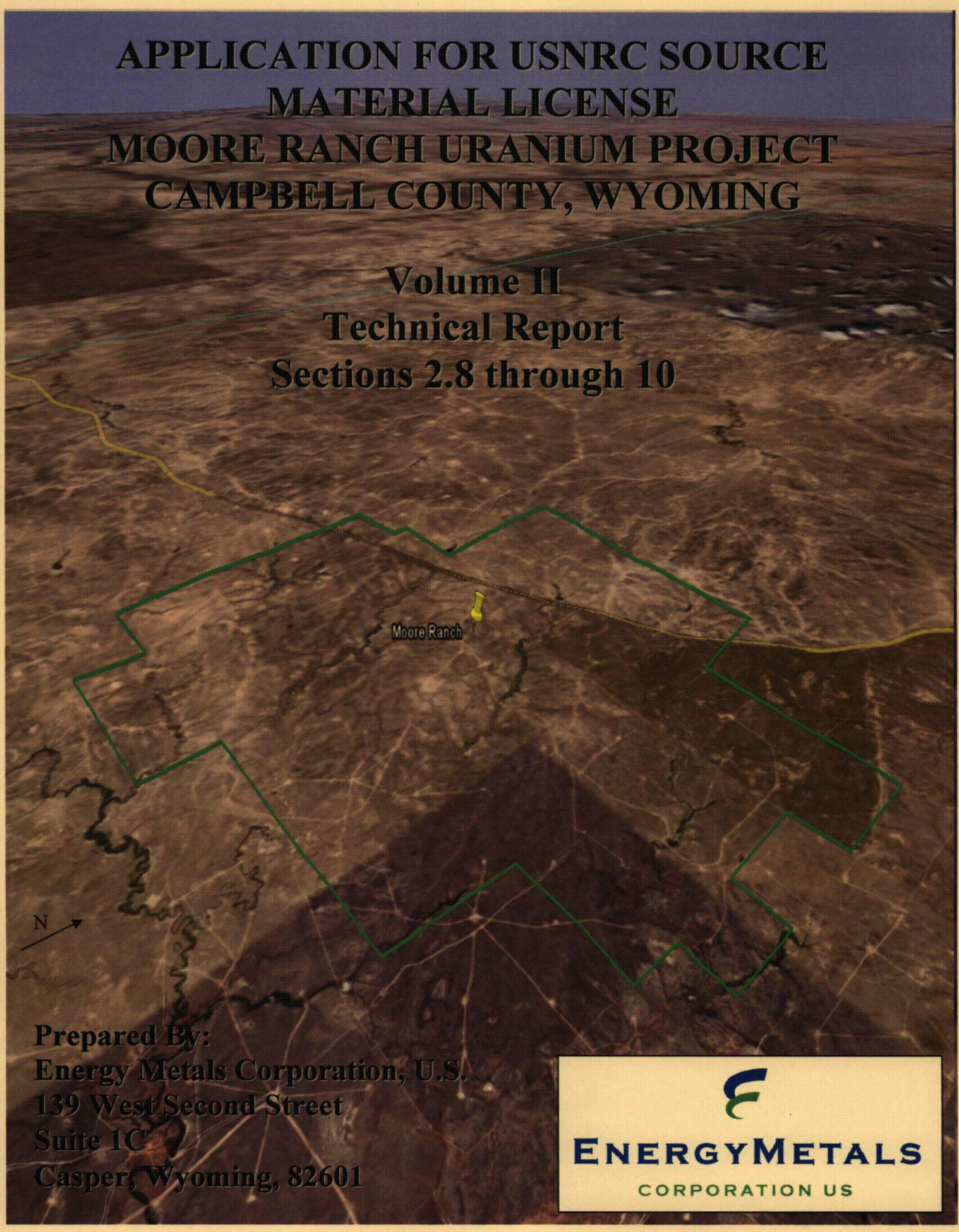
APPLICATION FOR USNRC SOURCE MATERIAL LICENSE
MOORE RANCH URANIUM PROJECT
CAMPBELL COUNTY, WYOMING

Volume II
Technical Report
Sections 2.8 through 10



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2.8 ECOLOGICAL RESOURCES

2.8.1 Introduction

This section describes the existing ecological resources within the Moore Ranch Project area. The analysis consisted of a review of documents, databases, and reports in conjunction with field surveys.

All vegetation sampling procedures were designed according to the Wyoming Department of Environmental Quality – Land Quality Division (WDEQ-LQD) Rules and Regulations for Non-Coal Permitting, Guideline 2 (November 1997), and the methodology approved by the WDEQ-LQD.

The wetland surveys were conducted in accordance with the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region. All Other Waters of the United States (OWUS) (40 CFR –Part 404) were also assessed during the surveys. The routine wetland delineation approach with onsite inspection was utilized, and the survey was conducted by pedestrian reconnaissance and color infra-red (CIR) photography. Identification of potential wetlands was based on visual assessment of vegetation and hydrology indicators, as well as intrusive soil sampling to determine the presence of wetland criteria indicators. United States Army Corps of Engineers (USACE) Data Forms-Great Plains Region (Draft), were utilized for each observation point. Hydrology and soils were evaluated whenever a plant community type met hydrophytic vegetation parameters based on the Dominance Test and Prevalence Index (as defined by the USACE Great Plains Regional Supplement), or whenever indicators suggested the potential presence of a seasonal wetland area under normal circumstances.

Background information on wildlife in the vicinity of the Moore Ranch Project was obtained from several sources, including the South Powder River Basin Coal FEIS (BLM 2003a), records from the Wyoming Game and Fish Department (WGFD), Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), and the U.S. Forest Service (USFS), and personal contact with biologists from those four agencies. Site-specific data for the Moore Ranch Project general analysis area were obtained from several sources, including WDEQ/LQD mine permit applications and annual wildlife monitoring reports for the various applicants and the neighboring Bates Creek, Cutthroat, and Rainbow CBM projects. Due to its proximity to existing mines, the proposed project area has also received extensive coverage during baseline and annual wildlife monitoring surveys for nearly 4 years. Both types of wildlife surveys encompass a large perimeter around mine permit areas. Consequently, all but the southeastern and extreme western sections have been included in multiple baseline studies and annual wildlife monitoring

efforts associated with the Bates Creek, Cutthroat, and Rainbow coal bed methane (CBM) activities.

2.8.2 Regional Setting

The Moore Ranch Project is within the mixed grass eco-region of the Northern Great Plains (EPA 1993). The elevation within the proposed Moore Ranch License Area (License area) ranges from approximately 5,220 to 5,391 feet above mean sea level (AMSL). Topography in that area is primarily level to gently rolling, though numerous prominent ephemeral drainages dissect the site. Similar terrain characterizes un-mined lands surrounding the License area.

The License area is comprised primarily of grassland with areas of sage in the southwest corner. Interspersed among those major communities are less abundant habitat types of seeded grasslands (improved pastures) and ephemeral draws.

No perennial streams or other permanent water bodies exist within the proposed License area. The majority of the area is drained to the south by Pine Tree Draw and Simons Draw tributaries of Ninemile Creek, which is a tributary of the perennial Antelope Creek. All natural flow in the region is categorized as intermittent or ephemeral. A few stock tanks and reservoirs were scattered throughout the area, though the reservoirs rarely contained water.

Trees were quite limited on the License area and consisted primarily of the plains cottonwood (*Populus deltoides*), peachleaf willow (*Salix amygdaloides*), and Russian-olive (*Elaeagnus angustifolia*). Most occurred alone or in small stands of fewer than five trees beside reservoirs or in drainage bottoms.

The License area is all private lands used for sheep grazing as the principal land use in the region for many years, although conventional oil and gas production has also had a long-term presence in the area. More recently, CBM activities, and their associated infrastructure, have become prominent across the landscape both within and surrounding the proposed License area.

2.8.3 Climate

The proposed Moore Ranch Project is located in a semi-arid or steppe climate. The region is characterized seasonally by cold harsh winters, hot dry summers, relatively warm moist springs and cool autumns. Temperature extremes range from roughly -25° F in the winter to 100° F in the summer. The "last freeze" occurs during late May and the "first freeze" mid-to-late September.

Yearly precipitation totals are typically near 10 inches. The region is prone to severe thunderstorm events throughout the spring and early summer months and much of the precipitation is attributed to these events. In a typical year, the area will see 4 or 5 severe thunderstorm events (as defined by the National Weather Service criteria) and 40 to 50 thunderstorm days. Autumn stratiform rain events also contribute to precipitation totals, but to a lesser degree than those before mentioned. Snow frequents the region throughout winter months (40-50 in / year), but provides much less moisture than rain events.

Windy conditions are fairly common to the area. Nearly 5% of the time hourly wind speed averages exceed 25 mph. The predominant wind direction is west/southwest with the wind blowing out of that direction 20% of the time. A north/northwest secondary mode is also present. Surface wind speeds are relatively high all year-round, with hourly averages 11 - 15 mph. Higher average wind speeds are encountered during the winter months while summer months experience lower average wind speeds.

2.8.4 Baseline Data

Ecological studies including baseline flora and fauna data were collected to fulfill the objectives specified in USNRC NUREG-1569, *Standard Review Plan for In situ Leach Uranium Extraction License Applications.* Ecological surveys were also conducted in accordance with applicable WDEQ-LQD, WGFD, and USFWS established guidelines. These agencies were consulted accordingly during development of survey plans to ensure adequate objectives, methodologies, and survey techniques were utilized.

Vegetation and wetland surveys were conducted by BKS Environmental Associates (BKS) of Gillette Wyoming during the spring/summer of 2007. Wildlife surveys were conducted by Thunderbird, Jones and Stokes of Gillette during the fall of 2006 through the summer of 2007.

The following sections were developed from the final survey reports completed by BKS and Thunderbird, Jones and Stokes.

2.8.5 Terrestrial Ecology

2.8.5.1 Vegetation

2.8.5.1.1 Survey Methodology

General

All sampling procedures were designed according to the WDEQ-LQD Rules and Regulations for Non-Coal Permitting, Guideline 2 (November 1997), and the methodology approved by the WDEQ.

Areas with sheep present were avoided by BKS during sampling by request of the land owner and, for this reason, numerical order of sampling points was not possible.

Mapping

Four different plant communities were identified for this area, i.e., Meadow Grassland, Upland Grassland, Agricultural Grassland, Big Sagebrush Shrubland, using 2001 CIR aerial photography, which was verified by field survey.

Transect Origin Selection

A computerized systematic grid (through ArcGIS) was used to randomly locate sample points within each vegetation community. These computer generated random numbers were then uploaded to a hand-held Garmin Global Positioning System (GPS) unit for actual location in the field.

Cover

A sample size of 20 50-meter point-intercept cover transects were sampled within the Meadow Grassland, Upland Grassland, and Big Sagebrush Shrubland and 22 50-meter point-intercept cover transects were sampled within the Agricultural Grassland for a total of 82 cover points in the License area.

In the vegetation communities, each 50-meter transect represented a single sample point. Percent cover measurements were taken from point-intercepts at 1-meter intervals along a 50-meter transect. Transects that exceeded the boundaries of the vegetation community being sampled were redirected back into its vegetation community at a 90 degree angle

from the original transect direction at the point of intercept. In instances where a 90 degree angle of reflection did not place the transect within the sampled community, a 45 degree angle of reflection was used. Each point-intercept represents 2% towards cover measurements.

Percent cover measurements record "first-hit" point-intercepts by live foliar vegetation species, litter, rock, or bare ground. Multiple hits on vegetation were recorded, but used only for the purpose of constructing a plant species list for each plant community.

Species Composition

A list of plant species encountered during 2007 quantitative sampling is compiled in Addendum 2.8-A by vegetation community type for each of the three wellfield areas. The species list includes plant species sampled in cover transects as well as plant species observed along the belt transect. Plant names in the *Rocky Mountain Vascular Plants of Wyoming* (Dorn, 3rd Edition) were utilized.

Total Vegetation Cover

Vegetation cover data was recorded by species, using first hit data. All point intercepts of living vegetation and growth produced during the current growing season was counted toward total vegetation cover. Total vegetation cover measurements were expressed in absolute percentages for each sample point. Percent vegetation cover is the vertical projection of the general outline of plants to the ground surface. Cover summaries for each vegetation community are contained in Addendum 2.8-B.

Total Ground Cover

Total ground cover data was recorded by live vegetation, litter, rock, or bare ground. Litter includes all organic material that is dead including manure. Rock fragments were recorded when equal to or greater than 2 centimeters in size (i.e., sheet flow, minimum non-erodable particle size). Total ground cover measurements were expressed in absolute percentages for each sample point. Total ground cover equals the sum of cover values for percent vegetation, percent litter, and percent rock.

Shrub Density

Even though shrub density sampling is not required for non-coal sites, this data was taken at the time of cover sampling to ensure adequate use of field time. Summarization of that data can be found in Addendum 2.8-C. This area is not part of any wildlife critical winter range; thus, shrub density information is not necessary.

Extended Reference Area

The Extended Reference Area (EXREFA) is a native land unit used to evaluate revegetation success on portions of the same native plant community that was affected by the mining operation. For this study area, the mining operation will affect the four plant communities, Meadow Grassland, Upland Grassland, Agricultural Grassland, and Big Sagebrush Shrubland. All areas of these communities not affected by mining activities will serve as the EXREFA. The EXREFA will be as large as practical, at least 2 acres, considering land ownership patterns and land management history.

2.8.5.1.2 Vegetation Survey Results

Mapping

The total estimated acreage for the disturbed area is 7,104.1 acres. Of these acres, the Meadow Grassland community was 323.5 acres (4.55%), the Upland Grassland community was 5,008.9 acres (70.51%), the Agricultural Grassland community was 931.6 acres (13.11%), and the Big Sagebrush Shrubland was 707.78 acres (9.96%). Areas with disturbance were 132.3 acres, 1.86%. Refer to Table 2.8-1 below for acreage of each vegetation community by License area acreage, and ½ mile buffer acreage. Refer to Figure 2.8.5-1 (Addendum 2.8-D) showing vegetation community mapping units for the Moore Ranch Project Area.

Table 2.8-1. Acreage and Percent of Total Area for Each of the Mapping Units.

	License Area	% of Area	½ Mile Buffer Area	% of Area
Mapping Units				
Meadow Grassland	323.5	4.55	146.0	2.97
Upland Grassland	5,008.9	70.51	3,841.2	78.25
Agricultural Grassland	931.6	13.11	315.3	6.42
Big Sagebrush Shrubland	707.8	9.96	572.6	11.66
Disturbance	132.3	1.86	34.1	0.69
TOTAL	7,104.1		4,909.1	

General

The EXREFA will remain unaffected over the course of the mining operation and will be used to evaluate revegetation success. The EXREFA will include portions of the same

native plant community that was affected by the mining operation but located outside those disturbed areas and within the License boundary.

2.8.5.1.3 Meadow Grassland

Cover

The Meadow Grassland plant community comprised 323.5 of the 7,104.1 acres of the License area (4.55%). Twenty cover transects were sampled for this community. Absolute total vegetation cover was 80.90%. Absolute bare soil and litter/rock percentages were 5.20% and 13.90%, respectively. Absolute total ground cover was 94.80%. *Elymus smithii* (western wheatgrass), provided the highest relative vegetation cover at 23.73%, while *Bromus inermis* (smooth brome) provided the next highest relative vegetation cover at 9.64%. Refer to Table 2.8-2 below for the absolute cover values.

Table 2.8-2. 2007 Absolute Cover for the Meadow Grassland Plant Community.

Vegetation Parameter	Mean
Absolute Total Vegetation Cover (%)	80.90
Absolute Total Cover (%)	94.80

Sample Adequacy

There were 20 samples taken in the Meadow Grassland plant community. The sample adequacy formula outlined in WDEQ-LQD Guideline 2 was utilized to determine the minimum required size of the sample population. The Meadow Grassland met sample adequacy. Refer to Table 2.8-3 below for sample adequacy values.

Table 2.8-3. Summary of Sample Adequacy Calculations for % Vegetation Cover in the Meadow Grassland.

	Mean	Standard Deviation	Sample Adequacy	Actual Sample #	Z-Value	Confidence Level Achieved
Mapping Unit						
Meadow Grassland						
Total Vegetation Cover	80.90	6.37	4.06	20.00	4.02	99.99
Total Ground Cover	94.80	6.33	2.92	20.00	4.74	99.99

Species Composition

Species composition for the Meadow Grassland plant community was dominated by cool season perennial grasses with 58.84% relative cover, followed by perennial forbs with 16.19% relative cover. Annual grasses had 11.62% relative cover. Annual and biennial forbs had 11.74% and 0.25% relative cover, respectively. Full and sub-shrubs had a total of 1.01% relative cover. Succulents had 0.12% relative cover. The annual grasses for this area were mainly cheatgrass brome and *Bromus japonicus*, Japanese brome. The cool season perennial grasses were mainly western wheatgrass and smooth brome. Perennial forbs were dominated by *Achillea millefolium* (western yarrow), *Vicia americana* (American vetch), and *Taraxacum officinale* (common dandelion). Annual and biennial forbs included *Alyssum desertorum* (alyssum), *Lappula redowskii* (beggar's tick), and *Chenopodium berlandieri* (pitseed goosefoot). Present shrubs/subshrubs were *Artemisia ludoviciana* (Louisiana sagewort) and *Artemisia cana* (silver sagebrush). Also present were mushroom species and *Opuntia polyacantha* (plains prickly pear). Refer to Table 2.8-4 for relative Meadow Grassland cover summary and Addendum 2.8-B for a complete Meadow Grassland cover summary.

Table 2.8-4. Vegetation Cover Sampling Data Summary of Species by Lifeform for the Meadow Grassland Community. All values are means.

	Vegetation Cover	
	Absolute	**Relative (%)**
Annual Grasses		
Total	9.40	11.62
Cool Season Grasses		
Total	47.80	59.09
Annual/Biennial Forbs		
Total	9.50	11.74
Perennial Forbs		
Total	13.10	16.19
Perennial Shrubs		
Total	0.60	0.74
Perennial Sub-Shrubs		
Total	0.40	0.49
Succulents		
Total	0.10	0.12

2.8.5.1.4 Upland Grassland

Cover

The Upland Grassland plant community comprised 5,008.9 of the 7,104.1 acres of the License area (70.51%). Twenty cover transects were sampled for this community. Absolute total vegetation cover was 62.80%. Absolute bare soil and litter/rock percentages were 12.30% and 19.50%, respectively. Absolute total ground cover was 87.90%. Western wheatgrass provided the highest relative vegetation cover at 23.33%. *Carex filifolia*, threadleaf sedge, provided the next highest cover at 16.94%. Refer to Table 2.8-5 below, for the absolute cover values.

Table 2.8-5. 2007 Absolute Cover for the Upland Grassland Plant Community.

Vegetation Parameter	Mean
Absolute Vegetation Cover (%)	62.80
Absolute Total Cover (%)	87.90

Sample Adequacy

There were 20 samples taken in the Upland Grassland plant community. The sample adequacy formula outlined in WDEQ-LQD Guideline 2 was utilized to determine the minimum required size of the sample population. The Upland Grassland met sample adequacy. Refer to Table 2.8-6 below for sample adequacy values.

Table 2.8-6. Summary of Sample Adequacy Calculations for % Vegetation Cover in the Upland Grassland.

	Mean	Standard Deviation	Sample Adequacy	Actual Sample #	Z-Value	Confidence Level Achieved
Mapping Unit						
Upland Grassland						
Total Vegetation Cover	62.80	11.65	22.55	20.00	1.70	95.54
Total Ground Cover	87.90	6.15	3.21	20.00	4.52	99.99

Species Composition

Species composition for the Upland Grassland plant community was dominated by cool season perennial grasses with 54.01% relative cover, followed by annual forbs with 19.97% relative cover. Annual grasses and warm season perennial grasses had 12.95% and 3.68% relative cover, respectively. Shrubs and subshrubs had a total 2.56% relative cover. Succulents had 0.80% relative cover. The annual grasses for this area were mainly cheatgrass brome and Japanese brome. The cool season perennial grasses were mainly western wheatgrass, threadleaf sedge, and *Hesperostipa comata* (needleandthread). Warm season perennial grasses consisted of *Bouteloua gracilis*, blue grama, and *Buchloe dactyloides*, buffalo grass. Perennial forbs were dominated by *Phlox hoodii*, Hood's phlox, and American vetch. Annual forbs included alyssum and *Plantago patagonica*, Pursh's plantain. Shrubs and subshrubs included *Artemisia tridentata* (big sagebrush), silver sagebrush, *Artemisia frigida*, fringed sagewort, and *Artemisia pedatifida*, birdfoot

sagewort. Also present were lichens, mushroom species and plains prickly pear. Refer to Table 2.8-7 for relative Upland Grassland cover summary and Addendum 2.8-B for a complete Upland Grassland cover summary.

