APPENDIX D-7

TITAN URANIUM USA, INC,

2010 BASELINE SOIL ASSESSMENT

SHEEP MOUNTAIN SOIL ANALYSIS AREA

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APPENDIX D-7

SOILS

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INTRODUCTION

This report presents baseline information on the soils occurring within the Titan Uranium, USA Inc. (Titan) – Sheep Mountain Soil Analysis Area. Baseline soils inventories were used to delineate the soil resources within the Sheep Mountain Soil Analysis Area and were used to determine topsoil salvage depths and ultimately replacement depths over the entire proposed project disturbance area.

METHODS

Review of Existing Literature

The soils in this portion of Fremont County were studied and mapped to an Order 3 scale by the U.S. Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) in 1983. Information regarding Fremont County is available in both electronic and hard copy formats. The NRCS has also centralized dissemination of typical soil series descriptions. This information is available on the internet at www.nrcs.usda.gov.

The 1980 Appendix D-7 Soil Assessment done by Mine Reclamation Consultants, Inc. under contract with Western Nuclear, Inc. was also reviewed. This soil survey was conducted during the fall of 1979 on the Western Nuclear, Inc. study area. The soil series identified within the study area included the BlackHall, Cotopaxi, Elk Mountain, Fluetsch, Ryan Park and Typic Cryorthents series. The estimated overall depth of salvageable topsoil was considered to be 0.73 feet. The most common limiting factor described was coarse textures with high percentages of fine sand or coarser material that limited the available water holding capacity. The 1980 Appendix D-7 Soil Assessment can be found in Addendum D-7-H.

2010 Project Participants

BKS Environmental Associates, Inc. (BKS) of Rock Springs, Wyoming performed the 2010 soil survey fieldwork, mapping and compiled the resulting report. Aerial imagery, for all maps used for this project, was obtained from the USDA. Drafting of the final soils map was completed by BKS. All soil samples were taken to Inter-Mountain Laboratories Inc. (IML) in Gillette, Wyoming for transmittal to Sheridan, Wyoming for analysis.

Soil Survey

Field mapping was conducted according to techniques and procedures outlined in the National Cooperative Soil Survey. Wyoming Department of Environmental Quality (WDEQ) Land Quality Division (LQD) Guideline 1 (August 1994 Revision) was used as a guide during all phases of the study.

An Order 2 soil survey was conducted in August of 2010. Actual soil boundaries were identified in the field by exposing soil profiles to determine the nature and extent of soil series within the Sheep Mountain Soil Analysis Area. The soil boundaries were delineated on a 2006 NAIP orthophoto with a relative scale of 1:8,000 for purposes of permit submittal. Refer to Table D-7.1.1 for Soil Map Unit Acreages and total Sheep Mountain Soil Analysis Area acreage.

In February and May 2011, several of the original disturbance boundaries were altered and new disturbance boundaries were added. The sampling done in August 2010 did not take these new disturbance boundaries into consideration but these new areas were observed to be similar to the previously surveyed area. Due to the potential of future disturbance boundary changes, a buffer was added around the leach and spoil disturbance areas. The original 2010 Soil Survey Area is included on the soil map for reference. All the acreages from the original 2010 Soil Survey Area are not incorporated in the report tables but reflect the revised disturbance boundaries with the associated buffer acres.

For information regarding the soils found outside of the disturbance boundary, see the NRCS Soil Map found in Addendum D-7-I. The detailed soil mapping found within the disturbance boundaries was conducted during this survey and uses the same NRCS soil series found within the project area. Due to the different soil survey order and scale, a number of the soil mapping boundaries on the disturbed areas differ from the NRCS mapping.

A total of 1,244.04 acres were included in the final soil mapping of the Sheep Mountain Soil Analysis Area. Overall, 21 soil profiles were exposed, sampled and had corresponding profile descriptions written. A total of 12 of those sampled profiles were sent to the laboratory for analysis. This resulted in 41 soil samples being sent to the laboratory. Due to change in the disturbance boundaries, only 9 of the 12 sampled profiles sent for analysis are used in this report.

It should be noted that a significant part of the project area was heavily disturbed or had already been reclaimed. All of the Underground Shaft areas (Sheep I and Sheep II) were considered disturbed. A sample was taken in each of the Underground Shaft areas, but due to the severely disturbed nature of the soils they were not taken to the laboratory for analysis. Large reclaimed areas were found in the original Paydirt Heap Leach and McIntosh Heap locations. The soils found there are not in their natural condition but the samples taken in these areas were sent to the laboratory. The soils mapped in these reclaimed areas are referred to as Onason Reclaimed Variants because they most resemble the Onason soil series. Refer to Tables D-7.1.3 for Soil Sample Locations within the Sheep Mountain Soil Analysis Area.

Field Sampling

Sampling of soil series identified within the original 2010 Soil Survey Area generally followed WDEQ Guideline 1 recommendations of three sampled pedons for series encompassing greater than 160 acres, two sampled pedons for series encompassing between 40 and 160 acres, and one sampled pedon for series

encompassing less than 40 acres. Since the disturbance boundaries changed after the initial soil survey and a buffer area was added, the Cushool soil series does not meet the soil sampling recommendations. See Table D-7.1.2 for the Soil Series Sample Summary within the Sheep Mountain Soil Analysis Area.

All soil samples were collected with a Giddings truck mounted auger or hand auger to paralithic contact or a maximum depth of 60", whichever was shallower. Sampled profiles were described in the field, to the extent possible, by the physical and chemical nature of each profile horizon. Backhoe pits were not utilized for soil sampling. Refer to Addendum D-7-F for Site Photographs.

Sample locations were identified on a base map, and global positioning system (GPS) points were collected with a hand-held Garmin GPS unit. Soil samples were placed in clean, labeled, polyethylene plastic bags, and sealed to limit sample drying. Samples were kept as cool as possible, but not stored on ice. Samples were delivered to IML in Gillette, Wyoming when sampling was completed for transmittal to Sheridan, Wyoming.

Laboratory Analysis

Samples were placed into lined aluminum pans to air dry. Coarse fragments were measured with a 10 mesh screen prior to grinding; the entire sample was then hand ground to pass a 10 mesh screen. An approximate 20 ounce subsample was obtained through splitting with a series of riffle splitters and subsequently analyzed. A second subsample was maintained in storage at IML. Approximately five percent of the samples were run for duplicate analysis.

Actual laboratory analysis followed the methodology outlined in WDEQ-LQD Guideline 1. In general, samples were processed as soon as possible after receipt. All analytical data is found in Addendum D-7-D Soil Laboratory Analysis.

RESULTS AND DISCUSSION

Soil Survey - General

The soils occurring within the Sheep Mountain Soil Analysis Area are typical of semi-deserts in the western intermountains of the United States. Due to prevailing climate and vegetation conditions, organic matter is accumulated slowly and is confined primarily to the surface horizon(s), resulting in light-coloration throughout the profile.

Topography consisted of rounded hills with moderate to steep slopes. Elevations ranged from 6,600 feet to 8,000 feet. The ground was sparsely vegetated with sage and grasses with occasional small to medium sized pine trees at higher elevations. The soils occurring throughout the Sheep Mountain Soil Analysis Area were generally coarse-loamy textured. The soils varied in depth to paralithic material, ranging from

5 inches to greater than 60 inches, but were mostly shallow. The majority of the soils were formed in slope alluvium over residuum weathered from sandstone.

Soil Mapping Unit Interpretation

The primary purpose of the 2010 baseline soils inventory was to characterize the soils within the Sheep Mountain Soil Analysis Area in terms of topsoil salvage depths and related physical and chemical properties. Refer to Addendum D-7-B and D-7-C for Soil Map Unit Descriptions and Soil Series Descriptions, respectively. Map units were based on existing NRCS format but tailored to fit actual findings within the Sheep Mountain Soil Analysis Area.

Analytical Results

Analyzed parameters, as defined in WDEQ Guideline 1, are in Addendum D-7-D, Soil Laboratory Analysis. Laboratory soil texture analysis did not include percent fine sands. Field observations of fine sands within individual profiles as well as sample site topographic position were used in conjunction with laboratory analytical results to determine series designation for soils with fine sands. For a few of the profile sampling locations, laboratory analysis yielded finer or coarser than expected textures, based on field observations. Where textures were not typical for the series (e.g., according to field observations or laboratory analysis), it was noted in the Range of Characteristics in the soil series descriptions.

Evaluation of Soil Suitability as a Plant Growth Medium

Approximate salvage depths of each map unit series are presented in Table D-7.1.6 and ranged from zero to 1.67 feet. Within the Sheep Mountain Soil Analysis Area, suitability of soil as a plant growth medium was generally limited by the physical factor of low saturation percentages and coarse fragment percentages. Chemical limiting factors included EC, SAR and selenium. According to WDEQ Guideline 1, marginal material was found in 7 of the 9 sampled profiles. Unsuitable material was found in 2 of the 9 sampled profiles. Marginal and unsuitable parameter information for the sampled profiles is identified in Table D-7.1.4. A summary of trends in marginal and unsuitable parameters as it relates to soil series is found in Table D-7.1.5.

Topsoil Volume Calculations

Based on the 2010 baseline soils inventory, associated field observations, and subsequent chemical analysis, the recommended weighted average topsoil salvage depth over the entire Sheep Mountain Soil Analysis Area was determined to be 0.33 feet. Refer to Table D-7.1.6 for Approximate Soil Salvage Depths. It is important to note that all listed depths in the tables or text are to the nearest hundredth decimal place as an artifact of calculation, despite the fact that topsoil salvage/replacement equipment depth capabilities are limited.

Soil Erosion Properties and Impacts

Based on the soil mapping unit descriptions, the hazard for wind and water erosion within the Sheep Mountain Soil Analysis Area varies from negligible to moderate. The potential for wind and water erosion is mainly a factor of surface characteristics of the soil, including texture and organic matter content. Given the generally coarse-loamy texture of the surface horizons throughout a majority of the Sheep Mountain Soil Analysis Area, the soils are more susceptible to erosion from wind than water. See Table D-7.1.7 for a Summary of Wind and Water Erosion Hazards within the Sheep Mountain Soil Analysis Area.

