APPENDIX D-8

TITAN URANIUM USA, INC,

2011 BASELINE VEGETATION ASSESSMENT ADDENDUM

SHEEP MOUNTAIN PROJECT AREA

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D8.1 SURVEY METHODOLOGY

General

Methods incorporated in the survey are, at a minimum, those suggested by Wyoming DEQ, Land Quality Division (WDEQ-LQD), for a predisturbance survey of the vegetation components (Guideline No.2).

Mapping

Established techniques for mapping plant communities were implemented to determine vegetation communities within the study area. Aerial photos of the study area were obtained and areas of similar vegetation characteristics were delineated. Each mapping unit was examined and delineated in the field and data concerning vegetation structure and general physiography were recorded. These data were analyzed to provide an understanding of the area enabling:

1. the identification of the kinds of vegetation communities that would comprise the vegetation type map;
2. the development of the narrative to describe each mapping unit.

Trees and shrubs were used as name designators for vegetative units and, as a general rule, inclusions less than three acres were not mapped. Aerial photographs provided the base maps for the delineation of the mapping units.

Vegetation type delineation was followed by drafting the vegetation map on stable base mylar and determining acreages for each mapping unit.

Sampling Procedures

Cover and shrub height data were extracted from randomly located line transects, quadrats were used for production, total population counts were done for tree data, and reconnaissance surveys were implemented to identify presence or absence of noxious weeds, selenium indicator species, rare or endangered plants, browse species, and unique sites. Reconnaissance surveys and plant species collections were made during May, June, July, and August, 1980, and cover, production, shrub height and tree data were gathered during early to mid-August 1980. Threatened and endangered plant surveys and Bureau of Land Management (BLM) sensitive species surveys were also conducted between May and August 2010.

Sample Location Selection

A random sample for each vegetation type occurring within the proposed affected area was taken by laying out two perpendicular lines, one along the south edge of the permit area (x axis) and one along the west edge (y axis). (Sampling procedure varied slightly between the affected and control areas as described below.) On the affected area, starting point locations for randomly locating transects and quadrats were initially determined in the office prior to field work by establishing a grid with x and y axes, each containing 999 units. Unit size for each axis was determined by permit area width and length. Numbers were taken from a table of random numbers with 999 as the greatest possible number. The starting points for initiating randomization were then marked on a map. Random numbers were generated until sufficient points were obtained for each vegetation type. These points were then located as close as possible in the field and a second set of two 2-digit numbers was taken from a table of random numbers to

determine quadrat location. The field operator then paced the number indicated by the first random number in a predetermined direction. (North was used unless pacing in this direction would take the operator out of the selected vegetation type. If this occurred, the operator paced south from the starting point.) Then, the operator rotated 90 degrees to the right and paced the number of steps indicated by the second random number. The southwest corner of the exclosure or the cover transect starting point was set at the tip of the operator's boot.

On the control areas, the southwest corner of the site was designated the starting point with an approximate east-west line along the south edge of the control area as the x-axis and an approximate north-south line along the west edge of the area as the y axis. A set of two 2-digit numbers was taken from a table of random numbers with 99 as the greatest possible number. The field operator then paced along the y axis (north) the number indicated by the first random number, turned 90 degrees and paced in a direction parallel to the x axis number indicated by the second random number. The southwest corner of the exclosure was then established at the tip of the operators boot.

Exclosure Construction

Exclosures, erected in May, 1980, were constructed in the shape of a pyramid, standing approximately five feet high and having a square base approximately five feet on each side. Four pieces of 48-inch high, two-by four-inch mesh, 12.5-gauge welded wire were cut to fit each side of the exclosure and were secured at each corner to half-inch reinforcement bar. The four 6.7-foot long pieces of rebar were driven six or more inches in the ground and tied together at the top. Two or more l8-inch stakes (3/8-inch rebar) were driven in the ground at the base of two or more sides of the exclosure to help hold the wire against the ground.

Transects

The line-point intercept sampling technique was used for cover estimation as described in Wyoming DEQ Guideline No.2, March 1979. Twenty points were sampled for cover along each of the 30.5 meter (100 feet) line transects; a sample point every five feet.

Quadrats

Production data were extracted from a meter square quadrat placed in the center of each exclosure. Near the end of the 1980 growing season (early to mid-August) annual year's growth of the above-ground biomass within each quadrat was clipped by major species and life forms (perennial grasses, grass-like species, perennial forbs, half-shrubs, shrubs, annual grasses, and annual forbs) and placed in separate drying bags. Major species are defined as the three or more species which are dominant in the vegetation type being sampled (not necessarily dominant in the quadrat). Samples were oven dried at 105°C for 24 hours, weighed to the nearest 0.1 gram, and weights recorded on data sheets.

Sample Adequacy

The number of samples required for estimating cover and production in each vegetation type were determined using the formulas suggested by the Wyoming Department of Environmental Quality Guideline No.2, Revision 2, March, 1979. Determination of the actual number of exclosures to be erected was based on past experience in similar vegetation types. Random sampling proceeded until adequate numbers were attained for cover and production for each type in relation to

confidence levels established by Wyoming DEQ, LQD or until minimum sample numbers were met as required (Cover: 30 transects on proposed affected areas and 15 on control area; Production: 15 quadrats on proposed affected areas and 10 on control areas).

Reconnaissance Surveys

In addition to other field work, special reconnaissance surveys were undertaken to note the presence of weeds, rare and endangered plants, important browse species, selenium indicator plants, and unusual or unique features.

An approximate population count was made on tree species to be affected by proposed mining activities.

General slope and aspect were recorded for each vegetation type and photographs (35mm kodacolor print film) were taken of each vegetation community and any unique areas (photo location and direction are identified on the vegetation map). During the 2010, threatened, endangered, and BLM sensitive plant surveys, photographs were taken using a digital camera.

Species Composition

Plant specimens with questionable identifications were collected and identified by personnel at the Rocky Mountain Herbarium on the University of Wyoming campus and by Bob Dorn at the Rocky Mountain Herbarium in 2010. A species list has been compiled and is presented in Addendum D8-A to provide the number and types of species that were found on the study area during 1980. An additional column was added to the species list to reflect the species noted within the mine permit during the 2010 vegetation radionuclide and threatened, endangered, and BLM sensitive species surveys.

Cover

Sixty cover transects were sampled in the proposed Congo Pit project area (30 in the Sagebrush-Grass type and 30 in the Limber Pine-Big Sagebrush type). Fifty-nine transects were established in the control areas (29 in the Sagebrush-Grass type and 30 in the Limber Pine-Big Sagebrush control). Cover data by species, litter, rock, and bare ground are listed in Addendum D8-B and production data by species and/or lifeform are summarized in Addendum D8-C.

Each transect comprised a sample size of one and a detection of a ten percent reduction with 90 percent confidence was established as the minimum sample adequacy level for both total vegetation cover and vegetation-litter-rock. Cover transects location and direction were randomly determined using numbers from a table of random numbers for location and random numbers generated by an HP25 for direction. If a transect fell outside the vegetation type being sampled, new random orientations were selected until the transect was within the type.

At each 1.5 m. (5 feet) interval along the 30.5 m. (100 feet) transect (total of 20 points per transect) , the first hit along a line projected downward perpendicular to the lower edge of the steel tape was recorded. (When overstory was present, the first hit projected upward was recorded.) Vegetation by species, litter, rock and bare ground were determined for percent cover. If more than one plant species would be hit by projecting the point downward, the additional species hit would be recorded as overlapping plant canopy structure.

