient distance criteria that could be used for identifying sensitive clusters of wells (i.e., domestic wells, irrigation wells, etc.).
  - a. E<sup>x</sup>ponent developed and applied criteria to identify potentially sensitive environments downstream of small stream crossings, with a number of such environments identified along the pipeline route. From an engineering perspective, concern for small streams

could and would be managed proactively during construction via micro-bore or such techniques. During construction, and continuing into the operational phase, further analysis would be done to assess overland flow (spreading) and transport for specific pipeline sections that intersect identified sensitive habitats, including the four streams identified by E<sup>x</sup>ponent. This modeling exercise could then be used to inform ERPs. Well depth and depth of release would also be assessed relative to the water table to screen/identify sensitive groundwater resources that may be more vulnerable to exposure to a hydrocarbon plume in the event of an oil spill. Finally, it is recommended that the presence of polycyclic aromatic hydrocarbons (PAHs) and naphthenic acids be better quantified for the products that are actually transported in the pipeline to better inform environmental remediation and response planning.

18. The risk assessment required by PHMSA in 49 CFR 195.452 would require a surface water spill distance of at least 10 miles downstream from the proposed pipeline centerline for identifying sensitive areas and contributory pipeline segments (CPSs) during the final design phase of the proposed Project.
  - a. Additional spreading analyses would be performed in areas where sensitive environmental receptors are found, to demonstrate that these areas are adequately protected and that additional valves would not have a net benefit. These calculations would be most useful early in the process, before the formal validation of valve placement, demonstrating that the placement does minimize spill volumes.
19. The risk assessment required by PHMSA in 49 CFR 195.452 would factor into its quantitative risk analysis the cause and effect of *other*, *other outside force damage*, and *equipment* cause categories and nulls in the PHMSA incident/accident dataset, to the extent that valid data exists to perform this work.
  - a. The Keystone analysis does not describe how the causes under the *other*, *other outside force damage*, and *equipment* cause categories were factored into the analysis and threat identification process. When the likelihood analysis more broadly expands to consider such incidents, as well as those at facilities, the nulls would be addressed. This would be considered in any update of the pipeline risk assessment if PHMSA gives approval for construction. Finally, the recommendations noted in the qualitative threats review done from a pipeline perspective are supported quantitatively.
  - b. A quantitative rationale would be presented for causes that have not been recognized as threats. Keystone would detail their data screening process and the method(s) to deal with nulls, so that a simple query could replicate the baseline frequencies on a threat-specific basis. Keystone employed a query process using the CAUSE and GEN\_CAUSE fields to obtain their cause/threat results. Further, it appears that their outcomes exclude the facilities that are an essential element of any pipeline system. Therefore, Battelle suggests that the risk assessment could be recast in a more generic setting. While currently restricted to use by government agencies and selectively by operators, a better approach would capitalize on the PHMSA National Pipeline Mapping System website to geo-locate the historic spill records as the means to better quantify localized threats.
  - c. The PHMSA list of general cause codes is longer than the list of cause codes TransCanada developed using ASME B31.8S and American Petroleum Institute (API) 1160. ASME B31.8S and API 1160 list more sub-elements under fewer cause codes. For

the EIS assessments, the damage codes used in the PHMSA database would be used. Over time, the damage codes from the standards would supplement these damage codes, but because they are more focused, they would not be used for EIS assessments.