Prime Farmland Assessment

Prime farmland was assessed by Nick Biltoft, the NRCS District Conservationist, Riverton, Wyoming. According to the NRCS soil survey, there are 3 soil map units within the eastern part of Fremont County that are determined to be prime farmland and only when irrigated. These 3 soil map units were not found within the Sheep Mountain Soil Analysis Area during the BKS, NRCS, or 1980 historical D-7 soil surveys. Refer to Addendum D-7-E for the NRCS Letter of Determination.

REFERENCES

U.S. Department of Agriculture, Natural Resource Conservation Service. 1993. Soil Survey of Fremont County, East Part and Dubois Area, Wyoming.

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Wyoming Department of Environmental Quality, Land Quality Division. 1994. Guideline 1, Topsoil and Overburden.

ADDENDUM D-7-A
TABLES

Table D-7.1.1: Soil Map Unit Acreages

Map Symbol	Map Unit Description	Permit Acreage	% Total Permit Area
BO	Bosler fine sandy loam	154.64	12.43
CU	Cushool sandy loam	251.82	20.24
D	Disturbance	334.7	26.90
ON / ON-RV	Onason / Onason Reclaimed Variant	446.02	35.85
RO	Rock River sandy loam	56.86	4.57
	Total	**1,244.04**	**100.00**

Table D-7.1.2: Soil Series Sample Summary

Soil Series	Number of Profiles to be Sampled for Chemical Analysis
Bosler	3
Cushool	2
Onason / Onason Reclaimed Variant	3
Rock River	1
Total	**9**

Table D-7.1.3: Soil Sample Locations

Soil Sample Number	Map Unit Symbol	Soil Series
2	BO	Bosler
4	CU	Cushool
6	ON	Onason
7	ON	Onason
8	CU	Cushool
10	RO	Rock River
11	BO	Bosler
13	BO	Bosler
17	ON-RV	Onason Reclaimed Variant

Table D-7.1.4: Marginal and Unsuitable Parameters within Sampled Profiles

Soil Sample Number	Soils Series	Depth (in)	Marginal[1]	Unsuitable[1]
2	Bosler	0-6	Saturation %	---
4	Cushool	5-11	Saturation %	---
6	Onason	12-18	Saturation %	---
7	Onason	0-18	Saturation %	---
8	Cushool	6-30	Saturation %	---
10	Rock River	10-20	SAR	---
		20-60	---	SAR
		20-60	EC	---
		20-60	Selenium	---
11	Bosler	28-40	---	SAR
13	Bosler	16-36	Saturation %	---
		16-26	Coarse Frag %	---
17	Onason	0-10	Saturation %	---

[1]Marginal and unsuitable parameters determined by comparing lab analysis with Table I-2 (Criteria to establish topsoil suitability) from WDEQ LQD Guideline 1.

Table D-7.1.5: Trends in Marginal and Unsuitable Parameters for Soil Series

Soils Series	Unsuitable/Marginal Parameter[1]
Bosler	Coarse Frag %, SAR, Saturation %
Cushool	Saturation %
Onason / Onason Reclaimed Variant	Saturation %
Rock River	EC, SAR, Selenium

[1]Marginal and unsuitable parameters determined by comparing lab analysis with Table I-2 (Criteria to establish topsoil suitability) from WDEQ LQD Guideline 1.

Table D-7.1.6: Approximate Soil Salvage Depths

Map Symbol	Map Unit Description	Permit Acreage[1]	Salvage Depth[2] (feet)	Total Volume of Topsoil[3]
BO	Bosler fine sandy loam	154.64	1.22	188.66
CU	Cushool sandy loam	251.82	0.46	115.84
D	Disturbance	334.7	0	0.00
ON / ON-RV	Onason / Onason Reclaimed Variant	446.02	0.14	62.44
RO	Rock River sandy loam	56.86	0.83	47.19
Average Salvage Depth of Project Area[4]		**---**	**0.33**	**---**
Total		**1,244.04**	**---**	**414.13**

[1]Found in Table D-7.1.1 of this report.
[2]Found in Addendum D-7-B of this report, under Topsoil Suitability.
[3]Calculated by multiplying permit acreage by salvage depth in feet, as shown in Table II-1 (Topsoil Volume Summary) of WDEQ LQD Guideline 1.
[4]Calculated as the average of the weighted average salvage depths found in Addendum D-7-B.

Table D-7.1.7: Wind and Water Erosion Hazards

Map Unit Symbol	Soil Series	Water Erosion Hazard[1]	Wind Erosion Hazard[2]
BO	Bosler	Moderate	Moderate
CU	Cushool	Slight	Moderate
ON / ON-RV	Onason / Onason Reclaimed Variant	Negligible	Moderate
RO	Rock River	Moderate	Moderate

[1]Based on Kw factor of A horizon from the NRCS Soil Data Mart {http://soildatamart.nrcs.usda.gov/}
[2]Based on Wind Erodibility Group from the NRCS Soil Data Mart {http://soildatamart.nrcs.usda.gov/}.

ADDENDUM D-7-B
SOIL MAP UNIT DESCRIPTION

Bosler fine sandy loam[1] – BO

This map unit consists of very deep, well drained soils formed in slopewash alluvium. Slopes range from 0 to 15 percent. The Bosler soil occurs on relict alluvial terraces and alluvial fan aprons at elevations between 6,000 to 8,000 feet.

The average annual precipitation ranges from 9 to 14 inches. The mean annual air temperature is approximately 40 to 45 degrees Fahrenheit, and the average frost-free season is approximately 70 to 110 days.

Permeability within the Bosler soil is moderate. The available water capacity is low (about 4.3 inches). Effective rooting depth is 60 inches or more. Surface runoff is slow to medium. The hazard of water or wind erosion is moderate.

Topsoil Suitability

This map unit is a fair source of topsoil to 14.67 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, the following marginal and unsuitable parameters were found:

Soil Sample 2

- marginal saturation percent values from 0 to 6 inches

Soil Sample 11

- unsuitable SAR values from 28 to 40 inches

Soil Sample 13

- marginal saturation percent values from 16 to 36 inches
- marginal coarse fragment percent values from 16 to 26 inches

The 14.67-inch salvage depth was used in Table D-7.1.6 Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Bosler series.

[1]Map unit description based on 1993 Fremont County - East Part and Dubois Area NRCS information.

Cushool sandy loam[1] – CU

This map unit consists of well drained soils that are moderately deep to soft sandstone that formed in slope alluvium and colluvium over residuum weathered from sandy shale and sandstone. Slopes range from 0 to 50 percent. The Cushool soil occurs on rock-controlled hills, pediments, structural benches, ridges, and short fan aprons at elevations between 5,300 to 7,800 feet.

The average annual precipitation ranges from 9 to 14 inches. The mean annual air temperature is approximately 39 to 45 degrees Fahrenheit, and the average frost-free season is approximately 75 to 110 days.

Permeability within the Cushool soil is moderate. The available water capacity is low (about 5.2 inches). Effective rooting depth is 20 to 40 inches. Surface runoff is low to high depending on slope. The hazard of water erosion is slight and the hazard of wind erosion is moderate.

Topsoil Suitability

This map unit is a fair source of topsoil to 5.5 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, the following marginal parameters were found:

Soil Sample 4

- marginal saturation percent values from 5 to 11 inches

Soil Sample 8

- marginal saturation percent values from 6 to 30 inches

The 5.5-inch salvage depth was used in Table D-7.1.6 Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Cushool series.

[1]Map unit description based on 1993 Fremont County - East Part and Dubois Area NRCS information.

Onason gravelly sandy loam / Onason Reclaimed Variant[1]– ON / ON-RV

This map unit consists of well drained soils that are shallow and very shallow to soft sandstone and formed in residuum and slopewash alluvium weathered from the underlying bedrock. Slopes range from 5 to 45 percent. The Onason soil occurs on footslopes, backslopes, and shoulders of hills and ridges at elevations between 6,000 to 7,600 feet.

The average annual precipitation ranges from 10 to 14 inches. The mean annual air temperature is approximately 34 to 44 degrees Fahrenheit, and the average frost-free season is approximately 80 to 110 days.

Permeability within the Onason soil is moderately rapid. The available water capacity is very low (about 1.5 inches). Effective rooting depth is 10 to 20 inches. Surface runoff is slow. The hazard of water erosion is negligible and the hazard of wind erosion is moderate.

Topsoil Suitability

This map unit is a fair source of topsoil to 1.67 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, the following marginal and unsuitable parameters were found:

Soil Sample 6

- marginal saturation percentage values from 12 to 18 inches

Soil Sample 7

- marginal saturation percentage values from 0 to 18 inches

Soil Sample 17

- marginal saturation percentage values from 0 to 10 inches

The 1.67-inch salvage depth was used in Table D-7.1.6 Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Onason series.

[1]Map unit description based on 1993 Fremont County - East Part and Dubois Area NRCS information.

Rock River sandy loam[1] – RO

This map unit consists of very deep, well drained soils that formed in calcareous alluvium derived mainly from sandstone, eolian deposits, and residuum. Slopes range from 0 to 25 percent. The Rock River soil occurs on alluvial fan aprons, relict terraces, benches, hillslopes, and areas of valley fill at elevations between 5,900 to 7,800 feet.

The average annual precipitation ranges from 10 to 14 inches. The mean annual air temperature is approximately 41 to 45 degrees Fahrenheit, and the average frost-free season is approximately 75 to 110 days.

Permeability within the Rock River soil is moderate. The available water capacity is moderate (about 8.7 inches). Effective rooting depth is 60 inches or more. Surface runoff is medium to rapid. The hazard of water or wind erosion is moderate.

Topsoil Suitability

This map unit is a fair source of topsoil to 10 inches based on Sample Location 10. According to WDEQ Guideline 1, the following marginal and unsuitable parameters were found:

Soil Sample 10

- marginal SAR values from 10 to 20 inches
- unsuitable SAR values from 20 to 60 inches
- marginal EC values from 20 to 60 inches
- marginal Selenium values from 20 to 60 inches

The 10-inch salvage depth was used in Table D-7.1.6 Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Rock River series.

[1]Map unit description based on 1993 Fremont County - East Part and Dubois Area NRCS information.

ADDENDUM D-7-C
SOIL SERIES DESCRIPTIONS

BOSLER sandy loam

SOIL MAPPING UNIT: BO

SOIL SAMPLE LOCATION: 2

TYPICAL PEDON: Bosler sandy loam-rangeland. (Colors are for dry soil unless otherwise stated.