Production

Production data were extracted from a meter square quadrat placed in the center of each exclosure. Near the end of the 1980 growing season (early to mid August) annual year's growth of the above-ground biomass within each quadrat was clipped by major species and life forms (perennial grasses, grass-like species, perennial forbs, half-shrubs, shrubs, annual grasses and annual forbs) and placed in separate drying bags. Major species are defined as the three or more species which are dominant in the vegetation type being sampled (not necessarily dominant in the quadrat). Samples were oven-dried at 105° C for 24 hours, weighted to the nearest 0.1gram, and weights recorded on data sheets.

Shrub Density

Shrub heights were measured by species along cover transects beginning at production quadrats. Shrubs intersecting the 30.5 m. (100 feet) line transect were measured to the nearest centimeter. Shrub height data are listed by species in Addendum D8-D and tree DBH and height data are summarized in Addendum D8-E.

Tree Density

Tree Density was determined within the Limber Pine-Big Sagebrush vegetation type. The method of total population sampling was utilized since the widespread intermittent nature of tree spacing in the community type made the point-quarter sampling method less effective. Tree height and diameter at breast height (DBH) were determined for trees within the Limber Pine-Big Sagebrush vegetation type. An approximate total number of tree species was also made within that community.

Control Areas

A control area (2.5 acres or larger) was established for each vegetation type on a site outside the proposed affected area. These sites will be used for cover and production comparisons and the evaluation of precipitation effects when bond release is anticipated (DEQ, LQD Guideline No.2, March, 1979).

D8.2 VEGETATION SURVEY RESULTS

Mapping

Geographic and topographic location of the two major vegetation types occurring on the study area is reasonably predictable as they appear to be directly related to soil, soil depth, slope, aspect, and, to some degree, elevation. A third vegetation community, Quaking Aspen with a Grass-Forb understory, exists southeast of the proposed affected area. The type is along a small, narrow hillside drainage, away from any proposed affected areas.

The Sagebrush-Grass type covers more total acres both within the proposed affected area and study area for a total of 782 acres. The affected area totals 142 acres (43%) and the study area totals 640 acres (43%). Acreages for the Limber Pine-Big Sagebrush type total 35.5 acres on the affected area (11%) and 383 acres (28.9%) in the study area (Table 3.6-1). The Quaking Aspen--Grass Forb type will not be disturbed under present development plans. The type comprised 0.2 % of the study area.

Table 3.6-1: Summary of Acreages for Vegetation Type (August 1980)

Vegetation Communities	Proposed Affected Area	Sampled Area	Control	Study Area
Sagebrush-Grass	142	180	5	640
Limber Pine-Big Sagebrush	35.5	42	4	383
Quaking Aspen	0	0	0	3
Disturbed	152.5	162	0	300
Total	**330**	**384**	**9**	**1,326**

D8.3 SAGEBRUSH-GRASS

General

The sagebrush-grass vegetation type predominantly at lower elevations than the Limber Pine-Big Sagebrush type, generally occurs on flat to moderately sloping concave fans of sandstone derived alluvium. This type is dominated by big sagebrush (*Artemisia tridentata*), black sagebrush (*Artemisia nova*), rubber rabbitbrush (*Chrysothamnus nauseosusa*), and Douglas rabbitbrush (*Chrysothamnus viscidiflorus*).

Cover

The Sagebrush-Grass type comprises 43% of the proposed affected area and 48.3% of the study area. A total of 59 transects were sampled for this vegetation types (30 in the proposed area and 29 in the control area). Vegetation cover averages approximately 37% on the type. Litter and rock average between 25% and 37% (25% on proposed affected, 37% on control area). More litter was found in the control area than the affected area. Bare ground averaged between 26% and 38% (38% on affected, 26% on control area).

Table 3.6-2: Absolute Cover for the Sagebrush-Grass Vegetation Type

Vegetation Parameter	Mean Study Area	Mean Control Area
Absolute Total Vegetation Cover (percent)	37.3	37.1
Absolute Total Cover for Litter/Rock (Percent)	22.8/2.3	35.2/1.5
Absolute Total Cover for Bare Ground (Percent)	37.5	26.2
Absolute Total Cover (percent)	62.5	73.8

Production

Annual production for 1980 on the Sagebrush-Grass type averaged 464 pounds per acre on the proposed affected area and 350 pounds per acre on the control area. Of this total, shrubs comprised the greatest percent with 275 pounds per acre on the affected area and 168 pounds per acre on the control area (59 and 48 percent respectively of the total vegetative production). While

perennial grasses made up 34 and 38 percent, respectively, (158 and 131 lbs/acre). Grasslike and perennial forbs comprised approximately 2 percent
each on the proposed affected area and between 6 and 8 percent each on the control areas.

Table 3.6-3: Production for the Sagebrush-Grass Vegetation Type

Vegetation Parameter	Mean Study Area	Mean Control Area
Grams per meter squared	52	39.2
Pounds per acres	463.9	349.5

Sample Adequacy

A total of 59 cover transects and 34 production plots were sampled in the Sagebrush-Grass type. The number of transects and quadrats sampled in each vegetation type proposed affected area and control was established from formulas and requirements defined in Wyoming DEQ, LQD Guideline No.2, Revision 2, March, 1979. The Sagebrush-Grass met sample adequacy guidelines. Refer to Table 3.6- 4 below for sample adequacy values.

Table 3.6-4: Summary of Sample Adequacy Calculations for Sagebrush-Grass Vegetation Type.

	Calculated Sample Adequacy Number (Affected Area	Actual Sample Number (Affected Area)	Calculated Sample Adequacy Number (Control Area)	Actual Sample Number (Control Area)
Sagebrush-Grass				
Total Vegetation Cover	20	30	28	29
Total Ground Cover	10	30	8.0	29
Total Production	7	18	4	16

Species Composition and Diversity

Shrubs comprise over 20 percent of the total ground cover, while grasses make up 9%, perennial forbs between 4% and 5%, and grasslike species around 3%. Bluebunch wheatgrass (*Agropyron spicatum*) and Sandberg bluegrass *(Poa secunda*), are the most dominant grass species. Threadleaf sedge (*Carex filifolia*) is the most dominant grasslike species. Hoods phlox (*Phlox hoodii*), rose pussytoes (*Antennaria rosea*), and hooker sandwort (*Arenaria hookeri*) are the most common forbs. For a complete list of species within the Sagebrush- Grass type refer to Addendum D8-A.

Table 3.6-5:. Vegetation Cover Sampling Data Summary of Species by Lifeform for the Sagebrush-Grass Vegetation Type.

	Vegetation Cover	
	Mean Study Area	**Mean Control Area**
Grasses	8.7	9.0
Grasslikes	3.3	2.5
Annual Forbs	0.3	0.2
Perennial Forbs	3.7	5.0
Half-Shrubs	0.8	0.3
Full Shrubs	20.5	20.0

Shrub Density

Shrubs, ranging from 2 to 69 cm high, average 21 cm within the type. Big sagebrush averages 18 cm in height, rubber rabbitbrush averages 33 cm, and Douglas rabbitbrush averages 17 cm tall.

D8.4 LIMBER PINE-BIG SAGEBRUSH

General

The Limber Pine-Big Sagebrush type, occurring predominantly along the ridge tops and steeper slopes, is characterized by shallow to very shallow soils interspersed with rock outcrops and boulder wash. The type is dominated by limber pine (*Pinus flexilis*), big sagebrush, black sagebrush, Douglas rabbitbrush, antelope bitterbrush (*Purshia tridentata*), bluebunch wheatgrass, Idaho fescue (*Festuca idahoensis*) and bluegrass (*Poa* spp.).

