

**ADDENDUM 3.3-A**  
**SOILS MAP**

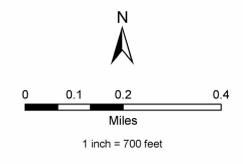


**Legend**

- Soil Sample Location (Laboratory Analysis)
- Soil Sample Location (Field Verification)
- Soil Sample Location (Radionuclide)
- Soil Map Units
- Reno Creek Project Boundary
- Sections
- TOWN/RNG

**Soil Map Unit Key**

Map Unit Symbol	Soil Map Unit
Bi	Bidman
Bo	Bowbac
Ca	Cambria
Cu	Cushman
D	Disturbed
F	Forkwood
Hi	Hiland
Ki	Kishona
Sh	Shingle
Te	Terro
Th	Theedle
Tu	Tullock
U	Ulm
Vo	Vonalee
W	Water



**AUC, LLC**

**RENO CREEK  
BASELINE SOILS  
ASSESSMENT  
CAMPBELL COUNTY, WY**

**ADDENDUM 3.3-B**  
**SOIL TABLES**

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**Table 3.3B-1: Soil Series Sample Summary for the Proposed Reno Creek Project <sup>1</sup>**

<b>Soil Series</b>	<b>Number of Profiles to be Sampled for Chemical Analysis</b>
Bidman	1
Bowbac	1
Cambria	3
Cushman	3
Forkwood	3
Haverdad	0*
Hiland	3
Kishona	3
Shingle	3
Terro	2
Theedle	3
Tulloch	1
Ulm	3
Vonalee	1
<b>Total</b>	<b>30</b>

<sup>1</sup>Based on the acreage of each soil series within the project area.

\* Based on WDEQ communication, no samples are required for this series.

**Table 3.3B-2: Soil Sample Locations for the Proposed Reno Creek Project**

<b>Soil Sample Number</b>	<b>Map Unit Designation</b>
68	Bidman Loam
66	Bowbac Sandy Loam
46, 55, 57	Cambria Loam
6, 9, 20	Cushman Loam
22, 35, 50	Forkwood Loam
N/A	Haverdad Loam
5, 8, 36	Hiland Sandy Loam
15, 28, 40	Kishona Loam
10, 17, 34	Shingle Loam
45, 49	Terro Sandy Loam
7, 25, 33	Theedle Loam
56	Tulloch Loamy Sand
19, 32, 44	Ulm Clay Loam
48	Vonalee Sandy Loam

**Table 3.3B-3: Soil Mapping Unit Acreages for the Proposed Reno Creek Project**

<b>Map Symbol</b>	<b>Map Unit Description</b>	<b>Proposed Project Acreage</b>	<b>% Total Area</b>
Bi	Bidman Loam	142.13	2.35
Bo	Bowbac Sandy Loam	34.44	0.57
Ca	Cambria Loam	844.13	13.94
Cu	Cushman Loam	223.54	3.69
D	Disturbed	279.18	4.61
Fo	Forkwood Loam	1474.49	24.34
Ha	Haverdad Loam	149.33	2.47
Hi	Hiland Sandy Loam	260.99	4.31
Ki	Kishona Loam	497.56	8.21
Sh	Shingle Loam	701.01	11.57
Te	Terro Sandy Loam	163.69	2.7
Th	Theedle Loam	1018.81	16.82
Tu	Tulloch Loamy Sand	15.94	0.26
Ul	Ulm Clay Loam	220.61	3.64
Vo	Vonalee Sandy Loam	26.33	0.43
W	Water	5.26	0.09
<b>Total</b>		<b>6,057.44</b>	<b>100</b>

**Table 3.3B-4: Summary of Approximate Soil Salvage Depths within the Proposed Reno Creek Project**

<b>Map Symbol</b>	<b>Mapping Unit Description</b>	<b>Proposed Project Area</b>	<b>Salvage Depth (ft)</b>	<b>Total Volume (Acre feet)</b>
Bi	Bidman Loam	142.13	1	142.13
Bo	Bowbac Sandy Loam	34.44	0.2	6.89
Ca	Cambria Loam	844.13	1.2	1012.95
Cu	Cushman Loam	223.54	1	223.54
D	Disturbed	279.18	0	0
Fo	Forkwood Loam	1474.49	0.9	1327.04
Ha	Haverdad Loam	149.33	1.4	209.07
Hi	Hiland Sandy Loam	260.99	1.5	391.49
Ki	Kishona Loam	497.56	1.9	945.36
Sh	Shingle Loam	701.01	1.8	1261.82
Te	Terro Sandy Loam	163.69	3	491.06
Th	Theedle Loam	1018.81	1.5	1528.21
Tu	Tulloch Loamy Sand	15.94	0.6	9.56
Ul	Ulm Clay Loam	220.61	1.2	264.73
Vo	Vonalee Sandy Loam	26.33	3.6	94.8
W	Water	5.26	0	0
<b>Average Salvage Depth of Project Area</b>			<b>1.31</b>	
<b>Total</b>		<b>6,057.44</b>		<b>7,908.65</b>

**Table 3.3B-5: Summary of Marginal and Unsuitable Parameters within the Sampled Profiles for the Proposed Reno Creek Project**

Series	Sample Point	Depth (in)	Parameter
Cushman	09	3-14	Marginal texture - Clay
Cushman	09	14-24	Marginal texture - Clay
Cushman	09	24-34	Marginal texture - Clay
Kishona	28	4-8	Marginal texture - Silty Clay
Kishona	28	28-42	Marginal texture - Silty Clay
Kishona	28	42-60	Marginal texture - Silty Clay Marginal selenium
Ulm	32	38-60	Marginal texture - Clay
Kishona	40	40-48	Marginal selenium
Kishona	40	48-60	Marginal selenium
Cambria	46	36-48	Marginal texture - Clay Marginal selenium
Cambria	46	48-60	Marginal texture - Clay Marginal selenium
Cambria	55	32-48	Marginal selenium
Cambria	55	48-60	Marginal selenium
Bidman	68	12-22	Marginal texture- Clay
Bidman	68	22-42	Marginal texture - Clay
Bidman	68	42-54	Marginal selenium
Bidman	68	54-60	Marginal selenium

**Table 3.3B-6: Summary of Wind and Water Erosion Hazards<sup>1</sup> Within the Proposed Reno Creek Project**

<b>Map Symbol</b>	<b>Map Unit Description</b>	<b>Water Erosion Hazard</b>	<b>Wind Erosion Hazard</b>
Bi	Bidman Loam	Moderate	Slight
Bo	Bowbac Sandy Loam	Slight	Moderate
Ca	Cambria Loam	Moderate	Slight
Cu	Cushman Loam	Moderate	Slight
Fo	Forkwood Loam	Moderate	Slight
Ha	Haverdad Loam	Moderate	Moderate
Hi	Hiland Sandy Loam	Slight	Moderate
Ki	Kishona Loam	Moderate	Moderate
Sh	Shingle Loam	Moderate	Moderate
Te	Terro Sandy Loam	Slight	Moderate
Th	Theedle Loam	Moderate	Moderate
Tu	Tulloch Loamy Sand	Slight	Severe
Ul	Ulm Clay Loam	Slight	Moderate
Vo	Vonalee Sandy Loam	Slight	Moderate

<sup>1</sup>Based on soil mapping unit descriptions.

**ADDENDUM 3.3-C**  
**SOIL MAPPING UNIT DESCRIPTIONS**

**List of Soil Mapping Descriptions**

Bidman Loam (Bi) .....	3.3C-1
Bowbac Sandy Loam (Bo).....	3.3C-2
Cambria Loam (Ca) .....	3.3C-3
Cushman Loam (Cu).....	3.3C-4
Forkwood Loam (F).....	3.3C-5
Haverdad Loam (Ha) .....	3.3C-6
Hiland Sandy Loam (Hi).....	3.3C-7
Kishona Loam (Ki).....	3.3C-8
Shingle Loam (Sh) .....	3.3C-9
Terro Sandy Loam (Te) .....	3.3C-10
Theedle Loam (Th) .....	3.3C-11
Tulloch Loamy Sand (Tu).....	3.3C-12
Ulm Clay Loam (U).....	3.3C-13
Vonalee Sandy Loam (Vo) .....	3.3C-14

**Bidman Loam<sup>1</sup> (Bi)**

This map unit consists of very deep, well-drained soils formed in alluvium weathered from shale bedrock. Slopes range from 0 to 25 percent. The Bidman soil occurs on alluvial fans, fan remnants, terraces, ridges, and hills at elevations between 2,600 and 6,000 feet.

The average annual precipitation ranges from 10 to 14 inches. The mean annual air temperature is approximately 47 to 66 degrees Fahrenheit, and the average frost-free season is approximately 100 to 130 days.

Permeability within the Bidman soil is slow. The available water capacity is high. Effective rooting depth is 60 inches or more. Surface runoff ranges from low to high. The hazard of water erosion is moderate; wind erosion is slight.

**Topsoil Suitability**

This map unit is a suitable source of topsoil to 12 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, the following marginal or unsuitable parameters were found:

**Soil Sample 68**

- marginal texture of clay from 12 to 22 inches and from 22 inches to 42 inches; and
- marginal selenium concentrations from 42 to 54 inches and from 54 inches to 60 inches.

The 12-inch salvage depth was used in Addendum 3.3-B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Bidman series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

**Bowbac Sandy Loam<sup>1</sup> (Bo)**

The Bowbac series consists of moderately deep, well drained soils formed in alluvium, eolian deposits or residuum derived primarily from argillaceous sandstone. This series occupies alluvial fans, terraces, dissected fan remnants, fan piedmonts, hillslopes, pediments, plateaus, ridges and buttes at elevations ranging from 3,500 to 6,500 feet. Slopes are 0 to 15 percent and both simple and complex.

The mean annual precipitation is about 13 inches, and the mean annual temperature is about 46 degrees F.

Permeability within the Bowbac soil is moderate. The available water capacity is low. Effective rooting depth is 20 to 40 inches. Surface runoff ranges from medium to low. The hazard of water erosion is slight; wind erosion is moderate.

**Topsoil Suitability**

This map unit is a suitable source of topsoil to 2 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, no marginal or unsuitable parameters were found.

The 2-inch salvage depth was used in Addendum 3.3-B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Bowbac series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

### **Cambria Loam<sup>1</sup> (Ca)**

The Cambria series consists of very deep, well drained, moderately permeable soils which formed in alluvium and slope alluvium on fan remnants, alluvial fans, fan piedmonts, terraces, ridges and hills at elevations ranging from 3,500 to 6,500 feet. Slopes range from 0 to 15 percent and are usually simple but may be complex where the area has been dissected by ephemeral streams.

The mean annual precipitation is about 12 inches, and the mean annual air temperature is about 45 degrees F.

Permeability within the Cambria soil is moderate. The available water capacity is high. Effective rooting depth is greater than 60 inches. Surface runoff ranges from medium to low. The hazard of water erosion is moderate; wind erosion is slight.

### **Topsoil Suitability**

This map unit is a suitable source of topsoil to 14.7 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, the following marginal or unsuitable parameters were found:

#### **Soil Sample 46**

- marginal texture of clay and marginal selenium concentrations from 36 to 48 inches and from 48 to 60 inches.

#### **Soil Sample 55**

- marginal selenium concentrations from 32 to 48 inches and from 48 inches to 60 inches.

The 14.7-inch salvage depth was used in Addendum 3.3-B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Cambria series.

<sup>1</sup>*Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

### **Cushman Loam<sup>1</sup> (Cu)**

This map unit consists of moderately deep, well drained soils formed in slope-wash alluvium, and residuum from inter-bedded shale and siltstone and fine-grained argillaceous sandstone. Slopes range from 0 to 20 percent. The Cushman soil occurs on buttes, fan remnants, hills, piedmonts, ridges and terraces at elevations between 3,500 and 6,000 feet.

The average annual precipitation ranges from 10 to 14 inches. The mean annual air temperature is approximately 43 to 51 degrees Fahrenheit, and the average frost-free season is approximately 105 to 130 days.

Permeability within the Cushman soil is moderate. The available water capacity is low. Effective rooting depth is 20 to 40 inches. Surface runoff is medium. The hazard of water erosion is moderate and the hazard of wind erosion is slight.

### **Topsoil Suitability**

This map unit is a suitable source of topsoil to 10.33 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, the following marginal or unsuitable parameters were found:

#### **Soil Sample 09**

- marginal texture of clay from 3 to 14 inches, from 14 to 24 inches, and from 24 to 34 inches.

The 10.33-inch salvage depth was used in Addendum 3.3-B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Cushman series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

**Forkwood Loam<sup>1</sup> (F)**

This map unit consists of very deep, well drained soils formed in alluvium. Slopes range from 0 to 15 percent. The Forkwood soil occurs on terraces, alluvial fans, fan remnants, hills, ridges and pediments at elevations between 3,500 and 6,000 feet.

The average annual precipitation ranges from 10 to 14 inches. The mean annual air temperature is approximately 43 to 51 degrees Fahrenheit, and the average frost-free season is approximately 105 to 130 days.

Permeability within the Forkwood soil is moderate. The available water capacity is high. Effective rooting depth is 60 inches or more. The hazard of water erosion is moderate and the hazard of wind erosion is slight.

**Topsoil Suitability**

This map unit is a suitable source of topsoil to 21.33 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, no marginal or unsuitable parameters were found.

The 21.33-inch salvage depth was used in Addendum 3.3-B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Forkwood series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

**Haverdad Loam<sup>1</sup> (Ha)**

This map unit consists of very deep, well drained soils formed in stratified alluvium on flood plains and low terraces at elevations ranging from 3,500 to 6,500 feet. Slopes range from 0 to 6 percent.

The average annual precipitation ranges from 10 to 17 inches. The mean annual air temperature is approximately 43 to 52 degrees Fahrenheit, and the average frost-free season is approximately 105 to 130 days.

Permeability within the Haverdad soil is moderate. The available water capacity is moderate. Effective rooting depth is 60 inches or more. The hazard of water and wind erosion is moderate.

**Topsoil Suitability**

This map unit is a suitable source of topsoil to 18.0 inches based on an average of 2010 mapping locations. According to WDEQ Guideline 1, no marginal or unsuitable parameters were observed.

The 18.0-inch salvage depth was used in Addendum 3.3-B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Haverdad series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

**Hiland Sandy Loam<sup>1</sup> (Hi)**

The Hiland series consists of very deep, well drained soils formed in alluvium or eolian deposits on relict surfaces consisting of terraces, fans, fan remnants pediments, ridges, hills and stabilized dunes at elevations ranging from 3,500 to 6,300 feet. Permeability is moderate. Slopes range from 0 to 20 percent.

The average annual precipitation is about 12 inches, and the mean annual air temperature is about 45 degrees F.

Permeability within the Hiland soil is moderate. The available water capacity is moderate. Effective rooting depth is greater than 60 inches. Surface runoff is low to medium. The hazard of water erosion is slight; wind erosion is moderate.

**Topsoil Suitability**

This map unit is a suitable source of topsoil to 22.67 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, no marginal or unsuitable parameters were found.

The 22.67-inch salvage depth was used in Addendum 3.3-B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Hiland series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

### **Kishona Loam<sup>1</sup> (Ki)**

The Kishona series consists of very deep, well drained soils formed in alluvium on fan aprons, alluvial fans, fan remnants, hills, ridges and terraces at elevations ranging from 3,500 to 6,700 feet. Permeability is moderate. Slopes range from 0 to 30 percent.

The average annual precipitation is about 12 inches, and the mean annual temperature is about 46 degrees F.

Permeability within the Kishona soil is moderate. The available water capacity is high. Effective rooting depth is greater than 60 inches. Surface runoff ranges from slow to medium. The hazard of water and wind erosion is moderate.

### **Topsoil Suitability**

This map unit is a suitable source of topsoil to 11.33 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, the following marginal or unsuitable parameters were found:

#### **Soil Sample 28**

- marginal texture of silty clay from 4 to 8 inches and from 28 to 42 inches; and
- marginal texture of silty clay and marginal selenium concentrations from 42 to 60 inches.

#### **Soil Sample 40**

- marginal selenium concentrations from 40 to 48 inches and from 48 inches to 60 inches.