Table 2.8-7. Vegetation Cover Sampling Data Summary of Species by Lifeform for the Upland Grassland Community. All values are means.

	Vegetation Cover	
	Absolute	**Relative (%)**
Annual Grasses		
Total	8.10	12.90
Warm Season Grasses		
Total	2.30	3.66
Cool Season Grasses		
Total	33.70	53.66
Annual/Biennial Forbs		
Total	12.60	20.06
Perennial Forbs		
Total	4.00	6.37
Perennial Shrubs		
Total	0.90	1.43
Perennial Sub-Shrubs		
Total	0.70	1.11
Succulents		
Total	0.50	0.80

2.8.5.1.5 Agricultural Grassland

Cover

The Agricultural Grassland plant community comprised approximately 931.61 of the 7,104.1 acres of the License area (13.11%). Twenty-two cover transects were sampled for this community. Absolute total vegetation cover was 68.09%. Absolute bare soil and litter/rock percentages were 7.09 and 24.73, respectively. Absolute total ground cover was 93.00%. *Agropyron cristatum*, crested wheatgrass, provided the highest relative vegetation cover at 36.01%, while alyssum provided the next highest relative vegetation cover at 24.32%. Refer to Table 2.8-8 below for the absolute cover values.

Table 2.8-8. 2007 Absolute Cover for the Agricultural Grassland Plant Community.

Vegetation Parameter	Mean
Absolute Total Vegetation Cover (%)	68.09
Absolute Total Cover (%)	92.91

Sample Adequacy

There were 22 samples taken in the Agricultural Grassland plant community. The sample adequacy formula outlined in WDEQ-LQD Guideline 2 was utilized to determine the minimum required size of the sample population. The Agricultural Grassland met sample adequacy. Refer to Table 2.8-9 below for sample adequacy values.

Table 2.8-9. Summary of Sample Adequacy Calculations for % Vegetation Cover in the Agricultural Grassland.

	Mean	Standard Deviation	Sample Adequacy	Actual Sample #	Z-Value	Confidence Level Achieved
Mapping Unit						
Agricultural Grassland						
Total Vegetation Cover	68.09	7.84	8.69	22.00	2.88	99.80
Total Ground Cover	92.91	4.57	1.59	22.00	6.74	99.99

Species Composition

Species composition for the Agricultural Grassland plant community was dominated by cool season perennial grasses with 49.40% relative cover, followed by annual forbs with 28.62% relative cover. Annual grasses and warm season perennial grasses had 13.27% and 0.15% relative cover, respectively. Perennial forbs and biennial forbs had 6.90% and 0.26% relative cover, respectively. Succulents had 0.15% relative cover and subshrubs had 1.26% relative cover. The annual grasses for this area were mainly cheatgrass brome and Japanese brome. The cool season perennial grasses were mainly crested wheatgrass and western wheatgrass. Only one warm season perennial grass, blue grama, was noted. Perennial forbs were dominated by American vetch, *Sphaeralcea coccinea* (scarlet globemallow), and *Lygodesmia juncea* (skeletonweed). Annual and biennial forbs included alyssum, Pursh's plantain and *Melilotus officianalis*, yellow sweetclover. The only subshrub was *Atriplex gardneri*, Gardner's saltbush. Also present were mushroom

species, and the succulents *Coryphantha vivipara*, purple ball cactus and plains prickly pear. Refer to Table 2.8-10 below for relative Agricultural Grassland cover summary and Addendum 2.8-B for a complete Agricultural Grassland cover summary.

Table 2.8-10. Vegetation Cover Sampling Data Summary of Species by Lifeform for the Agricultural Grassland Community. All values are means.

	Vegetation Cover	
	Absolute	**Relative (%)**
Annual Grasses		
Total	9.09	13.35
Warm Season Grasses		
Total	0.09	0.13
Cool Season Grasses		
Total	33.82	49.67
Annual/Biennial Forbs		
Total	19.72	28.96
Perennial Forbs		
Total	4.73	6.95
Perennial Sub-Shrubs		
Total	0.55	0.81
Succulents		
Total	0.09	0.13

2.8.5.1.6 Big Sagebrush Shrubland

Cover

The Big Sagebrush Shrubland plant community comprised approximately 707.8 of the 7,104.1 acres of the License area (9.96%). Twenty cover transects were sampled for the Big Sagebrush Shrubland community. Absolute total vegetation cover was 67.30%. Absolute bare soil and litter/rock percentages were 8.90 and 20.10, respectively. Absolute total ground cover was 91.20%. Western wheatgrass provided the highest relative vegetation cover at 15.03%, while alyssum provided the next highest relative vegetation cover at 13.99%. Refer to Table 2.8-11 below for the absolute cover values.

Table 2.8-11. 2007 Absolute Cover for the Big Sagebrush Shrubland Plant Community.

Vegetation Parameter	Mean
Absolute Total Vegetation Cover (%)	67.30
Absolute Total Cover (%)	91.20

Sample Adequacy

There were 20 samples taken in the Big Sagebrush Shrubland plant community. The sample adequacy formula outlined in WDEQ-LQD Guideline 2 was utilized to determine the minimum required size of the sample population. The Big Sagebrush Shrubland met sample adequacy. Refer to Table 2.8-12 below for sample adequacy values.

Table 2.8-12. Summary of Sample Adequacy Calculations for % Vegetation Cover in the Big Sagebrush Shrubland.

	Mean	Standard Deviation	Sample Adequacy	Actual Sample #	Z-Value	Confidence Level Achieved
Mapping Unit						
Big Sagebrush Shrubland						
Total Vegetation Cover	67.30	9.85	14.04	20.00	2.16	98.46
Total Ground Cover	91.20	6.72	3.29	20.00	4.29	99.99

Species Composition

Species composition for the Big Sagebrush Shrubland plant community was dominated by cool season perennial grasses with 39.29% relative cover, followed by annual forbs with 22.02% relative cover. Annual grasses and warm season perennial grasses had 17.71% and 2.08% relative cover, respectively. Perennial forbs had 10.27% relative cover. Shrubs and subshrubs had a total 8.48% relative cover. Succulents had 0.15% relative cover. The annual grasses for this area were mainly cheatgrass brome and Japanese brome. The cool season perennial grasses were dominated by western wheatgrass and *Poa pratensis*, Kentucky bluegrass. Warm season perennial grasses consisted of blue grama and buffalo grass. Perennial forbs were dominated by American vetch and Hood's phlox. Annual forbs included alyssum and Pursh's plantain. Present shrubs and subshrubs were fringed sagewort, silver sagebrush, big sagebrush, *Atriplex*

canascens, four-wing saltbush, and *Hymenoxys richardsonii*, pingue rubberweed. Also present were lichens, mushroom species and plains prickly pear. Refer Table 2.8-13 below for relative Big Sagebrush Shrubland cover summary and to Addendum 2.8-B for a Big Sagebrush Shrubland complete cover summary.

Table 2.8-13. Vegetation Cover Sampling Data Summary of Species by Lifeform for the Big Sagebrush Shrubland Community. All values are means.

	Vegetation Cover	
	Absolute	**Relative (%)**
Annual Grasses		
Total	11.90	17.68
Warm Season Grasses		
Total	1.40	2.08
Cool Season Grasses		
Total	26.50	39.38
Annual/Biennial Forbs		
Total	14.80	21.99
Perennial Forbs		
Total	6.90	10.25
Perennial Shrubs		
Total	4.90	7.28
Perennial Sub-Shrubs		
Total	0.80	1.19
Succulents		
Total	0.10	0.15

2.8.5.1.7 Vegetation Survey Discussion

The proposed 7,104.1 acre License area consists of 4 vegetation communities: Meadow Grassland, Upland Grassland, Agricultural Grassland, and Big Sagebrush Shrubland. Each community was investigated for baseline vegetation information in support of an NRC Source Materials License and a Regular Mine Permit Application.

No threatened or endangered species were encountered within the License area. There was the presence of two state designated weeds, Canada thistle and field bindweed, in the License area.

2.8.5.2 Wetlands

The wetland delineation was conducted as part of the baseline assessment for the Moore Ranch Project. The wetland delineation will be utilized for reclamation planning and mining infrastructure location.

Figure 2.8.5-2 identifies the general area location on a color infrared (CIR) map and Figures 2.8.5-3 through 2.8.5-8 identify areas of wetland concentrations. All wetlands maps referenced in this section are presented in Addendum 2.8-E.

Construction, operation, or reclamation activities, which cause disturbance or impacts to jurisdictional wetlands on the proposed Moore Ranch Project, will be performed in accordance with appropriate Nationwide Permits (NWP), if applicable:

- NWP 44 non-coal mining activities, which requires Pre-construction Notification (PCN) for all activities;
- NWP 12 utility line activities, which requires a PCN for an area where a section 10 permit is required, discharges that result in the loss of >1/10 acre,
- NWP 14 linear transportation projects, which requires a PCN for ½ acre in non-tidal waters and 1/3 an acre in tidal waters.

NWP 44, NWP 12, and NWP 14 have an acreage limit of half an acre for Waters of the United States (WoUS). Impacts to Other Waters of the United States (OWUS) are not considered under the acreage limit. All of the wetlands presented in this study are recommended to be non-jurisdictional since the wetlands are all isolated and do not support interstate commerce. Final determination of jurisdictional decision lies with the United States Army Corps of Engineers (USACE).

2.8.5.2.1 Wetland Survey Methodology

The wetland surveys were conducted in accordance with the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region. All OWUS were also assessed during the surveys. The routine wetland delineation approach with onsite inspection was utilized, and the survey was conducted by pedestrian reconnaissance and CIR photography. Identification of potential wetlands was based on visual assessment of vegetation and hydrology indicators, as well as intrusive soil sampling to determine the presence of wetland criteria indicators. USACE Data Forms-Great Plains Region (Draft), were utilized for each observation point. Hydrology and soils were evaluated whenever a plant community type met hydrophytic vegetation parameters based on the Dominance Test and Prevalence Index (as defined by the

USACE Great Plains Regional Supplement), or whenever indicators suggested the potential presence of a seasonal wetland area under normal circumstances.

Natural Resources Conservation Service (NRCS) soils mapping for Campbell County, Wyoming, and BKS soil mapping of the project area were reviewed for general soils information.

Potential wetlands (WoUS) and OWUS were initially identified via review of area maps to include the following:

1) 1976 United States Fish and Wildlife Service hardcopy NWI mapping;
2) 2001 CIR imagery for the Pine Tree Quadrangle
3) 2001 CIR imagery for the Artesian Draw
4) 1954 Artesian Draw, Wyoming, Quadrangle Map
5) 1977 Pine Tree, Wyoming, Quadrangle Map

Wetland indicator categories were identified for each dominant plant species noted through use of the National List of Vascular Plant Species that Occur in Wetlands, 1996 National Summary. Region 4 (North Plains) indicator categories were utilized for the project area. Wetland species identified at the Moore Ranch Project site are listed in Addendum 2.8-F.

Field sample locations and resulting wetland boundaries were recorded with a hand-held Garmin GPSmap 60Cx Global Positioning System (GPS) unit and a Garmin III Plus GPS unit in NAD 1983 UTM Zone 13. BKS and Land Surveying Inc. (LSI) provided drafting services for the project.

2.8.5.2.2 Wetland Survey Results

The project area generally occurred on uplands, with inclusions of several drainages. Five of the main drainages were evaluated using pedestrian reconnaissance, while the remaining small drainages were evaluated based on CIR mapping and evaluated drainage results. The majority of the wetlands were found along existing drainage bottoms; however the wetlands were not continuous throughout the drainages. The wetland classifications along the drainages were primarily Palustrine Emergent (PEM) WoUS and Palustrine Unconsolidated Bottom (PUB) OWUS. The proposed project may affect a total of 35.29 acres of PEM stream channel, PUB stream channel, PEM isolated ponds, and PUB isolated ponds. See Table 2.8-14 (Addendum 2.8-E) for a summary of wetland areas within the proposed license area.

Several coal bed methane (CBM) outfalls, windmills and livestock watering tanks, were found within the project area. All were located along or within a drainage. Several of the outfalls, along with the watering tanks, were releasing water into the drainages that were being delineated.

Relatively abrupt upland/wetland transition areas occurred, and were a result of changes in topography occurring along drainage channels.

Soils information for the project area was obtained by NRCS Web Soil Survey for southern Campbell County, Wyoming, (2006) and by BKS soil mapping. Soils within the project area were mapped as the following:

There are six main drainage basins located in the project area; each of the drainages had differing soil types. Drainage basin 1 had 153-1 Haverdad clay loam, 0-6% slopes in the northern half of the drainage and 153-2 Kishona clay loam, 0-6% slopes in the southern half and on the southwest and northeast tributary. Drainage basin 2 had 116-1 Cambria loam, 0 to 6 percent slopes in the northern half and 153-2 Kishona clay loam, 0-6% slopes in the southern half. Drainage 3 had 153-1 Haverdad clay loam, 0-6% slopes. Drainage basin 2 had 116-2 Kishona loam, 0-6% slopes north of the Highway 387 and 235 Vonalee fine sandy loam, 0-10% slopes south of the highway. Drainage basin 5 and 6 also had 235 Vonalee fine sandy loam, 0-10% slopes. Refer to Section 2.6.2 for more information on site soils.

Soil map units 153-1, 153-2, 116-1, and 116-2 are found on the Wyoming Hydric Soils List for southern Campbell County. The map units in the 153 association are typically found on floodplains. The map units in the 116 complex are typically found in depressions and have poorly drained soils. Soil map unit 235 was not found on the Wyoming Hydric Soils List.

The project area was generally characterized by Upland Grass areas with pockets of Big Sagebrush Shrubland and an occasional Agricultural field. The drainage basins composed mainly of Meadow Grassland. Meadow Grassland comprised of 323.90 acres; the dominate vegetation were *Elymus smithii* (Western wheatgrass) and *Bromus inermis* (smooth brome). The wetland indicator status of these plants are UPL (upland) and FACU (facultative upland) respectively. Refer to Section 2.8.5.1 for more details regarding the vegetation communities and plants found within the project area.

Simmons Draw

Simmons Draw runs north to south and has several small tributaries and two large tributaries within the project area. Simmons Draw is located in T42N R75W Section 33 and T41N R75W is Section 2, 3, and 4. The first tributary to Simmons Draw intersects in T41N R75W in Section 3; the second tributary to Simmons Draw intersects in Section 2.

A PEM wetland is present at W10 in the southwest quarter of the southwest quarter of Section 33; this wetland was also mapped in 1976 by NWI mapping. The soils in the drainage are hydric from W7 to W9 to W11; however only at W10 was there water present and hydrophytic vegetation.

Moving southeast down the drainage the CIR map indicates red along the drainage however no water was present and the vegetation in the drainage had an indicator status of FACU primarily, with few to none obligate vegetation. Due to the presence of some *Populus deltoids* (plains cottonwood) and *Salix amygdaloides* (peachtree willow) trees in the drainage and saturated hydric soils the area between W5 and W15 were classified as a PUB wetland. At W5 there was a ponded area with surface water present (at a depth of about 12 inches) due to a man made berm. The ponded area had fringe and emergent vegetation that passed the dominance test and hydric clay loam soils with redox depressions and about 1 cm of muck present. The drainage channel south of the berm had no presence of hydric soils or hydrophytic vegetation, or water present.

The small unnamed tributaries off of Simmons Draw did not exhibit any wetland characteristics.

At W16 there is a small isolated PEM and POW stock pond wetland present. The stock pond had about four inches of water present with hydric silty clay soils with redox depressions, depleted matrix, and a loamy gleyed matrix. The stock pond is present due to a man made berm. The vegetation within the drainage bottom is primarily composed of vegetation that had UPL and FACU indicator status, *Poa pratensis* (Kentucky bluegrass), *Koelena macrantha* (Prairie junegrass), and *Hordeum jubatum* (foxtail barley). Another stock pond surrounded by upland vegetation is located at W10.

In the middle of Section 3 there are two small stock ponds that have the designation as POW and PEM wetland. The first wetland is found at W19; no surface water is present but had a water table at a depth of nine inches. The silty clay loam hydric soil had a depleted matrix and redox depressions. The dominate vegetation had an obligate indicator status, *Eleocharis acicularis* (slender spikerush). Upstream of this wetland was an upland swale and downstream was an old cattle water tank. The second wetland was

found further downstream of the first; both wetland ponds were isolated along the drainage.

The drainage between W20 and waypoint 23 was considered a PEM wetland based on the presences of hydrophytic vegetation and hydric soils. The hydrology present was based on secondary indicators of geomorphic position and oxidized rhizospheres in living root channels. Downstream of waypoint 23, upland vegetation is more dominant than the hydrophytic vegetation.

As Simmons Draw crosses over the project area, upland vegetation was dominant in the drainage and no wetlands existed in the area.

First Tributary to Simmons Draw

The first tributary to Simmons Draw is located on the western side of the project area in T42N R75W in Sections 28, 27, and 34, and in T41N R75W in Section 3.

The first tributary to Simmons Draw has no wetlands North of Highway 387. One previously identified PEM wetland just north of the road is no longer present; the wetland was previously mapped in 1976 by NWI.

South of the highway there is a windmill present, though the windmill is not active. A PEM wetland area is present within the drainage from W35 to W34, 0.125 acres. There is a berm that separates the two ponded areas but the wetland extends past the berm. There is no hydrology indicators present as the windmill is no longer active. This PEM wetland area is receding due to the lack of water present. South of W34 the hydrophytic vegetation begins to drop out and the uplands are more dominant in the drainage.

The channel between W34 and W33 is not a wetland since none of the wetland parameters are met. However from W33 to W31 the drainage is considered a wetland channel, 6.04 acres. The wetland characteristics at W32 are receding based on secondary hydrology indicators and vegetation did not pass the dominance or prevalence index, but the dominance test was fifty percent, and one of the dominant species was obligate, *Juncus balticus* (Baltic rush).

There is a CBM outfall area at W39. There is open water present at W27 but only secondary hydrology indicators present at W28. As the wetland channel begins to disappear at W31 there is still hydrophytic vegetation, however the hydric soil indicators are found within dead root channels and hydrology is present only by secondary indicators. It is likely that the wetland will recede to a point nearer to W27 in the future due to the lack of water presence downstream of W27.

Second Tributary to Simmons Draw

The second tributary to Simmons Draw is located on the eastern side of the project area in T42N R75W in Sections 2, 27, and 35. The drainage is split by highway 387. North of the highway there is a windmill that is generating water into a POW stock pond. There was no hydrophytic vegetation around the edge of the pond, so no intrusive soil samples were taken. This stock pond was originally mapped by NWI as a PEM wetland; however the hydrophytic vegetation is gone and now is a POW stock pond.

South of highway 387 there are three CBM outfalls. These outfalls are owned by Devon Energy Corporation. The first outfall is found at waypoint 71, just south of the outfall there is a PEM and POW ponded area. The pond is dominated by hydrophytic vegetation including *Typha latifolia* (cattails) and slender spikerush. Downstream of the pond to W38, hydric soils are present but the hydrophytic vegetation did not pass the dominance test or the prevalence index, thus this area had been a wetland in the past but the vegetation is receding as the water source is not present. At waypoint 70 there is another CBM outfall area with similar hydrophytic vegetation to waypoint 71, another pond sits below the outfall area. This pond is considered PEM wetland. Downstream of the outfall the drainage is considered a PEM wetland as hydrophytic vegetation is dominant and hydric soils are present with redox depressions. Water is not present in the drainage but due to the presence of the other two factors and that the CBM outfalls have water present, it can be concluded that water likely runs down the drainage sometime during the growing season. The wetland stops at waypoint 90 where the water ponds from another CBM outfall point.