20. Given the dominance of risks associated with the mainline pipe and other system components (i.e., those components other than mainline valves or tanks), the risk assessment required by PHMSA in 49 CFR 195.452 would consider a risk management program that addresses these two categories of system components to effectively reduce risk. In comparing the average risks associated with the four system components analyzed (mainline pipe, mainline valves, tanks, and other system components), 97 percent of the risk was related to the mainline pipe and other system component risks. These two risk components represent the risks associated with the mainline pipe and fixed facilities such as pumping stations. The risk assessment would assess the individual components and threats to the pipeline system separately when evaluating risk, conducting incident frequency calculations, and evaluating trends.
  - a. In comparing the average risks associated with the four system components analyzed (mainline pipe, mainline valves, tanks, and other system components) 97 percent of the risk was in the mainline pipe and other system component risks with the risk almost evenly split. These two risk components represent the risks associated with the mainline pipe and fixed facilities such as pumping stations. Given the dominance of these two system components, a risk management program that addresses these system components would be most effective in reducing risk.
  - b. As a result of an internal review of the Risk Assessment Report, Battelle performed a statistical analysis of both the onshore crude oil spill volumes and total damage costs reported to PHMSA. The statistical analyses revealed that both the spill volumes and total damage cost estimates were found to be lognormally distributed. As a result of this finding, it was shown that there is a statistically significant difference, at the 95 percent confidence level, between the spill volumes and total damage costs for the four system components used in the Risk Assessment and in Appendix K, Historical Pipeline Incident Analysis, of the Final Supplemental EIS.
21. Spill prevention as covered in the ERP, IMP, and related plans would consider a spill's effect on wetlands and streams used by federally protected species and candidate species throughout the lifespan of the proposed Project and Keystone would work with the USFWS as appropriate.
  - a. E<sup>x</sup>ponent does not recommend designating the entire whooping crane migration corridor as an HCA. Rather, E<sup>x</sup>ponent has recommended mitigation measures at the stream crossings and associated wetlands in the proposed Project area that bisect the whooping crane migration corridor as shown on the maps provided in E<sup>x</sup>ponent's Third-Party Consultant Review of the TransCanada Keystone XL Pipeline Risk Assessment.
  - b. As with whooping cranes, E<sup>x</sup>ponent does not recommend designating the entire migration corridors as HCAs for other migratory special status species. Rather, E<sup>x</sup>ponent has recommended mitigation measures at the stream crossings and associated wetlands used by migratory special status species.
  - c. Critical habitat would be protected and it qualifies as an HCA. Data from the USFWS regarding critical habitat that could be affected by a spill would be included in the more

- detailed analysis required by PHMSA. E<sup>x</sup>ponent recommends that the stream crossings and attendant wetlands it has identified would also be mitigated as part of the ERP.
- d. Fifty-nine small stream crossings within the Rainwater Basin Wildlife Management District (RBWMD) have special status wetlands at the stream crossings that could potentially be used by whooping cranes and other wetland-dependent special status species. For this reason, E<sup>x</sup>ponent recommends that these stream crossings would be considered for additional mitigation measures to protect the whooping crane habitat of the RBWMD because of its importance as a stopover area for whooping crane feeding and resting.
  - e. While most whooping cranes stay within their migration corridor, they are seen outside the corridor on a regular basis and may have even begun prospecting new areas. Related to this point, many other special status species are capable of using new areas on a yearly basis. A further complication is that, according to the United States Geologic Survey (USGS), many water bird habitats within the RBWMD may be in a state of deterioration, and may already be compelling whooping cranes to use unprotected wetlands within the proposed Project. Therefore, E<sup>x</sup>ponent suggests that Keystone would conduct a bi-annual consultation with U.S. Fish and Wildlife Service (USFWS) to identify areas of high potential for use by special status species and to update the proposed Project ERPs as appropriate.
  - f. Given the 50-year projected lifespan of the proposed Project and the possibility that one or more special status species may move into the Project vicinity during that timeframe, E<sup>x</sup>ponent concludes that the monitoring outlined in 49 CFR 195 may be insufficient to protect special status species over the lifespan of the Project. Specifically, E<sup>x</sup>ponent recommends that, in addition to monitoring physical factors that might impact pipeline integrity, Keystone develop a biological monitoring plan for these special and unique special status habitats to periodically determine whether threatened and endangered (T&E) and other special status species are using these habitats within the Project area and whether they are afforded sufficient protection under the ERP.
22. Evaluation of the pipeline throughout the lifespan of the proposed Project would consider federally protected species and candidate species to assure that the provisions of the USFWS' Keystone XL Pipeline Biological Opinion under Section 7 of the Endangered Species Act (ESA) are met.
- a. E<sup>x</sup>ponent does not recommend designating the entire whooping crane migration corridor as an HCA. Rather, E<sup>x</sup>ponent has recommended mitigation measures at the stream crossings and associated wetlands in the proposed Project area that bisect the whooping crane migration corridor as shown on the maps provided in E<sup>x</sup>ponent's Third-Party Consultant Review of the TransCanada Keystone XL Pipeline Risk Assessment.
  - b. As with whooping cranes, E<sup>x</sup>ponent does not recommend designating the entire migration corridors as HCAs for other migratory special status species. Rather, E<sup>x</sup>ponent has recommended mitigation measures at the stream crossings and associated wetlands used by migratory special status species.
  - c. Critical habitat would be protected and it qualifies as an HCA. Data from the USFWS regarding critical habitat that could be affected by a spill would be included in the more