The 11.33-inch salvage depth was used in Addendum 3.3-B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Kishona series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

**Shingle Loam (Sh)**

The Shingle series consists of well drained soils that are very shallow or shallow to bedrock. This series formed in residuum and colluvium derived from inter-bedded shale and sandstone or in alluvium from mudstone. Shingle soils are on bedrock controlled hillslopes and ridges at elevations ranging from 3,200 to 6,500 feet. Slopes are 0 to 80 percent.

The average annual precipitation ranges from 10 to 14 inches. The mean annual air temperature is approximately 45 degrees Fahrenheit, and the average frost-free season is approximately 105 to 130 days.

Permeability within the Shingle soil is moderate. The available water capacity is very low. Effective rooting depth is 10 to 20 inches. The hazard of water and wind erosion is moderate.

**Topsoil Suitability**

This map unit is a suitable source of topsoil to 6.67 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, no marginal or unsuitable parameters were found.

The 6.67-inch salvage depth was used in Addendum 3.3-B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Shingle series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

### **Terro Sandy Loam (Te)**

The Terro series consists of well drained soils that are moderately deep to soft bedrock. The series formed on gently to steeply sloping hills, ridges, fan remnants, terraces and plateaus in residuum, alluvium, colluvial slopewash or eolian materials derived primarily from soft sandstone at elevations ranging from 3,600 to 6,500 feet. Slopes are 0 to 30 percent.

The average annual precipitation ranges from 10 to 14 inches. The mean annual air temperature is approximately 47 to 51 degrees Fahrenheit, and the average frost-free season is approximately 105 to 130 days.

Permeability within the Terro soil is moderately rapid. The available water capacity is low. Effective rooting depth is 20 to 40 inches. The hazard of water erosion is slight and the hazard of wind erosion is moderate.

### **Topsoil Suitability**

This map unit is a suitable source of topsoil to 14.0 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, no marginal or unsuitable parameters were found.

The 14.0-inch salvage depth was used in Addendum 3.3B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Terro series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

**Theedle Loam<sup>1</sup> (Th)**

The Theedle series consists of well drained soils that are moderately deep to soft bedrock. This series formed in residuum and slope alluvium weathered from soft sandstone. The Theedle soils are on hills, ridges and fan remnants at elevations ranging from 3,500 to 6,500 feet. Slopes are 0 to 75 percent.

The mean annual precipitation is about 12 inches, and the mean annual air temperature is 45 degrees F.

Permeability within the Theedle soil is moderate. The available water capacity is moderate. Effective rooting depth is 20 to 40 inches. Surface runoff is slow to rapid. The hazard of water and wind erosion is moderate.

**Topsoil Suitability**

This map unit is a suitable source of topsoil to 16.67 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, no marginal or unsuitable parameters were found.

The 16.67-inch salvage depth was used in Addendum 3.3-B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Theedle series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

**Tullock Loamy Sand (Tu)**

The Tullock series consists of moderately deep excessively drained soils formed in residuum, alluvium or eolian deposits derived from sandstone. The series is found on dunes, hills and ridges at elevations ranging from 3,500 to 6,000 feet. Slopes are 0 to 45 percent.

The average annual precipitation ranges from 10 to 14 inches. The mean annual air temperature is approximately 47 to 53 degrees Fahrenheit, and the average frost-free season is approximately 105 to 130 days.

Permeability within the Tullock soil is rapid. The available water capacity is very low. Effective rooting depth is 20 to 40 inches. The hazard of water erosion is slight and the hazard of wind erosion is severe.

**Topsoil Suitability**

This map unit is a suitable source of topsoil to 18.0 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, no marginal or unsuitable parameters were found.

The 18.0-inch salvage depth was used in Addendum 3.3-B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Tullock series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

### **Ulm Clay Loam (U)**

The Ulm series consists of very deep, well drained soils, that formed in calcareous alluvium derived from sedimentary rock. Ulm soils are on relict terraces, alluvial fans, fan remnants, plateaus, ridges and hills at elevations ranging from 3,500 to 6,500 feet. Slopes are 0 to 18 percent.

The average annual precipitation ranges from 10 to 14 inches. The mean annual air temperature is approximately 46 to 51 degrees Fahrenheit, and the average frost-free season is approximately 105 to 130 days.

Permeability within the Ulm soil is moderate to slow. The available water capacity is high. Effective rooting depth is 60 inches or greater. The hazard of water erosion is moderate and the hazard of wind erosion is slight.

### **Topsoil Suitability**

This map unit is a suitable source of topsoil to 43.33 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, marginal or unsuitable parameters were found at the following location:

#### **Sample Point 32:**

- Marginal texture - Clay was found from 38 to 60 inches.

The 43.33-inch salvage depth was used in Addendum 3.3-B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Ulm series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

**Vonalee Sandy Loam<sup>1</sup> (Vo)**

The Vonalee series consists of very deep, well drained soils on upland ridges and hills, alluvial fans, fan remnants, and on high terrace positions. The series formed in alluvium or eolian deposits derived from sandstone at elevations ranging from 3,500 to 6,500 feet. Slopes range from 0 to 30 percent

The average annual precipitation ranges from 10 to 14 inches. The mean annual air temperature is approximately 44 to 49 degrees Fahrenheit, and the average frost-free season is approximately 105 to 130 days.

Permeability within the Vonalee soil is moderately rapid. The available water capacity is moderate. Effective rooting depth is 60 inches or more. The hazard of water erosion is slight and the hazard of wind erosion is moderate.

**Topsoil Suitability**

This map unit is a suitable source of topsoil to 36.0 inches based on an average of 2010 sample locations. According to WDEQ Guideline 1, no marginal or unsuitable parameters were found.

The 36.0-inch salvage depth was used in Addendum 3.3B Table 3.3B-4 Summary of Approximate Soil Salvage Depths to calculate topsoil salvage volumes for the Vonalee series.

*<sup>1</sup>Map unit description based on 1998 Southern Campbell County Soil Survey and NRCS Soil Data Mart information.*

**ADDENDUM 3.3-D**  
**SAMPLED SOIL SERIES DESCRIPTIONS**

**List of Soil Series Descriptions**

Bidman Series .....	3.3D-1
Bowmac Series.....	3.3D-3
Cambria Series .....	3.3D-5
Cushman Series.....	3.3D-7
Forkwood Series .....	3.3D-9
Haverdad Series .....	3.3D-11
Hiland Series.....	3.3D-13
Kishona Series .....	3.3D-15
Shingle Series.....	3.3D-16
Terro Series.....	3.3D-17
Theedle Series.....	3.3D-18
Tulloch Series .....	3.3D-20
Ulm Series.....	3.3D-21
Vonalee Series .....	3.3D-22

**BIDMAN SERIES**

**SOIL MAPPING UNIT:** Bi - Bidman loam

**SOIL SAMPLE LOCATION:** 68

**TYPICAL PEDON:** Bidman loam grassland

**TAXONOMIC CLASS:** Fine, smectitic, mesic Ustic Paleargids

**A--**0 to 4 inches; clay loam, non-effervescent, very slightly alkaline (pH 7.4)

**Bt1--**4 to 12 inches; clay loam, non-effervescent, very slightly alkaline (pH 7.5)

**Bt2--**12 to 22 inches; clay, slightly effervescent; slightly alkaline (pH 7.8)

**Btk--**22 to 42 inches; clay, strongly effervescent, slightly alkaline (pH 7.9)

**Bk--**42 to 54 inches; clay loam, strongly effervescent, slightly alkaline (pH 7.8)

**Ck--**54 to 60 inches, clay loam, violently effervescent, slightly alkaline (pH 7.7)

**TYPE LOCATION:** Campbell County, Wyoming; refer to waypoint 68 on map included in this report.

**RANGE IN CHARACTERISTICS (according to official series description):** Depth to calcareous material ranges from 8 to 26 inches. Depth to the base of the argillic horizon ranges from 15 to 36 inches. Organic carbon ranges from 0.6 to 1.5 percent in the surface horizons and decreases uniformly with increasing depth. Cation exchange capacity ranges from 60 to 90 milliequivalents per 100 grams of soil. Rock fragments are typically less than 2 percent but ranges from 0 to 15 percent. This soil is dry in the moisture control section more than half the time cumulative that the soil temperature at a depth of 20 inches is 41degrees F. It is never moist in some or all parts for as long as 60 consecutive days during this same period. It is dry in all parts of the moisture control section for at least 60 consecutive days from July 15 to October 25 and for at least 90 cumulative days during this period. The mean annual soil temperature is 47 to 53 degrees F., and the soil temperature at a depth of 20 inches is 41 degrees F. or warmer for 175 to 195 days. The mean summer soil temperature at a depth of 20 inches ranges from 59 to 65 degrees F.

**SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):** Marginal clay texture was found between 12 and 42 inches. Marginal selenium was found between 42 and 60 inches. Estimated stripping depth is 12 inches.

**GEOGRAPHIC SETTING (according to official series description):** The Bidman

soils are on alluvial fans, fan remnants, terraces, ridges and hills. Elevation is 2,600 to 6,000 feet. Slopes range from 0 to 25 percent. These soils formed in thick, calcareous alluvial sediments derived from sedimentary rock. At the type location the mean annual temperature is 47 degrees F., and the mean summer temperature is 66 degrees F. The average annual precipitation is about 12 inches with about half the precipitation in April, May, and June. Precipitation ranges from 10 to 14 inches. The frost-free seasons are 100 to 130 days.

**BOWBAC SERIES**

**SOIL MAPPING UNIT:** Bo - Bowbac fine sandy loam

**SOIL SAMPLE LOCATION:** 66

**TYPICAL PEDON:** Bowbac sandy loam on a northeast facing slope of one percent under native vegetation

**TAXONOMIC CLASS:** Fine- loamy, mixed, superactive, mesic Ustic Haplargids

**A--**0 to 2 inches; fine sandy loam, non-effervescent, slightly alkaline (pH 7.5)

**Bt1--**2 to 12 inches; loam, violently effervescent, slightly alkaline (pH 7.4)

**Bt2--**12 to 18 inches; silty loam, violently effervescent, very slightly alkaline (pH 7.2)

**Bk--**18 to 36 inches; fine sandy loam, strongly effervescent, moderately alkaline (pH 8.0)

**Cr --** 36 to 48 inches; soft sandstone, slightly effervescent.

**TYPE LOCATION:** Campbell County, Wyoming; refer to waypoint 66 on map included in this report.

**RANGE IN CHARACTERISTICS (according to official series description):** Depth to soft sandstone ranges from 20 to 40 inches. Depth to continuous carbonate accumulation ranges from 10 to 35 inches, and depth to the base of the argillic horizon ranges from 10 to 35 inches. Coarse fragments range from 0 to 15 percent and are soft sandstone channers or semi-rounded pebbles. The soil is dry in the moisture control section more than half the time cumulative that the soil temperature at a depth of 20 inches is 41 degrees F. and is never moist in some or all parts for as long as 60 consecutive days when the soil temperature at a depth of 20 inches is 41 degrees F., which occurs about April 21-27, but is dry in all parts of the moisture control section for at least 60 consecutive days from July 15 to October 25 and for at least 90 consecutive days during this period. The mean annual soil temperature is 47 to 53 degrees F., and the soil temperature at a depth of 20 inches is 41 degrees F. or more for 175 to 192 days. EC ranges from 0 to 2 mmhos throughout the profile.

**SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):** No unsuitable or marginal values were present. Estimated stripping depth is 2 inches.

**GEOGRAPHIC SETTING (according to official series description):** Bowbac soils are on alluvial fans, terraces, dissected fan remnants, fan piedmonts, hill-slopes, pediments, plateaus, ridges, and buttes. Slopes are 0 to 15 percent. Elevations are 3,500 to 6,500 feet. The average annual precipitation is 13 inches with over half of the annual

precipitation falling in April, May, and June and less than one inch falling in each month of July, August, September, and October. Precipitation ranges from 10 to 14 inches. The mean annual temperature ranges from 43 to 51 degrees F. The frost-free season is about 105 to 130 days.

**CAMBRIA SERIES**

**SOIL MAPPING UNIT:** Ca - Cambria Loam

**SOIL SAMPLE LOCATION:** 55

**TYPICAL PEDON:** Cambria loam on rangeland.

**TAXONOMIC CLASS:** Fine-loamy, mixed, superactive, mesic Ustic Haplargids

**A--**0 to 4 inches; loam, non-effervescent, moderately acidic (pH 5.9)

**Bt1--**4 to 12 inches; clay loam, non-effervescent, very slightly acidic (pH 6.8)

**Bt2--** 12 to 18 inches, sandy clay loam, non-effervescent, slightly alkaline (pH 7.5)

**Bk1--**18 to 38 inches, sandy clay loam, strongly effervescent, moderately alkaline (pH 8.1)

**Bk2--** 38 to 48 inches, clay loam, strongly effervescent, moderately alkaline (pH 8.2)

**Ck--** 48 to 60 inches, loam, violently effervescent, moderately alkaline (pH 8.1)

**TYPE LOCATION:** Campbell County, Wyoming; refer to waypoint 55 on map included in this report.

**RANGE IN CHARACTERISTICS (according to official series description):** Soil moisture: The soil is dry in the moisture control section more than half the time cumulative that the soil temperature at a depth of 20 inches is 41 degrees F., which occurs about April 21-27, and is dry in all parts of the moisture control section for at least 60 consecutive days from July 15 to October 25 and for at least 90 cumulative days during this period. The mean annual soil temperature is 48 to 52 degrees F., and the soil temperature at a depth of 20 inches is 41 degrees F. or more for 175 to 192 days. Depth to the base of the argillic horizon: 10 inches or less; Depth to secondary calcium carbonate: 3 to 10 inches but ranges to 15 inches in some pedons. Particle-size control section: It is loam, clay loam, silty clay loam or sandy clay loam. The part below the argillic horizon averages 18 to 35 percent clay, 10 to 50 percent silt, and 20 to 70 percent sand with more than 15 but less than 52 percent coarser than very fine sand.

**SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):** Marginal selenium concentrations were found from 32 to 60 inches. Estimated stripping depth is 14.7 inches.

**GEOGRAPHIC SETTING (according to official series description):** Parent material: alluvium and slope alluvium from mixed sources. Landform: fan remnants, fan

piedmonts, alluvial fans, hills, ridges and terraces. Slopes: 0 to 15 percent; Elevations: 3,500 to 6,500 feet; Average annual precipitation: 10 to 14 inches with over one-half of the annual precipitation falling in April, May, and June and less than one inch falling in each month of July, August, September, and October; Mean annual air temperature: 43 to 51 degrees F.; Frost-free season: 105 to 130 days

**CUSHMAN SERIES**

**SOIL MAPPING UNIT:** Cu - Cushman loam

**SOIL SAMPLE LOCATION:** 20

**TYPICAL PEDON:** Cushman loam under native grass vegetation

**TAXONOMIC CLASS:** Fine- loamy, mixed, superactive, mesic Ustic Haplargids

**A--**0 to 4 inches, loam, moderately effervescent, slightly alkaline (pH 7.5)

**Bt--**4 to 20 inches, loam, strongly effervescent, moderately alkaline (pH 8.0)

**Bk--**20 to 36 inches, sandy loam, violently effervescent, moderately alkaline (pH 8.1)

**Cr--**36 to 48 inches, soft gray shale, moderately effervescent.

**TYPE LOCATION:** Campbell County, Wyoming; refer to waypoint 20 on map included in this report.

**RANGE IN CHARACTERISTICS (according to official series description):** Depth to paralithic contact and bedrock is typically about 28 to 32 inches but ranges from 20 to 40 inches. Depth to continuous horizons of carbonate accumulation is 7 to 26 inches. Depth to the base of the argillic horizon ranges from 10 to 26 inches. Depth to the base of the argillic horizon ranges from 10 to 26 inches. Rock fragments range from 0 to 15 percent and are soft shale channers or semi-rounded sandstone pebbles. The soil is dry in the moisture control section more than half the time cumulative that the soil temperature at a depth of 20 inches is 41 degrees F., which occurs about April 21-27, and is dry in all parts of the moisture controls section for at least 60 consecutive days from July 15 to October 25 and for at least 90 cumulative days during this period. The mean annual soil temperature is 47 to 53 degrees F., and the soil temperature at a depth of 20 inches is 41 degrees F. or more for 175 to 192 days. EC ranges from 0 to 2 mmhos throughout.

**SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):** No unsuitable or marginal values were present. Estimated stripping depth is 10.3 inches.

**GEOGRAPHIC SETTING (according to official series description):** Cushman soils are on buttes, fan remnants, fan piedmonts, hills, and ridges. Slopes range from 0 to 20 percent. The soils formed in moderately fine textured slope-wash, alluvium, and residuum. Surface erosion is common in overgrazed areas, and some thin eolian deposits overlie these soils in some areas. Elevations are 3,500 to 6,000 feet. The mean annual precipitation is 13 inches and ranges from 10 to 14 inches with over half of the annual precipitation falling in April, May, and June and less than one inch falling in each month of July, August, September, and October. The mean annual temperature is 43 to 51

degrees F. The frost-free season is about 105 to 130 days depending upon elevation, aspect, and air drainage.

## **FORKWOOD SERIES**

**SOIL MAPPING UNIT:** F - Forkwood loam

**SOIL SAMPLE LOCATION:** 22

**TYPICAL PEDON:** Forkwood loam- utilized as rangeland.

**TAXONOMIC CLASS:** Fine- loamy, mixed, superactive, mesic Ustic Haplargids

**A--**0 to 4 inches; loam, non-effervescent; slightly alkaline (pH 7.9)

**Bt--**4 to 8 inches; clay loam, non-effervescent, slightly alkaline (pH 7.9)

**Btk--**8 to 28 inches; clay loam, strongly effervescent; moderately alkaline (pH 8.0)

**Bk--**28 to 40 inches; loam, violently effervescent; moderately alkaline (pH 8.3)

**BCK--**40 to 60 inches; loam, violently effervescent, moderately alkaline (pH 8.1)

**TYPE LOCATION:** Campbell County, Wyoming; refer to waypoint 22 on map included in this report.

**RANGE IN CHARACTERISTICS (according to official series description):** Depth to the base of the argillic horizon is 10 to 33 inches, and depth to continuous horizons of carbonate accumulation is 10 to 33 inches. Rock fragments range from 0 to 15 percent. The soil is dry in the moisture control section more than half the time cumulative that the soil temperature at a depth of 20 inches is 41 degrees F., which occurs about April 21-27, and is dry in all parts of the moisture control section for at least 60 consecutive days from July 15 to October 25 and for at least 90 cumulative days during this period. The mean annual soil temperature ranges from 47 to 53 degrees F., and the soil temperature at a depth of 20 inches is 41 degrees F. or more for 175 to 192 days. EC ranges from 0 to 4 mmhos/cm throughout the profile. Bedrock is deeper than 60 inches.

**SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):** No unsuitable or marginal values were present. Estimated stripping depth is 21.3 inches.

**GEOGRAPHIC SETTING (according to official series description):** Forkwood soils are on terraces, alluvial fans, fan remnants, hills, ridges, ridges, and pediments. Slopes are 0 to 15 percent. The soils formed in slope-wash alluvium derived from inter-bedded shale and argillaceous sandstone. Elevations are 3,500 to 6,000 feet. The average annual precipitation is 10 to 14 inches with over half the annual precipitation falling in April, May, and June and less than one inch falling in each month of July, August, September, and October. The mean annual air temperature ranges from 43 to 51 degrees F. The estimated frost-free season is about 105 to 130 days depending upon elevation, aspect,

and air drainage.

## **HAVERDAD SERIES**

**SOIL MAPPING UNIT:** Ha - Haverdad loam

**SOIL SAMPLE LOCATION:** N/A

**TYPICAL PEDON:** Haverada Loam - utilized as rangeland

**TAXONOMIC CLASS:** Fine-loamy, mized, superactive, calcareous, mesic Ustic Torrifuvents

**A--0 to 5 inches;** clay loam, non effervescent, very slightly alkaline (pH 7.2)

**AC--5 to 18 inches;** clay loam, slightly effervescent, slightly alkaline (pH 7.7)

**C1--18 to 28 inches;** loam; strongly effervescent, very slightly alkaline (pH 7.8)

**C2--28 to 60 inches;** loam, strongly effervescent, moderately alkaline (pH 8.0)

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

**RANGE IN CHARACTERISTICS (according to official series description):** Soil moisture: The soil is dry in the moisture control section more than half the time cumulative that the soil temperature at a depth of 20 inches is 41 degrees F. or more. This soil is moist for 60 consecutive days when the soil temperature at 20 inches is 41 degrees F., which occurs about April 21-27, but is dry in all parts of the moisture control section for at least 60 consecutive days from July 15 to October 25 and for at least 90 cumulative days during this period. Mean annual soil temperature: 48 to 53 degrees F. and the soil temperature at a depth of 20 inches is 41 degrees F. or more for 175 to 195 days. Organic carbon content: .5 to 1.0 percent and decreases irregularly with depth; Rock fragments: 0 to 15 percent gravel; EC (mmhos/cm): 0 to 8 mmhos throughout but where irrigated some soils may range up to 16 mmhos; Calcium sulfate occurs in some pedons. The soil is typically calcareous to the surface, but some pedons are leached as deep as 20 inches.

**SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):** No unsuitable or marginal values were observed. Estimated stripping depth is 18.0 inches.

**GEOGRAPHIC SETTING (according to official series description):** Parent material: alluvium from mixed sources; Landform: floodplains and low terraces; Elevations: 3,500 to 6,500 feet; Slopes: 0 to 6 percent; Mean annual precipitation: about 11 inches, ranging 10 to 17, with over half of annual precipitation falling in April, May, and June; Mean annual temperature: about 45 degrees F. and ranges from 43 to 52 degrees F.; Frost-free period: 105 to 130 days. Variation from typical series: AC Horizon observed. Increase in Carbonate reaction with depth.

<sup>1</sup>Soil series description based on 1998 Southern Campbell County Soil Survey and field observations.

## **HILAND SERIES**

**SOIL MAPPING UNIT:** Hi - Hiland fine sandy loam

**SOIL SAMPLE LOCATION:** 36

**TYPICAL PEDON:** Hiland fine sandy loam on flat area utilized as rangeland

**TAXONOMIC CLASS:** Fine- loamy, mixed, superactive, mesic Ustic Haplargids

**A--**0 to 4 inches; fine sandy loam, non-effervescent, slightly acidic (pH 6.6)

**Bt1--**4 to 8 inches; clay loam, non-effervescent, slightly acidic (pH 6.7)

**Bt2--**8 to 16 inches; clay loam; non effervescent, very slightly alkaline (pH 7.3)

**Bt3--**16 to 42 inches; clay loam, strongly effervescent, moderately alkaline (pH 8.1)

**Bk--**42 to 60 inches; sandy loam, violently effervescent, moderately alkaline (pH 8.1)

**TYPE LOCATION:** Campbell County, Wyoming; refer to waypoint 36 on map included in this report.

**RANGE IN CHARACTERISTICS (according to official series description):** Gravel ranges from 0 to 15 percent in the solum and from 0 to 30 percent in the 2C or Bk horizons. The base of the Bt or Btk ranges from 15 to 35 inches. Depth to continuous carbonate accumulation ranges from 14 to 32 inches. The soil is dry in the moisture control section more than half the time cumulative that the soil temperature at a depth of 20 inches is 41 degrees F. and is never moist in all parts for as long as 60 consecutive days from July 15 to October 25 and for at least 90 cumulative days during this period. The mean annual soil temperature is 47 to 52 degrees F., and the soil temperature at a depth of 20 inches is 41 degrees F. or more for 175 to 192 days. EC ranges from 0 to 2 mmhos from the surface to the base of the Bt and from 1 to 4 mmhos below the base of the Bt. Bedrock is deeper than 60 inches.

**SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):** No unsuitable or marginal values were present. Estimated stripping depth is 22.7 inches.

**GEOGRAPHIC SETTING (according to official series description):** Hiland soils are on relict surfaces consisting of terraces, fan remnants, pediments, fans, ridges, hills and stabilized dunes. Slopes are 0 to 20 percent. They formed in moderately coarse alluvium and eolian material derived predominantly from sandstone. Elevations are 3,500 to 6,300 feet. The average annual precipitation is about 12 inches with over half of the annual precipitation falling in April, May, and June and less than one inch falling in each month of July, August, September, and October. Precipitation ranges from 10 to 14 inches. The

mean annual air temperature is 43 to 51 degrees F. The frost-free season is 105 to 130 days.

**KISHONA SERIES**

**SOIL MAPPING UNIT:** Ki - Kishona fine sandy loam

**SOIL SAMPLE LOCATION:** 15

**TYPICAL PEDON:** Kishona clay loam in rangeland

**TAXONOMIC CLASS:** Fine loamy, mixed, superactive, calcareous, mesic Ustic Torriorthents

**A--**0 to 5 inches; loam, non-effervescent, slightly alkaline (pH 7.2)

**Bk--**5 to 26 inches; sandy clay loam, non-effervescent, slightly alkaline (pH 7.7)

**C1--**26 to 40 inches; clay loam, strongly effervescent, moderately alkaline (pH 8.2)

**C2--**40 to 60 inches; clay loam, strongly effervescent, moderately alkaline (pH 8.5)

**TYPE LOCATION:** Campbell County, Wyoming; refer to waypoint 15 on map included in this report.

**RANGE IN CHARACTERISTICS (according to official series description):** Rock fragments ranges from 0 to 15 percent. The mean annual soil temperature ranges from 48 to 53 degrees F., and the soil temperature at a depth of 20 inches is 41 degrees F. or more for 190 to 202 days. The depth to carbonates ranges from 0 to 10 inches. Saline phases are recognized. The soil is dry in the moisture control section more than half the time cumulative that the soil temperature at a depth of 20 inches is 41 degrees F. and is never moist in some or all parts for as long as 90 consecutive days when the soil temperature at a depth of 20 inches is 48 degrees F. or more. The soil is moist for 60 consecutive days when the soil temperature at a depth of 20 inches is 41 degrees F., which occurs April 21-27, but is dry in all parts of the moisture control section for at least 60 consecutive days from July 15<sup>th</sup> to October 25 and for at least 90 days during that period.

**SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):** No unsuitable or marginal values were present. Estimated stripping depth is 11.3 inches.

**GEOGRAPHIC SETTING (according to official series description):** Kishona soils are on dissected alluvial fans, fan remnants, fan aprons, hills, ridges, and terraces. Slopes are typically 0 to 6 percent but range up to 30 percent on dissected slopes. The soils formed in alluvium derived from sandstones and shale. Elevation is 3,500 to 6,700 feet. The average annual precipitation ranges from 10 to 14 inches with over one half falling in April, May, and June and less than one inch falling in each month of July, August, September, and October. The mean annual air temperature is about 45 degrees F. but ranges from 43 to 51 degrees F. The frost-free season is about 105-130 days.

## **SHINGLE SERIES**

**SOIL MAPPING UNIT:** Sh - Shingle loam

**SOIL SAMPLE LOCATION:** 10

**TYPICAL PEDON:** Shingle clay loam on a toe slope of 6 percent in rangeland

**TAXONOMIC CLASS:** Loamy, mixed, superactive, calcareous, mesic, shallow Ustic Torriorthents

**A--**0 to 5 inches; sandy clay loam, non-effervescent, very slightly alkaline (pH 7.1)

**Bw--**5 to 13 inches; sandy clay loam, non-effervescent, slightly alkaline (pH 7.4)

**Cr --** 13 to 36 inches; soft white sandstone, violently effervescent.

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

**RANGE IN CHARACTERISTICS (according to official series description):** Depth to soft bedrock and paralithic contact ranges from 4 to 20 inches. The mean annual soil temperature is 47 to 53 degrees F. The soils commonly are calcareous throughout, but some pedons are leached to 6 inches. The particle size control section averages 20 to 35 percent clay and has more than 15 percent but less than 35 percent fine or coarser sand. The soil is usually dry. The moisture control section is usually moist in April, May, and early June. It is dry for 60 consecutive days or more during the 90 day period following the summer solstice. EC is 0 to 2 mmhos throughout.

### **SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):**

No unsuitable or marginal values were present. Estimated stripping depth is 6.7 inches.

**GEOGRAPHIC SETTING (according to official series description):** The Shingle soils occur on all hill slope positions. Slopes are 0 to 80 percent. These soils formed in colluviums and residuum weathered from soft, inter-bedded sandstone and shale or in alluvium from mudstone. Elevation is 3,200 to 6,500 feet. The mean annual precipitation is about 10 to 14 inches, most of which falls in April, May, and June. The mean annual temperature is about 45 degrees F. but ranges from 43 to 51 degrees F. The frost-free season is about 105 to 130 days.

## **TERRO SERIES**

**SOIL MAPPING UNIT:** Te - Terro sandy loam

**SOIL SAMPLE LOCATION:** 45

**TYPICAL PEDON:** Terro sandy loam--on west facing slope of 10 percent-rangeland

**TAXONOMIC CLASS:** Coarse-loamy, mixed, superactive, mesic Ustic Haplargids

**A--**0 to 2 inches; sandy loam, non-effervescent, slightly alkaline (pH 7.4)

**Bt--**2 to 12 inches; sandy loam, moderately effervescent, slightly alkaline (pH 7.6)

**Bk1--**12 to 26 inches; sandy loam, violently effervescent, slightly alkaline (pH 7.6)

**Ck--**26 to 40 inches; sandy loam, strongly effervescent, slightly alkaline (pH 7.4)

**TYPE LOCATION:** Campbell County, Wyoming; refer to waypoint 45 on map included in this report.

**RANGE IN CHARACTERISTICS (according to official series description):** Depth to horizons of continuous calcium carbonate accumulation ranges from 15 to 22 inches. Depth to the base of the argillic horizon is 10 to 22 inches. Depth to bedrock ranges from 20 to 40 inches. Rock fragments as channers range from 0 to 10 percent. The soil is dry in the moisture control section more than half the time cumulative that the soil temperature at a depth of 20 inches is 41 degrees F., which occurs about April 21-27, and is dry in all parts of the moisture control section for at least 60 consecutive days from July 15 to October 25 and for at least 90 cumulative days during this period. The mean annual soil temperature is 48 to 51 degrees F., and the soil temperature at a depth of 20 inches is 41 degrees F. or more for 175 to 192 days.

### **SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):**

No unsuitable or marginal values were present. Estimated stripping depth is 14.0 inches.

**GEOGRAPHIC SETTING (according to official series description):** The Terro soils are on nearly level to steeply sloping hills, ridges, fan remnants, terraces and plateaus. Slopes range from 0 to 30 percent. The soils formed in residuum, alluvium and colluvium. Elevation is 3600 to 6,500 feet. The average annual precipitation is 10 to 14 inches, and the average annual temperature is 47 to 51 degrees F. The frost-free season is 105 to 130 days.

**THEEDLE SERIES**

**SOIL MAPPING UNIT:** Th - Theedle loam

**SOIL SAMPLE LOCATION:** 33

**TYPICAL PEDON:** Theedle clay loam on west facing hill foot-slope of 6 percent rangeland

**TAXONOMIC CLASS:** Fine- loamy, mixed, superactive, calcareous, mesic Ustic Torriorthents

A--0 to 4 inches; clay loam, non-effervescent, slightly alkaline (pH 7.5)

Bck--4 to 10 inches; clay loam, strongly effervescent, slightly alkaline (pH 7.9)

C-- 10 to 24 inches, silty loam, violently effervescent, slightly alkaline (pH 7.9)

**TYPE LOCATION:** Campbell County, Wyoming; refer to waypoint 33 on map included in this report.

**RANGE IN CHARACTERISTICS (according to official series description):** Depth to soft, gray, calcareous sandstone or sandy shale ranges from 20 to 40 inches but is typically less than 32 inches. The soil lacks a cambic horizon, but structural Bw horizons are present in about half the pedons observed. The soil is typically calcareous throughout but may be leached up to 5 inches. The soil is dry in the moisture control section more than half the time cumulative that the soil temperature at a depth of 20 inches is 41 degrees F. and is dry in all parts for the moisture control section for at least 60 consecutive days from July 15 to October 25 and for at least 90 cumulative days during this period. The mean annual soil temperature is 47 to 51 degrees F., and the soil temperature at a depth of 20 inches is 41 degrees F. or more for 175 to 192 days. The particle size control section averages between 18 and 35 percent clay and is loam, clay loam, or sandy clay loam with more than 15 but less than 35 percent fine or coarser sands. The soil has up to 10 percent rock fragments throughout.

**SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):**

No unsuitable or marginal values were present. Estimated stripping depth is 16.7 inches.

**GEOGRAPHIC SETTING (according to official series description):** Theedle soils are on rock-controlled fan aprons, fan pediments, and undulating to rolling uplands. They may occupy all components of the hill slope profile, but are typically on the lower shoulder, foot slope, and toe slope. Slopes range from 0 to 75 percent. The soils formed in medium textured slope alluvium and residuum derived primarily from inter-bedded sandstone and shale. Elevation is 3,500 to 6,500 feet. The average annual precipitation is

12 inches with over half of the annual precipitation falling in April, May, and June and less than one inch falling in each month of July, August, September, and October. Precipitation ranges from 10 to 14 inches. The mean annual air temperature ranges from 45 to 51 degrees F. The frost-free season is 105 to 130 days.

## **TULLOCK SERIES**

**SOIL MAPPING UNIT:** Tu - Tullock loam sand

**SOIL SAMPLE LOCATION:** 56

**TYPICAL PEDON:** Tullock loamy sand in rangeland

**TAXONOMIC CLASS:** Mixed, mesic Ustic Torripsamments

**A--**0 to 4 inches; sandy loam, non-effervescent, very slightly acidic (pH 6.7)

**Bw--**4 to 12 inches; sandy loam, non-effervescent, very slightly alkaline (pH 7.2)

**C1--** 12 to 18 inches, sandy loam, non-effervescent, slightly alkaline (pH 7.5)

**C2--** 18 to 30 inches, loamy sand, non-effervescent, slightly alkaline (pH 7.7)

**TYPE LOCATION:** Campbell County, Wyoming; refer to waypoint 56 on map included in this report.

**RANGE IN CHARACTERISTICS (according to official series description):** These soils typically effervesce throughout but some in some pedons the A horizon is leached. Depth to paralithic contact is 20 to 40 inches. The soil has 0 to 15 percent rock fragments. These soils are usually dry in the moisture control section for 60 consecutive days and 90 cumulative days between July 15 and October 25. The soil temperature at a depth of 20 inches is 41 degrees F. or warmer for 175 to 192 days. The mean annual soil temperature is 47 to 53 degrees F.

### **SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):**

No unsuitable or marginal values were present. Estimated stripping depth is 18 inches.

**GEOGRAPHIC SETTING (according to official series description):** Tullock soils are on dunes and foot-slopes and toe-slopes of hills and ridges. They formed in eolian deposits and residuum derived from sandstone. Slopes are 0 to 45 percent. Elevation is 3500 to 6,000 feet. Mean annual soil temperature is 47 to 53 degrees F. Mean annual precipitation is 10 to 14 inches. The frost-free period is 105 to 130 days.

## **ULM SERIES**

**SOIL MAPPING UNIT:** U - Ulm clay loam

**SOIL SAMPLE LOCATION:** 32

**TYPICAL PEDON:** Ulm clay loam rangeland

**TAXONOMIC CLASS:** Fine, smectitic, mesic Ustic Haplargids

**A--**0 to 4 inches, clay loam, non-effervescent, moderately acidic (pH 5.8)

**Bt1--**4 to 12 inches, clay loam, non-effervescent, slightly acidic (pH 6.4)

**Bt2--**12 to 30 inches, clay loam, non-effervescent, slightly alkaline (pH 7.5)

**Btk1--**30 to 38 inches; clay loam, slightly effervescent, slightly alkaline (pH 7.8)

**Btk2--**38 to 60 inches; clay, moderately effervescent, moderately alkaline (pH 7.9)

**TYPE LOCATION:** Campbell County, Wyoming; refer to waypoint 32 on map included in this report.

**RANGE IN CHARACTERISTICS (according to official series description):** Depth to calcareous material ranges from 12 to 33 inches. Rock fragments range from 0 to 15 percent channers. The soil is dry in the moisture control section more than half the time cumulative that the soil temperature at a depth of 20 inches is 41 degrees F., which occurs about April 21-27, and is dry in all parts of the moisture control section for at least 60 consecutive days from July 15<sup>th</sup> to October 25 and for at least 90 cumulative days during this period. The mean annual soil temperature is 47 to 53 degrees F., and the soil temperature at a depth of 20 inches is 41 degrees F. or more for 175 to 192 days.

### **SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):**

Marginal texture of clay was present from 38 to 60 inches. Estimated stripping depth is 43.3 inches.

**GEOGRAPHIC SETTING (according to official series description):** Ulm soils are on relict alluvial terraces, alluvial fans, fan remnants, plateaus, and foot-slopes and toe-slopes of hills. Slopes are 0 to 18 percent. The soils formed in fine and medium textured alluvium derived from inter-bedded shale and argillaceous sandstone. Elevations are 3,500 to 6,500 feet. The mean annual precipitation is 10 to 14 inches with over half of the annual precipitation falling in April, May, and June and less than one inch falling in each month of July, August, September, and October. The mean annual air temperature ranges from 46 to 51 degrees F. The frost-free season is 105 to 130 days.

**VONALEE SERIES**

**SOIL MAPPING UNIT:** Vo - Vonalee fine sandy loam

**SOIL SAMPLE LOCATION:** 48

**TYPICAL PEDON:** Vonalee fine silty clay loam on north facing hill slope of 6 percent utilized as rangeland

**TAXONOMIC CLASS:** Coarse- loamy, mixed, superactive, mesic Ustic Haplargids

**A--**0 to 4 inches; sandy loam, non-effervescent, very slightly acidic (pH 6.7)

**Bt1--**4 to 12 inches; sandy loam, non-effervescent, neutral (pH 7.0)

**Bt2--**12 to 36 inches; sandy clay loam, non-effervescent, slightly alkaline (pH 7.6)

**Bk1--**36 to 48 inches; sandy clay loam, strongly effervescent, slightly alkaline (pH 7.7)

**Bk2--**48 to 60 inches; sandy clay loam, strongly effervescent, slightly alkaline (pH 7.9)

**TYPE LOCATION:** Campbell County, Wyoming; refer to waypoint 48 on map included in this report.

**RANGE IN CHARACTERISTICS (according to official series description):** Rock fragments are typically less than 5 percent but may range to 15 percent. Depth to continuous carbonate accumulations range from 11 to 40 inches, but the soils are typically calcareous above 30 inches. Depth to bedrock is greater than 60 inches. The soil is dry in the moisture control section more than half the time cumulative that the soil temperature at a depth of 20 inches is 41 degrees F. It is dry in all parts of the moisture control section for at least 60 consecutive days from July 15 to October 25 and for at least 90 cumulative days during this period. The average annual soil temperature is 47 to 51 degrees F., and the soil temperature at a depth of 20 inches is 41 degrees F., or more for 175 to 192 days.

**SUITABILITY FOR TOPSOIL (according to WDEQ Guideline 1, 1994):**

No unsuitable or marginal values were present. Estimated stripping depth is 36 inches.

**GEOGRAPHIC SETTING (according to official series description):** Vonalee soils are on ridges, hills, alluvial fans, fan remnants, and high terraces. Slopes are 0 to 30 percent. The soils formed in coarse and moderately coarse alluvium or eolian deposits derived largely from calcareous sandstone. Elevations are 3,500 to 6,500 feet. Precipitation ranges from 10 to 14 inches with over half of the annual precipitation falling in April, May and June and less than one inch falling in each month of July, August,

September, and October. The average annual air temperature ranges from 44 to 49 degrees F. The frost-free season is about 105 to 130 days.

**ADDENDUM 3.3-E**  
**LABORATORY RESULTS**



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**Soil Analysis Report**

**AUC LLC**

1536 Cole Blvd  
Suite 330  
Lakewood, CO 80401

Report ID: S1012396001

Project: Reno Creek Baseline Soils  
Date Received: 12/23/2010

Date Reported: 1/28/2011  
Work Order: S1012396

Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical	Organic Matter	PE	PE	PE	SAR
					Conductivity dS/m	LOI %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	
S1012396-001	#4	0-6	7.2	58.6	0.70	4.3	4.94	1.41	0.13	0.08
S1012396-002	#4	6-13	7.7	54.1	0.51	2.9	3.29	1.19	0.27	0.18
S1012396-003	#4	13-30	7.9	48.8	0.41	1.9	1.84	1.35	0.35	0.28
S1012396-004	#4	30-40	8.4	47.7	0.44	1.8	1.27	2.08	0.49	0.38
S1012396-005	#4	40-48	8.2	46.5	0.60	1.7	0.98	2.15	1.88	1.50
S1012396-006	#4	48-60	8.2	48.8	0.70	1.7	1.08	1.64	3.03	2.59
S1012396-007	#5	0-5	7.1	58.5	0.50	3.7	3.25	1.00	0.11	0.08
S1012396-008	#5	5-19	7.4	42.3	0.41	2.4	2.82	0.81	0.16	0.12
S1012396-009	#5	19-34	7.7	41.2	0.40	1.9	2.49	0.82	0.14	0.11
S1012396-010	#5	34-48	7.9	47.7	0.43	2.0	2.71	1.11	0.19	0.14
S1012396-011	#5	48-60	7.9	42.4	0.60	1.7	4.33	2.01	0.30	0.17
S1012396-012	#6	0-6	6.7	45.9	0.50	3.2	2.57	1.24	0.12	0.09
S1012396-013	#6	6-12	6.8	44.0	0.30	2.4	1.32	0.67	0.16	0.16
S1012396-014	#6	12-24	7.1	38.8	0.41	1.7	1.89	1.21	0.21	0.17
S1012396-015	#7	0-4	6.1	35.5	0.30	2.7	1.26	0.56	0.08	0.08
S1012396-016	#7	4-18	6.4	32.1	0.20	1.5	0.77	0.41	0.12	0.16
S1012396-017	#7	18-36	7.0	27.3	0.22	1.2	1.15	0.40	0.16	0.19
S1012396-018	#8	0-5	7.2	66.8	0.84	5.9	5.41	1.65	0.17	0.09
S1012396-019	#8	5-18	7.7	49.1	0.70	2.8	4.02	1.12	0.43	0.27
S1012396-020	#8	18-28	7.8	47.4	0.60	2.5	3.75	1.03	0.60	0.39

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



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**AUC LLC**

1536 Cole Blvd  
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Report ID: S1012396001

Project: Reno Creek Baseline Soils  
Date Received: 12/23/2010

Date Reported: 1/28/2011  
Work Order: S1012396

Lab ID	Sample ID	Depths Inches	Sand	Silt	Clay	Texture	Coarse	Available	Available	
			%	%	%		Fragment	Selenium	Boron	
			%	%	%					
						%	ppm	ppm		
S1012396-001	#4	0-6	26.0	44.0	30.0	Clay Loam	0.69	<0.02	0.38	
S1012396-002	#4	6-13	26.0	44.0	30.0	Clay Loam	2.87	<0.02	0.29	
S1012396-003	#4	13-30	30.0	41.0	29.0	Clay Loam	6.26	<0.02	0.23	
S1012396-004	#4	30-40	29.0	43.0	28.0	Clay Loam	10.0	<0.02	0.30	
S1012396-005	#4	40-48	26.0	46.0	28.0	Clay Loam	1.52	<0.02	0.30	
S1012396-006	#4	48-60	24.0	48.0	28.0	Clay Loam	2.04	<0.02	0.32	
S1012396-007	#5	0-5	64.0	22.0	14.0	Sandy Loam	1.05	<0.02	0.34	
S1012396-008	#5	5-19	60.0	24.0	16.0	Sandy Loam	0.11	<0.02	0.36	
S1012396-009	#5	19-34	64.0	19.0	17.0	Sandy Loam	0.23	<0.02	0.20	
S1012396-010	#5	34-48	56.0	23.0	21.0	Sandy Clay Loam	0.16	<0.02	0.18	
S1012396-011	#5	48-60	62.0	18.0	20.0	Sandy Clay Loam	0.26	<0.02	0.27	
S1012396-012	#6	0-6	59.0	22.0	19.0	Sandy Loam	1.64	<0.02	0.32	
S1012396-013	#6	6-12	58.0	19.0	23.0	Sandy Clay Loam	0.06	<0.02	0.28	
S1012396-014	#6	12-24	68.0	15.0	17.0	Sandy Loam	0.20	<0.02	0.22	
S1012396-015	#7	0-4	71.0	14.0	15.0	Sandy Loam	3.25	<0.02	0.14	
S1012396-016	#7	4-18	70.0	12.0	18.0	Sandy Loam	0.59	<0.02	0.14	
S1012396-017	#7	18-36	72.0	12.0	16.0	Sandy Loam	0.50	<0.02	0.14	
S1012396-018	#8	0-5	30.0	39.0	31.0	Clay Loam	0.82	<0.02	0.28	
S1012396-019	#8	5-18	38.0	34.0	28.0	Clay Loam	0.13	<0.02	0.19	
S1012396-020	#8	18-28	42.0	33.0	25.0	Loam	1.08	<0.02	0.26	

These results apply only to the samples tested.

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



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 Lakewood, CO 80401

Report ID: S1012396001

Project: Reno Creek Baseline Soils

Date Received: 12/23/2010

Date Reported: 1/28/2011

Work Order: S1012396

Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical	Organic Matter	PE	PE	PE	SAR
					Conductivity dS/m	LOI %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	
S1012396-021	#8	28-40	7.8	43.3	0.42	1.9	2.81	0.71	0.48	0.36
S1012396-022	#8	40-54	7.9	40.8	0.73	1.4	4.61	1.64	0.37	0.21
S1012396-023	#8	54-60	8.0	41.6	0.53	1.3	3.11	1.32	0.29	0.19
S1012396-024	#9	0-3	6.9	46.8	0.61	3.7	2.37	2.41	0.80	0.52
S1012396-025	#9	3-14	7.8	61.6	0.60	3.2	1.16	1.57	2.25	1.93
S1012396-026	#9	14-24	8.4	62.9	1.22	2.5	1.35	2.71	6.24	4.37
S1012396-027	#9	24-34	8.1	55.7	1.30	2.5	1.73	5.62	6.72	3.51
S1012396-028	#10	0-5	7.1	43.0	0.70	3.2	4.74	1.43	0.19	0.11
S1012396-029	#10	5-13	7.4	44.7	0.50	2.6	3.13	0.93	0.38	0.27
S1012396-030	#15	0-5	7.2	43.3	0.50	2.5	2.48	1.41	0.15	0.11
S1012396-031	#15	5-16	7.1	46.6	0.30	2.1	1.47	0.86	0.15	0.14
S1012396-032	#15	16-26	7.7	44.5	0.50	1.8	2.32	1.77	0.21	0.15
S1012396-033	#15	26-40	8.2	46.9	0.50	1.8	1.46	1.79	0.69	0.54
S1012396-034	#15	40-60	8.5	53.9	0.90	1.8	1.39	3.10	3.90	2.60
S1012396-035	#17	0-4	7.6	56.3	0.90	4.4	6.22	1.82	0.14	0.07
S1012396-036	#17	4-8	7.7	55.6	0.50	3.2	2.85	1.23	0.19	0.13
S1012396-037	#19	0-6	6.2	60.6	0.40	5.6	1.65	0.68	0.10	0.10
S1012396-038	#19	6-18	6.2	48.7	0.20	2.5	0.73	0.33	0.12	0.17
S1012396-039	#19	18-36	6.2	42.4	0.20	1.9	0.70	0.39	0.23	0.32
S1012396-040	#19	36-44	6.5	61.5	0.14	2.0	0.55	0.29	0.13	0.20

These results apply only to the samples tested.

