Summary of April 2010 Aerial Searches for Greater Sage-grouse Leks, Keystone XL Pipeline Project Steele City Segment (Montana and South Dakota)

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INTRODUCTION

TransCanada Keystone Pipeline LP (Keystone) is currently in the regulatory permitting process for the proposed Keystone XL Pipeline Project (Project). The Steele City Segment of the Project encompasses the proposed pipeline and related facilities such as pump stations, transmission lines, pipe yards and contractor yards in Montana, South Dakota and Nebraska.

A potential regulatory issue that could affect the permitting process is the occurrence of greater sage-grouse (*Centrocercus urophasianus*) in the vicinity of the Project in Montana and northwest South Dakota (Harding County). Due to declines in numbers and distribution throughout much of its historical range, the greater sage-grouse is a Bureau of Land Management (BLM) "sensitive species," a Montana "species of concern," a South Dakota "species of greatest conservation need" and in early 2010 the U.S. Fish and Wildlife Service (USFWS) identified the sage-grouse as a "candidate" species under the Endangered Species Act of 1973, as amended (ESA).

Sage-grouse are considered to be a sagebrush obligate but may use other habitats seasonally. Sage-grouse display/breeding sites, called leks, are usually located in or near sagebrush habitat. Numbers of leks, and counts of male sage-grouse attending leks, are used to monitor the spring breeding population.

For its original 2008 federal and state permit applications, Keystone obtained known locations of sage-grouse leks in the vicinity of its proposed pipeline route and alternatives from the BLM, Montana Department of Fish, Wildlife and Parks (MT FWP), Montana Natural Heritage Program (MTNHP) and South Dakota Department of Game, Fish and Parks (SD GFP). This information was updated as the pipeline route and various alternatives, as well as other Project-related activities, were revised. In April 2009 Keystone sponsored aerial searches of its proposed (as of February 2009) pipeline right-of-way (ROW) and certain project-related facilities for active sage-grouse leks (AECOM 2009). These searches examined the area within 0.6 mile of the Project centerline and a 2-mile buffer around proposed pump stations. Only one active sage-grouse lek was found in this comparatively narrow search corridor, near milepost (MP) 334 in Harding County, South Dakota.

Keystone repeated its aerial searches for leks in April 2010, based on the Project's March 2010 centerline. The search corridor was enlarged, and the searches were expanded to include 19 alternative centerline routes proposed by the Montana Department of Environmental Quality (MT DEQ) as well as transmission lines to proposed pump stations, pipe yards, contractor yards and other Project-related activities.

METHODS

In February 2010 Keystone developed sage-grouse lek aerial search protocols which were derived from various literature sources and guidance documents, as well as discussions with sage-grouse biologists, and included:

1. Depending on weather, fly surveys between April 5 and April 30;

2. Fly surveys from no earlier than 0.5 hour before sunrise to no later than 2 hours after sunrise. To the extent practicable, fly on clear, calm days with unrestricted visibility;

3. Fly surveys in a helicopter. Altitude will vary from <100 to >500 feet above the ground, depending on terrain or other safety concerns, presence of livestock or occupied buildings, etc., but will average about 300 feet above the ground. Where appropriate, flight lines will parallel the pipeline route and be placed 0.25 to 0.50 mile apart, depending on observability. There will be two observers in addition to the pilot;

4. A survey corridor 8 miles wide (4 miles on either side of the proposed and alternative Project centerlines, and proposed transmission lines to pump stations) will be flown in areas where: a) known active or inactive leks are located within 4 miles of the route; and/or b) suitable sagebrush habitat (defined using existing map layers, sage-grouse seasonal habitat definitions, or observations of habitat made during the flights) is dissected by the route or is adjacent to the centerline;

5. A 4-mile radius will be flown around specific project-related activities such as pipe yards if such site are not encompassed within the ROW 8-mile corridor;

6. All sage-grouse sightings will be located and mapped using GPS. Date, activity, number of birds and habitat will be recorded on field notes; and

7. Some sightings may be visited on the ground after the aerial surveys, depending on conditions (access permission, ground conditions, etc.).

