Beck Ranch Cover Soil Borrow Investigation

Clark Fork River Operable Unit of the Milltown Reservoir/ Clark Fork River Superfund Site

Prepared for:

Montana Department of Environmental Quality
1100 N. Last Chance Gulch
Helena, MT 59620-0901

Prepared by:

PBS&J

1120 Cedar Street
Missoula, MT 59802

October 15, 2008

Table of Contents

1. Introduction and Background 1
2. Findings and Results 2
2.1. Soil Types and Distribution 2
2.2. Analytical Results 3
2.2.1 Arsenic 4
2.2.2 Copper 5
2.2.3 Cadmium, Lead and Zinc 5
2.2.4 Organic Matter Content 6
2.2.5 Texture and Coarse Fragment Content 6
2.2.6 Specific Conductivity 7
2.2.7 pH 8
2.2.8 SAR 8
2.2.9 Soil Nutrients 8
2.2.10 Calcium Carbonate 8
2.3. Quality Assurance and Quality Control 9
2.3.1 Field Samples 9
2.3.2 Laboratory Analyses 9
3. Soil Volumes, Salvage and Use 10
3.1. Soil Volumes 10
3.1.1 A Horizon 11
3.1.2 B Horizon 11
3.1.3 C/MA Material 11
3.2. Compost and Cover Soil Use Considerations 12
3.2.1 Cost-Benefit Analysis 12
3.2.2 Reclaiming the Borrow Area 13
3.2.3 Upland Areas 13
3.2.4 Riparian Areas 14
3.3. Other Considerations 14
3.3.1 Salvage Operation 14
3.3.2 Weed Control 15
3.3.3 Quality Control testing 15
4. Summary and Recommendations 17
4.1. Soil Quality 17
4.2. Soil Volumes 17
4.3. Recommendations 18
4.3.1 Cover Soil and Compost Use 18
4.3.2 Soil Salvage Issues 19
5. References 21

RECEIVED
OCT 20 2008
Dept. of Environmental Quality
Remediation Division

PBSJ

List of Tables

Table 1. Summary of Sampling and Analytical Protocol
Table 2 Samples by Soil Horizon and Alluvium Type
Table 3. Suitability Criteria for Floodplain Backfill Materials for Remedial Action of the CFROU
Table 4. Summary of Analytical Data by Soil Horizon
Table 5. Statistical Summary of Select Analytical Data
Table 6. Field Quality Assurance and Quality Control Sample Results
Table 7. Volume of Available Cover Soil by Horizon
Table 8a. Volume of Compost Per Acre to Meet Target Organic Matter Content Levels.
Table 8b. Cost Per Acre of Incorporated Compost to Meet Target Organic Matter Content Levels.

List of Figures

Figure 1. Vicinity Map.
Figure 2. Soil Test Pit Location Map
Figures 3a-e. Fence Diagrams: Generalized Soil and Alluvium Stratigraphy
Figure 4. Distribution of Arsenic Concentrations in A Horizon Soil
Figures 5a-c. Depth of Salvage for A,B and C/MA Horizons

Appendices

Appendix A NRCS Site Soil Information
Appendix B Soil Typifying Pedon Descriptions and Soil Test Pit Horizon Depths
Appendix C Soil Test Pit Photographs
Appendix D Laboratory Data and QA/QC Report
Appendix E Statistical Analyses

1. Introduction and Background

This document presents the results of a soil borrow investigation performed at a parcel of land owned by Atlantic Richfield, historically referred to as the Beck Ranch. The property consists of 343 acres of primarily pivot-irrigated cropland that is located on the eastern foot slopes of the Flint Creek Range, approximately 3 miles south-southwest of Deer Lodge, Montana, in sections 18 and 19 of Township 7 North, Range 9 West (Figure 1). A previous investigation performed by Pioneer Technical Services of Butte for Atlantic Richfield Company (2003), indicated that the project contains loamy soils generally suitable for use as cover soil in the Clark Fork River Operable Unit (CFROU).

The objectives of the soil borrow investigation were to characterize the physical and chemical characteristics of the soil material relative to the cover soil criteria for the CFROU and to develop estimates of salvageable volume based on these criteria. Additionally, a simple cost-benefit analysis is provided comparing the use of A and B horizon soils amended with various amounts of compost to achieve required cover soil organic matter content requirements. Recommendations regarding the use of cover soil and compost for remediation of specific material types (i.e. exposed tailings) and flood plain areas (i.e. upland; riparian/riparian corridor) referred to on the Record of Decision (ROD) are also provided.