Cover

The Limber Pine-Big Sagebrush type comprises 11% (35.5 acres on the affected area) and 28.9% (383 acres in the study area). A total of 60 transects were sampled for this vegetation types (30 in the proposed area and 30 in the control area). Vegetation cover averages approximately 43% on the affected area and 40% on the control area. Litter and rock average between 30% and 35%; and bare ground between 25% and 27%.

Table 3.6-6: Absolute Cover for the Limber Pine-Big Sagebrush Vegetation Type

Vegetation Parameter	Mean Study Area	Mean Control Area
Absolute Total Vegetation Cover (percent)	42.8	39.8
Absolute Total Litter/Rock Cover (percent)	19.7/10.8	28.3/6.8
Absolute Total Bare Ground Cover (percent)	26.7	25
Absolute Total Cover (percent)	73.3	75.0

Production

Annual production for 1980 on the Limber Pine-Big Sagebrush type averaged 580 pounds per acre on the proposed affected area and 380 pounds per acre on the control area. Of this, shrubs comprised the greatest percent of the total on the affected area with 299 pounds per acre (52% of the total vegetation production) followed by perennial grasses with 231 pounds per acre (40%). Together perennial grasses and shrubs comprised nearly 92% of total production on the affected area for the type. Perennial forbs made up most of the remaining production with 41 pounds per acres (7%).

Table 3.6-7: Production for the Limber Pine-Big Sagebrush Vegetation Type

Vegetation Parameter	Mean Study Area	Mean Control Area
Grams per meter squared	65	42.5
Pounds per acres	579.5	379.5

Sample Adequacy

A total of 60 cover transects and 36 production plots were sampled in the Limber Pine-Big Sagebrush type. The number of transects and quadrats sampled in each vegetation type proposed affected area and control was established from formulas and requirements defined in Wyoming DEQ, LQD Guideline No.2, Revision 2, March, 1979. The Limber Pine-Big Sagebrush met sample adequacy guidelines. Refer to Table 3.6-8 below for sample adequacy values.

Table 3.6-8: Summary of Sample Adequacy Calculations for Limber Pine-Big Sagebrush Vegetation Type.

	Calculated Sample Adequacy Number (Affected Area	Actual Sample Number (Affected Area)	Calculated Sample Adequacy Number (Control Area)	Actual Sample Number (Control Area)
Limber Pine-Big Sagebrush				
Total Vegetation Cover	21	30	28	30
Total Ground Cover	12	30	6	30
Total Production	5	18	7	18

Species Composition and Diversity

Shrubs comprise 24.7% of the total ground cover, grasses comprised 11.5%, perennial forbs were 5.3%, while grasslikes, half-shrubs, and succulents comprised less than 1% vegetation cover on the affected area. The control area had a higher percentage of grass present at 16.5% compared to

the approximate 12% on the affected area. However, all other totals by lifeform were less in the control area, and half shrubs and succulents were not noted. Rose pussytoes and hooker sandwort are the most common perennial forbs. Big sagebrush is the most abundant shrub in both areas. Also, this community had two tree species present, Limber Pine and *Juniperus osteosperma* (Utah Juniper). For a complete list of species within the Limber Pine-Big Sagebrush type refer to Addendum D8-A.

Table 3.6-9: Vegetation Cover Sampling Data Summary of Species by Lifeform for the Limber Pine-Big Sagebrush Vegetation Type

	Percent Vegetation Cover	
	Mean Affected Study Area	**Mean Control Area**
Grasses	11.5	16.5
Grasslikes	0.7	0.2
Forbs	5.3	4.2
Half-Shrubs	0.5	0.0
Full Shrubs	24.7	19.0
Succulents	0.2	0.0

Shrub Density

Shrubs, ranging from 5 to 97 cm high, average 29 cm within the type. Big sagebrush averages 34 cm, black sagebrush averages 16 cm, antelope bitterbrush averages 23 cm, and snowberry (*Symphoricarpos* spp.) averages 19 cm in height.

Tree Density

Limber pines were the dominant species in total number and DBH, while the Utah juniper had greater height then the limber pine. The proposed affected area had approximately 146 limber pine trees and 15 Utah juniper trees present. These numbers include most of the trees in the Congo Pit area and the north and south haul road, but it is not a total population count. The mean DBH in the proposed affected area for limber pines was 15.6 cm and the height mean was 4.4 m. The mean DBH in the proposed affected area for Utah juniper was 17cm and the mean height was 5.2 m. The control area had a total of 25 limber pines and 45 Utah junipers; these include all the trees in the control area. The DBH was not calculated in the control area on either species, the height was less in the control area than the proposed affected.

Table 3.6-10: Tree Density Data (DBH, Height, Total Number of Species Present) Summary for the Limber Pine-Big Sagebrush Vegetation Type

Area	Species	DBH (cm)		Height (m)		Total Number
		Mean	Range	Mean	Range	
Proposed Affected Area	Limber pine	15.6	4.0-30.7	4.4	2.1-9.1	146
	Utah juniper	17	--	5.2	--	15
	Total Number	--	--	--	--	161
Control Area	Limber pine	31.3	20.2-48.5	4.2	1.2-7.6	25
	Utah juniper	--	--	2.4	0.9-6.1	45
	Total Number	--	--	--	--	70

D8.5 VEGETATION SURVEY DISCUSSION

The North Crooks Gap proposed affected area (Congo Pit Project Area) contains approximately 330 acres of which 152 acres are presently disturbed to the extent that no vegetation community of consequence is established. Of the remaining 178 acres, the sagebrush--grass type comprises 80% (142 acres) with a 1980 average vegetation cover of 37% and an average annual production (1980) of 464 pounds per acre. The Limber Pine-Big Sagebrush type makes up 20% (35.5 acres) with a 1980 average vegetation cover of 43 percent and 1980 average annual production of 580 pounds per acre.

The proposed affected area had an average 1980 vegetative cover of 38.4 percent and average production of 487 pounds per acre within the two vegetation types (excluding disturbed lands).

Nearly all the Sagebrush-Grass type and most of the Limber Pine-Big Sagebrush type have been partially or completely disturbed by past or present mine related activities within the proposed Congo pit, south and north haul roads, and south spoil pile sites. The proposed north spoil site has been disturbed in several minor areas, but vegetation communities are well established for the most part. Natural succession is evident on many of the older roads and disturbance areas, while the more recent disturbed sites have little perennial vegetative cover.

No noxious weeds were sighted on the study area during the 1980 reconnaissance surveys. However, during pedestrian reconnaissance surveys in 2010, one state designated weed, *Cirsium arvense* (Canada thistle), and one county designated weed, *Cirsium vulgare* (bull thistle) were noted within the project area. Bull thistle was noted on the reclaimed land south of the Congo Pit, within the affected area. Canada thistle was located on a historical mine exploration road west of the Sheep 2 Shaft, outside the affected area, but within the project area.

One selenium indicator species, *Astragalus pectinatus* (milkvetch) was observed during the 1980 study. The species appeared as scattered individuals along the discharge stream from the present mine facility. The stream passes through the center of the proposed north spoil dump site in an east to west direction.

D8.6 THREATENED, ENDANGERED, AND SPECIAL CONCERN PLANT SPECIES

No threatened or endangered plant species were encountered on the study area during 1980 field investigations. In 2010, plant and habitat surveys for both *Penstemon haydenii* (blowout penstemon) an endangered plant species and *Spiranthes diluvialis* (Ute ladies'-tresses) a threatened plant species were not noted. Habitat for these species is also absent.