The Bosler series consists of very deep, well drained soils formed in slopewash alluvium. They occupy relict alluvial terraces and alluvial fan aprons. Slopes typically are less than 6 percent but range from 0 to 15 percent. The mean annual precipitation is about 12 inches, and the mean annual temperature is about 41 degrees F.

A--0 to 6 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine roots; 10 percent fine gravel; non-effervescent; neutral (pH 7.1); clear smooth boundary.

Bt--6 to 12 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common fine roots; common distinct clay films on faces of peds; 5 percent fine gravel; non-effervescent; slightly alkaline (pH 7.4); clear smooth boundary.

C1--12 to 19 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common fine roots; common distinct clay films on faces of peds; 5 percent fine gravel; non-effervescent; neutral (pH 7.1); clear smooth boundary.

C2--19 to 30 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common fine roots; common distinct clay films on faces of peds; 5 percent fine gravel; non-effervescent; slightly alkaline (pH 7.5); clear smooth boundary.

2C--30 to 60 inches; very gravelly sand; single grained, loose; non-effervescent; 40 percent fine and medium granitic and quartzitic gravel. (This horizon was considered paralithic in the field and was not sampled)

TYPE LOCATION: Fremont County, Wyoming; refer to waypoint 13 on the map included in this report.

RANGE IN CHARACTERISTICS (according to official series description): The depth of contrasting 2Bk or 2C horizon is 20 to 40 inches. The mean annual soil temperature ranges from 41 to 47 degrees F.,

and the mean annual summer temperature ranges from 59 to 63 degrees F. Rock fragment content above the 2Bk or 2C horizon ranges from 0 to 15 percent gravel.

The A horizon has hue of 7.5YR through 2.5Y, value of 5 or 6 dry, 3 through 5 moist, and chroma of 2 through 4. EC is less than 2 mmhos. This horizon is typically free of carbonates but may effervesce slightly in some pedons. Reaction ranges from neutral through moderately alkaline.

The Bt and Btk horizons have hue of 7.5YR through 2.5Y, value of 4 through 6 dry, 3 through 6 moist, and chroma of 2 through 4. Texture is sandy clay loam or clay loam with 20 to 35 percent clay and more than 35 percent fine sand or coarser. EC is less than 2 mmhos. Reaction is neutral through moderately alkaline. The Bt is a diagnostic argillic horizon, and in most pedons the Btk is also part of the diagnostic argillic.

The Bk horizon has hue of 7.5YR through 2.5Y, value of 6 through 8 dry, 5 through 7 moist, and chroma of 1 through 4. Texture is loam with 18 to 27 percent clay. EC is less than 2 mmhos. Reaction is moderately or strongly alkaline. The Bk is a diagnostic calcic horizon with 15 to 35 percent calcium carbonate equivalent.

The 2C or 2Bk horizon has variable colors depending upon the lithochromic colors of the clean sand and gravel. Texture is gravelly sand, extremely gravelly sand, very gravelly loamy sand, loamy sand or sand. This horizon may be stratified with lenses of sand or gravel. Rock fragments vary with strata but average from 0 to 70 percent fine and medium quartzitic or granitic gravel. There is less than 5 percent cobbles present.

TAXONOMIC CLASS: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Ustic Calciargids

SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994): Marginal values were found for saturation percentage from 0-6". Estimated salvage depth is 0 inches due to marginal saturation percentage values.

GEOGRAPHIC SETTING (according to official series description): Bosler soils are on gently to moderately sloping relict high terraces, fan aprons, and fan piedmonts. They formed in medium textured, mixed alluvium over sand and gravel strata. Elevation ranges from 6,000 to 8,000 feet. The mean annual precipitation ranges from 9 to 14 inches of which about half falls as snow and rain in April, May, and early June. The mean annual temperature ranges from 40 to 45 degrees F. The frost-free season is estimated to be 70 to 110 days depending upon elevation, aspect, and air drainage.

VARIATION FROM TYPICAL SERIES: This profile is less calcareous than usual. There are "C" horizons in place of the typical "Btk" and "Bk" horizons. The pH is more acidic from 19-30" than normal.

CUSHOOL loamy sand

SOIL MAPPING UNIT: CU

SOIL SAMPLE LOCATION: 4

TYPICAL PEDON: Cushool loamy sand-rangeland. (Colors are for dry soil unless otherwise stated.)

The Cushool series consists of well drained soils that are moderately deep to soft sandstone. They formed in slope alluvium and colluvium over residuum weathered from sandy shale and sandstone. Cushool soils are on rock-controlled hills, pediments, structural benches, ridges, and short fan aprons. Slopes are 0 to 50 percent. The mean annual precipitation is about 12 inches, and the mean annual temperature is about 41 degrees F.

A--0 to 5 inches; grayish brown (10YR 5/2) loamy sand, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; non-effervescent; slightly acid (pH 6.3); clear smooth boundary.

Bt1--5 to 11 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure parting to moderate medium granular; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; few distinct clay films on faces of peds and inside root channels; non-effervescent; slightly acid (pH 6.2); clear smooth boundary.

Bt2--11 to 18 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; many clay films on faces of peds and in root channels; non-effervescent; slightly acid (pH 6.3).

Bt3--18 to 30 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; few distinct clay films on faces of peds and in root channels; non-effervescent; neutral (pH 6.6); gradual wavy boundary.

Cr--30 to 48 inches; soft, non-calcareous sand interbedded with thin and moderately thick lenses of sandstone.

TYPE LOCATION: Fremont County, Wyoming; refer to waypoint 4 on the map included in this report.

RANGE IN CHARACTERISTICS (according to official series description):

Mean annual soil temperature ranges: 41 to 47 degrees F.
Mean summer temperature: 59 to 63 degrees F
Depth to calcic horizon: 11 to 34 inches
Depth to paralithic contact: 20 to 40 inches shale interbedded with sandstone
These soils are typically free of carbonates through the upper part of the Bt horizon.
Rock fragments range from 0 to 30 percent throughout the whole soil and are pebbles or channers.
Exchangeable sodium ranges from 0 to 15 percent throughout the argillic horizon and Bk horizons.
EC ranges from 0 to 4 mmhos throughout.

A horizon:
Hue: 7.5YR to 5Y
Value: 4 through 7 dry, 3 through 5 moist
Chroma: 2 through 6 dry or moist
Calcium carbonate equivalent: 0 to 5 percent
Reaction: neutral through moderately alkaline

Bt horizon:
Hue: 7.5YR to 5Y
Value: 4 through 6 dry, 3 or 4 moist
Chroma: 2 through 6 dry or moist
Texture: sandy clay loam, fine sandy loam, or sandy loam with 18 to 35 percent clay, 0 to 28 percent silt, and 45 to 80 percent sand with more than 35 percent being fine sand or coarser.
Calcium carbonate equivalent: 0 to 5 percent
Reaction: neutral through moderately alkaline
The Btk horizon when present is moderately or strongly alkaline.

Bk horizon:
Hue: 7.5YR to 5Y
Value: 5 through 7 dry, 4 through 7 moist
Chroma: 2 through 6 dry or moist
Texture: loamy fine sand, sandy loam, fine sandy loam
Calcium carbonate equivalent: 5 to 15 percent
Reaction: moderately or strongly alkaline

A thin C horizon is present in some pedons.

TAXONOMIC CLASS: Fine, smectitic, frigid Ustic Paleargids

SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994): Marginal values were found for saturation percentage from 5-11". Estimated salvage depth is 5 inches due to marginal saturation percentage values.

GEOGRAPHIC SETTING (according to official series description):

Parent material: slope alluvium and colluvium over residuum weathered from sandy shale and sandstone
Landform: rock-controlled hill and ridge slopes, fan aprons, pediments, and structural benches
Slopes: 0 to 50 percent
Elevations: 5,300 to 7,800 feet
Mean annual precipitation: about 12 inches but ranges from 9 to 14 inches of which about half falls as snow and rain in April, May, and early June
Mean annual temperature: about 41 degrees F. and ranges from 39 to 45 degrees F.
Frost-free season: 75 to 110 days depending upon elevation, aspect, and air drainage.

VARIATION FROM TYPICAL SERIES: This profile is less calcareous and more acidic than typical.

ONASON sandy loam

SOIL MAPPING UNIT: ON

SOIL SAMPLE LOCATION: 6

TYPICAL PEDON: Onason gravelly sandy loam - rangeland. (Colors are for dry soil unless otherwise stated.)

The Onason series consists of well drained soils that are shallow and very shallow to soft sandstone. These soils formed in residuum and slopewash alluvium weathered from the underlying bedrock. Onason soils are on footslopes, backslopes, and shoulders of hills and ridges. Slopes range from 5 to 45 percent. The mean annual precipitation is about 12 inches, and the mean annual temperature is about 41 degrees F.

A--0 to 5 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak very fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine and few medium roots; 15 percent semirounded pebbles; non-effervescent; neutral (pH 6.6); abrupt smooth boundary.

C1--5 to 12 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak medium and coarse granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and few medium roots; 15 percent semirounded pebbles; non-effervescent; slightly acid (pH 6.4); clear smooth boundary.

C2--12 to 18 inches; light yellowish brown (2.5Y 6/4) sandy loam, light olive brown (2.5Y 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; many fine and few medium roots; 15 percent semirounded pebbles; non-effervescent; slightly acid (pH 6.5); abrupt wavy boundary.

Cr--18 to 36 inches; soft, coarse-grained non-calcareous sandstone interbedded with thin lenses of shale.

TYPE LOCATION: Fremont County, Wyoming; refer to waypoint 6 on the map included in this report.

RANGE IN CHARACTERISTICS (according to official series description): Depth to the paralithic contact and bedrock ranges from 4 to 20 inches. These soils are noncalcareous throughout. The mean annual soil temperature is 36 to 45 degrees F., and the mean summer soil temperature is 59 to 62 degrees F. The particle size control section averages gravelly sandy loam or sandy loam throughout. Clay ranges from 8 to 18 percent and rock fragments of fine or very fine semirounded pebbles range from 0 to 35 percent. EC is less than 2 mmhos throughout.
The A horizon has hue of 2.5Y or 10YR, value of 4 through 6 dry, 3 through 5 moist, and chroma of 2 through 4. Lag gravel covering up to 75 percent of the surface is common in some pedons. Reaction is neutral or mildly alkaline.