Between July 21 and 23, 2008, 29 soil tests pits were excavated to depths between 11 and 17 feet using a CAT 320C tracked excavator provided by Wasley Excavation of Butte, Montana (Figure 2). Each soil pit was described in general accordance with Natural Resource and Conservation Service (NRCS) protocol and individual horizons within the pit were identified. Physical characteristics and observations recorded included color, horizon thickness and boundary, hand texture, visual estimate of coarse fragment content (> ¼ inch diameter), structure, consistency, effervescence and root occurrence. A detailed account of the procedures used to describe soil pits and collect and analyze samples can be found in the Sampling and Analysis Plan (SAP) for the Beck Ranch Soil Borrow Investigation (MDEQ 2008). Although described in the SAP, acid-base accounting was not performed on any samples.

In addition to soil pit descriptions, 42 soil samples (excluding QA/QC samples) were collected from 14 test pits for laboratory analysis of physical and chemical characteristics (Tables 1 and 2). The majority of samples were collected from specific horizons within a test pit and no samples were composted between pits. A limited number of samples were collected from either combined horizons and within a specific portion of a horizon to compare with results of individual horizon samples. This was done to determine if organic matter and arsenic levels were consistent throughout A horizon samples or were limited to the upper portions of the horizon; and to compare analytical results for combined horizon samples with mean values calculated from individual horizon values. Two samples of a fine-grained alluvial material observed at depth in several pits were also collected. Not all samples were analyzed for all parameters. Analyses were performed by Northern Analytical Laboratories of Billings, Montana.

2. Findings and Results

Overall, there is adequate volume of chemically and physically suitable soil material available to address the anticipated needs associated with excavation and cover soil use in exposed tailings (upland and riparian) and riparian corridor areas in the CFROU, based on the information provided in the Record of Decision and the assumptions made in this report. Compost addition to some soil will be required to meet organic matter cover soil criteria. Some A horizon samples had arsenic concentrations (maximum value 39 mg/kg) above the cover soil criteria threshold (30 mg/kg), although the mean A horizon value was 29.4 mg/kg. The distribution of arsenic concentrations will affect cover soil salvage operations, use and costs and should be considered in determining the suitability of the site for cover soil borrow. Results are discussed in detail in the following subsections.

2.1. Soil Types and Distribution

The NRCS soil map of the project area shows the dominant soils in the area are the Con loam, Varney-Con loams, and Sixbeacon gravelly loam, with the former comprising approximately 75 % percent of total area. The Con and Sixbeacon series are classified as Aridic Haplustolls while the Varney series is a Calcidic Argiustoll. All soils are calcareous, have similar textures (loams) and parent material (alluvium), appreciable coarse fragment content and have formed on alluvial fans. The soils encountered during the site investigation generally confirmed these characteristics. NRCS soil information is presented in Appendix A.

The distribution of soils and alluvial materials at the project site are depicted in two ways; typifying soil pedon descriptions (Appendix B) and fence diagrams (Figures 3a through 3e). The former represent typical vertical soil sequences within a pit and have more detail on the description of soil physical characteristics and distinct horizons and subhorizons than the latter. The fence diagrams, created using Autodesk Civil 3D, depict the distribution of soil and alluvium across the site and group horizons and materials based on similar physical characteristics and potential salvageability and use. By necessity, the lateral extent of material between pits is interpolated when the material is present in one pit and absent in an adjacent pit. Photographs of representative test pits are presented in Appendix C.

Soils in the project area consist primarily of a 7 to 14 inch loam to sandy loam surface horizon (A), beneath which lie sandy loam to sandy clay loam B subhorizons (diagnostic horizons Bt, Bk) between 16 and 38 inches thick, cumulatively. For the purposes of this document, the B horizon is discussed as a single horizon. Structure in the A and B horizons is typically moderate to strong, medium to coarse subangular blocky (sometimes breaking to granular), with the compacting effects of plowing and harvesting often evident in the B horizon. The B horizon (and subhorizons) is strongly reactive (calcareous). Both the A and B horizons are present across the site and typically contain < 15 % fine to medium sized gravel (< 1 inch diameter; visual estimation), except in the

northern and western portion of section 19 and most of section 18, where coarse fragment content and size increase in these horizons. The C horizon is between approximately 6 and 24 inches thick and typically comprised of fine to coarse sandy loam with weak to moderate medium subangular blocky to massive structure.