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Report ID: S1012396001

Project: Reno Creek Baseline Soils  
Date Received: 12/23/2010

Date Reported: 1/28/2011  
Work Order: S1012396

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse	Available	Available
							Fragment %	Selenium ppm	Boron ppm
S1012396-021	#8	28-40	46.0	31.0	23.0	Loam	0.98	<0.02	0.24
S1012396-022	#8	40-54	45.0	31.0	24.0	Loam	0.13	<0.02	0.16
S1012396-023	#8	54-60	43.0	32.0	25.0	Loam	0.03	<0.02	0.18
S1012396-024	#9	0-3	34.0	37.0	29.0	Clay Loam	0.49	<0.02	0.33
S1012396-025	#9	3-14	22.0	31.0	47.0	Clay	0.20	<0.02	0.38
S1012396-026	#9	14-24	24.0	29.0	47.0	Clay	0.06	<0.02	0.73
S1012396-027	#9	24-34	22.0	29.0	49.0	Clay	1.16	0.07	0.80
S1012396-028	#10	0-5	60.0	20.0	20.0	Sandy Clay Loam	2.43	<0.02	0.31
S1012396-029	#10	5-13	55.0	19.0	26.0	Sandy Clay Loam	0.78	<0.02	0.35
S1012396-030	#15	0-5	49.0	30.0	21.0	Loam	1.86	<0.02	0.22
S1012396-031	#15	5-16	48.0	26.0	26.0	Sandy Clay Loam	0.04	<0.02	0.17
S1012396-032	#15	16-26	40.0	36.0	24.0	Loam	0.22	<0.02	0.18
S1012396-033	#15	26-40	36.0	36.0	28.0	Clay Loam	0.47	<0.02	0.28
S1012396-034	#15	40-60	28.0	40.0	32.0	Clay Loam	0.06	<0.02	0.44
S1012396-035	#17	0-4	25.0	42.0	33.0	Clay Loam	3.16	<0.02	0.24
S1012396-036	#17	4-8	17.0	49.0	34.0	Silty Clay Loam	3.83	<0.02	0.23
S1012396-037	#19	0-6	24.0	45.0	31.0	Clay Loam	0.38	<0.02	0.44
S1012396-038	#19	6-18	36.0	34.0	30.0	Clay Loam	0.24	<0.02	0.25
S1012396-039	#19	18-36	38.0	33.0	29.0	Clay Loam	0.05	<0.02	0.25
S1012396-040	#19	36-44	34.0	31.0	35.0	Clay Loam	0.02	<0.02	0.19

These results apply only to the samples tested.

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Karen Secor, Soil Lab Supervisor



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Report ID: S1012396001

Project: Reno Creek Baseline Soils  
 Date Received: 12/23/2010

Date Reported: 1/28/2011  
 Work Order: S1012396

Lab ID	Sample ID	Depths Inches	pH	Saturation	Electrical	Organic Matter	PE	PE	PE	SAR
			s.u.	%	Conductivity dS/m	LOI %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	
S1012396-041	#19	44-60	6.8	38.0	0.23	1.5	0.92	0.44	0.16	0.19
S1012396-042	#20	0-4	7.5	49.1	0.70	3.7	4.67	0.95	0.10	0.06
S1012396-043	#20	4-20	8.0	47.7	0.34	1.7	2.42	1.26	0.18	0.14
S1012396-044	#20	20-36	8.1	43.7	1.80	1.3	6.77	19.4	3.17	0.88
S1012396-045	#22	0-4	7.9	50.5	0.46	3.4	2.94	0.88	0.14	0.10
S1012396-046	#22	4-8	7.9	49.4	0.38	3.1	2.65	0.96	0.13	0.09
S1012396-047	#22	8-28	8.0	50.2	0.33	1.8	1.84	1.57	0.30	0.23
S1012396-048	#22	28-40	8.3	39.5	0.40	1.3	1.22	1.85	1.18	0.95
S1012396-049	#22	40-60	8.1	41.7	0.90	1.1	3.19	4.36	2.77	1.43
S1012396-050	#25	0-5	7.2	49.5	0.38	3.3	2.45	1.12	0.14	0.10
S1012396-051	#25	5-10	7.6	49.8	0.43	2.4	2.72	1.47	0.23	0.16
S1012396-052	#25	10-24	8.0	53.6	0.40	1.6	1.74	1.72	0.67	0.51
S1012396-053	#28	0-4	7.2	55.6	0.47	4.3	3.38	1.40	0.13	0.09
S1012396-054	#28	4-8	7.7	55.5	0.40	3.2	2.67	1.10	0.15	0.11
S1012396-055	#28	8-28	7.9	57.2	0.35	2.5	1.92	1.40	0.45	0.35
S1012396-056	#28	28-42	7.9	55.5	1.03	1.8	4.23	4.46	3.25	1.56
S1012396-057	#28	42-60	7.6	57.8	2.50	1.7	26.2	20.4	5.49	1.14
S1012396-058	#32	0-4	5.8	64.2	0.42	5.6	2.18	0.88	0.15	0.12
S1012396-059	#32	4-12	6.4	56.6	0.22	2.7	1.27	0.54	0.18	0.19
S1012396-060	#32	12-30	7.5	57.8	0.37	2.2	2.36	0.94	0.21	0.16

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 Karen Secor, Soil Lab Supervisor



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Report ID: S1012396001

Project: Reno Creek Baseline Soils  
Date Received: 12/23/2010

Date Reported: 1/28/2011  
Work Order: S1012396

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse Fragment %	Available Selenium ppm	Available Boron ppm
S1012396-041	#19	44-60	48.0	26.0	26.0	Sandy Clay Loam	0.42	<0.02	0.17
S1012396-042	#20	0-4	43.0	32.0	25.0	Loam	1.43	<0.02	0.65
S1012396-043	#20	4-20	38.0	36.0	26.0	Loam	0.51	<0.02	0.20
S1012396-044	#20	20-36	57.0	25.0	18.0	Sandy Loam	1.44	0.05	0.16
S1012396-045	#22	0-4	41.0	35.0	24.0	Loam	0.97	<0.02	0.24
S1012396-046	#22	4-8	34.0	36.0	30.0	Clay Loam	0.40	<0.02	0.41
S1012396-047	#22	8-28	25.0	44.0	31.0	Clay Loam	0.36	<0.02	0.22
S1012396-048	#22	28-40	42.0	35.0	23.0	Loam	2.31	<0.02	0.21
S1012396-049	#22	40-60	48.0	36.0	16.0	Loam	2.82	<0.02	0.38
S1012396-050	#25	0-5	42.0	29.0	29.0	Clay Loam	1.12	<0.02	0.39
S1012396-051	#25	5-10	32.0	44.0	24.0	Loam	0.13	<0.02	0.30
S1012396-052	#25	10-24	17.0	56.0	27.0	Silty Clay Loam	0.07	<0.02	0.34
S1012396-053	#28	0-4	26.0	38.0	36.0	Clay Loam	0.75	<0.02	0.27
S1012396-054	#28	4-8	20.0	40.0	40.0	Silty Clay	0.22	<0.02	0.32
S1012396-055	#28	8-28	18.0	44.0	38.0	Silty Clay Loam	0.22	<0.02	0.42
S1012396-056	#28	28-42	14.0	42.0	44.0	Silty Clay	1.96	0.03	0.65
S1012396-057	#28	42-60	10.0	44.0	46.0	Silty Clay	0.87	0.14	0.36
S1012396-058	#32	0-4	32.0	33.0	35.0	Clay Loam	1.02	<0.02	0.30
S1012396-059	#32	4-12	34.0	33.0	33.0	Clay Loam	0.10	<0.02	0.27
S1012396-060	#32	12-30	27.0	37.0	36.0	Clay Loam	0.16	<0.02	0.18

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 Labs 1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

**Soil Analysis Report**

**AUC LLC**

1536 Cole Blvd  
Suite 330  
Lakewood, CO 80401

Report ID: S1012396001

Project: Reno Creek Baseline Soils

Date Received: 12/23/2010

Date Reported: 1/28/2011

Work Order: S1012396

Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical	Organic Matter	PE	PE	PE	SAR
					Conductivity dS/m	LOI %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	
S1012396-061	#32	30-38	7.8	56.1	0.40	1.6	2.17	1.04	0.17	0.13
S1012396-062	#32	38-60	7.9	56.4	0.50	1.5	1.99	1.64	0.21	0.16
S1012396-063	#33	0-4	7.5	58.7	0.61	4.1	4.88	1.14	0.10	0.06
S1012396-064	#33	4-10	7.9	62.0	0.64	3.0	3.09	1.18	0.15	0.10
S1012396-065	#33	10-24	7.9	50.9	0.43	2.1	2.24	1.57	0.42	0.31
S1012396-066	#34	0-3	7.6	54.5	0.73	3.1	5.58	1.43	0.12	0.07
S1012396-067	#34	3-12	7.8	53.2	0.42	2.0	2.61	1.24	0.36	0.26
S1012396-068	#35	0-6	6.5	48.5	0.38	3.8	1.79	0.87	0.18	0.16
S1012396-069	#35	6-16	6.5	41.8	0.16	2.3	0.61	0.46	0.15	0.21
S1012396-070	#35	16-30	6.7	50.3	0.25	2.5	1.19	0.70	0.13	0.13
S1012396-071	#35	30-38	7.4	49.8	0.37	2.2	2.05	1.18	0.17	0.13
S1012396-072	#35	38-52	7.7	42.6	0.41	1.7	2.13	1.25	0.21	0.16
S1012396-073	#35	52-60	7.8	35.4	0.52	1.0	2.49	1.89	0.28	0.19
S1012396-074	#36	0-4	6.6	44.2	0.30	3.1	1.33	1.11	0.14	0.13
S1012396-075	#36	4-8	6.7	53.1	0.34	3.0	1.35	1.41	0.22	0.19
S1012396-076	#36	8-16	7.3	54.0	0.47	2.8	2.45	1.89	0.25	0.17
S1012396-077	#36	16-42	8.1	49.6	0.54	1.7	2.17	2.03	1.62	1.12
S1012396-078	#36	42-60	8.1	39.4	0.97	1.1	2.25	3.87	4.79	2.74
S1012396-079	#40	0-4	7.5	51.1	0.40	3.4	3.54	1.10	0.18	0.12
S1012396-080	#40	4-12	7.7	53.2	0.40	2.7	3.36	1.00	0.09	0.06

These results apply only to the samples tested.

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Miscellaneous Abbreviations: SAR= Sodium Adsorption Ratio, CEC= Cation Exchange Capacity, ESP= Exchangeable Sodium Percentage

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Karen Secor, Soil Lab Supervisor



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Your Environmental Monitoring Partner

**Soil Analysis Report**

**AUC LLC**

1536 Cole Blvd  
Suite 330  
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Report ID: S1012396001

Project: Reno Creek Baseline Soils

Date Reported: 1/28/2011

Date Received: 12/23/2010

Work Order: S1012396

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse Fragment %	Available Selenium ppm	Available Boron ppm
S1012396-061	#32	30-38	29.0	36.0	35.0	Clay Loam	0.04	<0.02	0.18
S1012396-062	#32	38-60	24.0	36.0	40.0	Clay	0.17	<0.02	0.48
S1012396-063	#33	0-4	36.0	37.0	27.0	Clay Loam	8.66	<0.02	0.46
S1012396-064	#33	4-10	26.0	44.0	30.0	Clay Loam	2.84	<0.02	0.35
S1012396-065	#33	10-24	20.0	56.0	24.0	Silty Loam	1.90	<0.02	0.27
S1012396-066	#34	0-3	18.0	47.0	35.0	Silty Clay Loam	0.18	<0.02	0.31
S1012396-067	#34	3-12	10.0	59.0	31.0	Silty Clay Loam	0.03	<0.02	0.27
S1012396-068	#35	0-6	40.0	36.0	24.0	Loam	0.13	<0.02	0.27
S1012396-069	#35	6-16	37.0	36.0	27.0	Clay Loam	<0.01	<0.02	0.13
S1012396-070	#35	16-30	35.0	33.0	32.0	Clay Loam	<0.01	<0.02	0.18
S1012396-071	#35	30-38	26.0	42.0	32.0	Clay Loam	<0.01	<0.02	0.31
S1012396-072	#35	38-52	50.0	27.0	23.0	Sandy Clay Loam	<0.01	<0.02	0.35
S1012396-073	#35	52-60	69.0	14.0	17.0	Sandy Loam	<0.01	<0.02	0.24
S1012396-074	#36	0-4	39.0	39.0	22.0	Loam	0.77	<0.02	0.26
S1012396-075	#36	4-8	31.0	31.0	38.0	Clay Loam	0.06	<0.02	0.30
S1012396-076	#36	8-16	31.0	30.0	39.0	Clay Loam	1.91	<0.02	0.26
S1012396-077	#36	16-42	34.0	31.0	35.0	Clay Loam	0.05	<0.02	0.48
S1012396-078	#36	42-60	54.0	19.0	27.0	Sandy Clay Loam	<0.01	<0.02	0.92
S1012396-079	#40	0-4	63.0	18.0	19.0	Sandy Loam	0.23	<0.02	0.31
S1012396-080	#40	4-12	44.0	33.0	23.0	Loam	0.09	<0.02	0.40

These results apply only to the samples tested.

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Report ID: S1012396001

Project: Reno Creek Baseline Soils  
Date Received: 12/23/2010

Date Reported: 1/28/2011  
Work Order: S1012396

Lab ID	Sample ID	Depths Inches	pH	Saturation	Electrical Conductivity	Organic Matter LOI	PE Calcium	PE Magnesium	PE Sodium	SAR
			s.u.	%	dS/m	%	meq/L	meq/L	meq/L	
S1012396-081	#40	12-24	8.0	56.8	0.32	2.0	2.54	1.56	0.28	0.20
S1012396-082	#40	24-40	8.2	50.8	3.03	1.4	10.8	46.7	12.5	2.34
S1012396-083	#40	40-48	8.2	60.0	5.60	1.7	21.3	180	39.5	3.94
S1012396-084	#40	48-60	8.1	57.1	4.30	1.2	6.81	87.1	21.5	3.14
S1012396-085	#44	0-4	6.6	46.4	0.22	2.6	1.10	0.63	0.10	0.11
S1012396-086	#44	4-10	7.1	52.6	0.46	2.5	2.95	1.43	0.15	0.10
S1012396-087	#44	10-18	7.7	50.0	0.31	2.4	2.04	0.88	0.18	0.15
S1012396-088	#44	18-24	7.9	45.4	0.33	1.7	1.68	1.14	0.38	0.32
S1012396-089	#44	24-36	7.9	44.6	0.40	1.8	1.44	1.30	0.89	0.76
S1012396-090	#44	36-60	7.8	47.8	1.00	1.9	2.78	2.11	2.97	1.90
S1012396-091	#45	0-2	7.4	44.5	0.50	3.4	3.37	1.03	0.12	0.08
S1012396-092	#45	2-12	7.6	46.0	0.40	2.4	2.54	0.84	0.13	0.10
S1012396-093	#45	12-26	7.6	43.4	0.40	1.8	2.02	0.92	0.17	0.14
S1012396-094	#45	26-40	7.4	43.2	2.00	1.0	24.8	11.5	0.53	0.13
S1012396-095	#46	0-4	6.8	52.0	0.44	3.1	2.91	1.21	0.13	0.09
S1012396-096	#46	4-12	7.2	55.1	0.39	2.9	2.48	1.05	0.29	0.22
S1012396-097	#46	12-24	7.8	50.0	0.43	2.4	2.96	1.36	0.40	0.27
S1012396-098	#46	24-36	8.1	51.4	0.54	2.6	1.82	1.09	2.28	1.89
S1012396-099	#46	36-48	7.7	59.9	2.50	4.3	23.5	14.8	8.60	1.97
S1012396-100	#46	48-60	7.8	62.2	2.84	5.7	30.7	17.8	11.0	2.24

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= water soluble, AB-DTPA= Ammonium Bicarbonate-DTPA, AAO= Acid Ammonium Oxalate

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**Soil Analysis Report**  
**AUC LLC**