The C horizon has hue of 2.5Y or 10YR, value of 5 or 6 dry, 4 through 6 moist, and chroma of 2 through 4. A thin Bw horizon is present in some pedons. Reaction is neutral or mildly alkaline.

The Cr horizon consists of soft, noncalcareous, coarse- and medium-grained sandstone interbedded with thin lenses of shale and siltstone. The yellowish brown or brown sandstone may have discontinuous lenses of hard sandstone or shale in some pedons. The soil-bedrock interface is considered a paralithic contact and roots plane out at the contact.

TAXONOMIC CLASS: Loamy, mixed, superactive, nonacid, frigid, shallow Ustic Torriorthents

SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994): Marginal values were found for saturation percentage from 12-18". Estimated salvage depth is 5 inches due to the presence of the "C" horizon.

GEOGRAPHIC SETTING (according to official series description): Onason soils are on footslopes, backslopes, and shoulders of rolling and steep hills and ridges. These soils formed in residuum and slopewash alluvium weathered from the underlying noncalcareous sandstone. Slopes range from 5 to 45 percent. Elevations are 6,000 to 7,600 feet. The climate is cool, semiarid with moist springs and dry summers. The mean annual precipitation ranges from 10 to 14 inches of which about half falls as snow or rain in April, May, and early June. The mean annual temperature is about 34 to 44 degrees F. The estimated frost-free season is about 80 to 110 days, but frost may occur in any month.

VARIATION FROM TYPICAL SERIES: The pH is slightly more acidic from 5-18" than normal. There is no typical A2 horizon.

ONASON loamy sand

SOIL MAPPING UNIT: ON

SOIL SAMPLE LOCATION: 7

TYPICAL PEDON: Onason gravelly loamy sand - rangeland. (Colors are for dry soil unless otherwise stated.)

The Onason series consists of well drained soils that are shallow and very shallow to soft sandstone. These soils formed in residuum and slopewash alluvium weathered from the underlying bedrock. Onason soils are on footslopes, backslopes, and shoulders of hills and ridges. Slopes range from 5 to 45 percent. The mean annual precipitation is about 12 inches, and the mean annual temperature is about 41 degrees F.

A--0 to 5 inches; brown (10YR 5/3) loamy sand, brown (10YR 4/3) moist; weak very fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine and few medium roots; 15 percent semirounded pebbles; non-effervescent; slightly acid (pH 6.2); abrupt smooth boundary.

C--5 to 18 inches; light yellowish brown (2.5Y 6/4) sandy loam, light olive brown (2.5Y 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; many fine and few medium roots; 15 percent semirounded pebbles; non-effervescent; slightly acid (pH 6.3); abrupt wavy boundary.

Cr--18 to 36 inches; soft, coarse-grained non-calcareous sandstone interbedded with thin lenses of shale.

TYPE LOCATION: Fremont County, Wyoming; refer to waypoint 7 on the map included in this report.

RANGE IN CHARACTERISTICS (according to official series description): Depth to the paralithic contact and bedrock ranges from 4 to 20 inches. These soils are noncalcareous throughout. The mean annual soil temperature is 36 to 45 degrees F., and the mean summer soil temperature is 59 to 62 degrees F. The particle size control section averages gravelly sandy loam or sandy loam throughout. Clay ranges from 8 to 18 percent and rock fragments of fine or very fine semirounded pebbles range from 0 to 35 percent. EC is less than 2 mmhos throughout.
The A horizon has hue of 2.5Y or 10YR, value of 4 through 6 dry, 3 through 5 moist, and chroma of 2 through 4. Lag gravel covering up to 75 percent of the surface is common in some pedons. Reaction is neutral or mildly alkaline.

The C horizon has hue of 2.5Y or 10YR, value of 5 or 6 dry, 4 through 6 moist, and chroma of 2 through 4. A thin Bw horizon is present in some pedons. Reaction is neutral or mildly alkaline.

The Cr horizon consists of soft, noncalcareous, coarse- and medium-grained sandstone interbedded with thin lenses of shale and siltstone. The yellowish brown or brown sandstone may have discontinuous

lenses of hard sandstone or shale in some pedons. The soil-bedrock interface is considered a paralithic contact and roots plane out at the contact.

TAXONOMIC CLASS: Loamy, mixed, superactive, nonacid, frigid, shallow Ustic Torriorthents

SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994): Marginal values were found for saturation percentage from 0-18". Estimated salvage depth is 0 inches due to marginal saturation percentage values.

GEOGRAPHIC SETTING (according to official series description): Onason soils are on footslopes, backslopes, and shoulders of rolling and steep hills and ridges. These soils formed in residuum and slopewash alluvium weathered from the underlying noncalcareous sandstone. Slopes range from 5 to 45 percent. Elevations are 6,000 to 7,600 feet. The climate is cool, semiarid with moist springs and dry summers. The mean annual precipitation ranges from 10 to 14 inches of which about half falls as snow or rain in April, May, and early June. The mean annual temperature is about 34 to 44 degrees F. The estimated frost-free season is about 80 to 110 days, but frost may occur in any month.

VARIATION FROM TYPICAL SERIES: The pH is slightly more acidic than normal. There is no typical A2 horizon.

CUSHOOL sandy loam

SOIL MAPPING UNIT: CU

SOIL SAMPLE LOCATION: 8

TYPICAL PEDON: Cushool sandy loam -rangeland. (Colors are for dry soil unless otherwise stated.)

The Cushool series consists of well drained soils that are moderately deep to soft sandstone. They formed in slope alluvium and colluvium over residuum weathered from sandy shale and sandstone. Cushool soils are on rock-controlled hills, pediments, structural benches, ridges, and short fan aprons. Slopes are 0 to 50 percent. The mean annual precipitation is about 12 inches, and the mean annual temperature is about 41 degrees F.

A--0 to 6 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; non-effervescent; neutral (pH 6.6); clear smooth boundary.

Bt1--6 to 18 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure parting to moderate medium granular; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; few distinct clay films on faces of peds and inside root channels; non-effervescent; neutral (pH 6.8); clear smooth boundary.

Bt2--18 to 30 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; few distinct clay films on faces of peds and in root channels; non-effervescent; neutral (pH 6.7); gradual wavy boundary.

Cr--30 to 36 inches; soft, non-calcareous sand interbedded with thin and moderately thick lenses of sandstone.

TYPE LOCATION: Fremont County, Wyoming; refer to waypoint 8 on the map included in this report.

RANGE IN CHARACTERISTICS (according to official series description):

Mean annual soil temperature ranges: 41 to 47 degrees F.
Mean summer temperature: 59 to 63 degrees F
Depth to calcic horizon: 11 to 34 inches
Depth to paralithic contact: 20 to 40 inches shale interbedded with sandstone
These soils are typically free of carbonates through the upper part of the Bt horizon.
Rock fragments range from 0 to 30 percent throughout the whole soil and are pebbles or channers.

Exchangeable sodium ranges from 0 to 15 percent throughout the argillic horizon and Bk horizons.
EC ranges from 0 to 4 mmhos throughout.

A horizon:
Hue: 7.5YR to 5Y
Value: 4 through 7 dry, 3 through 5 moist
Chroma: 2 through 6 dry or moist
Calcium carbonate equivalent: 0 to 5 percent
Reaction: neutral through moderately alkaline

Bt horizon:
Hue: 7.5YR to 5Y
Value: 4 through 6 dry, 3 or 4 moist
Chroma: 2 through 6 dry or moist
Texture: sandy clay loam, fine sandy loam, or sandy loam with 18 to 35 percent clay, 0 to 28 percent silt, and 45 to 80 percent sand with more than 35 percent being fine sand or coarser.
Calcium carbonate equivalent: 0 to 5 percent
Reaction: neutral through moderately alkaline
The Btk horizon when present is moderately or strongly alkaline.

Bk horizon:
Hue: 7.5YR to 5Y
Value: 5 through 7 dry, 4 through 7 moist
Chroma: 2 through 6 dry or moist
Texture: loamy fine sand, sandy loam, fine sandy loam
Calcium carbonate equivalent: 5 to 15 percent
Reaction: moderately or strongly alkaline

A thin C horizon is present in some pedons.

TAXONOMIC CLASS: Fine, smectitic, frigid Ustic Paleargids

SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994): Marginal values were found for saturation percentage from 6-30". Estimated salvage depth is 6 inches due to marginal saturation percentage values.

GEOGRAPHIC SETTING (according to official series description):

Parent material: slope alluvium and colluvium over residuum weathered from sandy shale and sandstone
Landform: rock-controlled hill and ridge slopes, fan aprons, pediments, and structural benches

Slopes: 0 to 50 percent
Elevations: 5,300 to 7,800 feet
Mean annual precipitation: about 12 inches but ranges from 9 to 14 inches of which about half falls as snow and rain in April, May, and early June
Mean annual temperature: about 41 degrees F. and ranges from 39 to 45 degrees F.
Frost-free season: 75 to 110 days depending upon elevation, aspect, and air drainage.

VARIATION FROM TYPICAL SERIES: This profile is more acidic from 18-30". This profile is less calcareous than typical.

ROCK RIVER loam

SOIL MAPPING UNIT: RO

SOIL SAMPLE LOCATION: 10

TYPICAL PEDON: Rock River loam-rangeland. (Colors are for dry soil unless otherwise stated.)

The Rock River series consists of very deep, well drained soils that formed in calcareous alluvium derived mainly from sandstone, eolian deposits, and residuum. Rock River soils are on alluvial fan aprons, relict terraces, benches, hillslopes, and areas of valley fill. Slopes are 0 to 25 percent. The mean annual precipitation is about 10 inches, and the mean annual temperature is about 42 degrees F.

A--0 to 5 inches; light brownish gray (10YR 6/2) loam, dark yellowish brown (10YR 3/4) moist; hard crust that parts to weak fine granular; hard, very friable, slightly sticky and slightly plastic; many fine and medium roots; non-effervescent; slightly alkaline (pH 7.5); clear smooth boundary.

Bt1--5 to 10 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium prismatic structure parting to moderate medium angular blocky; hard, firm sticky and plastic; few fine and many medium roots; continuous thin clay films on faces of peds; non-effervescent; slightly alkaline (pH 7.7); clear smooth boundary.