However, one Bureau of Land Management (BLM) sensitive plant species, *Pinus flexilus* (limber pine) is present within the affected area as well as the control area. Limber pine is a major component to the Limber pine-Big sagebrush vegetation community. *Physaria saximontana* var. *saximontana* (Rocky Mountain twinpod) is another BLM sensitive species that has habitat in the project area, however it has no individuals or populations present. Rocky Mountain twinpod has limited habitat within the road disturbance boundary south of Sheep 2 Shaft.

References

Dorn, R.D. 2001, *Vascular Plants of Wyoming*, 3rd ed. Mountain West Publishing, Cheyenne, Wyoming. 412 p.

Wyoming Department of Environmental Quality, Land Quality Division. 1979, Guideline 2.

Range Inventory and Analysis, 1980, Vegetation Survey of the Western Nuclear, Inc. North Crooks Gap Study Area (Revised 4-6-81)

ADDENDUM D8-A

VEGETATION SPECIES SUMMARY

Scientific Name	Common Name	Sagebrush-Grass Affected Area (1981 survey)	Sagebrush-Grass Control Area (1981 survey)	Limber Pine-Big Sagebrush Affected Area (1981 survey)	Limber Pine-Big Sagebrush Control Area (1981 survey)	Additional Species found within the project area (1981 survey)	2010 Species Observed within the project area
Annual Grasses							
Bromus tectorum	Cheatgrass					X	X
Perennial Grasses							
Agropyron cristatum	Crested wheatgrass					X	X
Agropyron dasystachyum	Thickspike wheatgrass	X		X			X
Agropyron riparium	Streambank wheatgrass					X	
Agropyron smithii	Western wheatgrass	X		X	X		
Agropyron spicatum	Bluebunch wheatgrass	X	X	X	X		X
Agropyron trachycaulum	Slender wheatgrass					X	X
Agropyron spp.	Wheatgrass					X	
Bouteloua gracilis	Blue grama			X			X
Bromus carinatus	California brome					X	
Bromus inermis	Smooth brome					X	
Calamovilfa longifolia	Prairie sandreed						X
Distichlis spicata	Inland saltgrass					X	
Elymus cinereus	Basin wildrye					X	
Elymus hispidus	Intermediate wheatgrass						X
Festuca idahoensis	Idaho fescue		X	X	X		
Festuca ovina	Sheep fescue						X
Festuca spp.	Fescue						X
Hordeum jubatum	Foxtail barley					X	X

Scientific Name	Common Name	Sagebrush-Grass Affected Area (1981 survey)	Sagebrush-Grass Control Area (1981 survey)	Limber Pine-Big Sagebrush Affected Area (1981 survey)	Limber Pine-Big Sagebrush Control Area (1981 survey)	Additional Species found within the project area (1981 survey)	2010 Species Observed within the project area
Perennial Grasses continued							
Koeleria cristata	Prairie junegrass	X	X	X	X		X
Leucopoa kingii	King spikefescue			X			
Melica bulbosa	Onion melic					X	
Oryzopsis hymenoides	Indian ricegrass	X		X			X
Phleum pratense	Timothy						X
Poa canbyi	Canby bluegrass	X					
Poa cusickii	Cusick bluegrass					X	
Poa juncifolia	Alkali bluegrass						X
Poa fendleriana	Mutton bluegrass	X		X	X		
Poa nervosa	Wheeler bluegrass					X	
Poa secunda	Sandberg bluegrass	X	X	X	X		X
Poa spp.	Bluegrass						X
Sitanion hystrix	Bottlebrush squirreltail	X					X
Stipa comata	Needleandthread	X	X	X	X		X
Stipa occidentalis	Western needlegrass					X	
Grasslike Species							
Carex douglasii	Douglas sedge					X	
Carex eleocharis	Needleleaf sedge	X	X	X			X
Carex filifolia	Threadleaf sedge	X	X	X	X		X
Carex nebrascensis	Nebraska sedge						X

Scientific Name	Common Name	Sagebrush-Grass Affected Area (1981 survey)	Sagebrush-Grass Control Area (1981 survey)	Limber Pine-Big Sagebrush Affected Area (1981 survey)	Limber Pine-Big Sagebrush Control Area (1981 survey)	Additional Species found within the project area (1981 survey)	2010 Species Observed within the project area
Grasslikes continued							
Carex vallicola	Valley sedge					**X**	
Carex spp.	Sedge					**X**	**X**
Eleocharis palustris	Common spikerush						**X**
Juncus balticus	Baltic rush					**X**	
Annual Forbs							
Cleome serrulata	Rocky mountain bee plant					**X**	
Collinsia parviflora	Blue-eyed Mary					**X**	
Cordylanthus ramosus	Bushy birdbeak						**X**
Cryptantha torreyana	Minerscandle					**X**	
Descurainia spp.	Tansymustard					**X**	
Eriogonum cernuum	Wild buckwheat					**X**	
Gayophytum diffusum	Groundsmoke					**X**	
Kochia scoparia	Fireweed summercypress	**X**				**X**	
Lappula redowskii	Bluebur stickseed					**X**	
Linanthus septentrionalis	Flaxflower					**X**	
Lithophragma glabrum	Woodlandstar					**X**	
Machaeranthera canescens	Aster					**X**	
Melilotus officinalis	Yellow sweetclover						**X**
Monolepis nuttalliana	Nuttall monolepis	**X**				**X**	

Scientific Name	Common Name	Sagebrush-Grass Affected Area (1981 survey)	Sagebrush-Grass Control Area (1981 survey)	Limber Pine-Big Sagebrush Affected Area (1981 survey)	Limber Pine-Big Sagebrush Control Area (1981 survey)	Additional Species found within the project area (1981 survey)	2010 Species Observed within the project area
Annual Forbs continued							
Orthocarpus luteus	Yellow owlclover		X			X	X
Rumex salicifolius	Dock					X	
Salsola kali	Common Russian thistle					X	
Sisymbrium altissimum	Tumbling hedgemustard					X	
Streptanthella longirostris	Straepanthelia					X	
Perennial Forbs							
Achillea millefolium	Western yarrow						X
Agoseris glauca	Pale Agoseris					X	
Allium textile	Prairie onion					X	X
Antennaria rosea	Rose pussytoes	X	X	X	X	X	X
Antennaria umbrinella	Umber pussytoes					X	
Arenaria hookeri	Hooker sandwort	X	X	X	X	X	X
Arenaria congesta	Ballhead sandwort				X	X	
Arenaria nuttallii	Nuttall sandwort					X	
Arnica cordifolia	Heartleaf arnica					X	
Aster chilensis	Pacific aster					X	
Astragalus miser	Weedy milkvetch					X	
Melilotus officinalis	Yellow sweetclover						X
Astragalus sericoleucus	silky milkvetch						X
Astragalus spatulatus	Spoonleaf milkvetch					X	X

Scientific Name	Common Name	Sagebrush-Grass Affected Area (1981 survey)	Sagebrush-Grass Control Area (1981 survey)	Limber Pine-Big Sagebrush Affected Area (1981 survey)	Limber Pine-Big Sagebrush Control Area (1981 survey)	Additional Species found within the project area (1981 survey)	2010 Species Observed within the project area
Perennial Forbs continued							
Astragalus spp.	Milkvetch	**X**					**X**
Balsamorhiza incana	Hoary balsamroot					**X**	
Balsamorhiza sagittata	Arrowleaf balsamroot					**X**	
Calochortus nuttallii	Sego lily						**X**
Castilleja flava	Indian paintbrush					**X**	
Castilleja linariifolia	Wyoming indian paintbrush					**X**	**X**
Cerastium arvense	Starry cerastium	**X**				**X**	
Cirsium arvense	Canada thistle						**X**
Cirsium canescens	Prairie thistle					**X**	
Cirsium spp.	Thistle	**X**		**X**			
Cirsium vulgare	Bull thistle						**X**
Chenopodium album	Common lambsquarter						**X**
Crepis acuminata	Tapertip hawksbeard					**X**	**X**
Crepis modocensis	Yellowstone hawksbeard					**X**	
Comandra pallida	Pale bastardtoadflax		**X**			**X**	
Cryptantha celosioides	Buttecandle						**X**
Cryptantha sericea	Minerscandle					**X**	
Cryptantha spp.	Cryptantha					**X**	**X**
Delphinium nelsonii	Nelson's Larkspur					**X**	