- detailed analysis required by PHMSA. E<sup>x</sup>ponent recommends that the stream crossings and attendant wetlands it has identified would also be mitigated as part of the ERP.
- d. Fifty-nine small stream crossings within the RBWMD have special status wetlands at the stream crossings that could potentially be used by whooping cranes and other wetland-dependent special status species. For this reason, E<sup>x</sup>ponent recommends that these stream crossings would be considered for additional mitigation measures to protect the whooping crane habitat of the RBWMD because of its importance as a stopover area for whooping crane feeding and resting.
  - e. While most whooping cranes stay within their migration corridor, they are seen outside the corridor on a regular basis and may have even begun prospecting new areas. Related to this point, many other special status species are capable of using new areas on a yearly basis. A further complication is that, according to the USGS, many water bird habitats within the RBWMD may be in a state of deterioration, and may already be compelling whooping cranes to use unprotected wetlands within the proposed Project. Therefore, E<sup>x</sup>ponent suggests that Keystone would conduct a bi-annual consultation with USFWS to identify areas of high potential for use by special status species and to update the proposed Project ERPs as appropriate.
  - f. Given the 50-year projected lifespan of the proposed Project and the possibility that one or more special status species may move into the Project vicinity during that timeframe, E<sup>x</sup>ponent concludes that the monitoring outlined in 49 CFR 195 may be insufficient to protect special status species over the lifespan of the Project. Specifically, E<sup>x</sup>ponent recommends that, in addition to monitoring physical factors that might impact pipeline integrity, Keystone develop a biological monitoring plan for these special and unique special status habitats to periodically determine whether T&E and other special status species are using these habitats within the Project area and whether they are afforded sufficient protection under the ERP.
23. Knowledge on the chemistry of dilbit continues to increase, and that new information should be incorporated into planning and operations as appropriate (e.g., to improve spill response planning).
24. Based on location-specific analyses of fate and effects of spills that Keystone would undertake prior to construction, Keystone should consider the use of additional valves and/or noninvasive boring technologies at the small stream crossings that E<sup>x</sup>ponent identified as associated with additional potentially sensitive ecological areas, and where Keystone's release analysis shows the potential exists for medium to very large spills.
25. Keystone should rely upon stream-specific scour analyses for small stream crossings to identify where the pipeline should be buried deeper than 5 feet or where horizontal directional drilling may be warranted. The particular small stream crossings identified by E<sup>x</sup>ponent should be given attention in this regard.
26. Both the likelihood (incident frequency) and the consequences were found to vary significantly between the discrete elements (e.g., stations, tanks, etc.) and lineal elements (e.g., pipeline, mainline valves, etc.) with large differences also evident between the system components and the facilities that comprise the discrete elements. Such results cast uncertainty on the use of aggregated metrics for risk, and equally cast uncertainty on the use

of aggregated “professional engineering judgment,” because the aggregation tends to mask potentially opposed trends. Accordingly, Keystone should assess risk at the level of these three elements, and use a rate other than a per-mile-year-average rate for the discrete elements.