Bt2--10 to 20 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to moderate fine and medium angular blocky; hard, firm, sticky and plastic; few coarse roots; continuous, thin clay films on faces of peds; slightly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Bt3--20 to 33 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common thin clay films on faces of peds; slightly effervescent, lime as many fine and medium soft masses and threads; 10 percent pebbles 1/4 to 3/4 inch in diameter; moderately alkaline (pH 8.0); clear smooth boundary.

Bt4--33 to 44 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common thin clay films on faces of peds; slightly effervescent, lime as many fine and medium soft masses and threads; 10 percent pebbles 1/4 to 3/4 inch in diameter; moderately alkaline (pH 8.1); clear smooth boundary.

Bt5--44 to 60 inches; light brownish gray (10YR 6/2) loam, brown (10YR 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; slightly effervescent; moderately alkaline (pH 8.0).

TYPE LOCATION: Fremont County, Wyoming; refer to waypoint 10 on the map included in this report.

RANGE IN CHARACTERISTICS (according to official series description):

Depth to continuous horizons of calcium carbonate accumulation is 13 to 30 inches. Depth to the base of the argillic horizon is 12 to 34 inches. The mean annual soil temperature ranges from 43 to 46 degrees F., and the mean summer soil temperature ranges from 59 to 65 degrees F. EC is less than 4 mmhos throughout. The rock fragments in the soil are less than 3/4 inch in diameter.

The A horizon has hue of 2.5Y through 7.5YR, value of 4 through 6 dry, 3 through 5 moist, and chroma of 2 through 4. Reaction is neutral through moderately alkaline.

The Bt horizon has hue of 2.5Y through 7.5YR, value of 4 through 6 dry, 4 or 5 moist, and chroma of 2 through 6. Texture is sandy clay loam or gravelly sandy clay loam, averaging 20 to 35 percent clay and has more than 35 percent fine or coarser sand. Rock fragments range from 0 to 25 percent pebbles. Reaction is neutral through moderately alkaline.

The Bk horizon has hue of 2.5Y through 7.5YR, value of 5 through 8 dry, 4 through 7 moist, and chroma of 2 through 6. Texture is sandy clay loam, sandy loam, or fine sandy loam modified with from 0 to 30 percent pebbles. Some pedons have textures of loamy sand or coarser below 40 inches. It has accumulation of secondary calcium carbonate that ranges from 1 through 14 percent. Reaction is moderately or strongly alkaline. Some pedons have a C horizon.

TAXONOMIC CLASS: Fine-loamy, mixed, superactive, frigid Ustic Calciargids

SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994): Marginal values were found for selenium and EC from 20-60” and for SAR from 10-20”. Unsuitable values were found for SAR from 20-60”. Estimated salvage depth is 10 inches due to marginal SAR values.

GEOGRAPHIC SETTING (according to official series description):

Rock River soils are on alluvial fans, fan aprons, benches, hillslopes, and toeslopes. The soils formed in material weathered from calcareous sandstone, eolian deposits, and residuum. Slopes are 0 to 25 percent. Elevation is 5,900 to 7,800 feet. The mean annual precipitation ranges from 10 to 14 inches of which about half falls as snow or rain in April, May, and early June. The mean annual temperature is about 41 to 45 degrees F., and the mean summer temperature is 59 to 63 degrees F. The frost-free season is about 75 to 110 days but varies according to aspect, elevation, and air drainage.

VARIATION FROM TYPICAL SERIES: This profile is less calcareous than typical. The texture is slightly finer than usual from 0-10” and 20-60”.

BOSLER loam

SOIL MAPPING UNIT: BO

SOIL SAMPLE LOCATION: 11

TYPICAL PEDON: Bosler loam-rangeland. (Colors are for dry soil unless otherwise stated.

The Bosler series consists of very deep, well drained soils formed in slopewash alluvium. They occupy relict alluvial terraces and alluvial fan aprons. Slopes typically are less than 6 percent but range from 0 to 15 percent. The mean annual precipitation is about 12 inches, and the mean annual temperature is about 41 degrees F.

A--0 to 6 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine roots; 10 percent fine gravel; non-effervescent; neutral (pH 6.6); clear smooth boundary.

Bt1--6 to 14 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common fine roots; common distinct clay films on faces of peds; 5 percent fine gravel; non-effervescent; slightly alkaline (pH 7.4); clear smooth boundary.

Bt2--14 to 28 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common fine roots; common distinct clay films on faces of peds; 5 percent fine gravel; slightly effervescent; moderately alkaline (pH 8.2); clear smooth boundary.

Btk--28 to 40 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common fine roots; common distinct clay films on faces of peds; 5 percent fine gravel; moderately effervescent; moderately alkaline (pH 7.9); clear smooth boundary.

2C--40 to 60 inches; very gravelly sand; single grained, loose; calcareous; 40 percent fine and medium granitic and quartzitic gravel. (This horizon was considered paralithic in the field and was not sampled)

TYPE LOCATION: Fremont County, Wyoming; refer to waypoint 11 on the map included in this report.

RANGE IN CHARACTERISTICS (according to official series description):

The depth of contrasting 2Bk or 2C horizon is 20 to 40 inches. The mean annual soil temperature ranges from 41 to 47 degrees F., and the mean annual summer temperature ranges from 59 to 63 degrees F. Rock fragment content above the 2Bk or 2C horizon ranges from 0 to 15 percent gravel.

The A horizon has hue of 7.5YR through 2.5Y, value of 5 or 6 dry, 3 through 5 moist, and chroma of 2 through 4. EC is less than 2 mmhos. This horizon is typically free of carbonates but may effervesce slightly in some pedons. Reaction ranges from neutral through moderately alkaline.

The Bt and Btk horizons have hue of 7.5YR through 2.5Y, value of 4 through 6 dry, 3 through 6 moist, and chroma of 2 through 4. Texture is sandy clay loam or clay loam with 20 to 35 percent clay and more than 35 percent fine sand or coarser. EC is less than 2 mmhos. Reaction is neutral through moderately alkaline. The Bt is a diagnostic argillic horizon, and in most pedons the Btk is also part of the diagnostic argillic.

The Bk horizon has hue of 7.5YR through 2.5Y, value of 6 through 8 dry, 5 through 7 moist, and chroma of 1 through 4. Texture is loam with 18 to 27 percent clay. EC is less than 2 mmhos. Reaction is moderately or strongly alkaline. The Bk is a diagnostic calcic horizon with 15 to 35 percent calcium carbonate equivalent.

The 2C or 2Bk horizon has variable colors depending upon the lithochromic colors of the clean sand and gravel. Texture is gravelly sand, extremely gravelly sand, very gravelly loamy sand, loamy sand or sand. This horizon may be stratified with lenses of sand or gravel. Rock fragments vary with strata but average from 0 to 70 percent fine and medium quartzitic or granitic gravel. There is less than 5 percent cobbles present.

TAXONOMIC CLASS: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Ustic Calciargids

SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994): Unsuitable values were found for SAR from 28-40”. Estimated salvage depth is 28 inches due to unsuitable SAR values.

GEOGRAPHIC SETTING (according to official series description): Bosler soils are on gently to moderately sloping relict high terraces, fan aprons, and fan piedmonts. They formed in medium textured, mixed alluvium over sand and gravel strata. Elevation ranges from 6,000 to 8,000 feet. The mean annual precipitation ranges from 9 to 14 inches of which about half falls as snow and rain in April, May, and early June. The mean annual temperature ranges from 40 to 45 degrees F. The frost-free season is estimated to be 70 to 110 days depending upon elevation, aspect, and air drainage.

VARIATION FROM TYPICAL SERIES: This profile is slightly finer than typical from 0-28”.

BOSLER sandy loam

SOIL MAPPING UNIT: BO

SOIL SAMPLE LOCATION: 13

TYPICAL PEDON: Bosler sandy loam-rangeland. (Colors are for dry soil unless otherwise stated.

The Bosler series consists of very deep, well drained soils formed in slopewash alluvium. They occupy relict alluvial terraces and alluvial fan aprons. Slopes typically are less than 6 percent but range from 0 to 15 percent. The mean annual precipitation is about 12 inches, and the mean annual temperature is about 41 degrees F.

A--0 to 8 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) moist; moderate fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine roots; 10 percent fine gravel; non-effervescent; neutral (pH 6.8); clear smooth boundary.

Bt--8 to 16 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common fine roots; common distinct clay films on faces of peds; 5 percent fine gravel; non-effervescent; slightly acid (pH 6.3); clear smooth boundary.

C1--16 to 26 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common fine roots; common distinct clay films on faces of peds; 5 percent fine gravel; non-effervescent; neutral (pH 6.7); clear smooth boundary.

C2--26 to 36 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common fine roots; common distinct clay films on faces of peds; 5 percent fine gravel; non-effervescent; neutral (pH 7.3); clear smooth boundary.

2C--36 to 60 inches; very gravelly sand; single grained, loose; non-effervescent; 40 percent fine and medium granitic and quartzitic gravel. (This horizon was considered paralithic in the field and was not sampled)

TYPE LOCATION: Fremont County, Wyoming; refer to waypoint 13 on the map included in this report.

RANGE IN CHARACTERISTICS (according to official series description): The depth of contrasting 2Bk or 2C horizon is 20 to 40 inches. The mean annual soil temperature ranges from 41 to 47 degrees F.,

and the mean annual summer temperature ranges from 59 to 63 degrees F. Rock fragment content above the 2Bk or 2C horizon ranges from 0 to 15 percent gravel.

The A horizon has hue of 7.5YR through 2.5Y, value of 5 or 6 dry, 3 through 5 moist, and chroma of 2 through 4. EC is less than 2 mmhos. This horizon is typically free of carbonates but may effervesce slightly in some pedons. Reaction ranges from neutral through moderately alkaline.

The Bt and Btk horizons have hue of 7.5YR through 2.5Y, value of 4 through 6 dry, 3 through 6 moist, and chroma of 2 through 4. Texture is sandy clay loam or clay loam with 20 to 35 percent clay and more than 35 percent fine sand or coarser. EC is less than 2 mmhos. Reaction is neutral through moderately alkaline. The Bt is a diagnostic argillic horizon, and in most pedons the Btk is also part of the diagnostic argillic.

The Bk horizon has hue of 7.5YR through 2.5Y, value of 6 through 8 dry, 5 through 7 moist, and chroma of 1 through 4. Texture is loam with 18 to 27 percent clay. EC is less than 2 mmhos. Reaction is moderately or strongly alkaline. The Bk is a diagnostic calcic horizon with 15 to 35 percent calcium carbonate equivalent.