The basal boundary of the C horizon is gradual to diffuse and grades downward into discontinuous, interbedded layers of mixed alluvium (MA) ranging from fine sands to coarse sandy gravel and cobbles, which are often stratified. Gravel and cobble content in this material varies widely within individual "beds" and between pits, ranging from approximately 15 to 50 %. This is typical of alluvial fans and results in variations between materials at depth across the site. For this reason, it is not feasible to delineate or salvage separately the C horizon or interbedded units into which it grades.

Material immediately beneath the B horizon containing < 25 % gravel and cobbles is classified as C/MA due to the difficulty in determining a clear boundary between the C horizon and underlying alluvium. It is typically moderately to strongly reactive to acid and is generally salvageable. Material with a gravel and cobble content between approximately 15 and 50%, with a fine fraction dominated by sands and strong evidence of stratification, is referred to solely as MA, and differs from C/MA primarily in the amount and size of coarse fragments and degree of stratification and interbeddedness. This material is generally not salvageable for use as cover soil. Where possible, distinct gravel/cobble lenses (G) and fine textured alluvium (FA), present at depth beneath several pits, were identified separately (Figures 3a through 3e). Generally, gravel and cobble content and the presence of distinct sandy gravel lenses increase to the north and west in the project area. FA material was typically massive and moderately reactive to acid in the field.

At the approximate boundary between sections 18 and 19, the slope breaks to the north toward Powel Creek (Figure 2). Observations from 4 test pits and on the ground surface in this area confirmed the findings of an earlier investigation by ARCO (2003) that gravel and cobbles are present in a relatively high percentage at and/or near the surface. A visual inspection of the pits in this area by MDEQ personnel during the investigation concurred with these findings; as a result MDEQ indicated that the focus of the investigation should be on the gentle east-facing slopes in section 19. For this reason, material from this area was not considered for primary salvage. The distribution of soil horizons and alluvium as they relate to salvageability and volumes is discussed in section 3.

2.2. Analytical Results

Representative samples from various soil horizons and alluvium were analyzed for the parameters to which the CFROU general fill and backfill criteria apply (Table 3). B horizon samples represented a composite of B subhorizons (i.e. Bt and Bk composited). Not all samples were analyzed for all parameters. The number of samples and analyses performed are summarized in Tables 1 and 3.

With the exception of organic matter content, there were no chemical or physical limitations to the use of B horizon material for cover soil. Two of 5 samples collected at depth in the C/MA material had elevated (< 5.5 dS/cm) Specific Conductivity values, with a single sample exhibiting a loamy sand texture. All other chemical (except organic matter content) and physical criteria were below threshold values for cover soil use.

Five of 14 samples from the A horizon exceeded the minimum cover soil arsenic criteria of 30 mg/kg; otherwise this horizon had no limitations for use as cover soil. Organic matter content (mean = 1.8 %) was sufficient for use in upland areas but would require addition of compost in riparian areas.

Concentrations of arsenic and metals were typically 2 to 3 times greater in the A horizon than the B and other subsoil horizons, with a relatively narrow range of values within a given horizon. These facts may reflect the historic plowing and irrigation practices at the site as well as the fact that presumed mode of metal deposition (smelter fallout). A detailed discussion of analytical results follows

Results are presented by horizon in Table 4 and the laboratory report can be found in Appendix D. Statistical analyses of key analytes are presented in Appendix E and summarized in Table 5. It is noteworthy that the calculation of geometric means showed that values were comparable to arithmetic means, thus the more conservative arithmetic mean was utilized to analyze data. Mean and median values were generally quite similar for most analytes.

2.2.1 Arsenic

Arsenic values in the A horizon ranged from 23 to 39 mg/kg with a mean of 29.4 mg/kg. Five of 14 samples (and one field duplicate) had arsenic concentrations at or above the CFROU threshold of 30 mg/kg for use as cover soil. Figure 4 depicts interpolated arsenic concentrations (Inverse Squared Method in GIS) for the A horizon across the site and shows that in general, concentrations > 30 mg/kg are present in the western third and central portions of the project area. However, because of the presumed aerial mode of arsenic deposition (smelter) and past agricultural activities (irrigation and plowing), which tend to homogenize the horizon, in conjunction with the apparent lack of a physiographic control (i.e. an area where arsenic-bearing material may have preferentially accumulated), ***care must be taken in interpreting these results***.