27. Keystone should uncouple the currently coupled threats involving internal corrosion and external corrosion, and those involving material versus construction threats, unless statistically valid reasons are established to pool these data.
28. The model and the process that were used by Keystone in its previous risk analysis to ensure that valves are placed to minimize the total outflow from a breach appear to be correct and should continue to be used. Keystone will redo portions of the outflow analysis that reflect the proposed Project route.
29. Adopting the All Spills outcomes relative to those for other choices based on the General Cause categories in the PHMSA database could significantly underestimate the median spill volume relative to the environmental exposure along the pipeline right-of-way (ROW). Trending the cumulative distributions of spill volumes shows that the Keystone benchmark under-predicts the likelihood of larger spills except at the higher percentiles, where all trends converge. The results indicate that parsing on the Incorrect Operations, Natural Forces, Third-Party Damage (TPD), and Pipeline/Mainline Valve (MLV) General Cause categories lead to larger values for the median spill and at the 90<sup>th</sup> percentile. Accordingly, there is the potential for much larger spills than has been considered relative to the All Spills benchmark case. Because such trends represent a system-level analysis of historic incidents that typically involve much smaller diameter line pipe as compared to the proposed Project, there is the potential for still larger spills where unique site-specific threats exist along the ROW. Keystone’s Risk Assessment should give consideration to a broader assessment of the environmental consequences relative to the probability of occurrence and spill volume, including the potential implications of pipe diameter. Spill analysis should focus on the threats associated with the major General Cause categories such as facilities, the pipeline, and its system components, which should present a clearer picture of the spill potential for the proposed Project. In turn, this should facilitate focusing the spill prevention, protection, and mitigation where it is most relevant.
30. To the extent practicable, future risk assessments should divide the pipeline system into component parts, assess the risk for each component, and then calculate the system risk from its components. The Battelle risk analysis shows that the subsystems that generate most of the risk are the mainline pipe and the fixed facilities such as the pumping stations. Thus, when developing preventive, protective, and mitigative programs, equal focus should be on the mainline pipe and the fixed facilities.
31. Naphthenic acids are a class of compounds found in crude oils (including Canadian oil sands) that can potentially result in aquatic toxicity if released into the environment; they have been the subject of significant research. Given the perceived link between tar sands processing and aquatic toxicity due to naphthenic acids, to the extent available, Keystone would obtain additional information on the naphthenic acid content of the oils to be transported.
32. Although PAH concentrations in petroleum are low compared to some environmental sources, this class of compounds can be a long-term driver for remediation and risk management following an oil spill. To the extent available, Keystone would obtain additional

information on the chemistry of the oils as this information will be needed for developing cleanup and remediation plans. An understanding of the PAH profiles of pipeline oils would allow for differentiation between baseline and spill impacts.

33. Keystone, as part of the final Project design, should further evaluate overland flow (spreading analysis) of spilled oil, and further evaluate the transport of spilled oil in small streams (e.g., the downstream distance crude oil could travel from the proposed pipeline centerline) for purposes of the ERP. These analyses should take into account potential density and viscosity increases associated with the loss of volatiles from heavy crudes and diluted bitumen.
34. Keystone should use the screening criteria (e.g., well depth, depth of release compared to water table, lithology between pipeline and aquifer) suggested in [E<sup>x</sup>ponent] report for identifying vulnerable/sensitive groundwater resources adjacent to the pipeline that do not classify as HCAs, but that may be more vulnerable to exposure to a benzene plume in the event of an oil spill. For example, these could be defined as clusters of both domestic and irrigation wells within 1,000 feet of a pipeline segment where an oil spill could occur in or within a few feet of the water table. E<sup>x</sup>ponent recommends that additional modeling be performed as part of the final Project design to further refine the appropriate downgradient distance criteria to be used for identifying sensitive clusters of wells. E<sup>x</sup>ponent recommends that these non-HCA groundwater resources be afforded a degree of protection from the occurrence of an oil spill and from the consequences of a spill similar to what is currently afforded to groundwater resources that are defined HCAs.
35. It is recommended that Keystone use a distance of at least 10 miles downstream from the proposed pipeline centerline to identify sensitive areas and to identify contributory pipeline segments (CPSs) during the final Project design phase.<sup>9</sup>