The 2C or 2Bk horizon has variable colors depending upon the lithochromic colors of the clean sand and gravel. Texture is gravelly sand, extremely gravelly sand, very gravelly loamy sand, loamy sand or sand. This horizon may be stratified with lenses of sand or gravel. Rock fragments vary with strata but average from 0 to 70 percent fine and medium quartzitic or granitic gravel. There is less than 5 percent cobbles present.

TAXONOMIC CLASS: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Ustic Calciargids

SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994): Marginal values were found for saturation percentage from 16-36” and for coarse fragment percentage from 16-26”. Estimated salvage depth is 16 inches due to due to marginal saturation and coarse fragment percentage values.

GEOGRAPHIC SETTING (according to official series description): Bosler soils are on gently to moderately sloping relict high terraces, fan aprons, and fan piedmonts. They formed in medium textured, mixed alluvium over sand and gravel strata. Elevation ranges from 6,000 to 8,000 feet. The mean annual precipitation ranges from 9 to 14 inches of which about half falls as snow and rain in April, May, and early June. The mean annual temperature ranges from 40 to 45 degrees F. The frost-free season is estimated to be 70 to 110 days depending upon elevation, aspect, and air drainage.

VARIATION FROM TYPICAL SERIES: This profile is less calcareous than usual. There are “C” horizons in place of the typical “Btk” and “Bk” horizons. The pH is more acidic from 8-36” than normal.

ONASON Reclaimed Variant

SOIL MAPPING UNIT: ON-RV

SOIL SAMPLE LOCATION: 17

TYPICAL PEDON: Onason gravelly sandy loam - rangeland. (Colors are for dry soil unless otherwise stated.)

The Onason series consists of well drained soils that are shallow and very shallow to soft sandstone. These soils formed in residuum and slopewash alluvium weathered from the underlying bedrock. Onason soils are on footslopes, backslopes, and shoulders of hills and ridges. Slopes range from 5 to 45 percent. The mean annual precipitation is about 12 inches, and the mean annual temperature is about 41 degrees F.

A--0 to 4 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) moist; weak very fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many fine and few medium roots; 15 percent semirounded pebbles; non-effervescent; neutral (pH 7.3); abrupt smooth boundary.

C--4 to 10 inches; light yellowish brown (2.5Y 6/4) sandy loam, light olive brown (2.5Y 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; many fine and few medium roots; 15 percent semirounded pebbles; non-effervescent; neutral (pH 7.2); abrupt wavy boundary.

Cr--10 to 24 inches; soft, coarse-grained non-calcareous sandstone interbedded with thin lenses of shale.

TYPE LOCATION: Fremont County, Wyoming; refer to waypoint 17 on the map included in this report.

RANGE IN CHARACTERISTICS (according to official series description): Depth to the paralithic contact and bedrock ranges from 4 to 20 inches. These soils are noncalcareous throughout. The mean annual soil temperature is 36 to 45 degrees F., and the mean summer soil temperature is 59 to 62 degrees F. The particle size control section averages gravelly sandy loam or sandy loam throughout. Clay ranges from 8 to 18 percent and rock fragments of fine or very fine semirounded pebbles range from 0 to 35 percent. EC is less than 2 mmhos throughout.
The A horizon has hue of 2.5Y or 10YR, value of 4 through 6 dry, 3 through 5 moist, and chroma of 2 through 4. Lag gravel covering up to 75 percent of the surface is common in some pedons. Reaction is neutral or mildly alkaline.

The C horizon has hue of 2.5Y or 10YR, value of 5 or 6 dry, 4 through 6 moist, and chroma of 2 through 4. A thin Bw horizon is present in some pedons. Reaction is neutral or mildly alkaline.

The Cr horizon consists of soft, noncalcareous, coarse- and medium-grained sandstone interbedded with thin lenses of shale and siltstone. The yellowish brown or brown sandstone may have discontinuous

lenses of hard sandstone or shale in some pedons. The soil-bedrock interface is considered a paralithic contact and roots plane out at the contact.

TAXONOMIC CLASS: Loamy, mixed, superactive, nonacid, frigid, shallow Ustic Torriorthents

SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994): Marginal values were found for saturation percentage from 0-10". Estimated salvage depth is 0 inches due to marginal saturation percentage values.

GEOGRAPHIC SETTING (according to official series description): Onason soils are on footslopes, backslopes, and shoulders of rolling and steep hills and ridges. These soils formed in residuum and slopewash alluvium weathered from the underlying noncalcareous sandstone. Slopes range from 5 to 45 percent. Elevations are 6,000 to 7,600 feet. The climate is cool, semiarid with moist springs and dry summers. The mean annual precipitation ranges from 10 to 14 inches of which about half falls as snow or rain in April, May, and early June. The mean annual temperature is about 34 to 44 degrees F. The estimated frost-free season is about 80 to 110 days, but frost may occur in any month.

VARIATION FROM TYPICAL SERIES: This is reclaimed soil that most resembles the Onason soil series. There is no typical A2 horizon.

ADDENDUM D-7-D

SOIL LABORATORY ANALYSIS

Inter-Mountain Laboratories, Inc.
1673 Terra Avenue, Sheridan, Wyoming 82801
(307) 672-8945

Soil Analysis Report
Titan Uranium USA
1225 Market St.
Riverton, WY 82501

Report ID: S1008301001

Project: Sheep Mtn.
Date Received: 8/18/2010

Date Reported: 9/30/2010
Work Order: S1008301

Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical Conductivity dS/m	Organic Matter LOI %	PE Calcium meq/L	PE Magnesium meq/L	PE Sodium meq/L	SAR
S1008301-001	#2	0-6	7.1	23.9	0.48	0.8	2.39	0.49	0.23	0.19
S1008301-002	#2	6-12	7.4	26.5	0.49	1.2	2.58	0.62	0.21	0.16
S1008301-003	#2	12-19	7.1	34.1	0.49	1.2	2.42	0.93	0.29	0.23
S1008301-004	#2	19-30	7.5	32.2	0.47	1.1	2.04	0.89	0.39	0.32
S1008301-005	#4	0-5	6.3	27.7	0.39	1.1	1.38	0.52	0.14	0.14
S1008301-006	#4	5-11	6.2	22.4	0.40	1.1	1.53	0.48	0.24	0.24
S1008301-007	#4	11-18	6.3	25.1	0.33	1.0	1.28	0.50	0.28	0.29
S1008301-008	#4	18-30	6.6	28.2	0.32	0.9	1.30	0.56	0.30	0.32
S1008301-009	#6	0-5	6.6	27.9	0.44	1.3	1.41	0.51	0.12	0.12
S1008301-010	#6	5-12	6.4	27.0	0.64	0.9	2.23	0.90	0.22	0.18
S1008301-011	#6	12-18	6.5	23.5	0.37	0.9	1.21	0.54	0.27	0.29
S1008301-012	#7	0-5	6.2	24.8	0.27	1.1	0.75	0.27	0.10	0.14
S1008301-013	#7	5-18	6.3	22.0	0.35	0.8	1.03	0.39	0.25	0.30
S1008301-014	#8	0-6	6.6	25.7	0.38	1.0	1.09	0.69	0.17	0.18
S1008301-015	#8	6-18	6.8	21.8	0.47	0.8	1.87	0.77	0.20	0.17
S1008301-016	#8	18-30	6.7	23.3	0.30	0.7	0.84	0.39	0.23	0.29
S1008301-017	#9	0-5	6.4	31.8	0.50	1.5	2.00	0.95	0.32	0.27
S1008301-018	#9	5-10	6.4	42.0	0.44	1.6	0.91	0.75	1.47	1.61
S1008301-019	#9	10-20	7.3	43.3	0.58	1.3	0.77	0.64	2.84	3.38
S1008301-020	#10	0-5	7.5	34.0	0.63	1.5	2.26	1.33	0.63	0.47

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Inter-Mountain Laboratories, Inc.
1673 Terra Avenue, Sheridan, Wyoming 82801
(307) 672-8945

Soil Analysis Report
Titan Uranium USA
1225 Market St.
Riverton, WY 82501

Report ID: S1008301001

Project: Sheep Mtn.
Date Received: 8/18/2010

Date Reported: 9/30/2010
Work Order: S1008301

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse Fragment %	Available Selenium ppm	Available Boron ppm
S1008301-001	#2	0-6	75.0	15.0	10.0	Sandy Loam	17.0	<0.02	0.15
S1008301-002	#2	6-12	76.0	14.0	10.0	Sandy Loam	10.6	<0.02	0.17
S1008301-003	#2	12-19	63.0	19.0	18.0	Sandy Loam	11.7	<0.02	0.31
S1008301-004	#2	19-30	58.0	25.0	17.0	Sandy Loam	2.25	<0.02	0.25
S1008301-005	#4	0-5	82.0	11.0	7.0	Loamy Sand	2.46	<0.02	0.27
S1008301-006	#4	5-11	71.0	18.0	11.0	Sandy Loam	12.7	<0.02	0.29
S1008301-007	#4	11-18	69.0	18.0	13.0	Sandy Loam	9.88	<0.02	0.22
S1008301-008	#4	18-30	67.0	17.0	16.0	Sandy Loam	7.63	<0.02	0.21
S1008301-009	#6	0-5	74.0	16.0	10.0	Sandy Loam	7.51	<0.02	0.29
S1008301-010	#6	5-12	72.0	17.0	11.0	Sandy Loam	7.98	<0.02	0.27
S1008301-011	#6	12-18	73.0	16.0	11.0	Sandy Loam	8.53	<0.02	0.23
S1008301-012	#7	0-5	81.0	11.0	8.0	Loamy Sand	8.50	<0.02	0.21
S1008301-013	#7	5-18	78.0	11.0	11.0	Sandy Loam	8.50	<0.02	0.22
S1008301-014	#8	0-6	76.0	14.0	10.0	Sandy Loam	17.3	<0.02	0.16
S1008301-015	#8	6-18	77.0	13.0	10.0	Sandy Loam	15.7	<0.02	0.12
S1008301-016	#8	18-30	71.0	16.0	13.0	Sandy Loam	12.6	<0.02	0.10
S1008301-017	#9	0-5	66.0	22.0	12.0	Sandy Loam	2.02	<0.02	0.21
S1008301-018	#9	5-10	31.0	41.0	28.0	Clay Loam	1.72	<0.02	0.24
S1008301-019	#9	10-20	29.0	43.0	28.0	Clay Loam	16.0	<0.02	0.26
S1008301-020	#10	0-5	49.0	32.0	19.0	Loam	7.41	<0.02	0.36