1536 Cole Blvd  
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 Lakewood, CO 80401

Report ID: S1012396001

Project: Reno Creek Baseline Soils  
 Date Received: 12/23/2010

Date Reported: 1/28/2011  
 Work Order: S1012396

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse	Available	Available
							Fragment %	Selenium ppm	Boron ppm
S1012396-081	#40	12-24	27.0	46.0	27.0	Clay Loam	0.22	<0.02	0.31
S1012396-082	#40	24-40	44.0	39.0	17.0	Loam	0.13	0.05	0.53
S1012396-083	#40	40-48	22.0	55.0	23.0	Silty Loam	100	0.19	0.40
S1012396-084	#40	48-60	46.0	36.0	18.0	Loam	0.13	0.13	0.28
S1012396-085	#44	0-4	40.0	29.0	31.0	Clay Loam	0.23	<0.02	0.23
S1012396-086	#44	4-10	35.0	28.0	37.0	Clay Loam	0.01	<0.02	0.18
S1012396-087	#44	10-18	40.0	26.0	34.0	Clay Loam	0.38	<0.02	0.34
S1012396-088	#44	18-24	44.0	26.0	30.0	Clay Loam	0.13	<0.02	0.28
S1012396-089	#44	24-36	47.0	25.0	28.0	Sandy Clay Loam	0.06	<0.02	0.41
S1012396-090	#44	36-60	32.0	32.0	36.0	Clay Loam	0.19	0.02	1.00
S1012396-091	#45	0-2	52.0	27.0	21.0	Sandy Clay Loam	1.87	<0.02	0.37
S1012396-092	#45	2-12	58.0	24.0	18.0	Sandy Loam	1.03	<0.02	0.28
S1012396-093	#45	12-26	66.0	19.0	15.0	Sandy Loam	0.99	<0.02	0.24
S1012396-094	#45	26-40	64.0	23.0	13.0	Sandy Loam	<0.01	<0.02	0.13
S1012396-095	#46	0-4	48.0	25.0	27.0	Sandy Clay Loam	0.32	<0.02	0.16
S1012396-096	#46	4-12	41.0	21.0	38.0	Clay Loam	0.07	<0.02	0.17
S1012396-097	#46	12-24	43.0	23.0	34.0	Clay Loam	0.11	<0.02	0.28
S1012396-098	#46	24-36	41.0	22.0	37.0	Clay Loam	0.30	<0.02	0.41
S1012396-099	#46	36-48	38.0	13.0	49.0	Clay	0.07	0.30	1.54
S1012396-100	#46	48-60	34.0	15.0	51.0	Clay	0.39	0.71	2.04

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

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Lab ID	Sample ID	Depths Inches	pH	Saturation	Electrical Conductivity	Organic Matter LOI	PE Calcium	PE Magnesium	PE Sodium	SAR
			s.u.	%	dS/m	%	meq/L	meq/L	meq/L	
S1012396-101	#48	0-4	6.7	37.8	0.59	2.6	4.77	1.54	0.27	0.15
S1012396-102	#48	4-16	7.0	36.5	0.22	1.8	1.43	0.50	0.15	0.16
S1012396-103	#48	16-36	7.6	36.5	0.31	1.5	2.11	0.77	0.24	0.20
S1012396-104	#48	36-48	7.7	35.5	0.52	1.6	2.92	1.17	0.42	0.29
S1012396-105	#48	48-60	7.8	38.2	0.52	1.5	3.18	1.54	0.60	0.39
S1012396-106	#49	0-4	7.0	38.8	0.32	2.5	2.15	0.82	0.12	0.10
S1012396-107	#49	4-16	6.9	43.2	0.21	2.0	1.07	0.55	0.16	0.17
S1012396-108	#49	16-26	7.5	46.2	0.31	1.0	1.72	0.86	0.20	0.17
S1012396-109	#50	0-8	7.3	59.8	0.60	4.4	3.59	1.33	0.20	0.13
S1012396-110	#50	8-18	7.8	51.7	0.33	2.6	2.07	0.67	0.13	0.11
S1012396-111	#50	18-26	7.9	52.3	0.38	3.0	2.54	0.91	0.19	0.14
S1012396-112	#50	26-48	8.0	49.3	0.42	2.0	2.55	0.94	0.27	0.21
S1012396-113	#50	48-60	7.9	51.5	0.39	1.8	1.82	0.83	0.24	0.20
S1012396-114	#55	0-4	7.1	43.2	0.46	2.7	2.10	1.05	0.15	0.12
S1012396-115	#55	4-14	7.8	52.2	0.37	2.4	2.02	1.19	0.63	0.50
S1012396-116	#55	14-32	8.1	54.0	0.73	2.0	2.22	1.88	2.80	1.96
S1012396-117	#55	32-48	8.1	61.2	1.85	1.7	5.35	5.96	9.97	4.19
S1012396-118	#55	48-60	7.9	51.8	3.20	1.6	24.4	21.1	16.9	3.55
S1012396-119	#56	0-4	6.7	34.7	0.25	2.1	1.47	0.53	0.12	0.12
S1012396-120	#56	4-12	7.2	34.6	0.22	1.4	1.39	0.55	0.12	0.12

These results apply only to the samples tested.

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Project: Reno Creek Baseline Soils  
Date Received: 12/23/2010

Date Reported: 1/28/2011  
Work Order: S1012396

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse	Available	Available
							Fragment %	Selenium ppm	Boron ppm
S1012396-101	#48	0-4	62.0	21.0	17.0	Sandy Loam	0.41	<0.02	0.29
S1012396-102	#48	4-16	64.0	19.0	17.0	Sandy Loam	0.19	<0.02	0.31
S1012396-103	#48	16-36	62.0	17.0	21.0	Sandy Clay Loam	0.36	<0.02	0.33
S1012396-104	#48	36-48	62.0	16.0	22.0	Sandy Clay Loam	0.88	<0.02	0.20
S1012396-105	#48	48-60	59.0	18.0	23.0	Sandy Clay Loam	1.71	<0.02	0.23
S1012396-106	#49	0-4	66.0	18.0	16.0	Sandy Loam	1.26	<0.02	0.21
S1012396-107	#49	4-16	68.0	11.0	21.0	Sandy Clay Loam	0.34	<0.02	0.20
S1012396-108	#49	16-26	85.0	6.0	9.0	Loamy Sand	0.53	<0.02	0.09
S1012396-109	#50	0-8	29.0	39.0	32.0	Clay Loam	0.07	<0.02	0.31
S1012396-110	#50	8-18	36.0	37.0	27.0	Clay Loam	0.43	<0.02	0.32
S1012396-111	#50	18-26	32.0	42.0	26.0	Loam	0.03	<0.02	0.44
S1012396-112	#50	26-48	32.0	39.0	29.0	Clay Loam	0.05	<0.02	0.23
S1012396-113	#50	48-60	25.0	40.0	35.0	Clay Loam	<0.01	<0.02	0.26
S1012396-114	#55	0-4	40.0	39.0	21.0	Loam	0.09	<0.02	0.34
S1012396-115	#55	4-14	25.0	39.0	36.0	Clay Loam	0.03	<0.02	0.38
S1012396-116	#55	14-32	22.0	39.0	39.0	Clay Loam	0.09	<0.02	0.53
S1012396-117	#55	32-48	18.0	44.0	38.0	Silty Clay Loam	0.66	0.23	1.23
S1012396-118	#55	48-60	24.0	41.0	35.0	Clay Loam	3.11	0.54	0.83
S1012396-119	#56	0-4	77.0	10.0	13.0	Sandy Loam	0.98	<0.02	0.26
S1012396-120	#56	4-12	74.0	10.0	16.0	Sandy Loam	0.20	<0.02	0.23

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Work Order: S1012396

Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical	Organic Matter	PE	PE	PE	SAR
					Conductivity dS/m	LOI %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	
S1012396-121	#56	12-18	7.5	32.1	0.23	1.2	1.02	0.48	0.17	0.19
S1012396-122	#56	18-30	7.7	28.9	0.31	0.9	1.56	0.59	0.17	0.17
S1012396-123	#57	0-4	5.9	39.1	0.30	2.7	1.19	0.68	0.13	0.13
S1012396-124	#57	4-12	6.8	47.6	0.15	2.0	0.64	0.47	0.17	0.22
S1012396-125	#57	12-18	7.5	46.4	0.30	2.0	1.14	0.91	0.13	0.13
S1012396-126	#57	18-38	8.1	44.0	0.33	1.5	1.83	1.42	0.58	0.46
S1012396-127	#57	38-48	8.2	47.6	0.42	1.7	1.30	1.24	1.86	1.65
S1012396-128	#57	48-60	8.1	45.8	0.74	1.9	1.52	2.12	3.56	2.64
S1012396-129	#66	0-2	7.5	51.3	0.65	3.6	5.16	1.00	0.16	0.09
S1012396-130	#66	2-12	7.4	53.5	0.90	3.0	6.06	1.90	0.22	0.11
S1012396-131	#66	12-18	7.2	51.7	0.50	2.0	2.65	1.74	0.68	0.46
S1012396-132	#66	18-36	8.0	50.6	0.99	1.2	1.84	2.27	5.15	3.59
S1012396-133	#68	0-4	7.4	48.2	0.44	3.6	2.74	1.15	0.20	0.14
S1012396-134	#68	4-12	7.5	57.5	0.36	3.4	1.83	1.20	0.54	0.44
S1012396-135	#68	12-22	7.8	56.7	0.38	2.7	1.32	1.06	1.21	1.11
S1012396-136	#68	22-42	7.9	60.4	1.04	2.3	2.95	3.26	4.53	2.57
S1012396-137	#68	42-54	7.8	47.3	2.30	1.6	9.64	12.6	7.53	2.26
S1012396-138	#68	54-60	7.7	43.9	2.84	1.4	22.9	23.4	9.23	1.92

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2Osol= 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

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



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**Soil Analysis Report**

**AUC LLC**

1536 Cole Blvd  
 Suite 330  
 Lakewood, CO 80401

Report ID: S1012396001

Project: Reno Creek Baseline Soils  
 Date Received: 12/23/2010

Date Reported: 1/28/2011  
 Work Order: S1012396

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse Fragment %	Available Selenium ppm	Available Boron ppm
S1012396-121	#56	12-18	82.0	5.0	13.0	Sandy Loam	0.24	<0.02	0.14
S1012396-122	#56	18-30	86.0	5.0	9.0	Loamy Sand	0.71	<0.02	0.11
S1012396-123	#57	0-4	50.0	30.0	20.0	Loam	0.24	<0.02	0.25
S1012396-124	#57	4-12	44.0	24.0	32.0	Clay Loam	0.22	<0.02	0.37
S1012396-125	#57	12-18	50.0	20.0	30.0	Sandy Clay Loam	0.04	<0.02	0.20
S1012396-126	#57	18-38	51.0	18.0	31.0	Sandy Clay Loam	1.30	<0.02	0.19
S1012396-127	#57	38-48	40.0	32.0	28.0	Clay Loam	0.06	<0.02	0.38
S1012396-128	#57	48-60	40.0	35.0	25.0	Loam	0.99	<0.02	0.66
S1012396-129	#66	0-2	40.0	39.0	21.0	Loam	2.68	<0.02	0.40
S1012396-130	#66	2-12	38.0	39.0	23.0	Loam	2.29	<0.02	0.26
S1012396-131	#66	12-18	26.0	55.0	19.0	Silty Loam	0.91	<0.02	0.23
S1012396-132	#66	18-36	39.0	49.0	12.0	Loam	1.34	<0.02	0.13
S1012396-133	#68	0-4	26.0	42.0	32.0	Clay Loam	0.43	<0.02	0.19
S1012396-134	#68	4-12	22.0	51.0	27.0	Clay Loam	0.04	<0.02	0.19
S1012396-135	#68	12-22	20.0	35.0	45.0	Clay	0.08	<0.02	0.23
S1012396-136	#68	22-42	17.0	37.0	46.0	Clay	0.02	0.04	0.80
S1012396-137	#68	42-54	38.0	31.0	31.0	Clay Loam	<0.01	0.25	0.84
S1012396-138	#68	54-60	41.0	29.0	30.0	Clay Loam	12.7	0.19	0.50

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Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical	Organic Matter	PE	PE	PE	SAR
					Conductivity dS/m	LOI %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	
S1012396-001	#4	0-6	7.2	58.6	0.70	4.3	4.94	1.41	0.13	0.08
S1012396-002	#4	6-13	7.7	54.1	0.51	2.9	3.29	1.19	0.27	0.18
S1012396-003	#4	13-30	7.9	48.8	0.41	1.9	1.84	1.35	0.35	0.28
S1012396-004	#4	30-40	8.4	47.7	0.44	1.8	1.27	2.08	0.49	0.38
S1012396-005	#4	40-48	8.2	46.5	0.60	1.7	0.98	2.15	1.88	1.50
S1012396-006	#4	48-60	8.2	48.8	0.70	1.7	1.08	1.64	3.03	2.59
S1012396-007	#5	0-5	7.1	58.5	0.50	3.7	3.25	1.00	0.11	0.08
S1012396-008	#5	5-19	7.4	42.3	0.41	2.4	2.82	0.81	0.16	0.12
S1012396-009	#5	19-34	7.7	41.2	0.40	1.9	2.49	0.82	0.14	0.11
S1012396-010	#5	34-48	7.9	47.7	0.43	2.0	2.71	1.11	0.19	0.14
S1012396-011	#5	48-60	7.9	42.4	0.60	1.7	4.33	2.01	0.30	0.17
S1012396-012	#6	0-6	6.7	45.9	0.50	3.2	2.57	1.24	0.12	0.09
S1012396-013	#6	6-12	6.8	44.0	0.30	2.4	1.32	0.67	0.16	0.16
S1012396-014	#6	12-24	7.1	38.8	0.41	1.7	1.89	1.21	0.21	0.17
S1012396-015	#7	0-4	6.1	35.5	0.30	2.7	1.26	0.56	0.08	0.08
S1012396-016	#7	4-18	6.4	32.1	0.20	1.5	0.77	0.41	0.12	0.16
S1012396-017	#7	18-36	7.0	27.3	0.22	1.2	1.15	0.40	0.16	0.19
S1012396-018	#8	0-5	7.2	66.8	0.84	5.9	5.41	1.65	0.17	0.09
S1012396-019	#8	5-18	7.7	49.1	0.70	2.8	4.02	1.12	0.43	0.27
S1012396-020	#8	18-28	7.8	47.4	0.60	2.5	3.75	1.03	0.60	0.39

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Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse	Available	Available
							Fragment %	Selenium ppm	Boron ppm
S1012396-001	#4	0-6	26.0	44.0	30.0	Clay Loam	0.69	<0.02	0.38
S1012396-002	#4	6-13	26.0	44.0	30.0	Clay Loam	2.87	<0.02	0.29
S1012396-003	#4	13-30	30.0	41.0	29.0	Clay Loam	6.26	<0.02	0.23
S1012396-004	#4	30-40	29.0	43.0	28.0	Clay Loam	10.0	<0.02	0.30
S1012396-005	#4	40-48	26.0	46.0	28.0	Clay Loam	1.52	<0.02	0.30
S1012396-006	#4	48-60	24.0	48.0	28.0	Clay Loam	2.04	<0.02	0.32
S1012396-007	#5	0-5	64.0	22.0	14.0	Sandy Loam	1.05	<0.02	0.34
S1012396-008	#5	5-19	60.0	24.0	16.0	Sandy Loam	0.11	<0.02	0.36
S1012396-009	#5	19-34	64.0	19.0	17.0	Sandy Loam	0.23	<0.02	0.20
S1012396-010	#5	34-48	56.0	23.0	21.0	Sandy Clay Loam	0.16	<0.02	0.18
S1012396-011	#5	48-60	62.0	18.0	20.0	Sandy Clay Loam	0.26	<0.02	0.27
S1012396-012	#6	0-6	59.0	22.0	19.0	Sandy Loam	1.64	<0.02	0.32
S1012396-013	#6	6-12	58.0	19.0	23.0	Sandy Clay Loam	0.06	<0.02	0.28
S1012396-014	#6	12-24	68.0	15.0	17.0	Sandy Loam	0.20	<0.02	0.22
S1012396-015	#7	0-4	71.0	14.0	15.0	Sandy Loam	3.25	<0.02	0.14
S1012396-016	#7	4-18	70.0	12.0	18.0	Sandy Loam	0.59	<0.02	0.14
S1012396-017	#7	18-36	72.0	12.0	16.0	Sandy Loam	0.50	<0.02	0.14
S1012396-018	#8	0-5	30.0	39.0	31.0	Clay Loam	0.82	<0.02	0.28
S1012396-019	#8	5-18	38.0	34.0	28.0	Clay Loam	0.13	<0.02	0.19
S1012396-020	#8	18-28	42.0	33.0	25.0	Loam	1.08	<0.02	0.26

These results apply only to the samples tested.