South of the bermed pond area at W41 hydrophytic vegetation is no longer dominant and only hydric soils with redox depressions are present. The area was a wetland in the past due to the presence of hydric soils but the water source has left. Further south of W41, the CIR photo shows light areas of pink down to the junction of Simmons Draw, no wetlands were present along this section of the second tributary to Simmons Draw.

Pine Tree Draw

Pine Tree Draw is located on the eastern side of the project area in Township 42N Range 75W in part of Sections 25, 26, and 36. Pine Tree Draw runs north to south and has one main tributary to the northwest of the drainage that intersects the draw at W51. Along the main tributary at W48 there is a CBM outfall that is generating water into the drainage. Hydrophytic vegetation is dominant and the sandy clay loam soils are hydric with a depleted matrix, as well as 3-4 inches of surface water and saturation. This POW and PEM wetland extends down to W50 where upland vegetation is dominant and hydric

soils and water are not present. This tributary intersects with Pine Tree Draw at W51, there is not wetlands present at the intersection.

North of the tributary along Pine Tree Draw there are no wetlands present. South of the tributary along Pine Tree Draw there are wetlands present starting at W47 and ending at W53. Hydrophytic vegetation is dominant in this area as well as hydric soils and hydrology. The hydric soils in the northern portion of the wetland by W47 are silty clay loam with sandy redox and redox depressions; while the southern portion of the wetland by W53 were considered sandy clay loam with a sandy gleyed matrix, redox depressions, and a strong hydrogen sulfide odor. The drainage PEM wetland beginning at W47 had secondary hydrologic indicators present and continued down to W53. At W53, there was an unmarked pipe pumping water into a bermed pond.

The wetland channel continues south past the berm to W54 where hydrophytic vegetation is not dominant but passes the prevalence index. Upland vegetation is encroaching into the drainage bottom and secondary hydrology indicators were present, geomorphic position and oxidized rhizospheres in living root channels. The sandy loam soils are hydric with redox depressions and sandy redox features. Once the drainage crossed the CBM road, it was dominated by upland vegetation and the soils are no longer hydric.

Ninemile Creek

Ninemile Creek runs west to east in Township 41N Range 75W in Sections 3, 4, 9, and 10. Previous NWI mapping indicates that there were two PEM areas located on the western section of Ninemile creek in the northwest quarter of the northeast quarter of Section 9, however these wetlands were not found to be present during the 2007 wetland delineation. Another PEM wetland identified under the NWI mapping was confirmed near W24, the present PEM wetland is smaller than that identified by NWI. A PEM wetland drainage was present between W24 and W23, as hydrophytic vegetation and hydric soils were present at both locations. W24 had secondary hydrology indicators present including geomorphic position and oxidized rhizospheres on living root channels, while W23 only had geomorphic position. The clay loam hydric soils found by W24 had redox depressions and the silty clay soils by W23 also had redox depressions. Further east along Ninemile Creek, bare ground was present with no presence of hydrophytic vegetation, thus ending the wetland channel.

2.8.5.2.3 Wetland Survey Conclusions

Numerous CBM outfalls were located throughout the project area and occurred along drainages. Windmills and livestock watering tanks were also found within the project area. Some outfalls and watering tanks had no water present while others were releasing

water into the drainages where they were located. The release of water from the CBM outfalls and watering tanks has influenced the presence or absence of wetland parameters located within these drainages. In drainages where water is still being released the wetland characteristics are actively present. Where water has ceased being released, the wetland paramters are receding, particularlity wetland hydrology and hydrophytic vegetation causing upland vegetation encroachment.

The Moore Ranch Uranium Project area had 31.22 acres of wetland channel present and 4.07 acres of PEM and POW wetland ponds and stock ponds present. All of the wetlands presented in this study are recommended to be non-jurisdictional because the wetlands are all isolated and do not support interstate commerce. Final determination of jurisdictional decision lies within the USACE.

2.8.5.3 Wildlife

2.8.5.3.1 General Setting

This section discusses the affected environment and environmental consequences to wildlife (terrestrial vertebrates) in general. The subsequent sections address the potential impacts to specific groups of wildlife species. As no underground or open pit mining would occur as part of the Moore Ranch Project, the analysis was limited to the Proposed Action (in situ recovery or ISR) and No Action alternatives.

Baseline wildlife information for the Moore Ranch Project was available from data collected by biologists with Thunderbird, Jones & Stokes Associates, Inc. (T/J&S) (formerly Thunderbird Wildlife Consulting) during previous inventory and monitoring efforts for the Bates Creek, Cutthroat, and Rainbow coal bed methane (CBM) plans-of-development (PODs). Those PODs collectively and coincidentally overlapped approximately 86% of the proposed Moore Ranch License area, 75% of the one-mile perimeter, and 52% of the two-mile perimeter. Generally, all but the extreme southeastern and western sections of the proposed License area and perimeters were included in previous studies. Surveys for one or more of those three PODs were conducted annually from 2003-2006, and included numerous wildlife species and habitat features of concern such as bald eagle (*Haliaeetus leucocephalus*) nesting and winter roost sites, grouse leks, and raptor nests, as well as surveys for other avian species of concern (e.g., mountain plover [*Charadrius montanus*], etc.).

Additional background information from wildlife surveys conducted near the Moore Ranch License area was obtained from several sources, including prior WDEQ/LQD mine permit applications and annual wildlife monitoring reports for nearby ISR

operations (Irigaray-Christensen Ranch [Cogema] and North Butte ISR [Pathfinder]: 1992-1999) and from similar documents generated from baseline and annual wildlife surveys conducted at local surface coal mines (1978-2007). Those data were further supplemented by Wyoming Game and Fish Department (WGFD), Bureau of Land Management (BLM), and U. S. Fish and Wildlife Service (USFWS) records from surveys conducted by their respective agency biologists in and near the vicinity of the Moore Ranch Project. Supporting data for impact analyses came from the Powder River Basin Oil and Gas Project FEIS (BLM 2003a), South Powder River Basin Coal FEIS (BLM 2003b), and Maysdorf Coal Lease Application FEIS (2007).

EMC commissioned T/J&S to conduct baseline wildlife investigations from October 2006 through June 2007 expressly for the Moore Ranch Project. Because much of the project area has been included in wildlife monitoring efforts annually since 2003, the WGFD reduced the study area for raptors and other migratory birds to the portions of the proposed Moore Ranch License area and one-mile perimeter not already encompassed by overlapping studies in recent years. Those locations within the License boundary included N and W ¼ Section 1 and W ½ Section 4, T41N, R75W; and SE ¼ Section 36, W ½ Section 33, and SE ¼ Section 28 T42N, R75W; the one-mile survey area for 2007 surrounded those locations. No reductions in the survey area were requested or implemented for sage-grouse, or Threatened and Endangered Species (T&E) inventories. As in previous years, wildlife surveys conducted specifically for the Moore Ranch Project targeted bald eagle winter roost sites, grouse leks, nesting raptors (including eagles), mountain plovers, and other avian species of concern. At the request of EMC, special attention was also paid to water bodies within the proposed Moore Ranch License area to gauge their use by waterfowl and shorebird species. In addition to these efforts, incidental observations of all other wildlife species seen within the proposed License area were recorded during each site visit.

2.8.5.3.2 Big Game

Pronghorn (*Antilocapra americana*) and mule deer (*Odocoileus hemionus*) are the only two big game species that regularly occur in the general analysis area for the Moore Ranch Project. No crucial big game habitat or migration corridors are recognized by the WGFD in this area. Crucial range is defined as any particular seasonal range or habitat component that has been documented as the determining factor in a population's ability to maintain and reproduce itself at a certain level.

Pronghorn are more abundant than mule deer in the Moore Ranch Project area, but neither species is prevalent. Upland grasslands dominate the project area and immediate perimeter. Although grassland habitats do provide adequate forage during much of the year, they are not considered as preferred by wintering pronghorn (Sundstrom et al.

1973). The home range for pronghorn can vary between 400 to 5,600 acres, depending on several factors including season, habitat quantity and quality, population characteristics, physical movement barriers, and local livestock occurrence. In northeast Wyoming, daily movement typically does not exceed 6.0 miles. Pronghorn may make seasonal migrations between summer and winter habitats, but migrations are often triggered by availability of specific plants and not local weather conditions (Fitzgerald et al. 1994).

The WGFD has classified the general analysis area as yearlong pronghorn range, which means that a population or a portion of a population of animals makes general use of this habitat on a year-round basis. The Moore Ranch Project spans two WGFD pronghorn Herd Units: the Pumpkin Buttes area to the north of Wyoming Highway 387, and the North Converse Unit south of the highway. The WGFD estimated the 2006 post-season pronghorn populations in those two hunt areas to be approximately 36,500 and 32,300, respectively; both considerably above objective (Pumpkin Buttes and North Converse Pronghorn JCR Reports, WGFD, 2006).

Mule deer use nearly all habitats, but prefer sagebrush-grassland, rough breaks, and riparian bottomland. Browse is an important component of the mule deer's diet throughout the year, comprising as much as 60 percent of total intake during autumn, while forbs and grasses typically make up the rest of their diet (Fitzgerald et al. 1994). Mule deer are not abundant in the general analysis area, with most individuals recorded in eroded draws and small tree windbreaks in that vicinity. In certain areas of the state, this species tends to be more migratory than white-tailed deer, traveling from higher elevations in the summer to winter ranges that provide more food and cover. However, monitoring indicates that mule deer are not very migratory in the vicinity of the Moore Ranch Project. The WGFD has classified the majority of the general analysis area as yearlong mule deer range, with a portion of the proposed License area south of the highway classified as "out". That range delineation is considered inadequate to support mule deer. As with pronghorn, the Moore Ranch Project spans the Pumpkin Buttes and North Converse mule deer Herd Units. The WGFD estimated the 2006 post-season pronghorn population to be approximately 12,350 and 9,700 animals, respectively whereas the herd objectives were 11,000 and 9,100, respectively (Pumpkin Buttes and North Converse Pronghorn JCR Reports, WGFD, 2006). No crucial or critical mule deer ranges or migration corridors occur on or within several miles of the Moore Ranch Project area.

2.8.5.3.3 Other Mammals

A variety of small and medium-sized mammal species occur in the vicinity of the general analysis area, although not all have been observed on the Moore Ranch tract itself. These

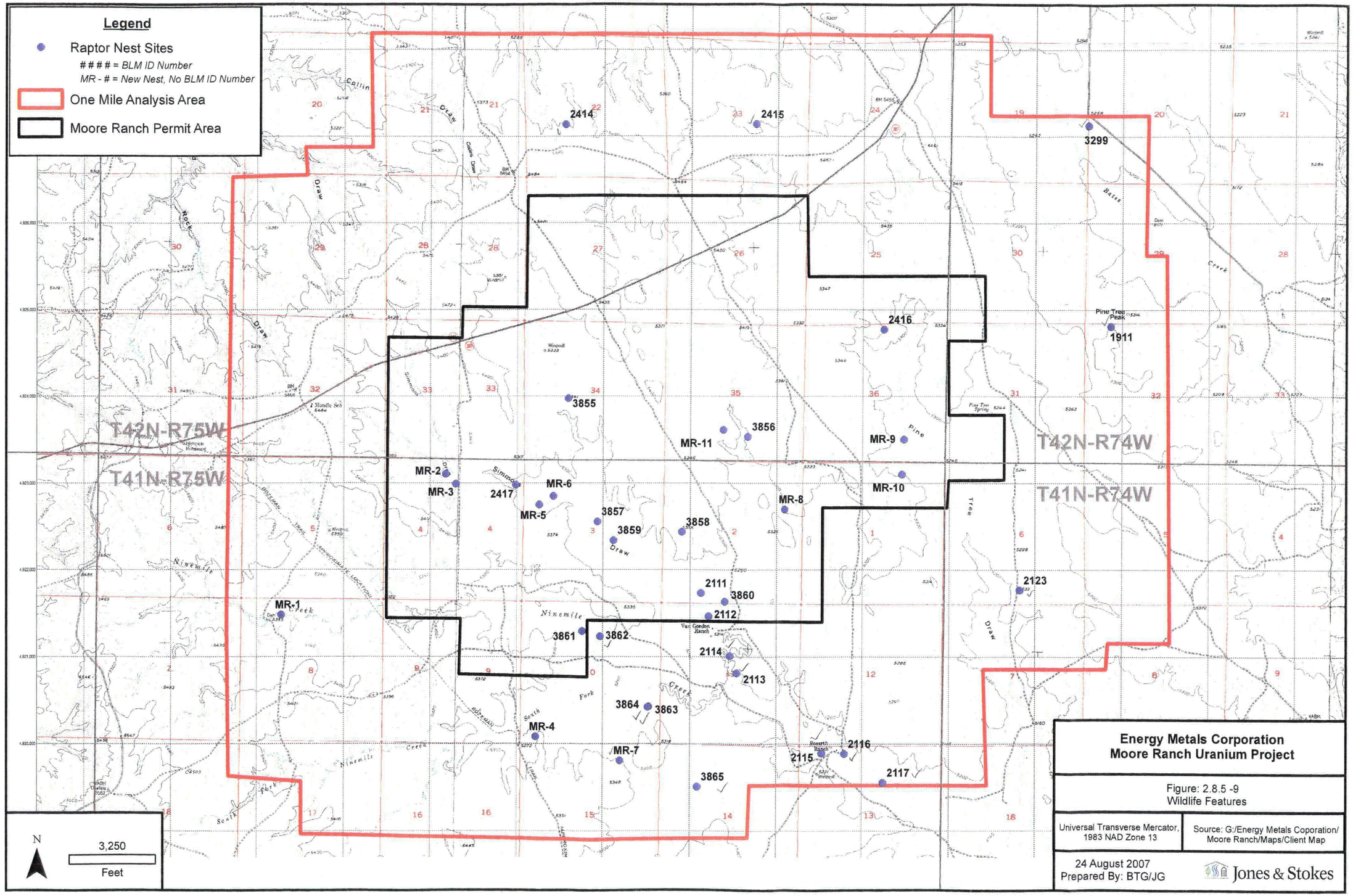
include predators and furbearers such as the coyote (*Canis latrans*), red fox (*Vulpes vulpes*), swift fox (*Vulpes velox*), bobcat (*Lynx rufus*), striped skunk (*Mephitis mephitis*), weasels (*Mustela* spp.), badger (*Taxidea taxus*), muskrat (*Ondatra zibethicus*), and raccoon (*Procyon lotor*). Prey species include various rodents (such as mice, rats, voles, gophers, ground squirrels, and chipmunks) and lagomorphs (jackrabbits [*Lepus* spp.] and cottontails [*Sylvilagus* spp.]). These prey species are cyclically common and widespread throughout the region, and are important for raptors and other predators. Porcupines (*Erethizon dorsatum*) and bats (such as hoary [*Lasiurus cinereus*], big brown [*Eptesicus fuscus*], and Townsend's big-eared [*Corynorhinus townsenii*[) have not been documented in the general analysis area, and have limited potential habitat in the vicinity. Repeated surveys in the Moore Ranch Project area and surrounding one-mile perimeter over the last few years have documented that no occupied black-tailed prairie dog (*Cynomys ludovicianus*) colonies are present there.

2.8.5.3.4 Raptors

The raptor species that could potentially occur in suitable habitats within the general analysis area for the Moore Ranch Project include the golden eagle (*Aquila chrysaetos*), ferruginous hawk, red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), northern harrier (*Circus cyaneus*), American kestrel (*Falco sparverius*), prairie falcon (*Falco mexicanus*), great horned owl (*Bubo virginianus*), burrowing owl (*Athene cunicularia*), and short-eared owl (*Asio flammeus*). Those species that are known to nest in the project area (proposed License and one-mile perimeter) are the ferruginous hawk, red-tailed hawk, and great horned owl. No nest sites have been documented in the general analysis area for any other raptor species since annual monitoring began there in 2003. Habitat is limited for those species that nest exclusively in trees or other uncommon habitat types, but several species are adapted to nesting on the ground, creek banks, buttes, or rock outcrops. Bald eagles and rough-legged hawks (*Buteo lagopus*) are primarily migrants and winter residents in northeast Wyoming. Bald eagles are not common nesters in eastern Wyoming due to the paucity of persistent fisheries and trees. Rough-legged hawks breed in the arctic regions.

Figure 2.8.5-9 shows the locations of 36 raptor nest sites that have been identified within the survey area (proposed License area and one-mile perimeter) for the Moore Ranch Project since 2003. Over time, natural forces have destroyed many nests. Nineteen nest sites were within the proposed Moore Ranch License area, and thus could potentially experience direct impacts from ISR operations in that area (Table 2.8-15); nests were present at 15 of the 19 sites during 2007. The remaining sites were within the surrounding perimeter. Information for each nest monitored over the last five years is presented in Table 2.8-15. As indicated, only those nest sites within one mile of portions of the License area never before surveyed were monitored during 2007. All three raptor species

known to historically nest within the Moore Ranch Project area actively nested (eggs laid) during 2007: the ferruginous hawk (three pairs), red-tailed hawk (three pairs), and great horned owl (three pairs). Seven of those nine active nest sites occurred within the proposed License area for the Moore Ranch Project.



Energy Metals Corporation
Moore Ranch Uranium Project

Figure: 2.8.5 -9
Wildlife Features

Universal Transverse Mercator, 1983 NAD Zone 13

Source: G:/Energy Metals Coporation/ Moore Ranch/Maps/Client Map

24 August 2007
Prepared By: BTG/JG

Jones & Stokes

Table 2.8-15. Raptor nest locations, status, and productivity at the Moore Ranch Uranium Project from 2003 through 2007.

BLM ID[1]	Species[2]	Subst-rate[3]	¼	¼	Sec	TWP	RNG	Nest Status & Productivity[4]				
								2003	2004	2005	2006	2007[5]
1911	FEHA	G	NW	NW	32	42N	74W	I	I	U	U	U
2111*	FEHA	G	SE	SW	2	41N	75W	--	A, ?, ?	I	A-T	A-T
2112*	GHOW	WIL	NE	NW	11	42N	75W	--	A	A, 1+, 1+	A,4?,4	A,2,2
2113	RTHA	WIL	SW	NE	11	41N	75W	--	A, ?, ?	A, 1+, 1	I	I
2114	BUTEO	WIL	SW	NW	11	42N	75W	--	I	I	I	D-N
2115	BUTEO	ELM	NW	NW	13	41N	75W	--	I	I	U	U
2116	BUTEO	ELM	NE	NW	13	41N	75W	--	I	I	U	U
2117	BUTEO	CW	NW	NE	13	41N	75W	--	CAGO	I	U	U
2123	FEHA	G	SW	SE	6	41N	74W	--	I	I	U	U
2414	FEHA	G	NE	SW	22	42N	75W	I	I	U	U	U
2415	FEHA	G	NW	SE	23	42N	75W	I	I	U	U	U
2416*	FEHA	G	NW	NE	36	42N	75W	I	I	D-N	--	--
2417*	RTHA	CW	NE	NE	4	42N	75W	I	I	D-N	--	--
3299	SWHA	PO	NW	SW	20	42N	74W	--	--	A-T	D-N	--
3855*	FEHA	G	NE	SW	34	42N	75W	--	--	U	I	I
3856*	FEHA	G	SW	SE	35	42N	75W	--	--	U	I	ALT

Table 2.8-15. Raptor nest locations, status, and productivity at the Moore Ranch Uranium Project from 2003 through 2007.

BLM ID[1]	Species[2]	Subst-rate[3]	¼	¼	Sec	TWP	RNG	Nest Status & Productivity[4]				
								2003	2004	2005	2006	2007[5]
3857*	GHOW	WIL	SW	NE	3	42N	75W	--	--	U	U	A, ?, ?
3858*	FEHA	G	SW	NW	2	41N	75W	--	--	U	I	I
3859*	FEHA	G	NW	SE	3	41N	75W	--	--	U	I	I
3860*	FEHA	CB	SE	SW	2	41N	75W	--	--	U	I	D-N
3861*	FEHA	G	NE	NW	10	41N	75W	--	--	U	I	I
3862	FEHA	G	NW	NE	10	41N	75W	--	--	U	I	I
3863	FEHA	G	NE	SE	10	41N	75W	--	--	U	I	U
3864	FEHA	G	NE	SE	10	41N	75W	--	--	U	I	U
3865	FEHA	G	SE	NW	14	41N	75W	--	--	U	I	U
MR-1	RTHA	CW	NW	NW	8	41N	75W	--	--	--	--	A, 1+, 1
MR-2*	GHOW	CW	SE	NW	4	42N	75W	--	--	--	U	A,1+,1+
MR-3*	RTHA	CW	SE	NW	4	42N	75W	--	--	--	U	A, 1+, ?
MR-4	RTHA	PO	SW	SW	10	41N	75W	--	--	--	A, ?, ?	A, 0, 0
MR-5*	FEHA	T	SW	NW	3	41N	75W	--	--	--	--	A, 0, 0
MR-6*	FEHA	T	SW	NW	3	41N	75W	--	--	--	U	D-N
MR-7	FEHA	G	NW	NE	15	41N	75W	--	--	--	A,0,0	I
MR-8*	FEHA	G	SE	NE	2	41N	75W	--	--	--	I	A, 1+, 1

Table 2.8-15. Raptor nest locations, status, and productivity at the Moore Ranch Uranium Project from 2003 through 2007.