These protocols were distributed and/or discussed with appropriate US FWS, BLM, MT FWP and SD GFP personnel in March 2010. As a result, the duration of the daily search period (Protocol 2) was shortened from no earlier than 0.5 hour before sunrise to no later than 1 hour after sunrise, because several reviewers stated that sage-grouse displays declined dramatically, and that some male sage-grouse might even leave the lek beginning about one hour after sunrise. In addition, the habitat definition (Protocol 4) was expanded to include the entire search corridor regardless of habitat north of the Missouri River (i.e., Phillips and Valley Counties, Montana) because two reviewers indicated that sage-grouse in this area might use habitats with lower sagebrush height and canopy cover than the "typical" scenario reported in the literature.

Aerial searches were flown from April 8 through April 12, 2010 in a Bell Jet Ranger III helicopter, with two observers in addition to the pilot. Prior to the flights, the helicopter pilot and one observer entered the search corridors into separate GPS units (one unit for back-up) for navigation purposes. MT FWP, BLM and SD GFP provided shape files with their most recent sage-grouse lek information (2009 in Montana, "recent" in South Dakota) from the search corridors in February and March 2010. These locations were transferred to aerial photo base maps of the search corridors, and were also entered into the GPS instruments. In addition, sagebrush land cover mapping from MTNHP (2009) for Montana and Wright and Wegner (2007) for South Dakota was overlain on the search corridor maps, and helped focus the search efforts. During the flights one observer took GPS waypoints and photographs of leks or habitat features, while the other recorded data separately.

Due to inclement weather and lack of landowner access outside the filed route, no ground checks could be completed within the April 30 time frame (Protocol 1).

RESULTS

Montana

Lek Activity

The results of Keystone's April 2010 aerial searches for greater sage-grouse leks within four miles of Project-related activities in Montana are summarized in Table 1. Montana lek locations with 4-mile radius, lek identification (ID) numbers (keyed to Table 1) and lek activity are also depicted at 1:100,000 on Map Sheets 1-7.

Prior to the survey, MT FWP provided the locations and survey histories of 43 leks within the 4-mile search corridor. Of these 43 leks, MT FWP considered 26 to be "Confirmed Active" (definitions are given in the footnotes to Table 1) in 2009; 22 of these leks were active in 2009 and data were not recorded and/or no males were observed on the remaining four leks. Sage-grouse were observed on only nine "Confirmed Active" leks during the April 2010 aerial searches. When sage-grouse were not seen at a particular site, an area within a 2-mile radius around the lek was thoroughly searched by flying the helicopter back and forth. In most instances, however, no sage-grouse were found.

MT FWP considered 17 of the 43 leks to be "Unconfirmed," either because these leks had not been surveyed in recent years (11 sites) or because males were observed in 2009 but there was insufficient information to confirm the leks' activity (six sites). Of these 17 leks, male sage-grouse were seen at three that had not been surveyed by MT FWP in recent years (Table 1). As with "Confirmed Active" leks, when sage-grouse were not observed at a particular site, an area within a 2-mile radius around the lek was searched by flying the helicopter back and forth.

Prior to the survey, BLM provided the location of a lek (henceforth referred to as the "BLM lek") that had been discovered in 2005 and has been active with a maximum of about eight males in recent years (Table 1). This lek location was visited in the 2010 aerial search but no birds were seen. Again, an area within a 2-mile radius around the lek was thoroughly searched by flying the helicopter back and forth.

These results do <u>not</u> mean that all leks where sage-grouse were not observed during the 2010 aerial searches had become inactive since 2009. While it is possible that leks with very low numbers of birds (1-3) in 2009 were not active in 2010, sage-grouse are comparatively long-lived birds that usually exhibit seasonal fidelity to the lek vicinity. Given MT FWP's definitions of "Confirmed Active" and "Unconfirmed," it seems likely that birds were present at or near some or all Montana leks but were simply not seen by the aerial observers. Although aerial surveys are a comparatively efficient method to search for sage-grouse leks over large areas in a short time, they are not infallible; it is possible that grouse were present in the vicinity but were overlooked. In some instances, sage-grouse may cease displays, hide or flee before they are seen from the aircraft. In others, sage-grouse may have been chased from the lek by a predator before the aircraft arrived. It is also possible, although unlikely, that sage-grouse simply did not attend the lek on the day of the visit.