Scientific Name	Common Name	Sagebrush-Grass Affected Area (1981 survey)	Sagebrush-Grass Control Area (1981 survey)	Limber Pine-Big Sagebrush Affected Area (1981 survey)	Limber Pine-Big Sagebrush Control Area (1981 survey)	Additional Species found within the project area (1981 survey)	2010 Species Observed within the project area
Perennial Forbs continued							
Delphinium spp.	Larkspur						X
Draba oligosperma	Snowbank draba					X	
Epilobium ciliatum	Willowherb					X	
Eremogone congesta	Balhead sandwort						X
Erigeron caespitosus	Tufted fleabane					X	
Erigeron compositus	Cutleaf daisy						X
Erigeron eatonii	Eaton fleabane					X	
Erigeron ochroleucus	Buff fleabane						X
Eriogonum flavum	Alpine golden buckwheat						X
Eriogonum ovalifolium	Cushion wild buckwheat	X				X	
Eriogonum umbellatum	Sulfur wild buckwheat					X	X
Eriogonum spp.	Buckwheat						X
Erysimum capitatum	Coast wallflower	X				X	
Fritillaria atropurpurea	Purplespot fritillary					X	
Geranium richardsonii	Richardson geranium					X	
Geranium viscosissimum	Sticky geranium					X	
Geum triflorum	Prairiesmoke sieversia					X	
Grindelia squarrosa	Curlycup gumweed	X				X	X
Haplopappus acaulis	Stemless goldenweed					X	X

Scientific Name	Common Name	Sagebrush-Grass Affected Area (1981 survey)	Sagebrush-Grass Control Area (1981 survey)	Limber Pine-Big Sagebrush Affected Area (1981 survey)	Limber Pine-Big Sagebrush Control Area (1981 survey)	Additional Species found within the project area (1981 survey)	2010 Species Observed within the project area
Perennial Forbs continued							
Heterotheca villosa	Hairy goldenaster					X	
Heuchera parviflora	Littleleaf alumroot					X	
Hymenoxys acaulis	Stemless actinea					X	
Ipomopsis aggregata	Skyrocket gilia					X	X
Ivesia gordonii	Gordon's Ivesia					X	
Leptodactylon pungens	Granite pricklygila		X			X	
Lesquerella alpina	Bladderpod					X	
Lewisia rediviva	Bitterroot					X	X
Liatris punctata	Dotted gayfeather					X	
Linum lewisii	Blue flax						X
Lithospermum incisum	Narrowleaf stoneseed						X
Lithospermum ruderale	Gromwell					X	
Lomatium dissectum	Lomatium					X	
Lomatium triternatum	Nineleaf Lomatium					X	
Lupinus argenteus	Silvery lupine					X	X
Lupinus sericeus	Silky lupine						
Lygodesmia juncea	Rush skeletonplant					X	
Machaeranthera grindelioides	Spiny goldenweed					X	
Mahonia repens	Creeping barberry					X	
Mertensia ciliata	Mountain bluebells					X	

Scientific Name	Common Name	Sagebrush-Grass Affected Area (1981 survey)	Sagebrush-Grass Control Area (1981 survey)	Limber Pine-Big Sagebrush Affected Area (1981 survey)	Limber Pine-Big Sagebrush Control Area (1981 survey)	Additional Species found within the project area (1981 survey)	2010 Species Observed within the project area
Perennial Forbs continued							
Mertensia lanceolata	Lanceleaf bluebells			**X**		**X**	
Mertensia spp.	Bluebells						**X**
Mentha arvensis	Wild mint						**X**
Orobanche fasciculata	Purple broomrape						**X**
Penstemon humilis	Low penstemon					**X**	
Penstemon laricifolius	Beardtongue					**X**	
Penstemon radicosis	Matroot penstemon					**X**	
Penstemon paysoniorum	Payson's beardtongue						**X**
Penstemon spp.	Penstemon species						**X**
Phacelia hastata	Spearhead phacelia						**X**
Phlox andicola	Prairie phlox						**X**
Phlox hoodii	Hoods phlox	**X**	**X**	**X**		**X**	**X**
Potentilla effusa	Saskatchewan cinquefoil					**X**	
Potentilla hippiana	Woolly cinquefoil						**X**
Potentilla ovina	Sheep cinquefoil					**X**	**X**
Potentilla spp.	Cinquefoil						**X**
Pteryxia hendersonii	Fernparsley					**X**	
Physaria species	twinpod						**X**
Rumex spp.	Dock					**X**	
Sedum lanceolatum	Wormleaf stonecrop		**X**		**X**	**X**	**X**

Scientific Name	Common Name	Sagebrush-Grass Affected Area (1981 survey)	Sagebrush-Grass Control Area (1981 survey)	Limber Pine-Big Sagebrush Affected Area (1981 survey)	Limber Pine-Big Sagebrush Control Area (1981 survey)	Additional Species found within the project area (1981 survey)	2010 Species Observed within the project area
Perennial Forbs continued							
Senecio canus	Groundsel					X	
Senecio integerrimus	Lambstongue groundsel					X	
Smilacina stellata	Starry falsesolomonseal					X	
sphaeromeria capitata	Rock tansy						X
Stenotus acaulis	Stemless goldenweed						X
Stephanomeria runcinata	Desert wire lettuce						X
Taraxacum officinale	Common dandelion					X	
Thermopsis rhombifolia	Prairie thermopsis	X		X		X	X
Townsendia spp.	Townsendia					X	
Trifolium andinum	Clover					X	X
Trifolium gymnocarpon	Hollyleaf clover						X
Viola spp.	Violet					X	
Zigadenus venenosus	Meadow deathcamas			X		X	
Half-Shrubs							
Artemisia frigida	Fringed sagewort	X	X	X		X	X
Artemisia pedatifida	Birdfoot sagewort	X				X	
Atriplex gardneri	Gardner saltbush					X	
Ceratoides lanata	Common winterfat	X				X	
Eriogonum spp.	Wild buckwheat					X	
Gutierrezia sarothrae	Broom snakeweed						X

Scientific Name	Common Name	Sagebrush-Grass Affected Area (1981 survey)	Sagebrush-Grass Control Area (1981 survey)	Limber Pine-Big Sagebrush Affected Area (1981 survey)	Limber Pine-Big Sagebrush Control Area (1981 survey)	Additional Species found within the project area (1981 survey)	2010 Species Observed within the project area
Half-Shrubs continued							
Paronychia sessiliflora	creeping nailwort						X
Shrubs							
Amelanchier alnifolia	Saskatoon serviceberry			X		X	
Amelanchier utahensis	Serviceberry					X	
Artemisia cana	Silver sagebrush						X
Artemisia nova	Black sagebrush	X	X	X	X	X	X
Artemisia tridentata	Big sagebrush	X	X	X	X		X
Artemisia tridentata ssp. tridentata	Basin big sagebrush					X	
Artemisia tridentata ssp. vaseyana	Mountain big sagebrush					X	
Artemisia tridentata ssp. wyomingensis	Wyoming big sagebrush					X	
Chrysothamnus nauseosus	Rubber rabbitbrush	X	X	X	X	X	X
Chrysothamnus viscidiflorus	Douglas rabbitbrush	X	X	X	X	X	X
Holodiscus dumosus	Ocean spray						
Juniperus communis	Common juniper					X	
Juniperus scopulorum	Rocky Mountain juniper						X
Prunus virginiana	Common chokecherry					X	
Purshia tridentata	Antelope bitterbrush			X	X	X	X
Ribes setosum	Currant					X	X