BLM ID[1]	Species[2]	Subst-rate[3]	¼	¼	Sec	TWP	RNG	Nest Status & Productivity[4]				
								2003	2004	2005	2006	2007[5]
MR-9*	FEHA	G	SW	SE	36	42N	75W	--	--	--	--	A, 3+, 3
MR-10*	FEHA	G	NW	NE	1	41N	75W	--	--	--	--	I
MR=11*	FEHA	G	NE	SW	35	42N	75W	--	--	--	--	I

* Nest sites within the proposed Moore Ranch Project License area.

[1] BLM ID numbers obtained from the *September 2006 Raptors Database.* Nests without assigned BLM ID numbers were discovered during baseline studies for the Moore Ranch Project, and are numbered sequentially from west to east as MR-#.

[2] Species Codes
BUTEO = Unknown buteo
FEHA = Ferruginous hawk
GHOW = Great horned owl
RTHA = Red-tailed hawk
SWHA = Swainson's hawk
CAGO = Canada goose

[3] Nest Substrate Codes
CB = Creek bank
CW = Cottonwood
ELM = Elm tree
G = Ground
PO = Power pole
T = Tree species
WIL = Willow

[4] Nest Status Codes
X,#,# = Status, number of young hatched, number of young fledged.
# + = Minimum estimate
A =Active
ALT =Alternate nest
A-T =Active-tended, no eggs laid
U =Unknown
D-N = Destroyed, natural causes
I = Inactive
--- = Nonexistent or undiscovered
? = Final production undetermined

[5] Due to previous years' coverage, only locations within one mile of portions of the License area that had never been surveyed before (N and W ¼ Section 1 and W ½ Section 4, T41N, R75W; and SE ¼ Section 36, W ½ Section 33, and SE ¼ Section 28 T42N, R75W) were required by WGFD to be checked during 2007.

2.8.5.3.5 Upland Game Birds

The only upland game bird known to regularly occur in the vicinity of the Moore Ranch Project is the mourning dove (*Zenaida macroura*). This species is a relatively common breeder in Campbell County, and is the most prevalent upland game bird in the general analysis area. Doves are often seen in the area during migration, with fewer observations during the nesting season. Most sightings at the Moore Ranch Project occurred near sites with water sources or trees, though they were occasionally recorded in upland grassland habitats.

The greater sage-grouse is a species of concern throughout the west, and is considered a "landscape species" due to its use of wide expanses of sagebrush habitats. Sage-grouse are found in sagebrush shrubland habitats, and sagebrush is essential during all seasons and for every phase of their life cycle. Sage-grouse in Wyoming are regulated by the WGFD. However, since July 2002, the USFWS has received at least three petitions requesting that the greater sage-grouse be listed as threatened or endangered across its entire range. Following a 12-month status review of the best available scientific and commercial information on the species, the USFWS found that listing was not warranted at this time. However, the agency continues to have concerns regarding sage-grouse population status, trends and threats, as well as concerns for other sagebrush obligates (USFWS 2005). As part of its "not warranted" listing determination, the USFWS indicated the need for continued efforts to conserve sage-grouse and sagebrush habitat on a long-term basis, and encouraged continued development and implementation of conservation strategies throughout the species' range. In May 2002, the USFWS office in Cheyenne, Wyoming, released a list entitled *Coal Mine List of 40 Migratory Bird Species of Management Concern in Wyoming*, which replaced the previous *Migratory Birds of High Federal Interest List*. The greater sage-grouse is included on the updated list, giving further impetus to ongoing annual survey efforts.

Approximately 75% of the Moore Ranch Project area and one-mile perimeter were surveyed annually for sage-grouse leks as part of wildlife studies for adjacent and overlapping CBM projects from 2003 through 2006. The entire License area and one-mile perimeter were surveyed in spring 2007 as part of baseline studies specific for the Moore Ranch Project, with special emphasis on the limited sagebrush stands in that area.

Although the sage-grouse is a year-round resident throughout much of the Powder River Basin, it is rare in the vicinity of the Moore Ranch Project. Potential habitat for this species is limited to relatively small stands scattered throughout the general analysis area, with no large expanses of contiguous sagebrush within several miles of the tract. Consequently, few sage-grouse have ever been documented in the area, and no grouse

leks have ever been discovered on or near the Moore Ranch License area. The nearest known sage-grouse lek (Collins) is located approximately 3.0 miles to the northwest of the Moore Ranch License boundary in T42N, R76W, NW¼ SE¼ Section 13.

2.8.5.3.6 Other Birds

The USFWS uses a specific list entitled *Migratory Bird Species of Management Concern in Wyoming* (MBSMC) for reviews related to non-coal surface disturbance projects (USFWS 2002). This list was taken directly from the Wyoming Bird Conservation Plan (Cerovski et al. 2001). The MBSMC list includes 77 avian species of concern. Twenty-two species are considered to be Level I, defined as species in need of conservation action. The remaining 55 species are classified as Level II, for which continued careful monitoring is recommended. All 77 species are listed in Table 2.8-16, including their primary nesting habitats, historical occurrence in the general area, and whether or not they were observed on the Moore Ranch Project during the 2006-2007 baseline studies.

Surveys for avian species of concern, including mountain plovers, sage-grouse, and bald eagles, were conducted in the Moore Ranch Project area annually from 2003 through 2007, whether for the project itself or as part of surveys associated with overlapping CBM operations. Most surveys occurred primarily in the spring and summer to document migrating and breeding birds, with additional winter searches for bald eagle roost sites. The survey area included most of the proposed License area and one-half-mile perimeter (one-mile for bald eagles) through summer 2006, with the entire area surveyed from fall 2006 through early summer 2007.

Only 5 of the 77 avian species of management concern were documented in the Moore Ranch Project area during baseline surveys from October 2006 through June 2007 (Table 2.8-16): the ferruginous hawk, McCown's longspur (*Calcarius mccownii*), lark bunting (*Calamospiza melanocorys*), vesper sparrow (*Pooecetes gramineus*), and chestnut-collared longspur (*Calcarius ornatus*). The hawk and McCown's longspur are considered as Level I species (conservation action) and the other three are Level II (monitoring). The ferruginous hawk is the only species that has been recorded nesting in the area during surveys conducted in the project area since 2003. However, the remaining four species are presumed to also nest in the area based on their presence and behavior during the breeding season.

Given the habitat characteristics of the Moore Ranch Project area, nine additional avian species of concern could potentially occur there: the bald eagle (recently delisted), Swainson's hawk, long-billed curlew (*Numenius americanus*), short-eared owl, upland sandpiper (*Bartramia longicauda*) (all five as Level I species), grasshopper sparrow (*Ammodramus savannarum*), loggerhead shrike (*Lanius ludovicianus*), and lark sparrow

(*Chondestes grammacus*) (all Level II species). Burrowing owls (Level I) could occur in the project area, but the lack of occupied prairie dog colonies there would restrict those owls to nesting in existing badger (*Taxidea taxus*) burrows or canid dens. The remaining 63 species have either never been documented in the project area during species-specific surveys, would be limited to spring or fall migration periods, or are not likely to occur there at all due to habitat and/or range restrictions (e.g., no treed riparian corridors, coniferous forests, sage expanses, large permanent water bodies).

Table 2.8-16. Migratory Bird Species of Management Concern in Wyoming-Non-coal List.

Species	Primary Nesting Habitat(s)	Status/Occurrence in Project Region[1]	Occurrence Within Project Area[2]
LEVEL I SPECIES – CONSERVATION ACTION NEEDED			
Mountain plover *Charadrius montanus*	Short-grass prairie, shrub-steppe	Locally common breeder	No records
Trumpeter swan *Cygnus buccinator*	Wetlands	No records	No records
Greater sage-grouse *Centrocercus urophasianus*	Shrub-steppe	Year-round resident	No records
McCown's longspur *Calcarius mccownii*	Short-grass prairie, shrub-steppe	Breeder	Observed, presumed breeder
Baird's sparrow *Ammodramus bairdii*	Short-grass prairie	Uncommon, potential breeder	Low No records
Ferruginous hawk *Buteo regalis*	Shrub-steppe, grasslands	Breeder	Observed, breeder
Brewer's sparrow *Spizella breweri*	Shrub-steppe, montane shrublands	Breeder	No records
Wilson's phalarope *Phalaropus tricolor*	Wetlands	Breeder	Observed, potential breeder
Franklin's gull *Larus pipixcan*	Wetlands	Uncommon migrant	No records
Sage sparrow *Amphispiza belli*	Shrub-steppe, montane shrublands	Uncommon breeder	No records
Swainson's hawk *Buteo swainsoni*	Plains/Basin riparian, grasslands	Uncommon breeder	No records
Long-billed curlew *Numenius americanus*	Short-grass prairie	Uncommon migrant	No records
Short-eared owl *Asio flammeus*	Short-grass prairie, shrub-steppe	Irregular breeder	No records
Northern goshawk *Accipiter gentiles*	Conifer, aspen	Uncommon migrant	No records
Peregrine falcon *Falco peregrinus*	Cliffs	Rare migrant	No records
Burrowing owl *Athene cunicularia*	Grasslands, shrub-steppe	Uncommon breeder	No records
Forster's tern *Sterna forsteri*	Wetlands	Uncommon migrant	No records
Bald eagle *Haliaeetus leucocephalus*	Riparian	Common migrant, winter resident, potential breeder	No records
Upland sandpiper *Bartramia longicauda*	Short-grass prairie, shrub-steppe	Uncommon breeder	One record, potential breeder

Table 2.8-16. Migratory Bird Species of Management Concern in Wyoming-Non-coal List.

Species	Primary Nesting Habitat(s)	Status/Occurrence in Project Region[1]	Occurrence Within Project Area[2]
Black tern *Chlidonias niger*	Wetlands	Rare migrant	No records
Whooping crane *Grus Americana*	Wetlands	No records	No records
Piping plover *Charadrius melodus*	Wetlands, aquatic	No records	No records
LEVEL II SPECIES – CONTINUED MONITORING RECOMMENDED			
Calliope Humming Bird *Stellula calliope*	Mid-elevation conifers, montane riparian	No records	No records
Lewis Woodpecker *Melanerpes lewis*	Low elevation conifer, plains/basin riparian	Uncommon occurrence	No records
Cassin's Kingbird *Tyrannus vociferans*	Juniper Woodland Plain/basin riparian	No records	No records
Lark Bunting *Calamospiza melanocorys*	Shortgrass prairie, shrub steppe	Breeder	Observed, presumed breeder
American White Pelican *Pelecanus erythrorhynchos*	Aquatic-rivers, lakes, ponds	Uncommon occurrence	No records
William's Sapsucker *Sphyrapicus thyroideus*	Mid-elevation conifer	No records	No records
Black-backed Woodpecker *Picoides arcticus*	Mid-elevation conifer, High elevation conifer	Uncommon occurrence	No records
Gray Flycatcher *Empidonax wrightii*	Juniper woodland, mountain-foothills shrub	No records	No records
Juniper Titmouse *Baeolophus ridgwayi*	Juniper woodlands	No records	No records
Dickcissel *Spiza americana*	Shortgrass prairie	Rare occurrence	No records
Chestnut-collared Longspur *Calcarius ornatus*	Shortgrass prairie	Potential breeder	Observed, likely breeder
Harlequin Duck *Histrionicus histrionicus*	Montane riparian	No records	No records
Snowy Plover *Charadrius alexandrinus*	Wetlands	No records	No records
Black-chinned Hummingbird *Archilochus alexandri*	Plains/basin riparian, shrub-steppe	No records	No records
Rufous Hummingbird *Selasphorus rufus*	Mid-elevation conifer	Uncommon occurrence	No records
Red-naped Sapsucker *Sphyrapicus nuchalis*	Aspen	No records	No records

Table 2.8-16. Migratory Bird Species of Management Concern in Wyoming-Non-coal List.

Species	Primary Nesting Habitat(s)	Status/Occurrence in Project Region[1]	Occurrence Within Project Area[2]
American Three-toed Woodpecker *Picoides dorsalis*	Mid-elevation conifer, high elevation conifer	No records	No records
Willow Flycatcher *Empidonax traillii*	Montane riparian Plains/basin riparian	Breeder	No records
Hammond's Flycatcher *Epidonax hammondii*	Higher-elevation confer with aspen, montane riparian	No records	No records
Codilleran Flycatcher *Empidonax occidentalis*	Montane riparian, mid-elevation conifer	Uncommon occurrence	No records
Pygmy Nuthatch *Sitta pygmaea*	Low-elevation conifer	No records	No records
Marsh Wren *Cistothorus palustris*	Wetlands	No records	No records
American Dipper *Cinclus mexicanus*	Montane riparian	No records	No records
Plumbeouos Vireo *Vireo plumbeus*	Mid-elevation conifer, low-elevation conifer	No records	No records
Townsend's Warbler *Dendroica townsendii*	High-elevation conifer, mid-elevation conifer	No records	No records
Dusky Flycatcher *Empidonax oberholseri*	Low-elevation conifer, aspen, mountain-foothills shrub	No records	No records
Western Bluebird *Sialia Mexicana*	Juniper woodlands, low-elevation conifer	Breeder	No records
Sage Thrasher *Oreoscoptes montanus*	Shrub-steppe	Breeder	No records
Grasshopper Sparrow *Ammodramus savannarum*	Short-grass prairie, shrub-steppe	Breeder	No records
Bobolink *Dolichonyx oryzivorus*	Short-grass prairie, shrub-steppe	Uncommon occurrence	No records
Common Loon *Gavia immer*	Lakes, wetlands	Uncommon occurrence	No records
Black-billed Cuckoo *Coccyzus erythropthalmus*	Plains/basin riparian	No records	No records
Red-headed Woodpecker *Melanerpes erythrocephalus*	Plains/basin riparian, low-elevation conifer	Breeder	No records
Yellow-billed Cuckoo *Coccyzus americanus*	Plains/basin riparian	Uncommon occurrence	No records
Eastern Screech Owl *Megascops asio*	Plains/basin riparian	No records	No records

Table 2.8-16. Migratory Bird Species of Management Concern in Wyoming-Non-coal List.

Species	Primary Nesting Habitat(s)	Status/Occurrence in Project Region[1]	Occurrence Within Project Area[2]
Western Screech Owl *Megascops kennicottii*	Plains/basin riparian	No records	No records
Great Gray Owl *Strix nebulosa*	Mid-elevation conifer, High-elevation conifer	No records	No records
Boreal Owl *Aegolius funereus*	High elevation conifer	No records	No records
Broad-tailed Hummingbird *Selasphorus platycercus*	Montane riparian, Plains/basin riparian mid-elevation conifer	No records	No records
Western Scrub-Jay *Aphelocoma californica*	Juniper woodlands	No records	No records
Loggerhead shrike *Lanius ludovicianus*	Shrub-steppe	Breeder	No records
Vesper Sparrow *Pooecetes gramineus*	Shrub-steppe	Breeder	Observed, presumed breeder
Lark Sparrow *Chondestes grammacus*	Shrub-steppe	Breeder	No records
Golden-crowned Kinglet *Regulus satrapa*	High-elevation conifer	No records	No records
McGillivray's Warbler *Oporornis tolmiei*	Montane riparian, Plains/basin riparian	Uncommon occurrence	No records
Ash-throated Flycatcher *Myiarchus cinerascens*	Juniper woodlands	Uncommon occurrence	No records
Bushtit *Psaltriparus minimus*	Juniper woodlands	No records	No records
Brown Creeper *Certhia americana*	Mid-elevation conifer, high-elevation conifer	No records	No records
Merlin *Falco columbarius*	Low-elevation conifer	Breeder	No records
Sprague's Pipit *Anthus spragueii*	Grassland, Plains/Basin riparian, short-grass prairie	No records	No records
Barn Owl *Tyto alba*	Short-grass prairie, urban	Uncommon occurrence	No records
White-faced Ibis *Plegadis chihi*	Wetland, aquatic	Uncommon occurrence	No records

Table 2.8-16. Migratory Bird Species of Management Concern in Wyoming-Non-coal List.

Species	Primary Nesting Habitat(s)	Status/Occurrence in Project Region[1]	Occurrence Within Project Area[2]
American Bittern *Botaurus lentiginosus*	Wetland, aquatic	Uncommon occurrence	No records
Common Tern *Sterna hirundo*	Wetland, aquatic	Uncommon occurrence	No records
Purple Martin *Progne subis*	Wetland, aquatic/Basin riparian, montane riparian	No records	No records

[1] Wyoming latilong encompassing Moore Ranch Project (from Cerovski et al. 2004).
[2] Observed within proposed Moore Ranch Project permit area during wildlife surveys conducted from 2003-2007.

2.8.5.3.7 Waterfowl, Shorebirds

Wildlife surveys completed specifically for EMC and other energy projects in the area have documented numerous other wildlife species that inhabit the region, including various species of waterfowl and shorebirds. These species may or may not be locally common inhabitants of the area, depending on the quantity and quality of aquatic habitats present.

Under natural conditions, the proposed Moore Ranch License area provides extremely limited and marginal habitat for waterfowl and shorebirds. As described for other aquatics-related species, above, natural aquatic habitats are mainly present during spring migration. Many of those water features are reduced to small, isolated pools or are completely dry during summer. Recent CBM development in the Moore Ranch Project area has increased the number of water sources present in that area, though their flow and depth are still relatively minimal in nature and duration.

Several species of waterfowl and shorebird species were observed within the proposed License area during baseline studies conducted in 2006 and 2007. Those sightings consisted primarily of relatively low numbers of common species such as the mallard (*Anas platyrhynchos*) and killdeer (*Charadrius vociferus*), with other species recorded less often. Most observations occurred during spring migration in early 2007.

2.8.5.4 Threatened, Endangered, or Candidate Species

2.8.5.4.1 Bald Eagle (Haliaeetus leucocephalus)

The USFWS officially listed the bald eagle as an endangered species in 43 of the lower 48 states on July 4, 1976. The listing was due to a combination of several factors, including widespread habitat loss, negative effects of pesticide use on reproductive success, indiscriminant shooting, and others. The status of the bald eagle was upgraded to threatened throughout the lower 48 states in 1995. Bald eagle population trends began increasing throughout most of the species' range in the early 1990's, and it was proposed for de-listing in 1999. The USFWS removed (delisted) the bald eagle in the lower 48 states from the Federal List of Endangered and Threatened Wildlife in July 2007 (Federal Register 2007). However, the species will remain under the protection of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Due to its status as a T&E species during field surveys for the Moore Ranch Project, and the recent occurrence of this delisting, the remaining discussion of bald eagles in this section is provided.

Bald eagles occur throughout North America, from Alaska and Canada south to Florida, the Gulf Coast, and northern Mexico. The northwest coast of North America serves as the stronghold for this species, with approximately one-half of the population inhabiting Alaska. The bald eagle is a relatively common winter resident and migrant in the Powder River Basin of northeast Wyoming, but only rarely nests in that region. In general, that area does not support consistent or concentrated sources of prey or carrion (e.g., fisheries, large groups of big game, waterfowl, or sheep, etc.) that would be expected to attract roosting or nesting bald eagles.

Biology and Habitat Requirements

Bald eagles typically nest in large trees within a stand of mature, similarly sized trees either along or in proximity (within 0.7 mile) to rivers, lakes, or reservoirs that harbor adequate fish populations. Those areas tend to be remote and experience little disturbance (Johnsgard 1990). Typically, the nest is placed in the crown of a large cottonwood or pine, but if the topography allows, eagles will nest on cliff edges or escarpments. Open-canopied trees and snags provide required perches in nesting and foraging areas.