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Page 2 of 4

Inter-Mountain Laboratories, Inc.
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Soil Analysis Report
Titan Uranium USA
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Report ID: S1008301001

Project: Sheep Mtn.
Date Received: 8/18/2010

Date Reported: 9/30/2010
Work Order: S1008301

Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical Conductivity dS/m	Organic Matter LOI %	PE Calcium meq/L	PE Magnesium meq/L	PE Sodium meq/L	SAR
S1008301-021	#10	5-10	7.7	31.2	0.66	1.3	0.92	0.65	3.49	3.94
S1008301-022	#10	10-20	8.2	34.2	1.61	0.8	0.64	0.66	11.8	14.7
S1008301-023	#10	20-33	8.0	39.7	10.9	0.7	17.2	30.9	111	22.7
S1008301-024	#10	33-44	8.1	40.0	11.5	0.7	17.8	26.7	122	25.8
S1008301-025	#10	44-60	8.0	28.1	9.92	0.7	16.5	16.6	98.8	24.3
S1008301-026	#11	0-6	6.6	57.1	0.49	1.5	2.03	0.96	0.26	0.21
S1008301-027	#11	6-14	7.4	34.2	0.62	1.3	1.05	0.59	2.74	3.02
S1008301-028	#11	14-28	8.2	42.9	1.16	0.9	0.71	0.79	8.03	9.26
S1008301-029	#11	28-40	7.9	35.2	7.37	0.6	19.6	16.0	65.1	15.4
S1008301-031	#12	0-5	6.3	26.1	0.40	1.5	1.19	0.56	0.17	0.19
S1008301-032	#12	5-10	6.4	28.9	0.36	1.4	1.32	0.62	0.23	0.24
S1008301-033	#12	10-18	6.5	21.1	0.36	1.0	0.88	0.50	0.25	0.31
S1008301-034	#13	0-8	6.8	27.8	0.58	1.4	3.18	1.22	0.47	0.32
S1008301-035	#13	8-16	6.3	33.5	0.27	1.3	0.83	0.35	0.22	0.28
S1008301-036	#13	16-26	6.7	23.3	0.35	0.7	1.06	0.48	0.47	0.54
S1008301-037	#13	26-36	7.3	24.8	0.45	0.8	1.65	0.64	0.85	0.80
S1008301-038	#15	0-6	5.8	26.1	0.26	1.1	0.75	0.29	0.16	0.22
S1008301-039	#15	6-18	6.4	26.2	0.31	1.0	1.38	0.46	0.25	0.26
S1008301-040	#17	0-4	7.3	23.9	0.64	1.2	2.72	0.92	1.10	0.81
S1008301-041	#17	4-10	7.2	23.1	0.53	1.2	2.98	0.64	0.21	0.16

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Inter-Mountain Laboratories, Inc.
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Titan Uranium USA
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Report ID: S1008301001

Project: Sheep Mtn.
Date Received: 8/18/2010

Date Reported: 9/30/2010
Work Order: S1008301

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse Fragment %	Available Selenium ppm	Available Boron ppm
S1008301-021	#10	5-10	51.0	28.0	21.0	Loam	5.55	<0.02	0.29
S1008301-022	#10	10-20	54.0	26.0	20.0	Sandy Clay Loam	9.04	<0.02	0.29
S1008301-023	#10	20-33	45.0	34.0	21.0	Loam	2.41	0.16	0.30
S1008301-024	#10	33-44	45.0	30.0	25.0	Loam	5.43	0.28	0.31
S1008301-025	#10	44-60	45.0	32.0	23.0	Loam	7.39	0.22	0.29
S1008301-026	#11	0-6	49.0	31.0	20.0	Loam	7.25	<0.02	0.17
S1008301-027	#11	6-14	45.0	36.0	19.0	Loam	3.52	<0.02	0.18
S1008301-028	#11	14-28	31.0	43.0	26.0	Loam	5.30	<0.02	0.35
S1008301-029	#11	28-40	56.0	27.0	17.0	Sandy Loam	14.3	<0.02	0.38
S1008301-031	#12	0-5	69.0	19.0	12.0	Sandy Loam	9.91	<0.02	0.22
S1008301-032	#12	5-10	66.0	17.0	17.0	Sandy Loam	7.33	<0.02	0.28
S1008301-033	#12	10-18	75.0	14.0	11.0	Sandy Loam	6.91	<0.02	0.21
S1008301-034	#13	0-8	69.0	18.0	13.0	Sandy Loam	15.0	<0.02	0.14
S1008301-035	#13	8-16	53.0	30.0	17.0	Sandy Loam	16.6	<0.02	0.16
S1008301-036	#13	16-26	73.0	16.0	11.0	Sandy Loam	27.8	<0.02	0.13
S1008301-037	#13	26-36	65.0	22.0	13.0	Sandy Loam	16.6	<0.02	0.19
S1008301-038	#15	0-6	77.0	12.0	11.0	Sandy Loam	12.1	<0.02	0.19
S1008301-039	#15	6-18	75.0	16.0	9.0	Sandy Loam	13.6	<0.02	0.16
S1008301-040	#17	0-4	73.0	17.0	10.0	Sandy Loam	14.5	<0.02	0.16
S1008301-041	#17	4-10	72.0	17.0	11.0	Sandy Loam	14.8	<0.02	0.20

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H20Sol= water soluble,AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate
Abbreviations used in acid base accounting: T.S.= Total Sulfur, AB= Acid Base, ABP= Acid Base Potential, PyrS= Pyritic Sulfur, Pyr+Org= Pyritic Sulfur + Organic Sulfur, Neutral. Pot.= Neutralization Potential
Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

Reviewed by: Karen A Secor
Karen Secor, Soil Lab Supervisor

Page 4 of 4

ADDENDUM D-7-E
PRIME FARMLAND DESIGNATION

United States Department of Agriculture

NRCS

received
12-17-10

Natural Resources Conservation Service
508 North Broadway Avenue
Riverton, Wyoming 82501
(307) 856-7524 Ext 3

Date: December 15, 2010

To: Jacob Mulinix
P.O. Box 3467
Gillette, WY 82717-3467

Jacob,

Here is the information you requested. There are only 3 soil map units from this soil survey that have been determined to be Prime Farmland, and that is only when irrigated. See attached.

Nick Biltoft, DC
Riverton NRCS

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

PAGE 1 OF 1
03/31/99

PRIME FARMLAND
prime farmland

Map symbol	Soil name
104	Almy loam, 0 to 6 percent slopes (where irrigated)
185	Poposhia loam, 1 to 6 percent slopes (where irrigated)
207	Sinkson-Almy sandy clay loams, 0 to 6 percent slopes (where irrigated)

ADDENDUM D-7-F
PHOTOGRAPHS

(Photo time stamps are not accurate)