Given the above, the relatively small number of samples, and the fact that the standard deviation (4.2 mg/kg) about the mean "bridges" the cover soil arsenic criteria value (30 mg/kg), the occurrence of soil from the A horizon with arsenic concentrations > 30 mg/kg in the eastern two thirds (i.e. "suitable) of the project area is probable. Collection and analysis of additional A horizon samples is recommended to refine the delineation of, and confirm that there are, discrete areas with arsenic concentrations < 30 mg/kg prior to salvage.

A subsample was collected from the 0 to 6 inch depth interval (smallest practically salvageable layer) from both TP-2 and TP-7 (2 samples total) to determine if arsenic concentrations may be preferentially elevated in the upper portions of the A horizon. Values for these two samples (21 mg/kg and 25 mg/kg, respectively) were comparable with those from the 0 to 11 inch interval at these pits (23 mg/kg and 26 mg/kg, respectively). Although not statistically conclusive, these values, in conjunction with the fact that the upper portions of the soil have been "homogenized" through past plowing agricultural activities, indicate that arsenic (and other metals) concentrations can be considered fairly uniform throughout the thickness of the A horizon.

The mean arsenic value for 14 co-located samples from the B horizon was 14.4 mg/kg with minimum and maximum values of < 10 and 22 mg/k, respectively. Two samples representing the combined A and B horizons had values of 21 and 22 mg/kg. A single sample from the 0 to 18 inch depth at TP-11, representing the A horizon and upper portion of the B horizon, had an arsenic concentration of 30 mg/kg. Arsenic concentrations in all other subsoil/alluvium materials were below detection (< 10 mg/kg).

An Analysis of Variance (ANOVA) (Appendix E) comparing arsenic concentrations in the A and B horizons (i.e. by depth) showed a significance difference ($p < 0.05$) between the horizons. Because the parent material of the two horizons is the same, this result supports the aerial deposition of arsenic. Similar results were obtained for copper.

In summary, arsenic data suggest that "on average", A horizon material will meet the arsenic cover soil criteria but that some material will exceed the threshold value. Blending of suitable A and B horizon materials would lower arsenic levels but would also affect organic matter levels and the possible use of material as cover soil (i.e. upland cover soil requires > 1.5 % organic matter by weight). This issue is discussed further in section 3.

2.2.2 Copper

Copper concentrations were below the CFROU cover soil criteria in all samples, with concentrations in the A horizon samples (mean = 63.6 mg/kg) roughly three times as high as those in the B horizon (mean = 19.6 mg/kg). Median values were similar to means within a given horizon. As was noted for arsenic, subsamples from 2 pits of the upper A horizons had the same or similar values compared to the entire A horizon (62 mg/kg; 59 mg/kg and 53 mg/kg), respectively.

2.2.3 Cadmium, Lead and Zinc

Nine samples, comprised of one sample from each major horizon (A, B, C/MA or FA) within 3 representative test pits (TP-1, TP-17 and TP-21) were analyzed for total cadmium, lead and zinc. All samples (A, B and C/MA or FA horizons from 3 test pits)

had cadmium, lead and zinc concentrations below the CFROU cover soil criteria, with cadmium below detection (< 2 mg/kg) in all samples.

Lead and zinc concentrations were generally about twice as high in the A horizon than in the subhorizons. Lead concentrations ranged between 21 and 22 mg/kg and 10 and 13 mg/kg in the A and C/MA horizons, respectively. All three samples from the B horizon had lead concentrations < 10 mg/kg. Zinc concentrations ranged from 76 to 86 mg/kg; 26 to 45 mg/kg; and 27 to 54 mg/kg for the A, B and C/MA horizons, respectively. Statistical analyses were not performed on these metals due to the small number of samples.

2.2.4 Organic Matter Content

Organic matter content (weight %; Walkley-Black method) in the A horizon samples ranged between 1.0 and 2.4 %, with a mean and median value of 1.76 and 1.8 %, respectively. Only a single sample had a value < 1.5 %. Samples from the B horizon had organic matter levels that ranged between 0.3 and 1.4 %, with a mean and median value of 0.8 %. Subsoil/alluvium organic matter levels ranged between 0.2 and 0.7 %, with two samples of the finer-grained subsoil material having values of 0.1 and 0.2 %.

These data indicate that the majority of A horizon material, but not B and other subsoil horizons, meets the CFROU threshold value of 1.5 % for use as an *upland* (i.e. exposed tailings areas outside the riparian corridor/zone) cover soil. Organic amendments would need to be added to all borrow material to be utilized in riparian areas, where the requirements are 5 to 7 % organic matter (or similar to uncontaminated adjacent soils). The use of organic amendments is discussed in detail in section 3.