All verified bald eagle nests in northeastern Wyoming (BLM Buffalo Field office GIS database) are located in significant, mature cottonwood stands along larger creeks or rivers (i.e., Tongue River, Powder River, Clear Creek, and Little Thunder Creek). Nesting attempts are rare elsewhere in the Powder River Basin (Beske 1994). Fish and waterfowl are the primary source of food for nesting bald eagles. Where available, large to mid-size carrion and large rodents (e.g., prairie dogs) can also be an important dietary component.

Bald eagles nest and winter throughout Wyoming, though typically are not locally abundant in the northeastern portion of the state. The species regularly migrates through and winters in Campbell County (Cerovski et al. 2004), and has often been documented during winter and early spring at local coal mines (see Annual Reports on file with the USFWS and LQD). Most eagles that migrate through or winter in Campbell County roost communally in stands of large ponderosa pine, along wooded cottonwood-riparian corridors, or in isolated stands of large trees. As water is scarce in the region, especially during winter, those birds likely forage widely for lagomorphs or carrion.

Existing Environment

No bald eagle nests or winter roosts have been documented within 1.0 mile of the Moore Ranch License area. The nearest documented winter roost is along the Powder River, approximately 10.0 miles to the northwest. Potential habitat for bald eagle nesting and roosting activities is quite limited within the project area (License and one-mile

perimeter). Only two small (10 trees or less) stands of mature cottonwoods are present on the Moore Ranch Project area itself, in the southwestern corner of the proposed License area. Other potential habitat is restricted to isolated or small (fewer than five trees) stands in the southern and southwestern portions of the one-mile perimeter. In general, the study area does not contain unique or sizeable, concentrated prey sources (e.g., fisheries, waterfowl wintering areas) that would be expected to attract bald eagles. No prairie dog colonies lie within the Moore Ranch study area boundary. Sheep and lambs are present in the spring, when bald eagles have typically left the region, though winter flocks are regularly pastured there. The area does not support a large big game herd, though some groups do winter in the area. No sightings of bald eagles occurred within the Moore Ranch survey area during winter roost surveys or other baseline surveys completed in that area from October 2006 through June 2007. No bald eagles were observed in or near the proposed License area during overlapping surveys in the area annually since 2003.

2.8.5.4.2 Black-footed Ferret (Mustela nigripes)

No occupied prairie dog colonies are present on or within one mile of the Moore Ranch Project area. Furthermore, that area is not within the boundaries of potential ferret reintroduction areas (USFS 2002, Grenier 2003). Consequently, the Proposed Action Alternative will have no direct, indirect, or cumulative effects on black-footed ferrets. The No Action Alternative also will have no effects on this species.

2.8.5.5 Aquatic Resources

2.8.5.5.1 Amphibians, Reptiles, and Aquatic Species

Wildlife surveys completed specifically for EMC and other energy projects in the area, as well as biological research projects in the eastern Powder River Basin, have documented numerous other wildlife species that inhabit the region, including various amphibians and reptiles. These species may or may not be locally common inhabitants of the area, depending on the quantity and quality of aquatic and other important habitats present.

Under natural conditions, aquatic habitat on and near the Moore Ranch Project area is limited by the ephemeral nature of surface waters in the general analysis area. The lack of deep-water habitat, and extensive and persistent water sources precludes the presence of fish, and limits the abundance and diversity of other aquatic species. As discussed above, water discharged from CBM wells has enhanced the water supply within some

drainages in the general analysis area. However, those enhanced areas are still relatively limited and/or isolated in nature, and no perennial drainages are present in the general analysis area.

Few reptiles and amphibians have been recorded during wildlife surveys conducted in the general analysis area over the years. The relatively low quantity and quality of aquatic habitat in the area reduces its potential to attract many of those species, particularly amphibians and turtles. Likewise, few rock outcrops or other habitats attractive to terrestrial reptiles are present in the project area.

The only herpetological species recorded within the proposed Moore Ranch Project License area during specific baseline studies in 2006 and 2007 was the common bullsnake (*Pituophis cantenifer sayi*), though others may have been present without being detected.

2.8.5.6 References

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ADDENDUM 2.8-A

VEGETATION SPECIES SUMMARY

			Vegetation Community			
Code	Scientific Name	Common Name	Meadow Grassland	Upland Grassland	Agricultural Grassland	Big Sage Shrubland
Annual Grasses						
ALOCAR	*Alopecurus carolinianus*	Foxtail	X			
BROCOM	*Bromus commutatus*	Bromegrass	X			
BROJAP	*Bromus japonicus*	Japanese brome	X	X	X	X
BROTEC	*Bromus tectorum*	Cheatgrass	X	X	X	X
VULOCT	*Vulpia octoflora*	Sixweeks fescue	X	X	X	X
Perennial Grasses seasonality Unknown						
CARDOU	*Carex douglasii*	Douglas sedge	X			
Cool Season Grasses						
ACHHYM	*Achnatherum hymenoides*	Indian ricegrass			X	
AGRCRI	*Agropyron cristatum*	Crested wheatgrass	X	X	X	
AGRSTO	*Agrostis stolonifera*	Carpet bent	X			
BROINE	*Bromus inermis*	Smooth brome	X		X	
CARFIL	*Carex filifolia*	Threadleaf sedge	X	X	X	X
CARNEB	*Carex nebrascensis*	Nebraska sedge	X			
CARPRA	*Carex praegracilis*	Silver sedge	X			
CARSPP	*Carex* species	Sedge	X			
CARSTE	*Carex stenophylla*	Needleleaf sedge	X			
ELEACI	*Eleocharis acicularis*	Slender spikerush	X			
ELEPAL	*Eleocharis palustris*	Creeping spikerush	X			
ELYHIS	*Elymus hispidus*	Intermediate wheatgrass		X		
ELYLAN	*Elymus lanceolatus*	Thickspike wheatgrass	X	X	X	X
ELYSMI	*Elymus smithii*	Western wheatgrass	X	X	X	X
HESCOM	*Hesperostipa comata*	Needle-and-thread	X	X	X	X
JUNBAL	*Juncus balticus*	Baltic rush	X			
KOEMAC	*Koeleria macrantha*	Prairie junegrass	X	X	X	X
NASVIR	*Nassella viridula*	Green needlegrass	X	X	X	X
POABUL	*Poa bulbosa*	Bulbous bluegrass			X	
POACOM	*Poa compressa*	Canada bluegrass		X		
POAPRA	*Poa pratensis*	Kentucky bluegrass	X	X	X	X
POASEC	*Poa secunda*	Sandberg bluegrass	X	X	X	X
POASPP	*Poa* species	Bluegrass	X		X	
SCISPP	*Scirpus* species	Bulrush	X			
Warm Season Grasses						
BOUGRA	*Bouteloua gracilis*	Blue grama		X	X	X
BUCDAC	*Buchloe dactyloides*	Buffalo grass		X		X

			Vegetation Community			
Code	Scientific Name	Common Name	Meadow Grassland	Upland Grassland	Agricultural Grassland	Big Sage Shrubland
Annual Forbs						
ALYALY	*Alyssum alyssoides*	Pale alyssum	X	X		X
ALYDES	*Alyssum desertorum*	Desert alyssum	X	X	X	X
ALYSPP	*Alyssum* species	Alyssum		X		X
BASSIE	*Bassia sieversiana*	Fireweed summercypress			X	
CAMMIC	*Camelina microcarpa*	Littleseed falseflax	X	X	X	X
CHEBER	*Chenopodium berlandieri*	Pitseed goosefoot	X			
DESPIN	*Descurainia pinnata*	Tansy mustard	X		X	
DESSOP	*Descurainia sophia*	Flixweed tansy mustard	X	X	X	X
HALGLO	*Halogeton glomeratus*	Halogeton		X		X
LAPRED	*Lapulla redowskii*	Beggar's tick	X	X	X	X
PHALIN	*Phacelia linearis*	Phacelia				X
PLAPAT	*Plantago patagonica*	Pursh's plantain		X	X	X
SALTRA	*Salsola tragus*	Russian thistle			X	
THLARV	*Thlaspi arvense*	Field pennycress	X		X	
VERPER	*Veronica peregrina*	Purslane speedwell	X			
Biennial Forbs						
MELOFF	*Melilotus officianalis*	Yellow sweetclover	X		X	
TRADUB	*Tragopogon dubius*	Salsify	X	X	X	
Perennial Forbs						
ACHMIL	*Achillea millefolium*	Western yarrow	X	X	X	X
AGOGLA	*Agoseris glauca*	Pale agoseris	X	X		
ALLTEX	*Allium textile*	Textile onion	X	X		X
AMBPSI	*Ambrosia psilostachya*	Western ragweed		X		
ANTDIM	*Antennaria dimorpha*	Low pussytoes	X		X	
ANTMIC	*Antennaria microphylla*	Littleleaf pussytoes	X			X
ASTBIS	*Astragalus bisulcatus*	Two-grooved milkvetch	X	X		
ASTMIS	*Astragalus miser*	Weedy milkvetch	X	X	X	X
BESWYO	*Besseya wyomingensis*	Wyoming besseya	X			
CALNUT	*Calochortus nuttallii*	Sego lily	X			
CERARV	*Cerastium arvense*	Field mouse ear	X		X	X
CIRARV	*Cirsium arvense*	Canada thistle	X	X	X	X
CONARV	*Convolvulus arvensis*	Field bindweed			X	X
DELBIC	*Delphinium bicolor*	Little larkspur	X			
ECHANG	*Echinacea angustifolia*	Blacksamson echinacea	X			X
EQUARV	*Equisetum arvense*	Field horsetail	X			
EQULAE	*Equisetum laevigatum*	Smooth horsetail	X			
ERIOCH	*Erigeron ochroleucus*	Fleabane		X	X	X

			Vegetation Community			
Code	Scientific Name	Common Name	Meadow Grassland	Upland Grassland	Agricultural Grassland	Big Sage Shrubland
GAUCOC	*Gaura coccinea*	Scarlet gaura	X	X	X	X
GRISQU	*Grindelia squarrosa*	Gumweed			X	X
HETVIL	*Heterotheca villosa*	Golden aster	X			
LEWRED	*Lewisia rediviva*	Bitterroot	X	X		X
LINLEW	*Linum lewisii*	Blue flax	X			
LINPUN	*Linanthus pungens*	Granite prickly gilia	X			
LITINC	*Lithospermum incisum*	Pacoon	X			
LOMFOE	*Lomatium foeniculaceum*	Biscuitroot	X	X	X	X
LYGJUN	*Lygodesmia juncea*	Skeletonweed			X	
MACPIN	*Machaeranthera pinnatifida*	Ironplant goldenweed		X		
MEDLUP	*Medicago lupulina*	Black medic	X	X	X	
MEDSAT	*Medicago sativa*	Alfalfa medic	X			
MEDSPP	*Medicago* species	Medic	X		X	
MENARV	*Mentha arvensis*	Field mint	X			
MUSDIV	*Musineon divaricatum*	Wild parsley	X	X		
PEDARG	*Pediomelum argophyllum*	Silverleaf scurfpea	X		X	
PEDESC	*Pediomelum esculentum*	Breadroot scurfpea		X		X
PENALB	*Penstemon albidus*	White beardtounge		X		
PENERI	*Penstemon eriantherus*	Fuzzytounge penstemon			X	
PHLHOO	*Phlox hoodii*	Hoods phlox		X		X
PHLLON	*Phlox longifolia*	Longleaf phlox		X		X
POTSPP	*Potentilla* species	Cinquefoil	X			
RUMSPP	*Rumex* species	Dock	X			
SOLSPP	*Solidago* species	Goldenrod	X			
SPHCOC	*Sphaeralcea coccinea*	Scarlet globemallow	X	X	X	X
TAROFF	*Taraxacum officinale*	Common dandelion	X	X	X	X
TYPLAT	*Typha latifolia*	Common cattail	X			
VICAME	*Vicia americana*	American vetch	X	X	X	X
Perennial Half & Sub-Shrubs						
ARTFRI	*Artemisia frigida*	Fringed sagewort		X	X	X
ARTLUD	*Artemisia ludoviciana*	Louisiana sagewort	X	X		
ARTPED	*Artemisia pedatifida*	Birdfoot sagewort		X		X
ATRGAR	*Atriplex gardneri*	Gardner's saltbush			X	
GUTSAR	*Gutierrezia sarothrae*	Broom snakeweed			X	
HYMRIC	*Hymenoxys richardsonii*	Pingue rubberweed			X	X
Perennial Shrubs						
ARTCAN	*Artemisia cana*	Silver sagebrush	X	X		X
ARTTRI	*Artemisia tridentata*	Big sagebrush		X		X
ATRCAN	*Atriplex canascens*	Four-wing saltbush				X
Succulent						
CORVIV	*Coryphantha vivipara*	Purple ball cactus			X	
OPUPOL	*Opuntia polyacantha*	Plains prickly pear	X	X	X	X

			Vegetation Community			
Code	Scientific Name	Common Name	Meadow Grassland	Upland Grassland	Agricultural Grassland	Big Sage Shrubland
Fungi						
MUSSPP	*Mushroom* species	Mushroom	X	X	X	X
Lichen						
XANSPP	*Xanthoparmelia* species	Lichen		X		X

Species observed but not sampled.

ADDENDUM 2.8-B

VEGETATION COVER SUMMARIES

Energy Metals
Moore Ranch
Report: Cover Summary

Site Id: UG
Name: Upland grassland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/15/2007

*() Represents Second Hit Data

Sample Method: Point Intercept
Sample Size: 50 Meter Transect
Number of Samples: 20
Report Date: 8/13/2007

Species	Cover (%) Mean Absolute *	Cover (%) Relative	Std. Dev. n - 1	Frequency (%) Absolute	Frequency (%) Relative	I.V.	Rank
Annual & Biennial Forbs							
Alyssum desertorum	9.60(1.90)	14.04	6.38	85.00	8.90	22.94	3
Alyssum species	0.20	0.29	0.62	10.00	1.05	1.34	24
Halogeton glomeratus	0.20	0.29	0.62	10.00	1.05	1.34	25
Plantago patagonica	2.60(0.50)	3.80	3.95	55.00	5.76	9.56	7
Sub-Total	12.60	18.42					
Annual Grasses							
Bromus japonicus	2.40(0.20)	3.51	4.66	40.00	4.19	7.70	8
Bromus tectorum	4.00(0.40)	5.85	4.94	65.00	6.81	12.66	6
Vulpia octoflora	1.70(0.30)	2.49	3.39	30.00	3.14	5.63	11
Sub-Total	8.10	11.85					
Cacti & Succulents							
Opuntia polyacantha	0.50	0.73	1.10	20.00	2.09	2.82	16
Sub-Total	0.50	0.73					
Cool Season Perennial Grasses							
Carex filifolia	10.50(0.90)	15.35	9.86	90.00	9.42	24.77	2
Elymus lanceolatus	0.20(0.10)	0.29	0.89	5.00	0.52	0.81	28
Elymus smithii	14.60(2.10)	21.35	8.08	95.00	9.95	31.30	1
Hesperostipa comata	4.10(0.40)	5.99	4.56	65.00	6.81	12.80	5
Koeleria macrantha	0.30(0.10)	0.44	0.98	15.00	1.57	2.01	20
Poa secunda	1.40(0.10)	2.05	2.98	30.00	3.14	5.19	12
Sub-Total	31.10	45.47					
Full Shrubs							
Artemisia cana	0.20(0.10)	0.29	0.62	15.00	1.57	1.86	22
Artemisia tridentata	0.70	1.02	1.63	20.00	2.09	3.11	15
Sub-Total	0.90	1.31					
Introduced Perennial Grasses							
Elymus hispidus	0.50	0.73	2.24	5.00	0.52	1.25	27
Poa pratensis	2.10	3.07	4.13	30.00	3.14	6.21	10
Sub-Total	2.60	3.80					
Lower Plants							
Lichens	5.60(0.60)	8.19	4.97	90.00	9.42	17.61	4
Sub-Total	5.60	8.19					
Perennial Forbs							
Achillea millefolium	0.10	0.15	0.45	5.00	0.52	0.67	29
Allium textile	0.10	0.15	0.45	5.00	0.52	0.67	30
Ambrosia psilostachya	0.40	0.58	1.05	15.00	1.57	2.15	18
Lomatium foeniculaceum	0.20	0.29	0.62	10.00	1.05	1.34	26
Phlox hoodii	1.70	2.49	2.45	40.00	4.19	6.68	9
Phlox longifolia	0.40	0.58	1.23	10.00	1.05	1.63	23
Psoralea tenuiflora	0.10	0.15	0.45	5.00	0.52	0.67	32
Sphaeralcea coccinea	0.40	0.58	0.82	20.00	2.09	2.67	17
Vicia americana	0.60(0.30)	0.88	1.14	30.00	3.14	4.02	13
Sub-Total	4.00	5.85					
Sub-Shrubs & Half-Shrubs							
Artemisia frigida	0.10	0.15	0.45	5.00	0.52	0.67	31
Artemisia pedatifida	0.60	0.88	2.26	10.00	1.05	1.93	21

Energy Metals
Moore Ranch
Report: Cover Summary

Site Id: M
Name: Meadow grassland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/15/2007

*() Represents Second Hit Data

Sample Method: Point Intercept
Sample Size: 50 Meter Transect
Number of Samples: 20
Report Date: 8/13/2007

Species	Cover (%) Mean Absolute *	Relative	Std. Dev. n - 1	Frequency (%) Absolute	Relative	I.V.	Rank
Agoseris glauca	0.50	0.62	1.10	20.00	1.91	2.53	21
Antennaria dimorpha	0.20	0.25	0.89	5.00	0.48	0.73	38
Astragalus miser	0.10	0.12	0.45	5.00	0.48	0.60	42
Besseya wyomingensis	0.60	0.74	1.96	10.00	0.96	1.70	30
Cerastium arvense	0.70	0.87	1.63	20.00	1.91	2.78	15
Cirsium arvense	0.40	0.49	0.82	20.00	1.91	2.40	22
Delphinium bicolor	0.70	0.87	1.87	20.00	1.91	2.78	16
Echinacea angustifolia	0.70	0.87	1.87	20.00	1.91	2.78	17
Equisetum arvense	0.20	0.25	0.62	10.00	0.96	1.21	33
Equisetum laevigatum	0.20	0.25	0.62	10.00	0.96	1.21	34
Lithospermum incisum	0.10	0.12	0.45	5.00	0.48	0.60	50
Lomatium foeniculaceum	0.10	0.12	0.45	5.00	0.48	0.60	51
Medicago lupulina	0.30	0.37	0.98	10.00	0.96	1.33	32
Medicago sp.	0.40	0.49	1.39	10.00	0.96	1.45	31
Mentha arvensis	0.10(0.10)	0.12	0.45	5.00	0.48	0.60	52
Solidago sp.	0.40	0.49	1.05	15.00	1.44	1.93	27
Taraxacum officinale	1.50(0.20)	1.85	3.49	35.00	3.35	5.20	10
Trifolium species	0.10	0.12	0.45	5.00	0.48	0.60	55
Vicia americana	2.00(0.50)	2.47	3.37	50.00	4.78	7.25	8
Sub-Total	13.10	16.18					
Sub-Shrubs & Half-Shrubs							
Artemisia ludoviciana	0.30(0.10)	0.37	0.73	15.00	1.44	1.81	29
Linanthus pungens	0.10	0.12	0.45	5.00	0.48	0.60	49
Sub-Total	0.40	0.49					
Total Stratified Vegetation Cover	87.00	2.01	8.01				
Total Non-Stratified Vegetation Cover	80.90	2.01	6.37				
LITTER/ROCK	13.90		7.27				
Total Ground Cover	94.80		6.33				
BARE SOIL	5.20		6.37				
Total Cover	100.00		2.24				
Species Abundance (No. of Species/Sample)	56.00						

Energy Metals
Moore Ranch
Report: Cover Summary

Page 1 of 2

Site Id: M
Name: Meadow grassland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/15/2007

*() Represents Second Hit Data

Sample Method: Point Intercept
Sample Size: 50 Meter Transect
Number of Samples: 20
Report Date: 8/13/2007