Keystone has committed to a number of measures beyond the spill cleanup measures described above, including specifically addressing several issues in its Emergency Response Plan and Oil Spill Response Plan (and the detailed risk analysis used in developing those plans). These measures include:

1. Develop a plan for long term sampling/monitoring in the event of an oil discharge to assess and monitor these impacts as part of the spill response plan.
2. Include spill contingency plans in the Emergency Response Plan to address submerged oil, floating oil, and cold-weather responses.
3. Consider in detail locations to pre-position response assets, including equipment to address submerged oil, and actual pre-positioning of those assets.
4. Specify in the ERP that spill drills and exercises include strategies and equipment deployment to address floating and submerged oil.
5. Consult and communicate with the Local Emergency Response Planning Committees and other emergency service agencies during ERP development to ensure ERPs are aligned.

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<sup>9</sup> Keystone has indicated that it uses a distance of 24 miles downstream per analysis provided by PHMSA Special Condition 14.

6. In the event that a spill affects a paleontological resource, prepare a paleontological mitigation plan to protect significant fossil resources.
7. In the event that a spill contaminates potable water supplies, be responsible for cleanup and restoration. Keystone would be responsible for providing an appropriate alternative potable water supply of comparable volume and quality to those impacted or provide compensation, if this option is agreed upon by the affected parties and Keystone. For groundwater used for industrial or irrigation purposes, Keystone may provide either an alternate supply of water or appropriate compensation for those facilities impacted, as may be agreed upon among the affected parties and Keystone. If the permit were approved, Keystone would memorialize that agreement through an appropriate written agreement with the Environmental Protection Agency.
8. File the following documents with Nebraska Department of Environmental Quality (NDEQ) by May 1 of each year:
  - a. Certificate of insurance as evidence that it is carrying a minimum of \$200 million in third-party liability insurance, with the NDEQ, as specified in the NDEQ's December 2012 Final Evaluation Report, and with the Montana Department of Environmental Quality (MDEQ), as required by Keystone's Certificate issued by MDEQ under the Montana Major Facility Siting Act (MFSA).
  - b. Copy of Keystone's Securities and Exchange Commission (SEC) Form 10-K and Annual Report. (Keystone's MFSA Certificate contains a similar requirement.)
9. On request, file the documents listed in item 8 above with other appropriate state agencies.
10. Continue to assess the efficacy of implementing groundwater monitoring wells based on results of its risk assessments accounting for significant threats and in situ conditions. In-line leak inspection using Smart Ball, MFL, and UT would remain the primary focus of leak detection and integrity management. In the event of a release either inside or outside of an HCA, Keystone would consider the installation of groundwater monitoring wells to delineate the release extent and the threat to groundwater resources.
11. In the event of a release, provide the specific Material Safety Data Sheets (MSDSs) of the product(s) shipped (and released) to emergency responders (including any state, local, or federal agencies involved in spill response actions) within 1 hour of the release. Keystone would maintain a point of contact who would be authorized to release the MSDS and chemical composition information to first responders. The point of contact would be available (when a release occurs) for requests for MSDSs and to identify the composition of the product (both crude and diluents) shipped in the pipeline. Keystone would establish a procedure for first responders to contact the point of contact with this hour timeframe.