2.2.5 Texture and Coarse Fragment Content

With the exception of a single sample from the 48 to 96 inch interval at TP-1, all samples from all horizons had textures of sandy loam or finer, thus meeting the CFROU cover soil criteria. "A" horizon textures were loams and sandy loams; B horizon textures included loams, sandy loams; sandy clay loams and a single clay loam, the latter two classes reflecting the development of an argillic (clay-enriched, horizon). "C/MA" horizon samples were sandy loams (and the single loamy sand) collected from fairly thick intervals to reflect the predominant overall texture of the interval. Two samples of the finer alluvium observed at the base of some test pits had loam and sandy clay loam texture (Figures 3a through 3e).

Coarse fragment content was estimated visually for all test pits in the field as well as by laboratory analysis. Field estimates pertained to fragments (pebbles and cobbles) greater than approximately 1/4 inch in diameter while laboratory determination was for particles > 2 mm. For practical purposes, the field and laboratory values are similar for the A and B horizons, where readily observable coarse fragment content was typically low (< 15 %)

and smaller than < 1 inch in diameter. It was therefore possible to obtain samples representative of the coarse fragment content. Samples from the C/MA horizon that contained appreciable coarse fragments were not sampled, nor were distinct gravel layers observed in the test pits. This was done because of the impracticality of obtaining a representative sample that would be more useful than a visual observation and the presumption that the majority of this material would not be used for cover soil.

Laboratory coarse fragment content was similar in the A and B horizons, ranging between 2.8 and 16.6 % and 3.6 and 16.8%, with means of 9.8 and 11.9 %, respectively. Samples collected from the C/MA subsoil had coarse fragments between 8.5 and 19.5 %.

Overall, based on laboratory results amd field observations, coarse fragment content is not a limiting factor for use as cover soil of the A and B horizons across the site, although the amount and size of coarse fragments increases in the northern and western third of the project area. (Figure 2). The C/MA horizon, particularly in the southern portion of the project area, has relatively low coarse fragment content (< 25 %). The presence of distinct gravel lenses and the amount of gravel and cobbles in mixed alluvium (MA) closer to the surface generally increases to the north and west (Figures 3a through 3e; Figure 5c).

2.2.6 Specific Conductivity

Data are reported from the laboratory as Electrical Conductivity (mmhos/cm). To be consistent with the language used in the Record of Decision (ESEPA 2004), synonymous term Specific Conductance (in dS/m) will be used. SC values generally increased with depth, a trend supported by the field observation of the presence of calcium carbonate (moderate to violent reaction) in the B and underlying horizons at most pits. This trend also likely reflects the downward movement of salts associated with irrigation as well as natural soil development on the site.

Data indicate that all samples from the A and B horizons meet the CFROU cover soil threshold criteria for Specific Conductance (SC). SC values ranged from 0.43 to 0.75 dS/m and 0.72 to 3.58 dS/m in A and B horizon samples, respectively. Mean and median values for these horizons were 0.59 and 0.56 dS/m, and 2.15 and 2.10 dS/m, respectively.

Five C/MA samples had SC values ranging between 1.90 and 5.53 dS/m, with a mean and median of 3.41 and 3.49 dS/m. Two of these samples had SC values > than 4 dS/m (4.01 and 5.53 dS/m). Two samples of the finer alluvium found at the base of some pits had SC values of 1.13 and 5.42 dS/m.

The C/MA samples were collected over a fairly large interval (40 to 63 inches) and SC values > 4 dS/m may indicate that there are discrete intervals within this heterogeneous material that may have even higher SC values. Blending during salvage may result in the "dilution" of SC values below 4 dS/cm. The affect of SC on the potential use and

salvage of C/MA material, and the quality control sampling required to monitor SC values, is discussed further is section 3.

2.2.7 pH

The pH values from all samples from all horizons are within the CFROU cover soil criteria range of 6.5 to 8.5. A and B horizon pH values ranged between 6.8 and 7.8, and 7.7 and 8.2, respectively, with mean and median values for all horizons ranging between 7.4 and 8.0.

2.2.8 SAR

Although there is not a specific criterion for Sodium Adsorption Ratio (SAR) for CFROU cover soil, it is desirable to ascertain if soil borrow material may have elevated SAR due to the potential negative effects of high levels of sodium on soil physical characteristics. Nine samples (A, B and C/MA or FA horizons) from three pits were analyzed for soluble sodium, calcium and magnesium in a saturated paste. From these data, SAR's were calculated. Values ranged from 0.26 to 6.64, with the lowest values in the upper soil profile and the highest value in the fine alluvium (FA) material at depth. This is typical for soils under irrigation. SAR values indicate that none of the soils are sodic and sodium levels are not an issue.