Scientific Name	Common Name	Sagebrush-Grass Affected Area (1981 survey)	Sagebrush-Grass Control Area (1981 survey)	Limber Pine-Big Sagebrush Affected Area (1981 survey)	Limber Pine-Big Sagebrush Control Area (1981 survey)	Additional Species found within the project area (1981 survey)	2010 Species Observed within the project area
Shrubs continued							
Ribes cereum	Wax currant					X	X
Rosa woodsii	Woods rose					X	
Salix exigua	Coyote willow					X	
Salix boothii	Booth's willow						X
Symphoricarpos albus	Common snowberry	X		X	X	X	X
Tetradymia canescens	Spineless horsebrush						X
Succulents							
Opuntia polyacantha	Plains pricklypear					X	X
Trees							
Betula occidentalis	Water birch						X
Juniperus osteosperma	Utah juniper				X	X	
Pinus flexilis	Limber pine				X	X	X
Populus deltoides	Eastern cottonwood						X
Populus tremuloides	Quacking aspen					X	X

ADDENDUM D8-B

VEGETATION COVER SUMMARIES

Titan Uranium Project
North Crooks Gap Study 1981
Report: Cover Summary

Site Id: Sagebrush-Grass Affected Area

Name: Titan Uranium

Comm. Type/Form: Baseline Cover
Sample Date: August 1980

Sample Method: Point Intercept
Sample Size: 30.5 Meter Transect
Number of Samples: 30
Report Date: 08/02/2010

Species	Cover Total	Cover Mean
Grasses		
Agropyron dasystachyum	20	0.7
Agropyron smithii	10	0.3
Agropyron spicatum	55	1.8
Koeleria cristata	25	0.8
Oryzopsis hymenoides	25	0.8
Poa fendleriana	65	2.2
Poa secunda	30	1.0
Sitanion hystrix	5	0.2
Stipa comata	25	0.8
Sub-total	260	8.6
Grass-like		
Carex eleocharis	15	0.5
Carex filifolia	85	2.8
Sub-total	100	3.3
Annual Forbs		
Kochia scoparia	5	0.2
Monolepis nuttalliana	5	0.2
Sub-total	10	0.3
Perennial Forbs		
Antennaria rosea	5	0.2
Arenaria hookeri	5	0.2
Astragalus spp.	5	0.2
Cerastium arvense	10	0.3
Cirsium spp.	5	0.2
Eriogonum ovalifolium	5	0.2
Erysimum capitatum	10	0.3
Grindelia squarrosa	20	0.7
Phlox hoodii	35	1.2
Thermopsis rhombifolia	10	0.3
Sub-total	110	3.7

Titan Uranium Project
North Crooks Gap Study 1981
Report: Cover Summary

Site Id: Sagebrush-Grass Affected Area

Name: Titan Uranium
Comm. Type/Form: Baseline Cover
Sample Date: August 1980

Sample Method: Point Intercept
Sample Size: 30.5 Meter Transect
Number of Samples: 30
Report Date: 08/02/2010

Species	Cover Total	Cover Mean
Half-Shrubs		
Artemisia frigida	25	0.8
Sub-total	25	0.8
Perennial Shrubs		
Artemisia nova	65	2.2
Artemisia tridentata	370	12.3
Chrysothamnus nauseosus	80	2.7
Chrysothamnus viscidiflorus	95	3.2
Symphoricarpos albus	5	0.2
Sub-total	615	20.6
Total Vegetation	1120	37.3
Litter	685	22.8
Rock	70	2.3
Bare Ground	1125	37.5
Vegetation, Litter, Rock (Total Cover)	1875	62.5

*Numbers do not always sum up correctly due to rounding within the summarization.

Titan Uranium Project
North Crooks Gap Study 1981
Report: Cover Summary

Site Id: Sagebrush-Grass Control Area

Name: Titan Uranium

Comm. Type/Form: Baseline Cover
Sample Date: August 1980

Sample Method: Point Intercept
Sample Size: 30.5 Meter Transect
Number of Samples: 29
Report Date: 08/02/2010

Species	Cover Total	Cover Mean
Grasses		
Agropyron spicatum	95	3.3
Festuca idahoensis	5	0.2
Koeleria cristata	45	1.5
Poa secunda	115	4.0
Sub-total	260	9.0
Grass-like		
Carex eleocharis	10	0.3
Carex filifolia	65	2.2
Sub-total	75	2.5
Annual Forbs		
Orthocarpus luteus	5	0.2
Sub-total	5	0.2
Perennial Forbs		
Antennaria rosea	40	1.4
Arenaria hookeri	30	1.0
Comandra pallida	15	0.5
Leptodactylon pungens	15	0.5
Phlox hoodii	35	1.2
Sedum lanceolatum	10	0.3
Sub-total	145	5.0

Titan Uranium Project
North Crooks Gap Study 1981
Report: Cover Summary

Site Id: Sagebrush Grass Control Area
Name: Titan Uranium
Comm. Type/Form: Baseline Cover
Sample Date: August 1980

Sample Method: Point Intercept
Sample Size: 30.5 Meter Transect
Number of Samples: 29
Report Date: 08/02/2010

Species	Cover Total	Cover Mean
Half-Shrubs		
Artemisia frigida	10	0.3
Sub-total	10	0.3
Perennial Shrubs		
Artemisia nova	275	9.5
Artemisia tridentata	180	6.2
Chrysothamnus nauseosus	10	0.3
Chrysothamnus viscidiflorus	115	4.0
Sub-total	580	20.0
Total Vegetation	1075	37.1
Litter	1020	35.2
Rock	45	1.5
Bare Ground	760	26.2
Vegetation, Litter, Rock (Total Cover)	2140	73.8

*Numbers do not always sum up correctly due to rounding within the summarization.

Titan Uranium Project
North Crooks Gap Study 1981
Report: Cover Summary

Site Id: Limber Pine-Big Sagebrush Affected Area

Name: Titan Uranium
Comm. Type/Form: Baseline Cover
Sample Date: August 1980

Sample Method: Point Intercept
Sample Size: 30.5 Meter Transect
Number of Samples: 30
Report Date: 08/02/2010

Species	Cover Total	Cover Mean
Grasses		
Agropyron smithii	15	0.5
Agropyron spicatum	150	5.0
Bouteloua gracilis	5	0.2
Festuca idahoensis	60	2.0
Koeleria cristata	15	0.5
Leucopoa kingii	15	0.5
Oryzopsis hymenoides	20	0.7
Poa secunda	60	2.0
Stipa comata	5	0.2
Sub-total	345	11.5
Grass-like		
Carex eleocharis	5	0.2
Carex filifolia	15	0.5
Sub-total	20	0.7
Perennial Forbs		
Antennaria rosea	80	2.7
Arenaria hookeri	35	1.2
Mertensia spp.	5	0.2
Phlox hoodii	25	0.8
Thermopsis rhombifolia	5	0.2
Zigadenus venenosus	10	0.3
Sub-total	160	5.3