Table 1. Summary of greater sage-grouse lek activity within 4.0 miles of Keystone XL Pipeline Project facilities or alternatives in Montana observed during aerial searches, April 2010.

Lek ID[a]	2010 Waypoint No.[b]	Within 4.0 Mile Of:[c]	Previous Activity[d]	No. Males Observed/Yr.[e]	Birds Expected in 2010[f]	2010 Activity[g]	No. Males Observed in 2010
BLM lek	-	CL, MTV-1	CA/2009	8/2009?	Y	No birds observed	
619	-	CL, TL(PS-11)	UC/1996	?/1996	?	No birds observed	
623	-	CL, F(PY-04)	CA/2009	16/2009	Y	No birds observed	
656/666	-	CL, F(PY-04)	CA/2009	37/2009	Y	No birds observed	
658	059	CL	CA/2009	1/2009	Y	Birds present	5
662	-	CL	UC/2009	3/2009	N?	No birds observed	
744	-	CL, MTV-3, TL(PS-10), F(PY-02)	CA/2009	2/2009	Y	No birds observed	
746	-	CL, MTV-3	CA/2009	13/2009	Y	No birds observed	
753	-	CL, MTV-3, TL(PS-10)	UC/2005	?/2005	?	No birds observed	
795	-	CL	CA/2009	?/2009	Y	No birds observed	
570	-	TL(PS-09)	CA/2009	20/2009	Y	No birds observed	
588	056	TL(PS-09)	CA/2009	30/2009	Y	Birds present	13-14 unident.
593	008	TL(PS-09)	CA/2009	19/2009	Y	Birds present	12
594	057	TL(PS-09)	CA/2009	27/2009	Y	Birds present	48
595	-	TL(PS-09)	CA/2009	?/2009	Y?	No birds observed	
799	-	CL	CA/2009	?/2009	Y?	No birds observed	
899	-	CL	UC/2009	?/2009	N?	No birds observed	
973	-	CL, MTV-16, F(PY-09)	CA/2009	8?2009	Y	No birds observed	
1114	-	TL(PS-14)	UC/2001	1/2001	?	No birds observed	
1292	-	CL, MTV-16, MTV-17, F(PY-09)	CA/2009	?/2009	Y?	No birds observed	
1298	-	CL, F(PY-04)	CA/2003	4/2003	Y	No birds observed	
1419/1420	-	CL, MTV-14, MTV-15	UC/2008/2004	?/2008	?	No birds observed	
1427	117	CL	UC/2008	?/2008	?	Birds present	6
1428	-	CL, MTV-13, TL(PS-14)	CA/2009	8?2009	Y	No birds observed	
1430	-	CL, MTV-13, TL(PS-14)	CA/2009	12/2009	Y	No birds observed	
1437	187	CL, MTV-18, PS-15, (PS-15)	UC/2004	11/2009	?	Birds present	12 + 7 unident.
1725	-	CL, MTV-13, TL(PS-14)	UC/2009	?/2009	N?	No birds observed	
1726	123	CL, MTV-17	CA/2009	24/2009	Y	Birds present	2
1734	-	CL, TL(PS-10)	UC/2007	12/2007	?	No birds observed	
1738	-	CL, TL(PS-11)	UC/2008	?/2008	?	No birds observed	
1739	-	CL	UC/2005	1/2005	?	No birds observed	
1781	058	CL, MTV-4	CA/2009	44/2009	Y	Birds present	11

Table. 1 (continued)

Lek ID[a]	2010 Waypoint No.[b]	Within 4.0 Mile Of:[c]	Previous Activity[d]	No. Males Observed/Yr.[e]	Birds Expected in 2010[f]	2010 Activity[g]	No. Males Observed in 2010
1782	060	CL, F(PY-04)	UC/2007	4/2007	?	Birds present	14 unident.
1801	-	CL, MTV-13, TL(PS-14)	UC/2009	?/2009	N?	No birds observed	
1805	118	CL, MTV-13, TL(PS-14)	CA/2009	14/2009	Y	Birds present	11-12
1832	120	CL, MTV-16	CA/2009	6/2009	Y	Birds present	11
121*	121	CL, MTV-16	--	--	--	Birds present	1
122*	122	CL, MTV-16	--	--	--	Birds present	1
1835	119	MTV-13, TL(PS-14)	CA/2009	12/2009	Y	Birds present	6-7
1837	-	CL, MTV-14, MTV-15, MTV-16	CA/2009	6/2009	Y	No birds observed	
1838	-	MTV-16, F(PY-09)	CA/2009	6/2009	Y	No birds observed	
1840	-	CL, MTV-16, MTV-17, F(PY-09)	CA/2009	7/2009	Y	No birds observed	
1853	-	TL(PS-09)	CA/2009	14/2009	Y	No birds observed	
007*	007	TL(PS-09)	--	--	--	Birds present	4
1894/5294	-	CL, F(PY-04)	UC/2009	9/2009	N?	No birds observed	
1900	-	CL, F(PY-04)	UC/2009	?/2009	N?	No birds observed	