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Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical	Organic Matter	PE	PE	PE	SAR
					Conductivity dS/m	LOI %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	
S1012396-021	#8	28-40	7.8	43.3	0.42	1.9	2.81	0.71	0.48	0.36
S1012396-022	#8	40-54	7.9	40.8	0.73	1.4	4.61	1.64	0.37	0.21
S1012396-023	#8	54-60	8.0	41.6	0.53	1.3	3.11	1.32	0.29	0.19
S1012396-024	#9	0-3	6.9	46.8	0.61	3.7	2.37	2.41	0.80	0.52
S1012396-025	#9	3-14	7.8	61.6	0.60	3.2	1.16	1.57	2.25	1.93
S1012396-026	#9	14-24	8.4	62.9	1.22	2.5	1.35	2.71	6.24	4.37
S1012396-027	#9	24-34	8.1	55.7	1.30	2.5	1.73	5.62	6.72	3.51
S1012396-028	#10	0-5	7.1	43.0	0.70	3.2	4.74	1.43	0.19	0.11
S1012396-029	#10	5-13	7.4	44.7	0.50	2.6	3.13	0.93	0.38	0.27
S1012396-030	#15	0-5	7.2	43.3	0.50	2.5	2.48	1.41	0.15	0.11
S1012396-031	#15	5-16	7.1	46.6	0.30	2.1	1.47	0.86	0.15	0.14
S1012396-032	#15	16-26	7.7	44.5	0.50	1.8	2.32	1.77	0.21	0.15
S1012396-033	#15	26-40	8.2	46.9	0.50	1.8	1.46	1.79	0.69	0.54
S1012396-034	#15	40-60	8.5	53.9	0.90	1.8	1.39	3.10	3.90	2.60
S1012396-035	#17	0-4	7.6	56.3	0.90	4.4	6.22	1.82	0.14	0.07
S1012396-036	#17	4-8	7.7	55.6	0.50	3.2	2.85	1.23	0.19	0.13
S1012396-037	#19	0-6	6.2	60.6	0.40	5.6	1.65	0.68	0.10	0.10
S1012396-038	#19	6-18	6.2	48.7	0.20	2.5	0.73	0.33	0.12	0.17
S1012396-039	#19	18-36	6.2	42.4	0.20	1.9	0.70	0.39	0.23	0.32
S1012396-040	#19	36-44	6.5	61.5	0.14	2.0	0.55	0.29	0.13	0.20

These results apply only to the samples tested.

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Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse	Available	Available
							Fragment %	Selenium ppm	Boron ppm
S1012396-021	#8	28-40	46.0	31.0	23.0	Loam	0.98	<0.02	0.24
S1012396-022	#8	40-54	45.0	31.0	24.0	Loam	0.13	<0.02	0.16
S1012396-023	#8	54-60	43.0	32.0	25.0	Loam	0.03	<0.02	0.18
S1012396-024	#9	0-3	34.0	37.0	29.0	Clay Loam	0.49	<0.02	0.33
S1012396-025	#9	3-14	22.0	31.0	47.0	Clay	0.20	<0.02	0.38
S1012396-026	#9	14-24	24.0	29.0	47.0	Clay	0.06	<0.02	0.73
S1012396-027	#9	24-34	22.0	29.0	49.0	Clay	1.16	0.07	0.80
S1012396-028	#10	0-5	60.0	20.0	20.0	Sandy Clay Loam	2.43	<0.02	0.31
S1012396-029	#10	5-13	55.0	19.0	26.0	Sandy Clay Loam	0.78	<0.02	0.35
S1012396-030	#15	0-5	49.0	30.0	21.0	Loam	1.86	<0.02	0.22
S1012396-031	#15	5-16	48.0	26.0	26.0	Sandy Clay Loam	0.04	<0.02	0.17
S1012396-032	#15	16-26	40.0	36.0	24.0	Loam	0.22	<0.02	0.18
S1012396-033	#15	26-40	36.0	36.0	28.0	Clay Loam	0.47	<0.02	0.28
S1012396-034	#15	40-60	28.0	40.0	32.0	Clay Loam	0.06	<0.02	0.44
S1012396-035	#17	0-4	25.0	42.0	33.0	Clay Loam	3.16	<0.02	0.24
S1012396-036	#17	4-8	17.0	49.0	34.0	Silty Clay Loam	3.83	<0.02	0.23
S1012396-037	#19	0-6	24.0	45.0	31.0	Clay Loam	0.38	<0.02	0.44
S1012396-038	#19	6-18	36.0	34.0	30.0	Clay Loam	0.24	<0.02	0.25
S1012396-039	#19	18-36	38.0	33.0	29.0	Clay Loam	0.05	<0.02	0.25
S1012396-040	#19	36-44	34.0	31.0	35.0	Clay Loam	0.02	<0.02	0.19

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					Conductivity dS/m	LOI %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	
S1012396-041	#19	44-60	6.8	38.0	0.23	1.5	0.92	0.44	0.16	0.19
S1012396-042	#20	0-4	7.5	49.1	0.70	3.7	4.67	0.95	0.10	0.06
S1012396-043	#20	4-20	8.0	47.7	0.34	1.7	2.42	1.26	0.18	0.14
S1012396-044	#20	20-36	8.1	43.7	1.80	1.3	6.77	19.4	3.17	0.88
S1012396-045	#22	0-4	7.9	50.5	0.46	3.4	2.94	0.88	0.14	0.10
S1012396-046	#22	4-8	7.9	49.4	0.38	3.1	2.65	0.96	0.13	0.09
S1012396-047	#22	8-28	8.0	50.2	0.33	1.8	1.84	1.57	0.30	0.23
S1012396-048	#22	28-40	8.3	39.5	0.40	1.3	1.22	1.85	1.18	0.95
S1012396-049	#22	40-60	8.1	41.7	0.90	1.1	3.19	4.36	2.77	1.43
S1012396-050	#25	0-5	7.2	49.5	0.38	3.3	2.45	1.12	0.14	0.10
S1012396-051	#25	5-10	7.6	49.8	0.43	2.4	2.72	1.47	0.23	0.16
S1012396-052	#25	10-24	8.0	53.6	0.40	1.6	1.74	1.72	0.67	0.51
S1012396-053	#28	0-4	7.2	55.6	0.47	4.3	3.38	1.40	0.13	0.09
S1012396-054	#28	4-8	7.7	55.5	0.40	3.2	2.67	1.10	0.15	0.11
S1012396-055	#28	8-28	7.9	57.2	0.35	2.5	1.92	1.40	0.45	0.35
S1012396-056	#28	28-42	7.9	55.5	1.03	1.8	4.23	4.46	3.25	1.56
S1012396-057	#28	42-60	7.6	57.8	2.50	1.7	26.2	20.4	5.49	1.14
S1012396-058	#32	0-4	5.8	64.2	0.42	5.6	2.18	0.88	0.15	0.12
S1012396-059	#32	4-12	6.4	56.6	0.22	2.7	1.27	0.54	0.18	0.19
S1012396-060	#32	12-30	7.5	57.8	0.37	2.2	2.36	0.94	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



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**Soil Analysis Report**

**AUC LLC**

1536 Cole Blvd  
Suite 330  
Lakewood, CO 80401

Report ID: S1012396001

Project: Reno Creek Baseline Soils  
Date Received: 12/23/2010

Date Reported: 1/28/2011  
Work Order: S1012396

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse	Available	Available
							Fragment %	Selenium ppm	Boron ppm
S1012396-041	#19	44-60	48.0	26.0	26.0	Sandy Clay Loam	0.42	<0.02	0.17
S1012396-042	#20	0-4	43.0	32.0	25.0	Loam	1.43	<0.02	0.65
S1012396-043	#20	4-20	38.0	36.0	26.0	Loam	0.51	<0.02	0.20
S1012396-044	#20	20-36	57.0	25.0	18.0	Sandy Loam	1.44	0.05	0.16
S1012396-045	#22	0-4	41.0	35.0	24.0	Loam	0.97	<0.02	0.24
S1012396-046	#22	4-8	34.0	36.0	30.0	Clay Loam	0.40	<0.02	0.41
S1012396-047	#22	8-28	25.0	44.0	31.0	Clay Loam	0.36	<0.02	0.22
S1012396-048	#22	28-40	42.0	35.0	23.0	Loam	2.31	<0.02	0.21
S1012396-049	#22	40-60	48.0	36.0	16.0	Loam	2.82	<0.02	0.38
S1012396-050	#25	0-5	42.0	29.0	29.0	Clay Loam	1.12	<0.02	0.39
S1012396-051	#25	5-10	32.0	44.0	24.0	Loam	0.13	<0.02	0.30
S1012396-052	#25	10-24	17.0	56.0	27.0	Silty Clay Loam	0.07	<0.02	0.34
S1012396-053	#28	0-4	26.0	38.0	36.0	Clay Loam	0.75	<0.02	0.27
S1012396-054	#28	4-8	20.0	40.0	40.0	Silty Clay	0.22	<0.02	0.32
S1012396-055	#28	8-28	18.0	44.0	38.0	Silty Clay Loam	0.22	<0.02	0.42
S1012396-056	#28	28-42	14.0	42.0	44.0	Silty Clay	1.96	0.03	0.65
S1012396-057	#28	42-60	10.0	44.0	46.0	Silty Clay	0.87	0.14	0.36
S1012396-058	#32	0-4	32.0	33.0	35.0	Clay Loam	1.02	<0.02	0.30
S1012396-059	#32	4-12	34.0	33.0	33.0	Clay Loam	0.10	<0.02	0.27
S1012396-060	#32	12-30	27.0	37.0	36.0	Clay Loam	0.16	<0.02	0.18

These results apply only to the samples tested.

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Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical	Organic Matter	PE	PE	PE	SAR
					Conductivity dS/m	LOI %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	
S1012396-061	#32	30-38	7.8	56.1	0.40	1.6	2.17	1.04	0.17	0.13
S1012396-062	#32	38-60	7.9	56.4	0.50	1.5	1.99	1.64	0.21	0.16
S1012396-063	#33	0-4	7.5	58.7	0.61	4.1	4.88	1.14	0.10	0.06
S1012396-064	#33	4-10	7.9	62.0	0.64	3.0	3.09	1.18	0.15	0.10
S1012396-065	#33	10-24	7.9	50.9	0.43	2.1	2.24	1.57	0.42	0.31
S1012396-066	#34	0-3	7.6	54.5	0.73	3.1	5.58	1.43	0.12	0.07
S1012396-067	#34	3-12	7.8	53.2	0.42	2.0	2.61	1.24	0.36	0.26
S1012396-068	#35	0-6	6.5	48.5	0.38	3.8	1.79	0.87	0.18	0.16
S1012396-069	#35	6-16	6.5	41.8	0.16	2.3	0.61	0.46	0.15	0.21
S1012396-070	#35	16-30	6.7	50.3	0.25	2.5	1.19	0.70	0.13	0.13
S1012396-071	#35	30-38	7.4	49.8	0.37	2.2	2.05	1.18	0.17	0.13
S1012396-072	#35	38-52	7.7	42.6	0.41	1.7	2.13	1.25	0.21	0.16
S1012396-073	#35	52-60	7.8	35.4	0.52	1.0	2.49	1.89	0.28	0.19
S1012396-074	#36	0-4	6.6	44.2	0.30	3.1	1.33	1.11	0.14	0.13
S1012396-075	#36	4-8	6.7	53.1	0.34	3.0	1.35	1.41	0.22	0.19
S1012396-076	#36	8-16	7.3	54.0	0.47	2.8	2.45	1.89	0.25	0.17
S1012396-077	#36	16-42	8.1	49.6	0.54	1.7	2.17	2.03	1.62	1.12
S1012396-078	#36	42-60	8.1	39.4	0.97	1.1	2.25	3.87	4.79	2.74
S1012396-079	#40	0-4	7.5	51.1	0.40	3.4	3.54	1.10	0.18	0.12
S1012396-080	#40	4-12	7.7	53.2	0.40	2.7	3.36	1.00	0.09	0.06

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Report ID: S1012396001

Project: Reno Creek Baseline Soils  
Date Received: 12/23/2010

Date Reported: 1/28/2011  
Work Order: S1012396

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse	Available	Available
							Fragment %	Selenium ppm	Boron ppm
S1012396-061	#32	30-38	29.0	36.0	35.0	Clay Loam	0.04	<0.02	0.18
S1012396-062	#32	38-60	24.0	36.0	40.0	Clay	0.17	<0.02	0.48
S1012396-063	#33	0-4	36.0	37.0	27.0	Clay Loam	8.66	<0.02	0.46
S1012396-064	#33	4-10	26.0	44.0	30.0	Clay Loam	2.84	<0.02	0.35
S1012396-065	#33	10-24	20.0	56.0	24.0	Silty Loam	1.90	<0.02	0.27
S1012396-066	#34	0-3	18.0	47.0	35.0	Silty Clay Loam	0.18	<0.02	0.31
S1012396-067	#34	3-12	10.0	59.0	31.0	Silty Clay Loam	0.03	<0.02	0.27
S1012396-068	#35	0-6	40.0	36.0	24.0	Loam	0.13	<0.02	0.27
S1012396-069	#35	6-16	37.0	36.0	27.0	Clay Loam	<0.01	<0.02	0.13
S1012396-070	#35	16-30	35.0	33.0	32.0	Clay Loam	<0.01	<0.02	0.18
S1012396-071	#35	30-38	26.0	42.0	32.0	Clay Loam	<0.01	<0.02	0.31
S1012396-072	#35	38-52	50.0	27.0	23.0	Sandy Clay Loam	<0.01	<0.02	0.35
S1012396-073	#35	52-60	69.0	14.0	17.0	Sandy Loam	<0.01	<0.02	0.24
S1012396-074	#36	0-4	39.0	39.0	22.0	Loam	0.77	<0.02	0.26
S1012396-075	#36	4-8	31.0	31.0	38.0	Clay Loam	0.06	<0.02	0.30
S1012396-076	#36	8-16	31.0	30.0	39.0	Clay Loam	1.91	<0.02	0.26
S1012396-077	#36	16-42	34.0	31.0	35.0	Clay Loam	0.05	<0.02	0.48
S1012396-078	#36	42-60	54.0	19.0	27.0	Sandy Clay Loam	<0.01	<0.02	0.92
S1012396-079	#40	0-4	63.0	18.0	19.0	Sandy Loam	0.23	<0.02	0.31
S1012396-080	#40	4-12	44.0	33.0	23.0	Loam	0.09	<0.02	0.40

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Date Received: 12/23/2010

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Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical	Organic Matter	PE	PE	PE	SAR
					Conductivity dS/m	LOI %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	
S1012396-081	#40	12-24	8.0	56.8	0.32	2.0	2.54	1.56	0.28	0.20
S1012396-082	#40	24-40	8.2	50.8	3.03	1.4	10.8	46.7	12.5	2.34
S1012396-083	#40	40-48	8.2	60.0	5.60	1.7	21.3	180	39.5	3.94
S1012396-084	#40	48-60	8.1	57.1	4.30	1.2	6.81	87.1	21.5	3.14
S1012396-085	#44	0-4	6.6	46.4	0.22	2.6	1.10	0.63	0.10	0.11
S1012396-086	#44	4-10	7.1	52.6	0.46	2.5	2.95	1.43	0.15	0.10
S1012396-087	#44	10-18	7.7	50.0	0.31	2.4	2.04	0.88	0.18	0.15
S1012396-088	#44	18-24	7.9	45.4	0.33	1.7	1.68	1.14	0.38	0.32
S1012396-089	#44	24-36	7.9	44.6	0.40	1.8	1.44	1.30	0.89	0.76
S1012396-090	#44	36-60	7.8	47.8	1.00	1.9	2.78	2.11	2.97	1.90
S1012396-091	#45	0-2	7.4	44.5	0.50	3.4	3.37	1.03	0.12	0.08
S1012396-092	#45	2-12	7.6	46.0	0.40	2.4	2.54	0.84	0.13	0.10
S1012396-093	#45	12-26	7.6	43.4	0.40	1.8	2.02	0.92	0.17	0.14
S1012396-094	#45	26-40	7.4	43.2	2.00	1.0	24.8	11.5	0.53	0.13
S1012396-095	#46	0-4	6.8	52.0	0.44	3.1	2.91	1.21	0.13	0.09
S1012396-096	#46	4-12	7.2	55.1	0.39	2.9	2.48	1.05	0.29	0.22
S1012396-097	#46	12-24	7.8	50.0	0.43	2.4	2.96	1.36	0.40	0.27
S1012396-098	#46	24-36	8.1	51.4	0.54	2.6	1.82	1.09	2.28	1.89
S1012396-099	#46	36-48	7.7	59.9	2.50	4.3	23.5	14.8	8.60	1.97
S1012396-100	#46	48-60	7.8	62.2	2.84	5.7	30.7	17.8	11.0	2.24