Titan Uranium Project
North Crooks Gap Study 1981
Report: Cover Summary

Site Id: Limber Pine Big Sagebrush Affected Area

Name: Titan Uranium
Comm. Type/Form: Baseline Cover
Sample Date: August 1980

Sample Method: Point Intercept
Sample Size: 30.5 Meter Transect
Number of Samples: 30
Report Date: 08/02/2010

Species	Cover Total	Cover Mean
Half-Shrubs		
Artemisia frigida	15	0.5
Sub-total	15	0.5
Perennial Shrubs		
Artemisia nova	60	2.0
Artemisia tridentata	380	12.7
Chrysothamnus nauseosus	45	1.5
Chrysothamnus viscidiflorus	100	3.3
Purshia tridentata	105	3.5
Symphoricarpos albus	50	1.7
Sub-total	740	24.7
Succulents		
Opuntia polyacantha	5	0.2
Sub-total	5	0.2
Total Vegetation	1285	42.8
Litter	590	19.7
Rock	325	10.8
Bare Ground	800	26.7
Vegetation, Litter, Rock (Total Cover)	2200	73.3

*Numbers do not always sum up correctly due to rounding within the summarization.

Titan Uranium Project
North Crooks Gap Study 1981
Report: Cover Summary

Site Id: Limber Pine Big Sagebrush Control Area

Name: Titan Uranium
Comm. Type/Form: Baseline Cover
Sample Date: August 1980

Sample Method: Point Intercept
Sample Size: 30.5 Meter Transect
Number of Samples: 30
Report Date: 08/02/2010

Species	Cover Total	Cover Mean
Grasses		
Agropyron spicatum	75	2.5
Festuca idahoensis	345	11.5
Koeleria cristata	25	0.8
Poa secunda	45	1.5
Stipa comata	5	0.2
Sub-total	495	16.5
Grass-like		
Carex filifolia	5	0.2
Sub-total	5	0.2
Perennial Forbs		
Antennaria rosea	50	1.7
Arenaria congesta	5	0.2
Arenaria hookeri	65	2.2
Sedum lanceolatum	5	0.2
Sub-total	125	4.2
Perennial Shrubs		
Artemisia nova	175	5.8
Artemisia tridentata	280	9.3
Chrysothamnus nauseosus	5	0.2
Chrysothamnus viscidiflorus	45	1.5
Juniperus osteosperma	10	0.3
Purshia tridentata	10	0.3
Symphoricarpos albus	45	1.5
Sub-total	570	19.0
Total Vegetation	1195	39.9
Litter	850	28.3
Rock	205	6.8
Bare Ground	750	25.0
Vegetation, Litter, Rock (Total Cover)	2250	75.0

*Numbers do not always sum up correctly due to rounding within the summarization.

ADDENDUM D8-C

VEGETATION PRODUCTION SUMMARIES

Titan Uranium Project
North Crooks Gap Study 1981
Report: Production Summary

Site Id: Sagebrush-Grass Affected Area
Name: Titan Uranium
Comm. Type/Form: Baseline Production
Sample Date: August 1980

Sample Method: Quadrats
Sample Size: 1 sq.m.
Number of Samples: 18
Report Date: 08/2/2010

Species	Mean	LBS/acre	Relative (%)
Grasses			
Agropyron dasystachyum	1.23	10.97	2.37
Agropyron smithii	0.63	5.62	1.21
Agropyron spicatum	9.08	81.01	17.46
Koeleria cristata	2.24	19.99	4.31
Oryzopsis hymenoides	0.03	0.27	0.06
Poa canbyi	0.30	2.68	0.58
Poa fendleriana	2.53	22.57	4.87
Poa secunda	1.17	10.44	2.25
Sitanion hystrix	0.07	0.62	0.13
Stipa comata	0.49	4.37	0.94
Sub-total	17.77	158.54	34.18
Grasslikes			
Carex eleocharis	0.17	1.52	0.33
Carex filifolia	0.94	8.39	1.81
Sub-total	1.12	9.99	1.81
Annual Forbs			
Miscellaneous	0.02	0.18	0.04
Sub-total	0.02	0.18	0.04
Perennial Forbs			
Eriogonum ovalifolium	0.48	4.28	0.92
Miscellaneous	0.67	5.98	1.29
Sub-total	1.16	10.36	2.23
Half-Shrubs			
Artemisia frigida	0.89	7.94	1.71
Ceratoides lanata	0.20	1.78	0.38
Sub-total	1.09	9.72	2.10
Shrubs			
Artemisia nova	6.45	57.55	12.41
Artemisia tridentata	19.99	178.35	38.45
Chrysothamnus nauseosus	1.06	9.46	2.04

Titan Uranium Project
North Crooks Gap Study 1981
Report: Production Summary Continued

Site Id: Sagebrush-Grass Affected Area
Name: Titan Uranium
Comm. Type/Form: Baseline Production
Sample Date: August 1980

Sample Method: Quadrats
Sample Size: 1 sq.m.
Number of Samples: 18
Report Date: 08/2/2010

Species	Mean	LBS/acre	Relative (%)
Chrysothamnus viscidiflorus	3.20	28.55	6.16
Symphoricarpos albus	0.13	1.16	0.25
Sub-total	30.83	275.07	59.30
Total Production	51.99	463.86	99.65

*Percent Relative Cover does not equal 100% due to rounding factors within the summed numbers

Titan Uranium Project
North Crooks Gap Study 1981
Report: Production Summary

Site Id: Sagebrush-Grass Control Area
Name: Titan Uranium
Comm. Type/Form: Baseline Production
Sample Date: August 1980

Sample Method: Quadrats
Sample Size: 1 sq.m.
Number of Samples: 16
Report Date: 08/2/2010

Species	Mean	LBS/acre	Relative (%)
Grasses			
Agropyron spicatum	9.31	83.06	23.76
Koeleria cristata	2.01	17.93	5.13
Poa secunda	2.40	21.41	6.13
Stipa comata	0.98	8.74	2.50
Sub-total	14.69	131.06	37.53
Grasslikes			
Carex filifolia	3.05	27.21	7.79
Sub-total	3.05	27.21	7.79
Perennial Forbs			
Miscellaneous	2.51	22.39	6.41
Sub-total	2.51	22.39	6.41
Half-Shrubs			
Artemisia frigida	0.14	1.25	0.36
Sub-total	0.14	1.25	0.36
Shrubs			
Artemisia nova	13.00	115.99	33.19
Artemisia tridentata	2.72	24.27	6.94
Chrysothamnus nauseosus	0.16	1.43	0.41
Chrysothamnus viscidiflorus	2.90	25.87	7.40
Sub-total	18.78	167.56	47.94
Total Production	39.17	349.47	100.03

*Percent Relative Cover does not equal 100% due to rounding factors within the summed numbers

Titan Uranium Project
North Crooks Gap Study 1981
Report: Production Summary

Site Id: Limber Pine-Big Sagebrush Affected Area
Name: Titan Uranium
Comm. Type/Form: Baseline Production
Sample Date: August 1980

Sample Method: Quadrats
Sample Size: 1 sq.m.
Number of Samples: 18
Report Date: 08/2/2010