Species	Cover (%) Mean Absolute *	Cover (%) Relative	Std. Dev. n - 1	Frequency (%) Absolute	Frequency (%) Relative	I.V.	Rank
Annual & Biennial Forbs							
Alyssum alyssoides	1.10	1.36	3.52	10.00	0.96	2.32	23
Alyssum desertorum	7.00(0.70)	8.65	6.76	65.00	6.22	14.87	3
Camelina microcarpa	0.10	0.12	0.45	5.00	0.48	0.60	43
Chenopodium berlandieri	0.40	0.49	1.79	5.00	0.48	0.97	35
Descurainia pinnata	0.10	0.12	0.45	5.00	0.48	0.60	47
Descurainia sophia	0.10	0.12	0.45	5.00	0.48	0.60	48
Lappula redowskii	0.70	0.87	2.70	10.00	0.96	1.83	28
Sub-Total	9.50	11.73					
Annual Grasses							
Alopecurus carolinianus	0.10	0.12	0.45	5.00	0.48	0.60	41
Bromus commutatus	0.20	0.25	0.89	5.00	0.48	0.73	39
Bromus japonicus	2.40	2.97	5.30	25.00	2.39	5.36	9
Bromus tectorum	6.60(0.80)	8.16	6.90	70.00	6.70	14.86	4
Vulpia octoflora	0.10	0.12	0.45	5.00	0.48	0.60	56
Sub-Total	9.40	11.62					
Cacti & Succulents							
Opuntia polyacantha	0.10	0.12	0.45	5.00	0.48	0.60	54
Sub-Total	0.10	0.12					
Cool Season Perennial Grasses							
Agrostis stolonifera	0.10	0.12	0.45	5.00	0.48	0.60	40
Carex douglasii	0.10	0.12	0.45	5.00	0.48	0.60	44
Carex filifolia	0.90(0.20)	1.11	2.38	20.00	1.91	3.02	14
Carex nebrascensis	1.00	1.24	4.03	10.00	0.96	2.20	25
Carex praegracilis	1.00	1.24	2.94	15.00	1.44	2.68	18
Carex sp.	0.10	0.12	0.45	5.00	0.48	0.60	45
Carex stenophylla	0.10	0.12	0.45	5.00	0.48	0.60	46
Eleocharis acicularis	0.30(0.10)	0.37	1.34	5.00	0.48	0.85	37
Elymus lanceolatus	1.40	1.73	3.79	15.00	1.44	3.17	12
Elymus smithii	19.20(0.60)	23.73	17.80	80.00	7.66	31.39	1
Hesperostipa comata	0.90(0.10)	1.11	3.14	15.00	1.44	2.55	20
Juncus balticus	4.10(0.20)	5.07	12.52	30.00	2.87	7.94	7
Koeleria macrantha	0.40	0.49	1.05	15.00	1.44	1.93	26
Nassella viridula	0.10	0.12	0.45	5.00	0.48	0.60	53
Poa secunda	0.30(0.10)	0.37	0.73	20.00	1.91	2.28	24
Poa sp.	0.40	0.49	1.79	5.00	0.48	0.97	36
Scirpus spp	1.30(0.70)	1.61	3.45	15.00	1.44	3.05	13
Sub-Total	31.70	39.16					
Full Shrubs							
Artemisia cana	0.60	0.74	1.31	20.00	1.91	2.65	19
Sub-Total	0.60	0.74					
Introduced Perennial Grasses							
Agropyron cristatum	2.60	3.21	7.11	20.00	1.91	5.12	11
Bromus inermis	7.90(0.40)	9.77	14.79	50.00	4.78	14.55	5
Poa pratensis	5.60(0.50)	6.92	4.75	85.00	8.13	15.05	2
Sub-Total	16.10	19.90					
Perennial Forbs							
Achillea millefolium	3.80(0.60)	4.70	3.89	80.00	7.66	12.36	6

Energy Metals
Moore Ranch
Report: Cover Summary

Site Id: BS
Name: Big sagebrush shrubland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/13/2007

*() Represents Second Hit Data

Sample Method: Point Intercept
Sample Size: 50 Meter Transect
Number of Samples: 20
Report Date: 8/13/2007

Species	Cover (%) Mean Absolute *	Cover (%) Relative	Std. Dev. n - 1	Frequency (%) Absolute	Frequency (%) Relative	I.V.	Rank
Sphaeralcea coccinea	0.90(0.10)	1.27	1.37	40.00	3.65	4.92	14
Taraxacum officinale	0.10	0.14	0.45	5.00	0.46	0.60	37
Vicia americana	3.00(0.40)	4.22	2.64	75.00	6.85	11.07	6
Sub-Total	6.90	9.71					
Sub-Shrubs & Half-Shrubs							
Artemisia frigida	0.40	0.56	1.79	5.00	0.46	1.02	26
Artemisia pedatifida	0.10	0.14	0.45	5.00	0.46	0.60	30
Hymenoxys richardsonii	0.30	0.42	0.98	10.00	0.91	1.33	23
Sub-Total	0.80	1.12					
Warm Season Perennial Grasses							
Bouteloua gracilis	0.50	0.70	2.24	5.00	0.46	1.16	25
Buchloe dactyloides	0.90	1.27	2.20	15.00	1.37	2.64	19
Sub-Total	1.40	1.97					
Total Stratified Vegetation Cover	71.80	2.34	12.78				
Total Non-Stratified Vegetation Cover	67.30	2.34	9.85				
LITTER/ROCK	23.70		12.60				
Total Ground Cover	94.80		6.72				
BARE SOIL	8.90		6.76				
Total Cover	100.00		0.45				
Species Abundance (No. of Species/Sample)	38.00						

Energy Metals
Moore Ranch
Report: Cover Summary

Site Id: BS
Name: Big sagebrush shrubland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/13/2007

*() Represents Second Hit Data

Sample Method: Point Intercept
Sample Size: 50 Meter Transect
Number of Samples: 20
Report Date: 8/13/2007

Species	Cover (%) Mean Absolute *	Relative	Std. Dev. n - 1	Frequency (%) Absolute	Relative	I.V.	Rank
Annual & Biennial Forbs							
Alyssum alyssoides	0.30	0.42	1.34	5.00	0.46	0.88	27
Alyssum desertorum	9.40(1.20)	13.22	5.55	95.00	8.68	21.90	1
Halogeton glomeratus	1.00	1.41	2.10	25.00	2.28	3.69	17
Plantago patagonica	3.70(0.30)	5.20	3.91	65.00	5.94	11.14	5
Sub-Total	14.40	20.25					
Annual Forbs							
Phacelia linearis	0.40	0.56	1.39	10.00	0.91	1.47	22
Sub-Total	0.40	0.56					
Annual Grasses							
Bromus japonicus	4.10	5.77	5.82	40.00	3.65	9.42	11
Bromus tectorum	6.20(1.00)	8.72	8.63	65.00	5.94	14.66	4
Vulpia octoflora	1.60(0.10)	2.25	2.39	35.00	3.20	5.45	13
Sub-Total	11.90	16.74					
Cacti & Succulents							
Opuntia polyacantha	0.10	0.14	0.45	5.00	0.46	0.60	35
Sub-Total	0.10	0.14					
Cool Season Perennial Grasses							
Carex filifolia	3.50(0.10)	4.92	5.31	55.00	5.02	9.94	10
Elymus lanceolatus	0.90	1.27	2.38	20.00	1.83	3.10	18
Elymus smithii	10.20(0.70)	14.35	9.45	75.00	6.85	21.20	2
Hesperostipa comata	3.30	4.64	3.96	60.00	5.48	10.12	9
Koeleria macrantha	1.20(0.20)	1.69	1.36	50.00	4.57	6.26	12
Nassella viridula	0.30	0.42	0.98	10.00	0.91	1.33	24
Poa secunda	0.20(0.10)	0.28	0.62	15.00	1.37	1.65	20
Sub-Total	19.60	27.57					
Full Shrubs							
Artemisia cana	0.40	0.56	1.39	10.00	0.91	1.47	21
Artemisia tridentata	4.40	6.19	6.31	50.00	4.57	10.76	7
Atriplex canescens	0.10	0.14	0.45	5.00	0.46	0.60	31
Sub-Total	4.90	6.89					
Introduced Perennial Grasses							
Poa pratensis	6.90	9.70	5.82	80.00	7.31	17.01	3
Sub-Total	6.90	9.70					
Lower Plants							
Lichens	3.80(0.10)	5.34	5.15	55.00	5.02	10.36	8
Sub-Total	3.80	5.34					
Perennial Forbs							
Achillea millefolium	1.00	1.41	1.65	35.00	3.20	4.61	16
Antennaria microphylla	0.10	0.14	0.45	5.00	0.46	0.60	29
Cerastium arvense	0.10	0.14	0.45	5.00	0.46	0.60	32
Convolvulus arvensis	0.10	0.14	0.45	5.00	0.46	0.60	33
Echinacea angustifolia	0.10	0.14	0.45	5.00	0.46	0.60	34
Oenothera sp.	0.00(0.10)	0.00	0.00	5.00	0.46	0.46	38
Pediomelum argophyllum	0.10	0.14	0.45	5.00	0.46	0.60	36
Phlox hoodii	1.20(0.20)	1.69	2.28	35.00	3.20	4.89	15
Phlox longifolia	0.20	0.28	0.89	5.00	0.46	0.74	28

Energy Metals
Moore Ranch
Report: Cover Summary

Site Id: AG
Name: Agricultural grassland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/13/2007

*() Represents Second Hit Data

Sample Method: Point Intercept
Sample Size: 50 Meter Transect
Number of Samples: 22
Report Date: 8/13/2007

Species	Cover (%) Mean Absolute *	Relative	Std. Dev. n - 1	Frequency (%) Absolute	Relative	I.V.	Rank
Bouteloua gracilis	0.09	0.13	0.43	4.55	0.60	0.73	25
Sub-Total	0.09	0.13					
Total Stratified Vegetation Cover	68.72	4.89	7.80				
Total Non-Stratified Vegetation Cover	68.09	4.89	7.84				
LITTER/ROCK	24.73		6.00				
Total Ground Cover	92.91		4.57				
BARE SOIL	7.09		4.57				
Total Cover	100.00		0.00				
Species Abundance (No. of Species/Sample)	31.00						

Energy Metals
Moore Ranch
Report: Cover Summary

Site Id: AG
Name: Agricultural grassland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/13/2007

*() Represents Second Hit Data

Sample Method: Point Intercept
Sample Size: 50 Meter Transect
Number of Samples: 22
Report Date: 8/13/2007

Species	Cover (%) Mean Absolute *	Cover (%) Relative	Std. Dev. n - 1	Frequency (%) Absolute	Frequency (%) Relative	I.V.	Rank
Annual & Biennial Forbs							
Alyssum desertorum	16.64	24.40	7.23	100.00	13.17	37.57	2
Bassia sieveriana	0.09	0.13	0.43	4.55	0.60	0.73	24
Descurainia pinnata	0.09	0.13	0.43	4.55	0.60	0.73	28
Lappula redowskii	0.36	0.53	1.00	13.64	1.80	2.33	15
Melilotus officinalis	0.18	0.27	0.59	9.09	1.20	1.47	21
Plantago patagonica	2.27	3.33	3.56	45.45	5.99	9.32	5
Thlaspi arvense	0.09	0.13	0.43	4.55	0.60	0.73	30
Sub-Total	19.72	28.92					
Annual Grasses							
Bromus japonicus	0.55	0.80	1.10	22.73	2.99	3.79	11
Bromus tectorum	8.18	12.00	9.68	59.09	7.78	19.78	3
Vulpia octoflora	0.36	0.53	1.18	9.09	1.20	1.73	19
Sub-Total	9.09	13.33					
Cacti & Succulents							
Coryphantha vivipara	0.09	0.13	0.43	4.55	0.60	0.73	27
Sub-Total	0.09	0.13					
Cool Season Perennial Grasses							
Carex filifolia	0.09	0.13	0.43	4.55	0.60	0.73	26
Elymus lanceolatus	1.73	2.53	2.64	40.91	5.39	7.92	6
Elymus smithii	2.18	3.20	3.65	31.82	4.19	7.39	7
Nassella viridula	0.36	0.53	1.00	13.64	1.80	2.33	17
Poa secunda	1.27(0.18)	1.87	1.80	40.91	5.39	7.26	9
Poa sp.	0.18	0.27	0.59	9.09	1.20	1.47	22
Sub-Total	5.81	8.53					
Fungi							
Mushroom sp.	0.09	0.13	0.43	4.55	0.60	0.73	29
Sub-Total	0.09	0.13					
Introduced Perennial Grasses							
Agropyron cristatum	24.64	36.13	11.24	100.00	13.17	49.30	1
Bromus inermis	0.91	1.33	1.72	27.27	3.59	4.92	10
Poa bulbosa	1.73(0.18)	2.53	2.98	36.36	4.79	7.32	8
Poa pratensis	0.73	1.07	1.58	18.18	2.40	3.47	13
Sub-Total	28.01	41.06					
Perennial Forbs							
Achillea millefolium	0.09	0.13	0.43	4.55	0.60	0.73	23
Convolvulus arvensis	0.27	0.40	0.94	9.09	1.20	1.60	20
Lygodesmia juncea	0.55	0.80	1.10	22.73	2.99	3.79	12
Medicago lupulina	0.00(0.18)	0.00	0.00	4.55	0.60	0.60	31
Medicago sp.	0.36	0.53	1.00	13.64	1.80	2.33	16
Sphaeralcea coccinea	0.55	0.80	1.26	18.18	2.40	3.20	14
Vicia americana	2.91(0.09)	4.27	5.08	68.18	8.98	13.25	4
Sub-Total	4.73	6.93					
Sub-Shrubs & Half-Shrubs							
Atriplex gardneri	0.55	0.80	1.87	9.09	1.20	2.00	18
Sub-Total	0.55	0.80					
Warm Season Perennial Grasses							

Energy Metals
Moore Ranch
Report: Cover Summary

Site Id: UG
Name: Upland grassland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/15/2007

*() Represents Second Hit Data

Sample Method: Point Intercept
Sample Size: 50 Meter Transect
Number of Samples: 20
Report Date: 8/13/2007

Species	Cover (%) Mean Absolute *	Relative	Std. Dev. n - 1	Frequency (%) Absolute	Relative	I.V.	Rank
Sub-Total	0.70	1.03					
Warm Season Perennial Grasses							
Bouteloua gracilis	1.60	2.34	4.52	15.00	1.57	3.91	14
Buchloe dactyloides	0.70	1.02	2.36	10.00	1.05	2.07	19
Sub-Total	2.30	3.36					
Total Stratified Vegetation Cover	70.20	1.30	14.62				
Total Non-Stratified Vegetation Cover	62.80	1.14	11.65				
LITTER/ROCK	19.50		7.94				
Total Ground Cover	87.90		6.15				
BARE SOIL	12.30		6.17				
Total Cover	95.00		0.89				
Species Abundance (No. of Species/Sample)	32.00						

ADDENDUM 2.8-C

VEGETATION DENSITY SUMMARIES

Energy Metals
Moore Ranch
Report: Density Summary

Site Id: AG
Name: Agricultural grassland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/11/2007

Sample Method: Transect
Sample Size: 50 sq. m.
Number of Samples: 22
Report Date: 8/13/2007

	Mean (Number/Plot)	Relative Density	Std. Dev. n - 1 (Number/Plot)	Mean (Number/sq.m.)	Mean (Number/Acre)
Full Shrubs					
Artemisia cana	6.45	77.17	14.64	0.13	522.64
Artemisia tridentata	1.41	16.85	6.61	0.03	114.10
Atriplex canescens	0.32	3.80	1.29	0.01	25.76
Sub-Total	8.18	97.83	22.54	0.16	662.50
Sub-Shrubs & Half-Shrubs					
Artemisia frigida	0.18	2.17	0.50	0.00	14.72
Sub-Total	0.18	2.17	0.50	0.00	14.72
Total	8.36	100.00	17.05	0.17	677.22

Energy Metals
Moore Ranch
Report: Density Summary

Site Id: BS
Name: Big sagebrush shrubland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/14/2007

Sample Method: Transect
Sample Size: 50 sq. m.
Number of Samples: 20
Report Date: 8/13/2007

	Mean (Number/Plot)	Relative Density	Std. Dev. n - 1 (Number/Plot)	Mean (Number/sq.m.)	Mean (Number/Acre)
Full Shrubs					
Artemisia cana	12.20	17.38	18.86	0.24	987.85
Artemisia tridentata	34.70	49.43	37.46	0.69	2,809.72
Atriplex canescens	3.80	5.41	13.38	0.08	307.69
Sub-Total	50.70	72.22	69.69	1.01	4,105.26
Sub-Shrubs & Half-Shrubs					
Artemisia frigida	16.70	23.79	58.01	0.33	1,352.23
Artemisia pedatifida	2.80	3.99	12.52	0.06	226.72
Sub-Total	19.50	27.78	70.53	0.39	1,578.95
Total	70.20	100.00	60.34	1.40	5,684.21

Energy Metals
Moore Ranch
Report: Density Summary

Site Id: M
Name: Meadow grassland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/15/2007

Sample Method: Transect
Sample Size: 50 sq. m.
Number of Samples: 20
Report Date: 8/13/2007

	Mean (Number/Plot)	Relative Density	Std. Dev. n - 1 (Number/Plot)	Mean (Number/sq.m.)	Mean (Number/Acre)
Full Shrubs					
Artemisia cana	3.15	87.50	7.34	0.06	255.06
Atriplex canescens	0.10	2.78	0.45	0.00	8.10
Sub-Total	3.25	90.28	7.79	0.07	263.16
Sub-Shrubs & Half-Shrubs					
Artemisia frigida	0.30	8.33	1.13	0.01	24.29
Krascheninnikovia lanata	0.05	1.39	0.22	0.00	4.05
Sub-Total	0.35	9.72	1.35	0.01	28.34
Total	3.60	100.00	8.34	0.07	291.50

Energy Metals
Moore Ranch
Report: Density Summary

Site Id: UG
Name: Upland grassland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/15/2007

Sample Method: Transect
Sample Size: 50 sq. m.
Number of Samples: 20
Report Date: 8/13/2007

	Mean (Number/Plot)	Relative Density	Std. Dev. n - 1 (Number/Plot)	Mean (Number/sq.m.)	Mean (Number/Acre)
Full Shrubs					
Artemisia cana	4.60	20.00	7.26	0.09	372.47
Artemisia tridentata	7.40	32.17	12.56	0.15	599.19
Atriplex canescens	0.05	0.22	0.22	0.00	4.05
Sub-Total	12.05	52.39	20.04	0.24	975.71
Sub-Shrubs & Half-Shrubs					
Artemisia frigida	2.95	12.83	5.93	0.06	238.87
Artemisia pedatifida	8.00	34.78	28.33	0.16	647.77
Sub-Total	10.95	47.61	34.26	0.22	886.64
Total	23.00	100.00	29.35	0.46	1,862.35

Energy Metals
Moore Ranch
Report: Density Summary

Site Id: UG
Name: Upland grassland
Comm. Type/Form: Vegetation Baseline
Sample Date: 6/15/2007

Sample Method: Transect
Sample Size: 50 sq. m.
Number of Samples: 20
Report Date: 8/13/2007

	Mean (Number/Plot)	Relative Density	Std. Dev. n - 1 (Number/Plot)	Mean (Number/sq.m.)	Mean (Number/Acre)

ADDENDUM 2.8-D

MOORE RANCH VEGETATION MAP

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

THAT CAN BE VIEWED AT THE RECORD TITLED:

DRAWING NO.: FIGURE 2.8.5-1, "MOORE RANCH URANIUM PROJECT VEGETATION MAPPING"