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Project: Reno Creek Baseline Soils  
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Work Order: S1012396

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse	Available	Available
							Fragment %	Selenium ppm	Boron ppm
S1012396-081	#40	12-24	27.0	46.0	27.0	Clay Loam	0.22	<0.02	0.31
S1012396-082	#40	24-40	44.0	39.0	17.0	Loam	0.13	0.05	0.53
S1012396-083	#40	40-48	22.0	55.0	23.0	Silty Loam	100	0.19	0.40
S1012396-084	#40	48-60	46.0	36.0	18.0	Loam	0.13	0.13	0.28
S1012396-085	#44	0-4	40.0	29.0	31.0	Clay Loam	0.23	<0.02	0.23
S1012396-086	#44	4-10	35.0	28.0	37.0	Clay Loam	0.01	<0.02	0.18
S1012396-087	#44	10-18	40.0	26.0	34.0	Clay Loam	0.38	<0.02	0.34
S1012396-088	#44	18-24	44.0	26.0	30.0	Clay Loam	0.13	<0.02	0.28
S1012396-089	#44	24-36	47.0	25.0	28.0	Sandy Clay Loam	0.06	<0.02	0.41
S1012396-090	#44	36-60	32.0	32.0	36.0	Clay Loam	0.19	0.02	1.00
S1012396-091	#45	0-2	52.0	27.0	21.0	Sandy Clay Loam	1.87	<0.02	0.37
S1012396-092	#45	2-12	58.0	24.0	18.0	Sandy Loam	1.03	<0.02	0.28
S1012396-093	#45	12-26	66.0	19.0	15.0	Sandy Loam	0.99	<0.02	0.24
S1012396-094	#45	26-40	64.0	23.0	13.0	Sandy Loam	<0.01	<0.02	0.13
S1012396-095	#46	0-4	48.0	25.0	27.0	Sandy Clay Loam	0.32	<0.02	0.16
S1012396-096	#46	4-12	41.0	21.0	38.0	Clay Loam	0.07	<0.02	0.17
S1012396-097	#46	12-24	43.0	23.0	34.0	Clay Loam	0.11	<0.02	0.28
S1012396-098	#46	24-36	41.0	22.0	37.0	Clay Loam	0.30	<0.02	0.41
S1012396-099	#46	36-48	38.0	13.0	49.0	Clay	0.07	0.30	1.54
S1012396-100	#46	48-60	34.0	15.0	51.0	Clay	0.39	0.71	2.04

These results apply only to the samples tested.

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Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical	Organic Matter	PE	PE	PE	SAR
					Conductivity dS/m	LOI %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	
S1012396-101	#48	0-4	6.7	37.8	0.59	2.6	4.77	1.54	0.27	0.15
S1012396-102	#48	4-16	7.0	36.5	0.22	1.8	1.43	0.50	0.15	0.16
S1012396-103	#48	16-36	7.6	36.5	0.31	1.5	2.11	0.77	0.24	0.20
S1012396-104	#48	36-48	7.7	35.5	0.52	1.6	2.92	1.17	0.42	0.29
S1012396-105	#48	48-60	7.8	38.2	0.52	1.5	3.18	1.54	0.60	0.39
S1012396-106	#49	0-4	7.0	38.8	0.32	2.5	2.15	0.82	0.12	0.10
S1012396-107	#49	4-16	6.9	43.2	0.21	2.0	1.07	0.55	0.16	0.17
S1012396-108	#49	16-26	7.5	46.2	0.31	1.0	1.72	0.86	0.20	0.17
S1012396-109	#50	0-8	7.3	59.8	0.60	4.4	3.59	1.33	0.20	0.13
S1012396-110	#50	8-18	7.8	51.7	0.33	2.6	2.07	0.67	0.13	0.11
S1012396-111	#50	18-26	7.9	52.3	0.38	3.0	2.54	0.91	0.19	0.14
S1012396-112	#50	26-48	8.0	49.3	0.42	2.0	2.55	0.94	0.27	0.21
S1012396-113	#50	48-60	7.9	51.5	0.39	1.8	1.82	0.83	0.24	0.20
S1012396-114	#55	0-4	7.1	43.2	0.46	2.7	2.10	1.05	0.15	0.12
S1012396-115	#55	4-14	7.8	52.2	0.37	2.4	2.02	1.19	0.63	0.50
S1012396-116	#55	14-32	8.1	54.0	0.73	2.0	2.22	1.88	2.80	1.96
S1012396-117	#55	32-48	8.1	61.2	1.85	1.7	5.35	5.96	9.97	4.19
S1012396-118	#55	48-60	7.9	51.8	3.20	1.6	24.4	21.1	16.9	3.55
S1012396-119	#56	0-4	6.7	34.7	0.25	2.1	1.47	0.53	0.12	0.12
S1012396-120	#56	4-12	7.2	34.6	0.22	1.4	1.39	0.55	0.12	0.12

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 Labs

1673 Terra Avenue, Sheridan, Wyoming 82801 ph: (307) 672-8945

Your Environmental Monitoring Partner

**Soil Analysis Report**

**AUC LLC**

1536 Cole Blvd  
Suite 330  
Lakewood, CO 80401

Report ID: S1012396001

Project: Reno Creek Baseline Soils  
Date Received: 12/23/2010

Date Reported: 1/28/2011  
Work Order: S1012396

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse	Available	Available
							Fragment %	Selenium ppm	Boron ppm
S1012396-101	#48	0-4	62.0	21.0	17.0	Sandy Loam	0.41	<0.02	0.29
S1012396-102	#48	4-16	64.0	19.0	17.0	Sandy Loam	0.19	<0.02	0.31
S1012396-103	#48	16-36	62.0	17.0	21.0	Sandy Clay Loam	0.36	<0.02	0.33
S1012396-104	#48	36-48	62.0	16.0	22.0	Sandy Clay Loam	0.88	<0.02	0.20
S1012396-105	#48	48-60	59.0	18.0	23.0	Sandy Clay Loam	1.71	<0.02	0.23
S1012396-106	#49	0-4	66.0	18.0	16.0	Sandy Loam	1.26	<0.02	0.21
S1012396-107	#49	4-16	68.0	11.0	21.0	Sandy Clay Loam	0.34	<0.02	0.20
S1012396-108	#49	16-26	85.0	6.0	9.0	Loamy Sand	0.53	<0.02	0.09
S1012396-109	#50	0-8	29.0	39.0	32.0	Clay Loam	0.07	<0.02	0.31
S1012396-110	#50	8-18	36.0	37.0	27.0	Clay Loam	0.43	<0.02	0.32
S1012396-111	#50	18-26	32.0	42.0	26.0	Loam	0.03	<0.02	0.44
S1012396-112	#50	26-48	32.0	39.0	29.0	Clay Loam	0.05	<0.02	0.23
S1012396-113	#50	48-60	25.0	40.0	35.0	Clay Loam	<0.01	<0.02	0.26
S1012396-114	#55	0-4	40.0	39.0	21.0	Loam	0.09	<0.02	0.34
S1012396-115	#55	4-14	25.0	39.0	36.0	Clay Loam	0.03	<0.02	0.38
S1012396-116	#55	14-32	22.0	39.0	39.0	Clay Loam	0.09	<0.02	0.53
S1012396-117	#55	32-48	18.0	44.0	38.0	Silty Clay Loam	0.66	0.23	1.23
S1012396-118	#55	48-60	24.0	41.0	35.0	Clay Loam	3.11	0.54	0.83
S1012396-119	#56	0-4	77.0	10.0	13.0	Sandy Loam	0.98	<0.02	0.26
S1012396-120	#56	4-12	74.0	10.0	16.0	Sandy Loam	0.20	<0.02	0.23

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

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Date Received: 12/23/2010

Date Reported: 1/28/2011  
Work Order: S1012396

Lab ID	Sample ID	Depths Inches	pH s.u.	Saturation %	Electrical	Organic Matter	PE	PE	PE	SAR
					Conductivity dS/m	LOI %	Calcium meq/L	Magnesium meq/L	Sodium meq/L	
S1012396-121	#56	12-18	7.5	32.1	0.23	1.2	1.02	0.48	0.17	0.19
S1012396-122	#56	18-30	7.7	28.9	0.31	0.9	1.56	0.59	0.17	0.17
S1012396-123	#57	0-4	5.9	39.1	0.30	2.7	1.19	0.68	0.13	0.13
S1012396-124	#57	4-12	6.8	47.6	0.15	2.0	0.64	0.47	0.17	0.22
S1012396-125	#57	12-18	7.5	46.4	0.30	2.0	1.14	0.91	0.13	0.13
S1012396-126	#57	18-38	8.1	44.0	0.33	1.5	1.83	1.42	0.58	0.46
S1012396-127	#57	38-48	8.2	47.6	0.42	1.7	1.30	1.24	1.86	1.65
S1012396-128	#57	48-60	8.1	45.8	0.74	1.9	1.52	2.12	3.56	2.64
S1012396-129	#66	0-2	7.5	51.3	0.65	3.6	5.16	1.00	0.16	0.09
S1012396-130	#66	2-12	7.4	53.5	0.90	3.0	6.06	1.90	0.22	0.11
S1012396-131	#66	12-18	7.2	51.7	0.50	2.0	2.65	1.74	0.68	0.46
S1012396-132	#66	18-36	8.0	50.6	0.99	1.2	1.84	2.27	5.15	3.59
S1012396-133	#68	0-4	7.4	48.2	0.44	3.6	2.74	1.15	0.20	0.14
S1012396-134	#68	4-12	7.5	57.5	0.36	3.4	1.83	1.20	0.54	0.44
S1012396-135	#68	12-22	7.8	56.7	0.38	2.7	1.32	1.06	1.21	1.11
S1012396-136	#68	22-42	7.9	60.4	1.04	2.3	2.95	3.26	4.53	2.57
S1012396-137	#68	42-54	7.8	47.3	2.30	1.6	9.64	12.6	7.53	2.26
S1012396-138	#68	54-60	7.7	43.9	2.84	1.4	22.9	23.4	9.23	1.92

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

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



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Work Order: S1012396

Lab ID	Sample ID	Depths Inches	Sand %	Silt %	Clay %	Texture	Coarse	Available	Available
							Fragment %	Selenium ppm	Boron ppm
S1012396-121	#56	12-18	82.0	5.0	13.0	Sandy Loam	0.24	<0.02	0.14
S1012396-122	#56	18-30	86.0	5.0	9.0	Loamy Sand	0.71	<0.02	0.11
S1012396-123	#57	0-4	50.0	30.0	20.0	Loam	0.24	<0.02	0.25
S1012396-124	#57	4-12	44.0	24.0	32.0	Clay Loam	0.22	<0.02	0.37
S1012396-125	#57	12-18	50.0	20.0	30.0	Sandy Clay Loam	0.04	<0.02	0.20
S1012396-126	#57	18-38	51.0	18.0	31.0	Sandy Clay Loam	1.30	<0.02	0.19
S1012396-127	#57	38-48	40.0	32.0	28.0	Clay Loam	0.06	<0.02	0.38
S1012396-128	#57	48-60	40.0	35.0	25.0	Loam	0.99	<0.02	0.66
S1012396-129	#66	0-2	40.0	39.0	21.0	Loam	2.68	<0.02	0.40
S1012396-130	#66	2-12	38.0	39.0	23.0	Loam	2.29	<0.02	0.26
S1012396-131	#66	12-18	26.0	55.0	19.0	Silty Loam	0.91	<0.02	0.23
S1012396-132	#66	18-36	39.0	49.0	12.0	Loam	1.34	<0.02	0.13
S1012396-133	#68	0-4	26.0	42.0	32.0	Clay Loam	0.43	<0.02	0.19
S1012396-134	#68	4-12	22.0	51.0	27.0	Clay Loam	0.04	<0.02	0.19
S1012396-135	#68	12-22	20.0	35.0	45.0	Clay	0.08	<0.02	0.23
S1012396-136	#68	22-42	17.0	37.0	46.0	Clay	0.02	0.04	0.80
S1012396-137	#68	42-54	38.0	31.0	31.0	Clay Loam	<0.01	0.25	0.84
S1012396-138	#68	54-60	41.0	29.0	30.0	Clay Loam	12.7	0.19	0.50

These results apply only to the samples tested.

Abbreviations for extractants: PE= Saturated Paste Extract, H2OSol= 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

**ADDENDUM 3.3-F**  
**SOIL SAMPLE PHOTOGRAPHS**



Photo 1: Profile Soil Sample 68 Bidman Loam



Photo 2: Profile Soil Sample 66 Bowbac Sandy Loam



Photo 3: Profile Soil Sample 46 Cambria Loam



Photo 4: Profile Soil Sample 55 Cambria Loam



Photo 5: Profile Soil Sample 57 Cambria Loam



Photo 6: Profile Soil Sample 15 Kishona Loam



Photo 7: Profile Soil Sample 28 Kishona Loam



Photo 8: Profile Soil Sample 40 Kishona Loam



Photo 9: Profile Soil Sample 6 Cushman Loam



Photo 10: Profile Soil Sample 9 Cushman Loam



Photo 11: Profile Soil Sample 20 Cushman Loam



Photo 12: Profile Soil Sample 7 Theedle Loam



Photo 13: Profile Soil Sample 25  
Theedle Loam



Photo 14: Profile Soil Sample 33  
Theedle Loam



Photo 15: Profile Soil Sample 5 Hiland  
Sandy Loam



Photo 16: Profile Soil Sample 8 Hiland  
Sandy Loam



Photo 17: Profile Soil Sample 36 Hiland  
Sandy Loam



Photo 18: Profile Soil Sample 22  
Forkwood Loam



Photo 19: Profile Soil Sample 35  
Forkwood Loam



Photo 20: Profile Soil Sample 50  
Forkwood Loam



Photo 21: Profile Soil Sample 48  
Vonalee Sandy Loam



Photo 22: Profile Soil Sample 56  
Tulloch Loamy Sand



Photo 23: Profile Soil Sample 10  
Shingle Loam  
3.5



Photo 24: Profile Soil Sample 17  
Shingle Loam



Photo 25: Profile Soil Sample 34  
Shingle Loam



Photo 26: Profile Soil Sample 45 Terro  
Sandy Loam



Photo 27: Profile Soil Sample 49 Terro  
Sandy Loam



Photo 28: Profile Soil Sample 19 Ulm  
Clay Loam



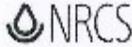
Photo 29: Profile Soil Sample 32  
Ulm Clay Loam



Photo 30: Profile Soil Sample 44  
Ulm Clay Loam

**ADDENDUM 3.3-G**  
**PRIME FARMLAND DESIGNATION**

United States Department of Agriculture



Natural Resources Conservation Service  
Gillette Field Office  
601 4J Court, Suite C  
Gillette, WY 82716

Phone: (307) 682-8843 x3  
Fax: (307) 682-3613  
Website: <http://www.wy.nrcs.usda.gov>

Date: August 25, 2011

Cody Bank  
BKS Environmental Associates  
PO Box 3467  
Gillette, WY 82717

Dear Mr. Bank,

The Natural Resources Conservation Service has reviewed the following list of legal descriptions that you submitted:

- T43N R73W: S 1/2 SECT 21, SW 1/4 SECT 22, E1/2 SECT 27, SECT 28, SECT 29, SE1/4 SECT 30, SECT 31, NW1/4 SECT 32, SECT 33, SECT 34, E1/2 SECT 35.
- T43N R74W: S 1/2 SECT 25, SE 1/4 SECT 35, SECT 36
- T42N R74W: SECT 1, SECT 12
- T42N R73W: SECT 6

None of the area described appears to be irrigated so there is no prime farm land or agricultural land of state wide importance contained within this legal description.

If you have any questions, or need to discuss this comment with us, please contact me at 307-682-8843 ext. 101.

Sincerely,



Timothy Kellogg  
District Conservationist

Helping People Help the Land  
An Equal Opportunity Provider and Employer