2.2.9 Soil Nutrients

Sixteen samples from various horizons were collected and analyzed for soil nutrients nitrate/nitrite, phosphorous and potassium (N, P, K), including Kjeldahl N (total organic nitrogen plus ammonia). Available potassium and phosphorous levels were high (> 250 and > 16 mg/kg, respectively) in A horizon soils, suggesting low (< 25 and <10 lbs/acre, respectively) rates of fertilizer are required. Available potassium and phosphorous levels In B horizon samples were low, indicating rates of 40 to 50 lbs/acre of both nutrients may warranted for B horizon used for cover soil. Plant available nitrogen levels were generally low, ranging between 1.2 and 9.2 lbs/acre in the A and B horizons. Organic N levels were consistent with general soil C:N ratios (< 15) calculated using organic matter as a surrogate for total organic carbon (C). It is recommended that this information be used in context with the selected seed mix, vegetation and experience obtained during revegetation work throughout the CFROU to develop fertilizer rates at the time of remediation.

2.2.10 Calcium Carbonate

Two samples from the A, B and horizons, and one each from the C/MA and FA material were collected from 2 test pits and analyzed for calcium carbonate ($CaCO_3$). The A

horizon samples, which typically did not show a discernable reaction to acid in the field, had $CaCO_3$values of 1.3 % and 1.4 %. The B horizon, which reacted violently to acid in the field, had between 10 and 20 % $CaCO_3$. The C/MA and FA samples had values of 8 % and 2.2 %, respectively. Overall, these values are consistent with a soil profile from which the majority of calcium carbonate has moved downward from the A horizon, accumulating in a Bk horizon and to a lesser degree, the underlying C horizon and alluvium. Values are consistent with the slightly alkaline pH values of most samples.

2.3. Quality Assurance and Quality Control

2.3.1 Field Samples

Field Quality Assurance and Quality Control (QA/QC) consisted of the collection of 3 Cross Contamination Blanks (CCB) and 3 Field Duplicates (FD) at a rate of 1 for every 20 samples to determine possible contamination between samples and sampling precision, respectively. Samples were analyzed for total arsenic and copper, pH and EC. Results are summarized in Table 6 and show that all samples met MDEQ criteria for collection of environmental soil samples including a Relative Percent Difference (RPD) < 35 % or, where applicable, a difference between sample values < 2 times the Project Required Detection Limit (PRDL).

Additionally, a blind field split (TP-17; 0 – 8 inches) was provided to the laboratory for analyses. This sample had similar results to the identified split and fell within the QA/QC standards discussed above.

2.3.2 Laboratory Analyses

Laboratory QA/QC consisted of the use of laboratory control samples, matrix spikes and duplicates. The laboratory QA/QC report provided by Northern Analytical Laboratories is included in Appendix D with the soil data sheets. A review of the report indicated no instances where the use and interpretation of the data for the intended purpose would be compromised.

3. Soil Volumes, Salvage and Use

Available cover soil borrow material is summarized by horizon in Table 7 and compared to the required cover soil volumes for areas to be excavated (exposed tailings and riparian corridor) and receive cover soil as presented in the Record of Decision (ROD) (USEPA 2004). For the purpose of this discussion, it is assumed that the majority of exposed tailings outside the riparian corridor will be classified as "uplands" and that the majority of the riparian areas are assumed to be located within the riparian corridor extending laterally 50 feet on either side of the river.

Required volumes were derived using an average excavation and cover soil replacement depth of 18 inches for exposed tailings (181 acres) and the riparian corridor (152 acres) in Reaches A and B. The riparian corridor area calculation was based on the assumption that 25 % of the stream banks in the corridor would be determined to be Class 1, requiring removal of phytotoxic materials. The volumes in the table also account for A horizon material with > 30 mg/kg arsenic (i.e. unsuitable) and the exclusion of subsoil salvage associated with a 25 foot wide perimeter road in section 19 (applies only to C/MA horizon). Salvageable volumes were calculated using the thicknesses of a given horizon at each soil test pit location and then extrapolating the thickness between pits using the Composite Method in Autodesk Land Desktop. A maximum excavation depth of 8 feet was assumed, depending on material suitability. No swell factor was used in the determination of any volumes.