WITHIN THIS PACKAGE... OR, BY SEARCHING USING THE DOCUMENT/REPORT DRAWING NO. FIGURE 2.8.5-1

D-01

ADDENDUM 2.8-E

WETLAND LOCATION SUMMARY AND MAPS

Table 2.8-14: Summary of Wetlands within the Project Area

Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
Simmons Draw	W1	Sec. 4 T41N R75W	Roll 1 P4 & P5	Non-Wetland	--	--	Foot slope	Upland vegetation	--
Simmons Draw	W3	Sec. 4 T41N R75W	Roll 1 P6 & P7	Non-Wetland	--	--	Depression area	Depression area caused by berm	--
Simmons Draw	Wpt 4	Sec. 4 T41N R75W	Roll 1 P11 & P12	Non-wetland	--	--	Tributary to main drainage	Upland grass in tributary	--
Simmons Draw	W5	Sec. 4 T41N R75W	Roll 1 P17 & P18	Wetland	POW		Pond due to man made berm	--	Non- jurisdictional
Simmons Draw	W6	Sec. 33 T42N R75W	Roll 1 P19 & P20	Non-wetland	--	--	Drainage bottom	Upland vegetation	--
Simmons Draw	W7	Sec. 33 T42N R75W	Roll 1 P22 & P23	Non-wetland	--	--	Drainage bottom	Upland vegetation	--
Simmons Draw	W8	Sec. 33 T42N R75W	Roll 1 P24-P26	Non-wetland	--	--	Depression in drainage	Upland vegetation dominant	--
Simmons Draw	*W9*	Sec. 33 T42N R75W	No Photo	Non-wetland	--	--	Drainage bottom	Primarily upland vegetation	--
Simmons Draw	*W10*	Sec. 33 T42N R75W	Roll 1 P27 & P28	Wetland	PEM		Depression located in an upland area	PEM identified with NWI	Non- jurisdictional

Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
								mapping	
Simmons Draw	W11	Sec. 33 T42N R75W	Roll 1 P29 & P30	Non-wetland	--	--	Drainage bottom	Primarily upland vegetation	--
Simmons Draw	W12	Sec. 33 T42N R75W	Roll 1 P31	Wetland	PEM		Drainage	--	Non- jurisdictional
Simmons Draw	*W13*	Sec. 4 T41N R75W	Roll 1 P32-P34	--	--	--	--	--	--
Simmons Draw	W14	Sec. 4 T41N R75W	No Photo	Non-wetland	--	--	Tributary of main drainage	Vegetation and hydrology is out	--
Simmons Draw	W15	Sec. 4 T41N R75W	Roll 1 P35 & P36	Non-wetland	--	--	Tributary of main drainage	Silver sage in bottom of drainage	--
Simmons Draw	W16	Sec. 4 T41N R75W	Roll 2 P1-P3	Stock Pond	PEM & POW		Stock pond	Vegetation in drainage is dominated by FACU & UPL plants	Non- jurisdictional
Simmons Draw	Wpt. 5	Sec. 4 T41N R75W	Roll 2 P4 & P5	Pond	PEM		--	Pond bermed on all sides	Non- jurisdictional
Simmons Draw	W17	Sec. 4 T41N R75W	Roll 2 P6 & P7	Non-wetland	--	--	Drainage bottom	Upland vegetation is same	--

Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
								throughout	
Simmons Draw	Wpt. 9	Sec. 4 T41N R75W	Roll 2 P8	Non-wetland	--	--	Stock pond area dammed	Vegetation dominated by upland	--
Simmons Draw	W18	Sec. 3 T41N R75W	Roll 2 P9 & P10	Non-wetland	--	--	Drainage bottom	--	--
Simmons Draw	W19	Sec. 3 T41N R75W	Roll 2 P11-P13	Wetland	PUB		Stock pond	--	Non- jurisdictional
Simmons Draw	Wpt. 16	Sec. 3 T41N R75W	Roll 2 P14 & P15	Wetland	PEM		Stock pond	Soils similar to W19	Non- jurisdictional
Simmons Draw	W20	Sec. 3 T41N R75W	Roll 2 P16 & P17	Wetland	PUB		Drainage bottom	--	Non- jurisdictional
Simmons Draw	W21	Sec. 3 T41N R75W	Roll 2 P18 & P19	Non-wetland	--	--	Drainage bottom	--	--
Simmons Draw	Wpt. 23	Sec. 3 T41N R75W	Roll 2 P20 & P21	Non-wetland	--	--	Drainage bottom	Dominated by UPL and FACU vegetation	--
Simmons Draw	W22	Sec. 3 T41N R75W	Roll 2 P22 & P23	Non-wetland	--	--	Drainage bottom	--	--
Simmons	Wpt. 24	Sec. 2	Roll 2	Non-	--	--	Drainage	Upland	--

Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
Draw		T41N R75W	P24 & P25	wetland			bottom	vegetation found in drainage bottom	
Ninemile Creek	W23	Sec. 10 T41N R75W	Roll 2 P26 & P27	Wetland	PUB		Drainage bottom	--	Non- jurisdictional
Ninemile Creek	Wpt. 25	Sec. 10 T41N R75W	Roll 2 P28-P30	Wetland	PUB		--	End wetland channel, CBM outfall	Non- jurisdictional
Ninemile Creek	W24	Sec. 9 T41N R75W	Roll 2 P31 & R32	Wetland	PUB		Pond area	Secondary Indicator is water	Non- jurisdictional
Ninemile Creek	Wpt. 33	Sec. 9 T41N R75W	Roll 2 P33 & P34	Wetland	PUB		Pond and drainage bottom	Drainage vegetation same as W24	Non- jurisdictional
Ninemile Creek	W25	Sec. 4 T41N R75W	Roll 2 P35 & P36	Non-wetland	--	--	Drainage bottom	--	--
Ninemile Creek	Wpt. 34	Sec. 9 T41N R75W	Roll 2 P37 & P38	Non-wetland	--	--	Drainage bottom	Vegetation is dominated by UPL and	--

Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
								FACU	
Tributary to Simmons Draw	W26	Sec. 3 T41N R75W	Roll 2 P39	Non-wetland	--	--	Drainage bottom	--	--
Tributary to Simmons Draw	W27	Sec. 34 T42N R75W	Roll 2 P40 & P41	Wetland	PEM & POW		Edge of drainage	CBM Well	Non- jurisdictional
Tributary to Simmons Draw	W28	Sec. 34 T42N R75W	Roll 2 P42 & P43	Wetland	PUB		Drainage bottom	--	Non- jurisdictional
Tributary to Simmons Draw	Wpt. 36	Sec. 34 T42N R75W	Roll 2 P44 & P45	Wetland	PEM & POW		Drainage bottom	--	Non- jurisdictional
Tributary to Simmons Draw	W29	Sect. 34 T42N R75W	Roll 2 P46 & P47	Wetland	PUB		Floodplain	--	Non- jurisdictional
Tributary to Simmons Draw	Wpt. 38	Sec. 34 T42N R75W	Roll 2 P48-P50	Wetland	PEM		Drainage by outfall	CBM Outfall	Non- jurisdictional
Tributary to Simmons Draw	W30	Sec. 3 T41N R75W	Roll 3 P1 & P2	Non-wetland	--	--	Drainage bottom	--	--

Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
Tributary to Simmons Draw	W31	Sec. 34 T42N R75W	Roll 3 P3 & P4	Wetland	PUB		Drainage bottom	Second hydrology indicators redox concentrations found in dead roots	Non- jurisdictional
Tributary to Simmons Draw	Wpt. 40	Sec. 34 T42N R75W	Roll 3 P5& P6	Wetland	PEM & POW		Pond	OBL vegetation present	Non- jurisdictional
Tributary to Simmons Draw	W32	Sec. 34 T42N R75W	Roll 3 P7-P9	Non-wetland	--	--	Outfall	--	--
Tributary to Simmons Draw	W33	Sec. 34 T42N R75W	Roll 3 P10 & P11	Non-wetland	--	--	Drainage bottom	End of wetland characteristics are dropping out	--
Tributary to Simmons Draw	W34	Sec. 34 T42N R75W	Roll 3 P12-P14	Wetland	PEM			Near windmill	Non- jurisdictional
Tributary to	W35	Sec. 35 T42N R75W	Roll 3 P15-P17	Non-wetland	--	--	Drainage	Wetland boundary	--

Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
Simmons Draw									
Second Tributary to Simmons Draw	W36	Sec. 35 T42N R75W	Roll 3 P20 & P21	Wetland	POW		Stock pond	--	Non- jurisdictional
Second Tributary to Simmons Draw	W37	Sec. 35 T42N R75W	Roll 3 P24 & P25	Wetland	PUB		Drainage bottom	--	Non- jurisdictional
Second Tributary to Simmons Draw	W38	Sec. 35 T42N R75W	Roll 3 P26 & P27	Non-wetland	--	--	Drainage bottom	Swale in downstream photo (roll 3, photo 27)	--
Second Tributary to Simmons Draw	Wpt. 57	Sec. 34 T42N R75W	Roll 3 P28 & P29	Wetland	PEM		CBM outfall area	CBM outfall area and bermed area	Non- jurisdictional
Second Tributary to Simmons Draw	Wpt. 71	Sec. 35 T42N R75W	Roll 3 P30 & P31	Wetland	PEM & POW		CBM	OBL vegetation dominant in area, water from outfall present	Non- jurisdictional

Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
Second Tributary to Simmons Draw	W39	Sec. 35 T42N R75W	Roll 3 P32-P35	Non-wetland	--	--	Flat floodplain	Near outfall area	--
Second Tributary to Simmons Draw	W40	Sec. 35 T42N R75W	Roll 3 P38-P41	Wetland	PEM		Drainage bottom	Open water in channel below	Non- jurisdictional
Second Tributary to Simmons Draw	Wpt. 72	Sec. 35 T42N R75W	Roll 3 P36 & P37	Non-wetland	--	--	Drainage bottom	Silver sage in drainage	--
Second Tributary to Simmons Draw	W41	Sec. 2 T41N R75W	Roll 3 P45 & P46	Non-wetland	--	--	Drainage bottom	Dead root channels	--
Second Tributary to Simmons Draw	Wpt. 77	Sec. 2 T41N R75W	Roll 3 P42-P44	Non-wetland	--	--	Culvert and berm	South side of vegetation similar to W39, berm area	--
Second Tributary to	W42	Sec. 35 T42N R75W	Roll 3 P52 & P53	Wetland	PUB			--	Non- jurisdictional

Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
Simmons Draw							--		
Second Tributary to Simmons Draw	Wpt. 78	Sec. 35 T42N R75W	Roll 3 P47-P51	Wetland	POW		Pond near outfall	OBL vegetation present on fringe	Non- jurisdictional
Second Tributary to Simmons Draw	Wpt. 92	Sec. 35 T42N R75W	Roll 4 P4-P6	Wetland	PEM at Outfall		CBM outfall	--	Non- jurisdictional
Second Tributary to Simmons Draw	Wpt. 93	Sec. 36 T42N R75W	Roll 4 P7 & P8	Wetland	PEM		Drainage bottom	Drainage below outfall	Non- jurisdictional
Pine Tree Draw	Wpt. 95	Sec. 36 T42N R75W	Roll 4 P11	Non-wetland	--	--	Pond	Outfall and surrounding pond are dry	--
Pine Tree Draw	Wpt. 98	Sec. 26 T42N 75W	Roll 4 P23 & P24	Wetland	PEM		Wellhead and drainage	Water from well head, PEM from Wpt. 98-W48	Non- jurisdictional
Pine Tree	Wpt. 102	Sec. 25	No Photo	Non-	--	--	CBM outfall		--

Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
Draw		T42N R75W		wetland				No water	
Pine Tree Draw	Wpt. 103-104	Sec. 25 T42N R75W	Roll 4 P32-P35	Wetland	PEM		Drainage bottom	Upland encroachin g on bottom of drainage to the west	--
Pine Tree Draw	Wpt. 115	Sec. 36 T42N R7W	Roll 4 P39 & P40	Wetland	PEM		Drainage bottom	Near culvert Upland area in middle	--
Pine Tree Draw	Wpt. 117	Sec. 36 T42N R75W	Roll 4 P46-P48	Non-wetland	--	--	CBM Outfall	--	--
Pine Tree Draw	Wpt. 119	Sec. 1 T41N R75W	--	--	--	--	--	--	--
Pine Tree Draw	Wpt. 128	Sec. 1 T41N R75W	Roll 4 P59 & P60	Wetland	PEM & POW		Stock pond	Similar characterist ics to other large ponds	--
Second Tributary to Simmons Draw	Wpt. 129 (move point to the west to SC27)	Sec. 27 T42N R75W	Roll 4 P61-P63	Wetland	POW		Stock pond	Similar characterist ics to other large ponds	--
Second Tributary	W43	Sec. 35 T42N R75W	Roll 3 P54 &	Wetland	PEM		Drainage bottom	Soils same as W42	Non- jurisdictional

Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
to Simmons Draw			P55					No water source	
Second Tributary to Simmons Draw	W44	Sec. 35 T42N R75W	Roll 4 P1-P3	Wetland	PEM		Drainage bottom	--	Non- jurisdictional
Pine Tree Draw	W45	Sec. 36 T42N R75W	Roll 4 P9 & P10	Non-Wetland	--	--	Drainage bottom	Edge of wetland boundary More upland vegetation and slight topological change	--
Pine Tree Draw	W46	Sec. 36 T42N R75W	Roll 4 P12-P14	Non-Wetland	--	--	Drainage bottom	Hydrophytic vegetation to east (W47) that abuts drainage	--
Pine Tree Draw	W47	Sec. 36 T42N R75W	Roll 4 P16-P18	Wetland	PEM		Swale that abuts	Upper portion of	Non- jurisdictional

Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
							drainage bottom	drainage east of W46	
Pine Tree Draw	W48	Sec. 26 T42N R75W	Roll 4 P19-P21	Wetland	PEM and POW		Drainage bottom	Channel approx. 20-25 ft Water coming from outfall; more redox concentrati ons lower in depth	Non- jurisdictional
Pine Tree Draw	W50	Sec. 25 T42N R75W	Roll 4 P24-P26	Non-wetland	--	--	Hillslope drainage	Wet boundary where tank water begins	--
Pine Tree Draw	W51	Sec. 25 T42N R75W	Roll 4 P27 & P28	Non-wetland	--	--	Drainage bottom	Oxidation in pore lining and matrix below 5 inches and above 5-8 inches	--
Pine Tree	W52	Sec. 25	Roll 4	Non-wetland	--	--	Drainage	Cattail	--

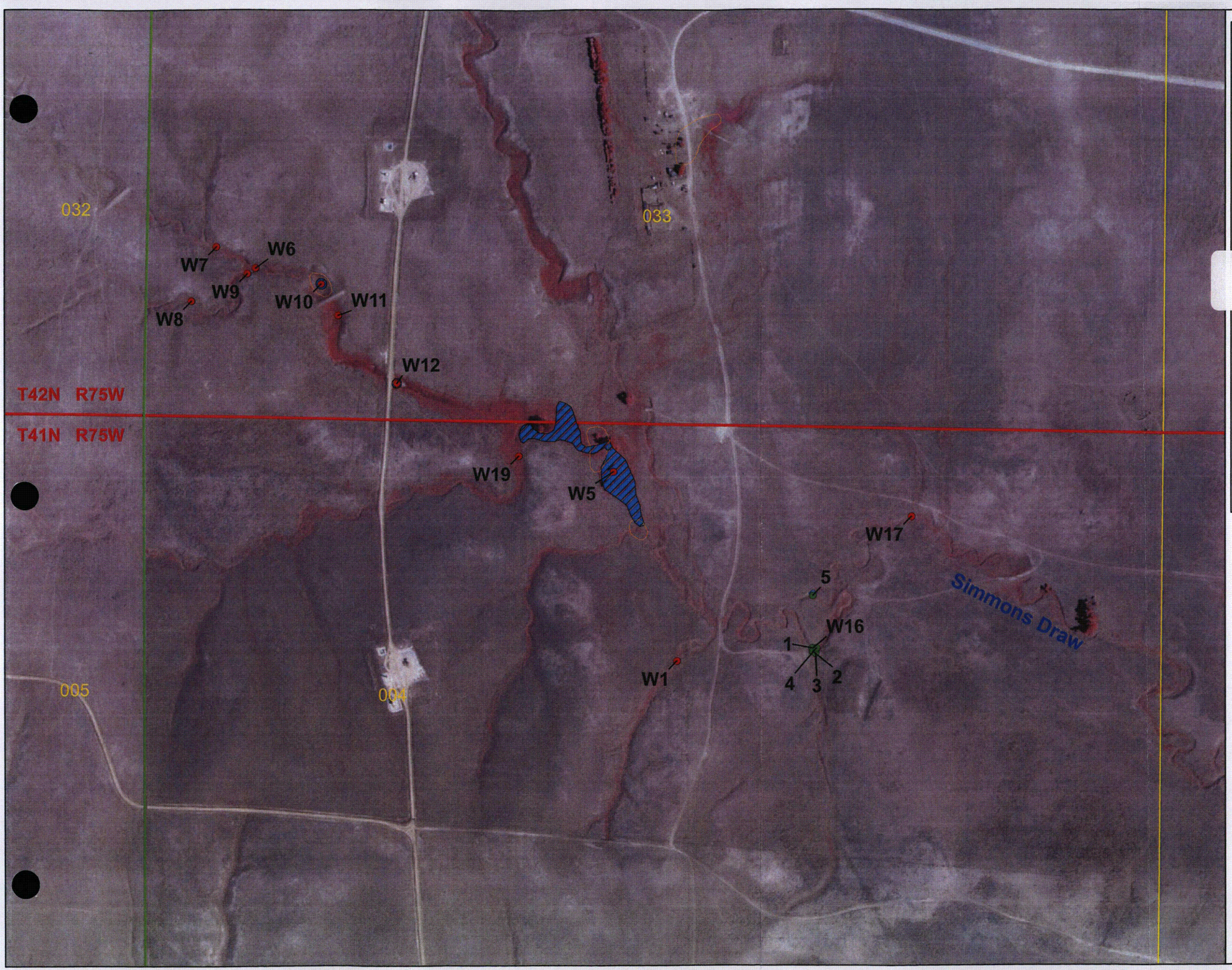
Drainage	Map and Plot ID (no Data Form 1 if italicized)	Legal Description	Photo #	2007 Delineation Designation	Cowardin Classification	Acreage of Cowardin Classification	Geomorphic Setting	Comments	Jurisdictional Recommendation
Draw		T42N R75W	P30 & P31				bottom	remnants 15' upstream from point	
Pine Tree Draw	W53	Sec. 36 T42N R75W	Roll 4 P36-P38	Wetland	POW		Pond	WPT 109 pipe with water running out	Non- jurisdictional
Pine Tree Draw	W54	Sec. 36 T42N R75W	Roll 4 P41-P43	Wetland	PUB		Drainage bottom	--	Non- jurisdictional
Pine Tree Draw	W55	Sec. 36 T42N R75W	Roll 4 P44 & P45	Non-wetland	--	--	Drainage bottom	Possible soil effects from CBM water; redox features from 3-7 inches; dead root channels	--

THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

THAT CAN BE VIEWED AT THE RECORD TITLED:
DRAWING NO.: FIGURE 2.8.5-2, "MOORE RANCH WETLAND MAP"

WITHIN THIS PACKAGE... OR, BY SEARCHING USING THE DOCUMENT/REPORT DRAWING NO. FIGURE 2.8.5-2

D-02



ENERGYMETALS
CORPORATION US

Moore Ranch Wetland Map (Simmons Draw)

Figure 2.8.5-3

Designed by: K. Halvorson
Drawn by: C. Robinson/LSI
Checked by: K. Halvorson
Date Drawn: 6/29/2007
Date Modified: 9/4/2007

Scale: 1"= 500'
Projection: NAD 1983, UTM Zone 13
Year of CIR photo: 2001
Sheet 1 of 1
File:C:\DATA\ArcGIS \BKS Environmental\07251\MAP\ Moore_Ranch_SimmonsDraw.mxd

Legals

T42N R75W
Sections 26-27, 33-36
T42N R74 W
SW1/4 of Sec. 31
SW1/2, SW1/4 of Sec. 30

T41N R75W
Sections 2, 3, 4
N/12, N12 of Sec. 1
W1/2, W1/2 of Sec. 1
NE1/4 of Sec. 9
NW1/4 of Sec. 10

Legend

- BKS Points
- D10a Points
- Windmill
- 1976 NWI Mapping (PEM)
- Wetland Channel
- Pond
- Berm
- Permit Boundary
- Central Plant Facility and Compressor Station
- Wellfield Areas
- Township/Range Line
- Section Line

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W E
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027

W35

57

W34

Tributary to Simmons Draw

034

47

W33

W32

39

38

W27

37

W28

T42N R75W

W31

T41N R75W

W30

35

W26

Legals

T42N R75W	T41N R75W
Sections 26-27, 33-36	Sections 2, 3, 4
T42N R74 W	N/12, N12 of Sec. 1
SW1/4 of Sec. 31	W1/2, W1/2 of Sec. 1
SW1/2, SW1/4 of Sec. 30	NE1/4 of Sec. 9
	NW1/4 of Sec. 10