[a]All lek ID's and locations provided by MT FWP in spring 2010 except "BLM lek" (provided by BLM in spring 2010) and those marked with an * (observed during spring 2010 aerial search)

[b]GPS waypoint number recorded during spring 2010 aerial search

[c]Pipeline-related activity:

CL = KXL proposed pipeline centerline;
MTV = MDEQ pipeline route revision;
TL = KXL proposed transmission line route;
F = KXL proposed facility (pump station, contractor yard, pipe yard, etc.)

[d]MT FWP definitions and data:

UC = Unconfirmed "single count with no subsequent survey or a reported lek without supporting survey data." (FWP definition);
CA = Confirmed Active "data supports existence of lek. Supporting data is defined as: 1) minimum of 2 years with 2 or more males lekking on site (preferred); or b) 1 year with 2 or more males lekking on site followed with evidence of lekking (vegetation trampling, feathers and droppings) during the subsequent year" (FWP definition);
Year = year of most recent survey

[e]Number of males recorded in the most recent counting year (MT FWP data). ? = number of males uncertain, either because no birds were recorded at the lek, or because the the number of males at the lek was not recorded.

[f]Birds were expected to be present at the lek during the spring 2010 aerial search based on Previous Activity column:

Y = Yes, lek expected to be active because males were present in 2009 (1 BLM lek; 22 of 26 MT FWP Confirmed Active leks).
? = Unknown, because lek has not been surveyed in recent years (11 of 17 MT FWP Unconfirmed leks).
Y? = Yes, lek expected to be active because MT FWP considered it to be Confirmed Active. However, either 0 birds were recorded at the lek in 2009, or the number of birds at the lek was not recorded (4 of 26 MT FWP Confirmed Active leks).
N? = Uncertain, either because no birds were recorded at the lek in 2009, or because even though males may have been present, MT FWP considered the lek Unconfirmed due to insufficient information. (6 of 17 MTFWP Unconfirmed leks)
- = Lek unknown before 2010 search. Would be considered Unconfirmed under MT FWP definitions.

[g]Whether birds were observed at or near the lek site during the 2010 aerial search.

Of the 12 leks from the agencies' data base that the April 2010 aerial searches verified as active, five had more males in 2010 than in the previous count, while six had fewer and one lek (ID 1427) could not be compared because the number of males had apparently not been recorded in the previous count (Table 1). In some cases the differences were dramatic. For example, 44 males were counted at ID 1781 in 2009 but only 11 were counted by the April 2010 aerial search; in contrast, 27 males were counted at ID 594 in 2009 while 48 were counted by the 2010 aerial search. It is not known if the differences in counts from year to year represent actual changes in numbers of displaying males (i.e., population change) or are an artifact of observation error.

Displaying male sage-grouse were also observed at three locations (ID numbers 007, 121 and 122) not included in the agencies' data base (Table 1). However, only one displaying male was recorded at two sites. By MT FWP definitions (footnotes to Table 1), these two sites may not actually be leks; all three sites would be considered "Unconfirmed" until further monitoring verifies their activity.

In summary, of 44 lek locations provided by MT FWP or BLM that were within four miles of a Project-related activity, displaying male sage-grouse were recorded at 12 by the April 2010 aerial search. Displaying male sage-grouse were observed at three additional locations, although these sites should be considered "Unconfirmed" pending subsequent monitoring.