3.1. Soil Volumes

Figures 5a through 5c show the salvage depths for the A, B (includes all B subhorizons) and C/MA horizons and indicate that A and B horizon thickness (means = 10 and 24 inches, respectively) is generally fairly uniform across the site while C/MA material is thicker in the southern portion of the project area. Generally, the occurrence of discrete lenses of gravel and mixed alluvium (MA) with a relatively higher gravel and cobble content increases to the north and west. This material is not recommended for salvage. The presence of a relatively thick layer of Fine Alluvium (FA) is present, typically at depth beneath MA or gravel material, in pits in the northern two-thirds of the project area. Due to its depth and stratigraphic position, it is not recommended for salvage.

It is noteworthy that volume calculations do not account for salvage of material north of the line between sections 18 and 19. This was agreed upon with MDEQ based on the occurrence of gravel and cobble-sized coarse fragments at or near the surface and the proximity of the north-facing slope to Powell Creek. A and B horizon material from this area (91,354 cy and 176,215 cy) could likely be utilized as "reserve" cover soil if necessary, pending additional laboratory analyses.

3.1.1 A Horizon

Figure 5a depicts A horizon thickness with an overlay of the portion of the project where arsenic values are interpolated to be < 30 mg/kg in the A horizon. The volume of A horizon material in this area is 198,576 cy, approximately 53 % of the total A horizon volume (Table 7). The use of this material is discussed in subsequent sections of this document.

It is worth noting again that relatively narrow range of arsenic values and statistical analyses (mean 29.4 mg/kg; standard deviation 4.2 mg/kg) suggest that some soil salvaged from the "suitable" A horizon area may have arsenic concentrations > 30 mg/kg. The volumes of "suitable" A horizon material should thus be viewed conservatively and strict quality control sampling employed during salvage.

3.1.2 B Horizon

Table 7 shows that the volume of B horizon material is adequate for all cover soil requirements for both the exposed tailings (upland) and riparian areas. Compost would need to be added to meet the organic matter content requirements for either area.

3.1.3 C/MA Material

As discussed in section 2.1, the C horizon portion of C/MA material would be impractical to salvage separately over large areas because of the gradual nature of the C/MA boundary as well as heterogeneous nature and distribution of the underlying Mixed Alluvium. Additionally, there are likely intervals with SC values > 4 dS/m within some portions of the C/MA material, making it difficult to be assured that all material would meet the SC cover soil requirement. Although blending during salvage would tend to "dilute" EC values and homogenize textures, it is best to assume that C/MA material will be used only as general fill and that a strict quality control sampling program be used during its salvage.

Contingency Analysis

It is prudent to consider the possibility of the need to excavate and replace a greater volume of material during remediation activities than is estimated in the ROD to account for varying conditions and material relationships encountered in the filed during design data collection and excavation activities. To represent a conservative situation, it is assumed that a 3 foot depth of excavation would be required over all areas of exposed tailings and the riparian corridor (sum equals approximately 333 acres). This amounts to a volume of 1,611,720 cy. As shown in Table 7, the combined volume of suitable A and B horizon material (1,117,761 cy) is adequate to address approximately 70 % of the total required volume, with C/MA material sufficient in quantity to meet the remainder of the required volume. Therefore, the project area should have enough cover soil and general

fill material to meet any anticipated needs for remediation on the CFROU, not excepting the need to add compost to meet organic matter cover soil criteria and for the material to pass QA/QC testing.

3.2. Compost and Cover Soil Use Considerations

3.2.1 Cost-Benefit Analysis

Tables 8a and 8b show the volumes and cost, respectively, associated with the procurement, application and incorporation of compost to A and B horizon material to achieve a given target organic matter content. The values are presented on a unit cost basis because of the uncertainty at this time of the actual acreage of exposed tailings that will be classified as upland or riparian areas. The values in the tables should be viewed as estimates to be used for general planning and comparing cover soil use alternatives. Assumptions and calculations used to derive volumes and costs are also shown.

The volume of compost needed to meet organic matter content requirements for the upper 6 inches of cover soil used in upland areas (1. 5 %) or riparian (5 – 7 %; or similar to adjacent uncontaminated soils) areas is the dominant factor affecting the cost-effectiveness of cover soil use for remediation efforts. A simple cost-benefit analysis was performed to compare the use of compost amended A (mean organic matter = 1.8 %) and B (mean organic matter = 0.8 %) horizon material for cover soil in excavated remediation areas.