Photo 1: Profile view of Sample Point 2

Photo 2: General view of Sample Point 2

Photo 3: Profile view of Sample Point 4

Photo 4: General view of Sample Point 4

Photo 5: Profile view of Sample Point 6

Photo 6: General view of Sample Point 6

Photo 7: Profile view of Sample Point 7

Photo 8: General view of Sample Point 7

Photo 9: Profile view of Sample Point 8

Photo 10: General view of Sample Point 8

Photo 13: Profile view of Sample Point 10

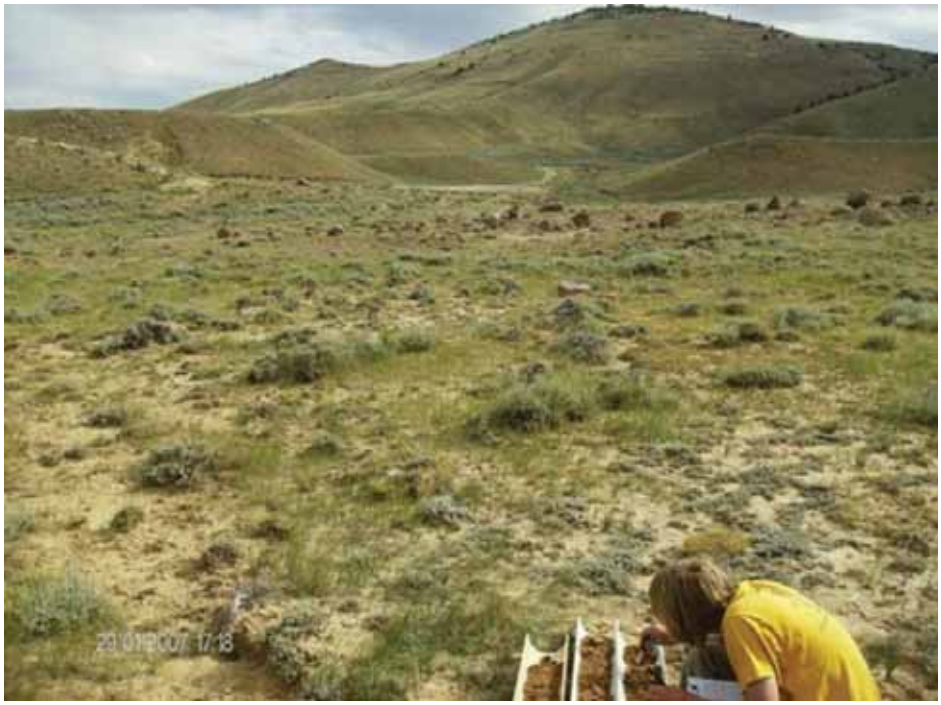


Photo 14: General view of Sample Point 10

Photo 15: Profile view of Sample Point 11

Photo 16: General view of Sample Point 11

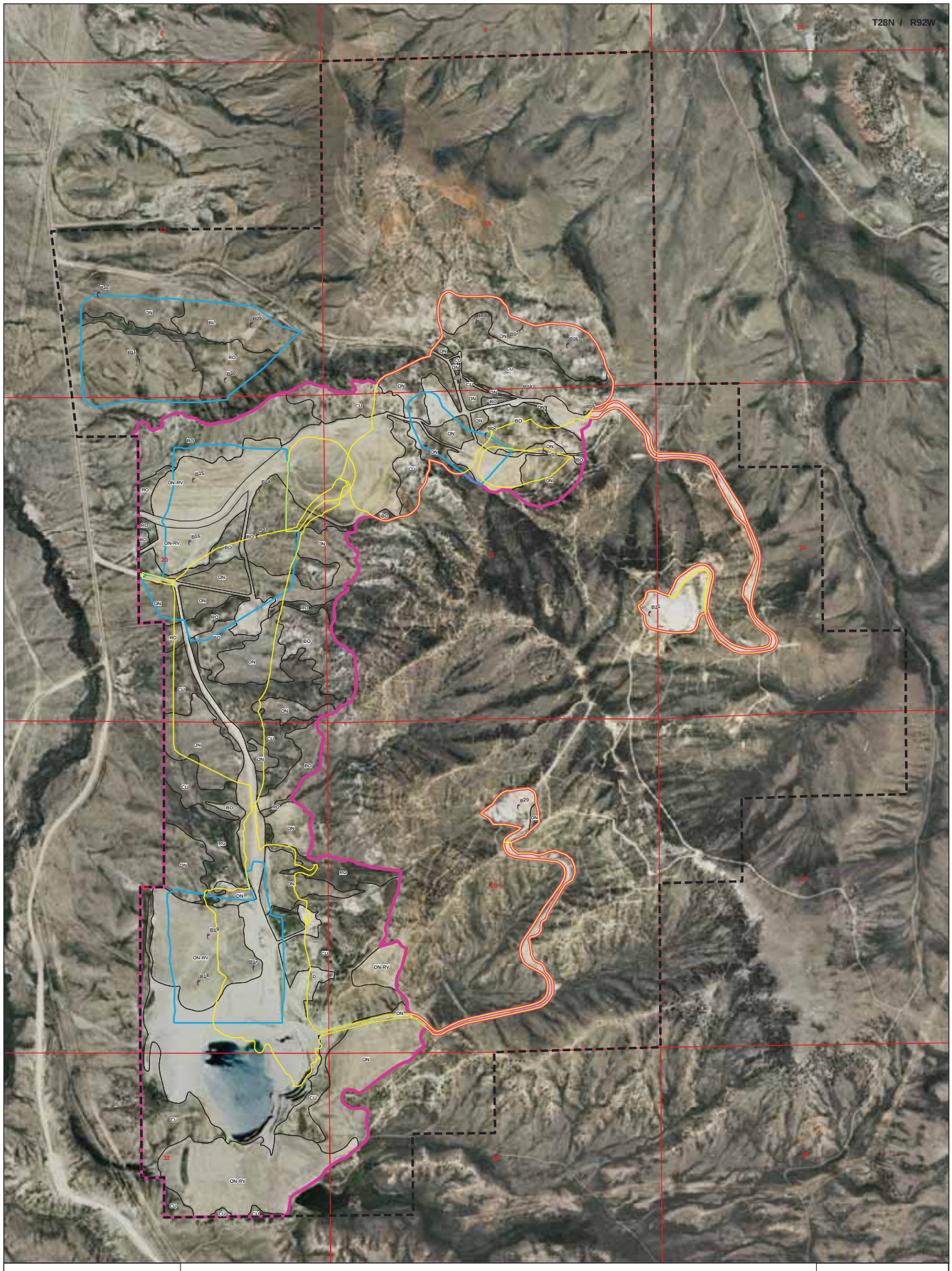
Photo 19: Profile view of Sample Point 13

Photo 22: Profile view of Sample Point 17

Photo 23: General view of Sample Point 17

ADDENDUM D-7-G

MAP



BRS Engineering
Titan Uranium
USA, Inc

Sheep Mountain
Baseline Soil
Assessment

Fremont County, WY

Legend

- Soil Sampling Locations
- Soil Map Units
- Permit Boundary
- Soil Analysis Area 2011
- Soil Survey Area 2010
- Maximum Extent of Surface Disturbance
- Sections
- TWN/RNG

Soil Series	MU Symbol
Blazon clay loam	BL
Bosler fine sandy loam	BO
Cushool sandy loam	CU
Disturbance	D
Onason gravelly sandy loam	ON
Onason Reclaimed Variant	ON-RV
Rock River sandy loam	RO

0 0.125 0.25 0.5
Miles

1:8,400

BKS Environmental Associates, Inc.

Map Created by: BKS - Tracy Spelts
Map Created on: April 30, 2010
Map Updated: June 14, 2011
Map Projection: NAD 83, UTM Zone 13
K:\Projects\BRS_Corporation\643_BRS_Titan_Sheep_MT_Uranium\Maps\BRS_Titan_Uranium_Project_Soils_v4.mxd

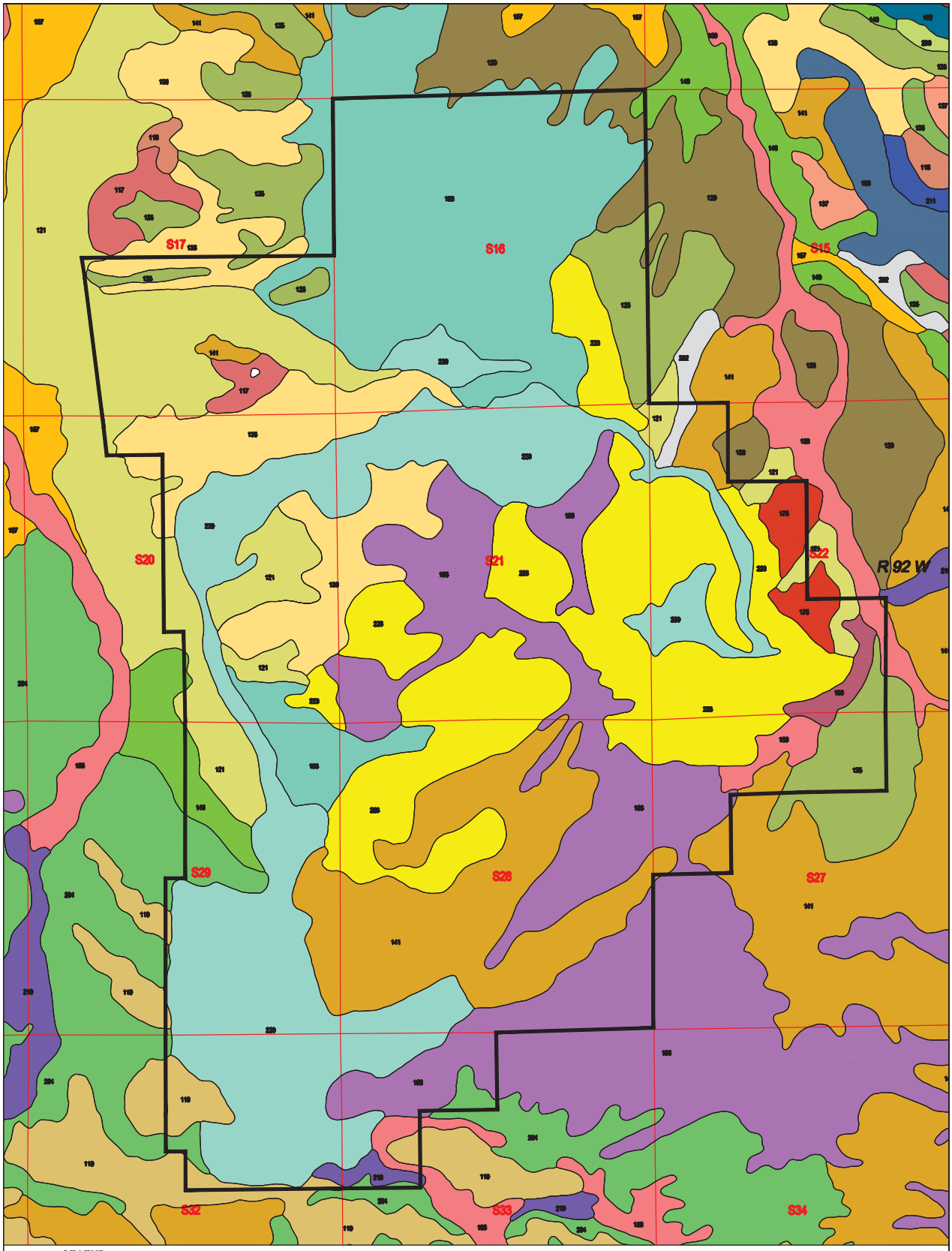
ADDENDUM D-7-H

1980 APPENDIX D-7 SOIL ASSESSMENT

REFER TO MINE PERMIT 381C

ADDENDUM D-7-I

NRCS SOIL MAP



LEGEND

SECTION LINE

PERMIT BOUNDARY

SOIL SERIES

117	Blackhall-Carmody association
118	Blazon-rock outcrop-Carmody complex
119	Blazon-Cousin complex
120	Bosler-Rock River sandy loams
121	Bosler-Ryan Park fine sandy loams
125	Brownsto very bouldery-Decoss variant-Brownsto complex
135	Cago-Pozuzo association
136	Cragosa-Carmody-Blazon complex
137	Cragosa-Rock outcrop-Carmody complex
140	Cushool-Rock River Association
141	Dalaplat-Rock River complex
157	Havre-Alsaker-Forelle loams
158	Havre-Forelle-Glendive complex
175	Milvar-Milvan complex
182	Pearsono-Rock outcrop-Arholer complex
183	Peyton sandy loam
188	Quander-Yonga-Quander complex
193	Rockietale-Rock outcrop-Blakiston complex
196	Rock outcrop-Blackhall complex
202	Ryan Park loamy fine sand
203	Ryan Park-Carmody association
204	Ryark sandy loam
208	Slickaw-Alzey-Thermopolis association
211	Thermopolis-Slickaw association
219	Venegas-Silas loams
223	Yonga-Quander complex
229	Dumps, mine

1,500' 0 750' 1,500'

1 inch = 1,500'

BRS ENGINEERING	EXISTING SOIL CONDITIONS	SHEEP MOUNTAIN MINES FREMONT COUNTY, WYOMING	REVISION DATE: 06/01/11
	SCALE: 1"=1500' DATE:		CAD FILENAME:
	DRAWN BY:CDS 6/1/11		DWG. NUMBER: FIGURE
			TITAN URANIUM USA INC