Distances of Leks from Project-related Activities

Approximate distances of the 47 greater sage-grouse leks identified for this report from various Project-related activities are given in Table 2. Distances are approximate due to: 1) the boundaries of certain Project-related activities would be expected to change as the Project develops; 2) lek locations may be somewhat fluid, moving slightly from year to year; 3) map scale; and 4) rounding error. Nevertheless, Table 2 shows that the proposed Project centerline is <1 mile from four leks, ≥1 but <2 miles from five leks, ≥2 but <3 miles from 16 leks, and ≥3 but < 4 miles from 11 leks. Further, of 23 leks that are within 4.0 miles of either the proposed centerline or a MT DEQ alternative, only four are closer to the proposed centerline while 14 are closer to a MT DEQ alternative, and five are approximately the same distance from either. No leks are within 4.0 miles of MDEQ route alternatives MTV-5 though MTV-12, and MTV-19 (Map Sheets 1-7).

Seven leks are within 4.0 miles of the transmission line to PS-09, three leks are within 4.0 miles of the transmission line to PS-10, two leks are within 4.0 miles of the transmission line to PS-11, six leks are within 4.0 miles of the transmission line to PS-14, and one lek is within 4.0 miles of each of the transmission lines to PS-13, PS-16 and PS-17. A total of 11 leks are within 4.0 miles of a pipe yard.

South Dakota

Lek Activity

SD GFP provided locations of many historical greater sage-grouse leks in Harding County (Map Sheets 7-8). Of these, 63 leks are within 4.0 miles of a Project-related activity, but many of these locations (23) are duplicates or alternate lek sites, reducing the actual number of leks

Table 2. Comparison of distances of Montana greater sage-grouse leks from Project-related activities.

Lek ID[a]	Birds Expected in 2010[b]	Birds Observed in 2010[b]	Approximate distance (mi.) from:			
			CL[c]	MTV[c]	TL[c]	F[c]
BLM lek	Y	N	1.3	3.8 (MTV-1)		
619	?	N	2.6		2.8 (PS-11)	
623	Y	N	3.2			3.9 (PY-04)
656/666	Y	N	0.5			2.8 (PY-04)
658	Y	Y	2.9			
662	N?	N	0.1			
744	Y	N	2.2	0.1 (MTV-3)	3.4 (PS-10)	3.6 (PY-02)
746	Y	N	2.9	2.4 (MTV-2)		
753	?	N	2.9	2.1 (MTV-3)	0.1 (PS-10)	
795	Y	N	2.2			
570	Y	N	--		1.0 (PS-09)	
588	Y	Y	--		3.0 (PS-09)	
593	Y	Y	--		0.1 (PS-09)	
594	Y	Y	--		1.8 (PS-09)	
595	Y?	N	--		2.8 (PS-09)	
799	Y?	N	0.5			
899	N?	N	3.8			
973	Y	N	4.1			3.5 (PY-09)
1114	?	N	--		2.2 (PS-13)	
1292	Y?	N	2.4	2.4 (MTV-16) 2.4 (MTV-17)		2.3 (PY-09)
1298	Y	N	0.9			1.4 (PY-04)
1419/1420	?	N	3.5	3.0 (MTV-14) 3.2 (MTV-15)		
1427	?	Y	3.3			
1428	Y	N	1.6	3.2 (MTV-13)	2.1 (PS-14)	
1430	Y	N	2.8	0.2 (MTV-13)	0.1 (PS-14)	
1437	?	Y	2.9	3.7 (MTV-18)		
1725	N?	N	2.0	3.5 (MTV-13)	2.4 (PS-14)	
1726	Y	Y	3.1	3.1 (MTV-17)		
1734	?	N	3.1		2.4 (PS-10)	
1738	?	N	3.5		3.8 (PS-11)	
1739	?	N	2.4			
1781	Y	Y	1.6	1.6 (MTV-4)		
1782	?	Y	3.8			3.2 (PY-04)
1801	N?	N	2.5	0.8(MTV-13)	3.6 (PS-14)	
1805	Y	Y	2.7	<0.1 (MTV-13)	0.1 (PS-14)	
1832	Y	Y	3.5	2.0 (MTV-16)		
121*	--	Y	2.4			
122*	--	Y	3.7			
1835	Y	Y	--	2.4 (MTV-13)	3.6 (PS-14)	
1837	Y	N	2.0	2.3 (MTV-14) 2.3 (MTV-15) 2.2 (MTV-16)		

Table 2 (continued).