Species	Mean	LBS/acre	Relative (%)
Grasses			
Agropyron dasystachyum	0.51	4.55	0.79
Agropyron smithii	0.67	5.98	1.03
Agropyron spicatum	9.78	87.26	15.06
Festuca idahoensis	5.61	50.05	8.64
Hesperochlea kingii	3.25	29.00	5.00
Koeleria cristata	1.63	14.54	2.51
Oryzopsis hymenoides	0.39	3.48	0.60
Poa fendleriana	0.61	5.44	0.94
Poa secunda	3.36	29.98	5.17
Stipa comata	0.10	0.89	0.15
Sub-total	25.92	231.26	39.89
Grasslikes			
Carex eleocharis	0.01	0.09	0.02
Carex filifolia	0.02	0.18	0.03
Sub-total	0.03	0.27	0.05
Annual Forbs			
Miscellaneous	0.87	7.76	1.34
Sub-total	0.87	7.76	1.34
Perennial Forbs			
Cirsium spp.	0.09	0.80	0.14
Miscellaneous	4.54	40.51	6.99
Sub-total	4.63	41.31	7.13
Shrubs			
Artemisia nova	2.29	20.43	3.53
Artemisia tridentata	22.98	205.03	35.38
Chrysothamnus nauseosus	0.66	5.89	1.02
Chrysothamnus viscidiflorus	3.56	31.76	5.48
Purshia tridentata	2.63	23.46	4.05
Symphoricarpos albus	1.38	12.31	2.12
Sub-total	33.50	298.89	51.58

Titan Uranium Project
North Crooks Gap Study 1981
Report: Production Summary Continued

Site Id: Limber Pine-Big Sagebrush Affected Area
Name: Titan Uranium
Comm. Type/Form: Baseline Production
Sample Date: August 1980

Sample Method: Quadrats
Sample Size: 1 sq.m.
Number of Samples: 18
Report Date: 08/2/2010

Species	Mean	LBS/acre	Relative (%)
Total Production	64.94	579.48	99.98

*Percent Relative Cover does not equal 100% due to rounding factors within the summed numbers

Titan Uranium Project
North Crooks Gap Study 1981
Report: Production Summary

Site Id: Limber Pine Big Sagebrush Control Area
Name: Titan Uranium
Comm. Type/Form: Baseline Production
Sample Date: August 1980

Sample Method: Quadrats
Sample Size: 1 sq.m.
Number of Samples: 18
Report Date: 08/2/2010

Species	Mean	LBS/acre	Relative (%)
Grasses			
Agropyron smithii	0.33	2.94	0.78
Agropyron spicatum	2.72	24.27	6.40
Festuca idahoensis	17.23	153.73	40.51
Koeleria cristata	0.56	5.00	1.32
Poa fendleriana	0.67	5.98	1.58
Poa secunda	0.56	5.00	1.32
Sub-total	22.07	196.91	51.89
Annual Forbs			
Miscellaneous	0.15	1.34	0.35
Sub-total	0.15	1.34	0.35
Perennial Forbs			
Miscellaneous	0.89	7.94	2.09
Sub-total	0.89	7.94	2.09
Shrubs			
Artemisia nova	3.26	29.09	7.67
Artemisia tridentata	13.03	116.25	30.64
Chrysothamnus nauseosus	0.87	7.76	2.05
Chrysothamnus viscidiflorus	1.73	15.44	4.07
Symphoricarpos albus	0.53	4.73	1.25
Sub-total	19.42	173.27	45.66
Total Production	42.53	379.45	100.00

ADDENDUM D8-D

VEGETATION DENSITY SUMMARIES

Titan Uranium Project
North Crooks Gap Study 1981
Report: Density Summary

Site Id: Sagebrush-Grass Affected Area
Name: Titan Uranium
Comm. Type/Form: Baseline Density
Sample Date: August 1980

Sample Method: Transect
Sample Size: 30.5 Meter Transect
Number of Samples: 30
Report Date: 08/02/2010

	Mean	Range	Total Samples
Shrubs			
Artemisia nova	13.0	2-27	62
Artemisia pedatifida	4.0	3-6	3
Artemisia tridentata	18.3	3-69	249
Chrysothamnus nauseosus	32.9	18-61	22
Chrysothamnus viscidiflorus	16.8	5-42	63
Symphoricarpos albus	21.3	19-23	3
Total			402

Titan Uranium Project
North Crooks Gap Study 1981
Report: Density Summary

Site Id: Sagebrush-Grass Control Area
Name: Titan Uranium
Comm. Type/Form: Baseline Density
Sample Date: August 1980

Sample Method: Transect
Sample Size: 30.5 Meter Transect
Number of Samples: 29
Report Date: 08/02/2010

	Mean	Range	Total Samples
Shrubs			
Artemisia nova	11.0	2-27	516
Artemisia tridentata	18.3	3-52	261
Chrysothamnus nauseosus	14.6	7-21	10
Chrysothamnus viscidiflorus	12.4	4-29	318
Total			1,105

Titan Uranium Project
North Crooks Gap Study 1981
Report: Density Summary

Site Id: Limber Pine-Big Sagebrush Affected Area
Name: Titan Uranium
Comm. Type/Form: Baseline Density
Sample Date: August 1980

Sample Method: Transect
Sample Size: 30.5 Meter Transect
Number of Samples: 30
Report Date: 08/02/2010

	Mean	Range	Total Samples
Shrubs			
Amelanchier alnifolia	46.8	35-61	4
Artemisia nova	15.6	5-45	34
Artemisia tridentata	34.3	5-97	281
Chrysothamnus nauseosus	34.1	7-69	42
Chrysothamnus viscidiflorus	22.3	5-56	107
Purshia tridentata	23.4	5-63	47
Symphoricarpos albus	25.1	5-80	90
Total			605

Titan Uranium Project
North Crooks Gap Study 1981
Report: Density Summary

Site Id: Limber Pine Big Sagebrush Control Area
Name: Titan Uranium
Comm. Type/Form: Baseline Density
Sample Date: August 1980

Sample Method: Transect
Sample Size: 30.5 Meter Transect
Number of Samples: 30
Report Date: 08/02/2010

	Mean	Range	Total Samples
Shrubs			
Artemisia nova	16.7	3-42	245
Artemisia tridentata	38.9	1-98	331
Chrysothamnus nauseosus	20.0	7-41	3
Chrysothamnus viscidiflorus	19.0	2-61	144
Juniperus communis	65.0	--	1
Juniperus osteosperma	80.5	67-94	2
Purshia tridentata	29.5	9-44	15
Ribes cereum	60.0	--	1
Symphoricarpos albus	19.2	4-49	86
Total			828

ADDENDUM D8-E

TREE DBH AND HEIGHT DATA

Titan Uranium Project
North Crooks Gap Study 1981
Report: Cover Summary

Site Id: Limber Pine-Big Sagebrush Affected Area
Name: Titan Uranium
Comm. Type/Form: Baseline
Sample Date: August 1981

Sample Method: Point Intercept
Sample Size: Affected Area

Report Date: 08/02/2010

	DBH		Height		
Species	Mean	Range	Mean	Range	Total Number
Pinus flexilis	15.6	4.0 - 30.7	4.4	2.1 - 9.1	146
Juniperus osteosperma	17	--	5.2*	--	15
Total					161**

*Most individuals less than DBH height (4.5 feet)
**Includes most trees in Congo Pit area and north and south haul roads, but is not a total population count

Titan Uranium Project
North Crooks Gap Study 1981
Report: Cover Summary

Site Id: Limber Pine-Big Sagebrush Control Area
Name: Titan Uranium
Comm. Type/Form: Baseline
Sample Date: August 1981

Sample Method: Point Intercept
Sample Size: Control Area

Report Date: 08/02/2010

	DBH		Height		
Species	Mean	Range	Mean	Range	Total Number
Pinus flexilis	31.3	20.2 - 48.5	4.2	1.2 - 7.6	25
Juniperus osteosperma	--	--	2.4	0.9 - 6.1	45
Total					70***

***Includes all trees in the Control Area.