Designed by: K. Halvorson
Drawn by: C. Robinson/LSI
Checked by: K. Halvorson
Date Drawn: 6/29/2007
Date Modified: 9/4/2007

Scale: 1"= 500'
Projection: NAD 1983, UTM Zone 13
Year of CIR photo: 2001
Sheet 1 of 1
File:C:\DATA\ArcGIS \BKS Environmental\07251\MAP\ Moore_Ranch_Tributary_SD.mxd

ENERGYMETALS
CORPORATION US

Figure 2.8.5-4

Moore Ranch Wetland Map (Tributary to Simmons Draw)

Legend

- BKS Points
- D10a Points
- Windmill
- 1976 NWI Mapping (PEM)
- Wetland Channel
- Pond
- Berm
- Permit Boundary
- Central Plant Facility and Compressor Station
- Wellfield Areas
- Township/Range Line
- Section Line

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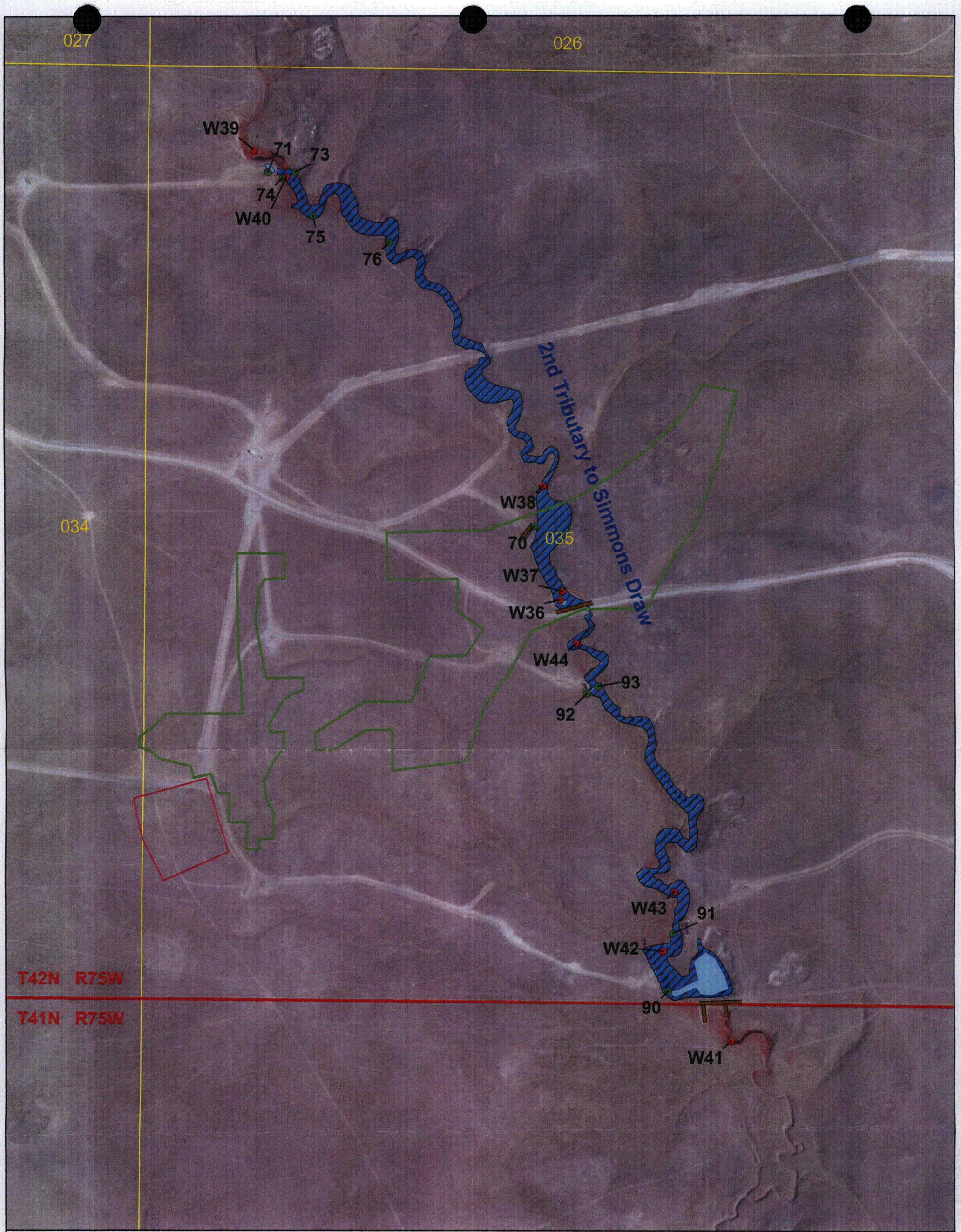

Legals

T42N R75W	T41N R75W
Sections 26-27, 33-36	Sections 2, 3, 4
T42N R74 W	N/12, N12 of Sec. 1
SW1/4 of Sec. 31	W1/2, W1/2 of Sec. 1
SW1/2, SW1/4 of Sec. 30	NE1/4 of Sec. 9
	NW1/4 of Sec. 10

Designed by: K. Halvorson
Drawn by: C. Robinson/LSI
Checked by: K. Halvorson
Date Drawn: 6/29/2007
Date Modified: 9/4/2007

Scale: 1"= 500'
Projection: NAD 1983, UTM Zone 13
Year of CIR photo: 2001
Sheet 1 of 1
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ENERGYMETALS
CORPORATION US

Figure 2.8.5-5

Moore Ranch Wetland Map (Second Tributary to Simmons Draw)

Legend

- BKS Points
- D10a Points
- Windmill
- 1976 NWI Mapping (PEM)
- Wetland Channel
- Pond
- Berm
- Permit Boundary
- Central Plant Facility and Compressor Station
- Wellfield Areas
- Township/Range Line
- Section Line

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96
W48
98
97
W50
W51
W52
103
104
W45
W46
95
W47
Pine Tree Draw
94
W53
109
105
W54
116
W55
117
118
T42N R75W
T41N R75W

Legals

T42N R75W	T41N R75W
Sections 26-27, 33-36	Sections 2, 3, 4
T42N R74 W	N/12, N12 of Sec. 1
SW1/4 of Sec. 31	W1/2, W1/2 of Sec. 1
SW1/2, SW1/4 of Sec. 30	NE1/4 of Sec. 9
	NW1/4 of Sec. 10

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Drawn by: C. Robinson/LSI
Checked by: K. Halvorson
Date Drawn: 6/29/2007
Date Modified: 9/4/2007

Scale: 1"= 600'
Projection: NAD 1983, UTM Zone 13
Year of CIR photo: 2001
Sheet 1 of 1
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ENERGYMETALS
CORPORATION US

Figure 2.8.5-6

Moore Ranch Wetland Map (Pine Tree Draw)

Legend

- BKS Points
- D10a Points
- Windmill
- 1976 NWI Mapping (PEM)
- Wetland Channel
- Pond
- Berm
- Permit Boundary
- Central Plant Facility and Compressor Station
- Wellfield Areas
- Township/Range Line
- Section Line

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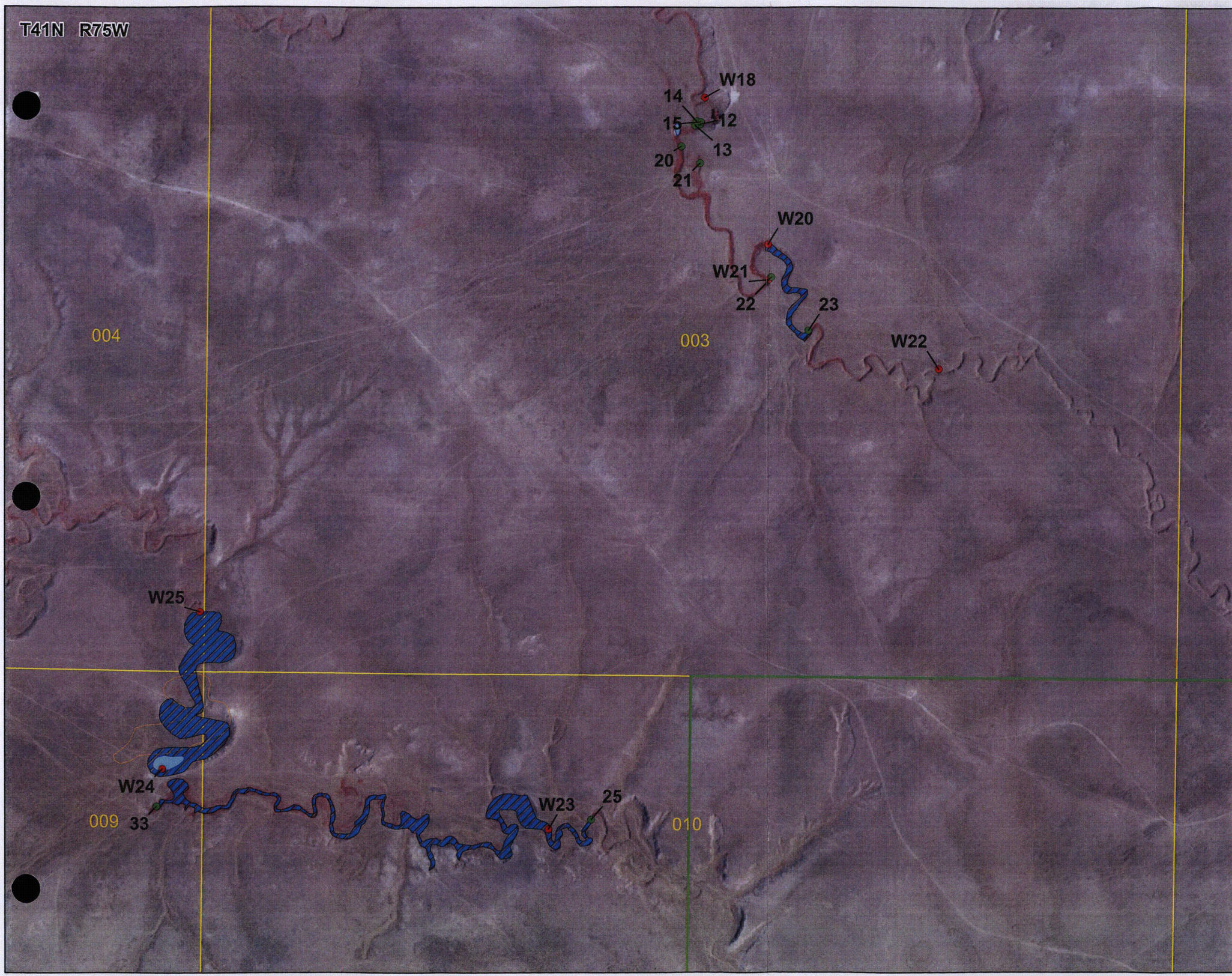

ENERGYMETALS
CORPORATION US

Moore Ranch Wetland Map (Nine Mile Creek)

Figure 2.8.5-7

Designed by: K. Halvorson
Drawn by: C. Robinson/LSI
Checked by: K. Halvorson
Date Drawn: 6/29/2007
Date Modified: 9/4/2007

Scale: 1"= 500'
Projection: NAD 1983, UTM Zone 13
Year of CIR photo: 2001
Sheet 1 of 1
File:C:\DATA\ArcGIS \BKS Environmental\07251\MAP\ Moore_Ranch_NineMileCreek.mxd

Legals

T42N R75W
Sections 26-27, 33-36
T42N R74 W
SW1/4 of Sec. 31
SW1/2, SW1/4 of Sec. 30

T41N R75W
Sections 2, 3, 4
N/12, N12 of Sec. 1
W1/2, W1/2 of Sec. 1
NE1/4 of Sec. 9
NW1/4 of Sec. 10

Legend

- BKS Points
- D10a Points
- Windmill
- 1976 NWI Mapping (PEM)
- Wetland Channel
- Pond
- Berm
- Permit Boundary
- Central Plant Facility and Compressor Station
- Wellfield Areas
- Township/Range Line
- Section Line

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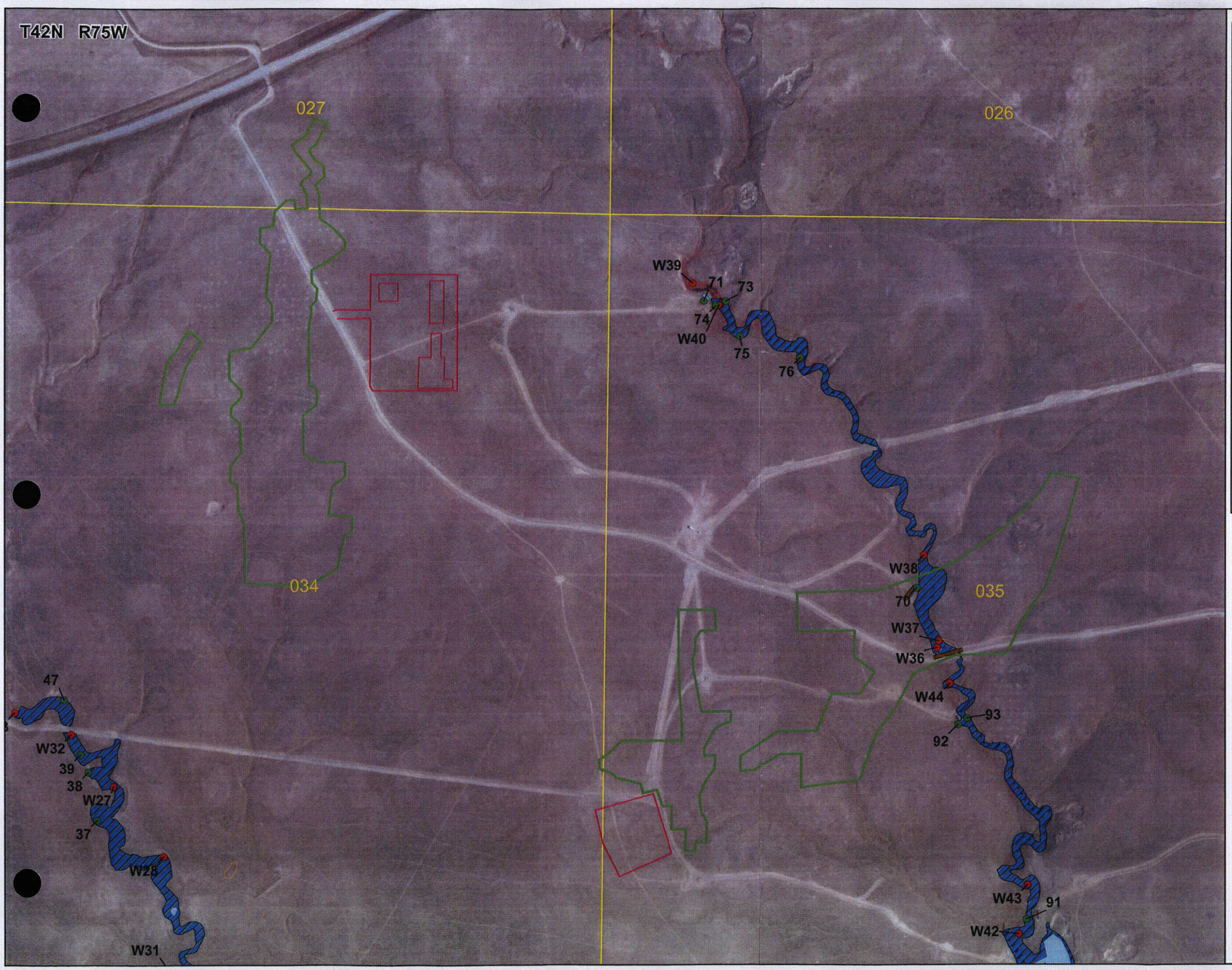

ENERGYMETALS
CORPORATION US

Moore Ranch Wetland Map (Wellfield Areas)

Figure 2.8.5-8

Designed by: K. Halvorson
Drawn by: C. Robinson/LSI
Checked by: K. Halvorson
Date Drawn: 6/29/2007
Date Modified: 9/4/2007

Scale: 1"= 625'
Projection: NAD 1983, UTM Zone 13
Year of CIR photo: 2001
Sheet 1 of 1
File:C:\DATA\ArcGIS \BKS Environmental\07251\MAP\ Moore_Ranch_Wellfields.mxd

Legals

T42N R75W
Sections 26-27, 33-36
T42N R74 W
SW1/4 of Sec. 31
SW1/2, SW1/4 of Sec. 30

T41N R75W
Sections 2, 3, 4
N/12, N12 of Sec. 1
W1/2, W1/2 of Sec. 1
NE1/4 of Sec. 9
NW1/4 of Sec. 10

Legend

- BKS Points
- D10a Points
- Windmill
- 1976 NWI Mapping (PEM)
- Wetland Channel
- Pond
- Berm
- Permit Boundary
- Central Plant Facility and Compressor Station
- Wellfield Areas
- Township/Range Line
- Section Line

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ADDENDUM 2.8-F

WETLAND SPECIES LIST

Scientific Name	Common Name	Indicator Status
Achillea millefolium	Common yarrow	FACU
Achnatherum hymendoides	Indian ricegrass	UPL
Agropyron cristatum	Crested wheatgrass	UPL
Alyssum alyssoides	Pale alyssum	UPL
Alyssum desertorum	Desert alyssum	UPL
Ambrosia tomentosa	Skeletonleaf bursage	UPL
Antennaria species	Pussytoes	UPL
Artemisia cana	Silver sagebrush	FACU
Astragulus miser	Timber milkvetch	UPL
Bromus inermis	Smooth brome	FACU
Bromus japiconus	Japanese brome	FACU
Bromus tectorum	Cheatgrass brome	UPL
Carex brevior	Sedge	FACU
Carex nebrascensis	Nebraska sedge	OBL
Carex praegracilis	Fieldclustered sedge	FACW
Carex species	Sedge	UPL
Cerastium arvense	Field cerastium	FACU
Cerastium vulgatum	Big chickweed	FACU
Cirsium arvense	Canada thistle	FACU
Danthonia species	Oatgrass	UPL
Descurainia sophia	Herb sophia	UPL
Eleocharis acicularis	Slender spikerush	OBL
Eleocharis palustris	Creeping spikerush	OBL
Elymus hispidus	Intermediate wheatgrass	UPL
Elymus smithii	Western wheatgrass	UPL
Equisetum arvense	Field horsetail	FAC
Helianthus species	Sunflower	UPL
Hordeum jubatum	Foxtail barley	FACW
Juncus balticus	Baltic rush	OBL
Juncus bufonius	Toad rush	OBL
Juncus gerardii	Saltmeadow rush	FAC
Koeleria macrantha	Prairie junegrass	UPL
Lappula redowski	Beggars tick	UPL
Medicago lupulina	Black medic	FACU
Medicago sativa	Alfalfa medic	NI
Microsteris gracilis	Slender phlox	UPL
Nassella viridula	Green needlegrass	UPL
Navarretia intertexta	Needleleaf navarretia	NI
Phleum pratense	Common timothy	FACU

Scientific Name	Common Name	Indicator Status
Poa pratensis	Kentucky bluegrass	FACU
Polygonum species	Knotweed	UPL
Polygonum aviculare	Prostrat knotweed	FACU
Potentilla species	Cinquefoil	UPL
Ratibida columnifera	Upright prairieconeflower	UPL
Rosa species	Rose	UPL
Rumex salicifolius	Willowleaf dock	NI
Rumex species	Dock	UPL
Ruppia cirrhosa	Spiral ditchgrass	OBL
Schoenoplectus pungens	Leafy bulrush	UPL
Sisyrinchium montanum	Strict blued-eyed grass	FAC
Solidago mollis	Velvety goldenrod	UPL
Solidago species	Goldenrod	UPL
Taraxacum officinale	Common dandelion	FACU
Thlaspi arvense	Field pennycress	FACU
Tragopogon dubius	Yellow salsify	UPL
Typha latifolia	Common cattail	OBL
Verbena bracteata	Bigbract verbena	FACU
Verbena hastate	Swamp verbena	UPL
Veronica anagallis-aquatica	Water speedwell	OBL
Veronica peregrina	Purslane speedwell	FACW
Vicia americana	American vetch	FAC
Polygonum aviculare	Devil's shoestring	FACU