Lek ID[a]	Birds Expected in 2010[b]	Birds Observed in 2010[b]	Approximate distance (mi.) from:			
			CL[c]	MTV[c]	TL[c]	F[c]
1838	Y	N	1.7	0.7 (MTV-16)		2.5 (PY-09)
1840	Y	N	1.1	1.1 (MTV-17)		0.9 (PY-09)
1853	Y	N	--		0.8 (PS-09)	
007*	--	Y	--		0.8 (PS-09)	
1894/5294	N?	N	2.4			2.0 (PY-04)
1900	N?	N	3.5			1.0 (PY-04)

[a]All lek ID's and locations provided by MT FWP in spring 2010 except "BLM lek" (provided by BLM in spring 2010) and those marked with an * (observed during spring 2010 aerial search)
[b]Table 1
[c]Project-related activity:
CL = KXL proposed pipeline centerline;
MTV = MDEQ pipeline route revision;
TL = KXL proposed transmission line route;
F = KXL proposed facility (pump station, contractor yard, pipe yard, etc.)

within 4.0 miles of the Project to 40. Of these 40 remaining sites, most are historical locations and/or counts that are ≥20 years old. All historical and "priority" leks within 4.0 miles of a Project-related activity were visited during the April 2010 aerial searches. It is likely that many of the historical leks are no longer active (for example, some lek locations were cultivated).

SD GFP also provided the locations of four "priority" leks within 4.0 miles of the Project which are known to be "recently" active. AECOM (2009) counted 15 displaying males at one of these sites (ID 8) in April 2009, but no sage-grouse were seen at any of these leks during the April 2010 aerial searches. Table 3 summarizes information for "priority leks" within 4.0 miles of the Project.

Distances of "Priority" Leks from Project-related Activities

Approximate distances of the 4 "priority" greater sage-grouse leks from various Project-related activities are given in Table 4. The proposed Project centerline in South Dakota is <1 mile from one lek, ≥1 but <2 miles from one lek, and ≥2 but <3 miles from two leks.

ID 8 (active in 2009) is <1 mile from a pump station (PS-16) and its associated transmission line. ID 10 is <1 mile from a pipe yard (PY-12).

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Table 3. Summary of greater sage-grouse "priority[a]" lek activity within 4.0 miles of Keystone XL Pipeline Project facilities or alternatives in south Dakota observed during aerial searches, April 2010.

Lek ID[b]	Within 4.0 Mile Of:[c]	No. Males Observed/Yr.	Birds Expected in 2010[e]	2010 Activity[f]
1	CL, PS-16, TL(PS-16)	--	?	No birds observed
7	CL	--	?	No birds observed
8	CL, PS-16, TL(PS-16)	15/2009[d]	Y	No birds observed
10	CL, PY-12	--	?	No birds observed

[a]SD GFP definitions and data:
Priority = Lek with "recent" activity
[b]All lek ID's and locations provided by SD GFP in spring 2010.
[c]Pipeline-related activity:
CL = KXL proposed pipeline centerline;
TL = KXL proposed transmission line route;
F = KXL proposed facility (pump station, contractor yard, pipe yard, etc.).
[d]AECOM (2009).
[e]Birds were expected to be present at the lek during the spring 2010 aerial search based on Previous Activity column:
Y= Yes, lek expected to be active because males were present in 2009.
?= Unknown, because leks may not have been surveyed in recent years.
[f]Whether birds were observed at or near the lek site during the 2010 aerial search.

Table 4. Comparison of distances of South Dakota greater sage-grouse leks from Project-related activities.

Lek ID[a]	Birds Expected in 2010[b]	Birds Observed in 2010[b]	Approximate distance (mi.) from:		
			CL[c]	TL[c]	F[c]
1	?	N	2.4	3.3	3.3
7	?	N	2.4		
8	Y	N	0.2	0.4	0.4
10	?	N	1.1		0.8

[a]All lek ID's and locations provided by SD GFP in spring 2010.
[b]Table 3
[c]Project-related activity:
CL = KXL proposed pipeline centerline;
TL = KXL proposed transmission line route;
F = KXL proposed facility (pump station, contractor yard, pipe yard, etc.)