Elements of the analysis included compost procurement, delivery, application and incorporation costs; volume of compost and amended soil required; and the relative costs of soil hauling. The analysis does not consider the benefits to the soil microbial community, soil/water physical characteristics and nutrient cycling associated with compost-derived organic matter versus latent soil organic matter.

As is evident in Table 8b, the cost of adding and incorporating compost to cover soil to reach target organic matter levels is substantial. On average, 80 cy of compost is required to achieve and increase of 1 % organic matter (dry weight) in the upper 6 inches of soil. Approximately 56 cy/acre of compost at a cost of $ 2,576/acre would be required to increase soil organic matter levels in B horizon soils (0.8 %) to the 1.5% levels required for the upper 6 inches of cover soil to be placed in upland areas. No compost addition would be required for the use of A horizon material in uplands. In riparian areas requiring the maximum amount of organic matter, approximately 500 cy of compost would need to be added to B horizon cover soil at a cost of $ 22,816/acre. This equates to about a 4 inch layer of compost, requiring significant effort and attendant costs to apply and incorporate.

Although the benefits of compost addition to soils with low organic matter content are well accepted, it is nonetheless still prudent to utilize suitable A and B horizon material in

the most cost-effective manner as possible to meet cover soil organic matter criteria. This is discussed in detail in the following subsections. The exclusion from salvage of a sufficient volume of A horizon material (arsenic > 30 mg/kg) to reclaim the borrow area is also discussed.

3.2.2 Reclaiming the Borrow Area

Based on the cover soil and compost volume estimates presented in Tables 7, 8a and 8b, it would be more cost effective to use on-site A horizon material to reclaim the borrow area to upland (1.5 % OM) or baseline (1.8 %) standards than to import compost for addition to B horizon material. This would result in less material handling and a potentially smaller footprint of excavation. By not salvaging the A horizon from the western portion of the site with > 30 mg/kg arsenic, enough volume of this material would be available to achieve the upland organic matter standard throughout the majority of the borrow area (adequate volume for approximately 220 acres). In essence, the upper half of the A horizon from this area could placed be used to reclaim the portion of the borrow area from which A horizon material was exported to the floodplain. This would also minimize the amount of soil with weed seeds and elevated arsenic concentrations being imported to the floodplain. It is noteworthy that the ROD states that weed management will be a high priority consideration during all remediation activities. This scenario assumes that additional arsenic analyses of A horizon samples will confirm the salvageable volume of suitable A horizon material presented in this document.

3.2.3 Upland Areas

The total volume of A horizon material is sufficient to provide a 6 inch depth of cover soil that meets "upland" requirements (1.5 % OM) for approximately 466 acres without the need for compost amendments. The volume of A horizon material with < 30 mg/kg arsenic is sufficient for 246 acres of upland areas. In either case, the volumes appear adequate to address foreseeable upland acreage (exposed tailings) requiring cover soil in Reaches A and B of the CFROU. Because the relative costs of salvaging, hauling and placing either A or B horizon material would be similar, the use of suitable A horizon material for upland remediation is obviously much more cost-efficient than adding compost to B horizon material.

The volume of B horizon material is sufficient to use as a one foot thick cover soil layer over which the A horizon material can be placed to achieve the minimum cover soil requirement of 18 inches under anticipated upland acreage scenarios. The volume is also adequate to address some areas where greater cover soil depths may be required. For the reasons discussed above, the A horizon soil is most effectively utilized and therefore recommended as the primary cover soil source in upland areas.

3.2.4 Riparian Areas

The 366,630 cy cover soil volume requirement of the riparian corridor equates to approximately 152 acres at an 18 inch depth. The volume of suitable A horizon soil is sufficient to provide cover soil for the upper 6 inches of such an area. The volume of B horizon material is adequate to meet this entire volume need. However, because the relatively small difference in organic matter content between the A or B horizons (1 %) compared to the riparian requirements (5 – 7 %) and large required volumes, the use of either A or B horizon material as cover soil for the upper 6 inch interval would require the addition of substantial amounts of compost (Table 8a). Costs to haul either material to the floodplain would be similar; therefore, the potential savings from reduced compost volumes associated with using A horizon material for all or a portion of riparian area cover soil needs would be nominal, particularly at higher compost addition rates (Table 8b). Additionally, there would not be an adequate volume of suitable A horizon soil remaining for use in the borrow or the upland areas, both of which are more cost-effectively reclaimed/remediated using A horizon soil relative to riparian areas.

The use of B horizon material would also reduce the chance of importing cover soil with concentrations of arsenic > 30 mg/kg , as well as minimize the amount of weed seeds brought into the riparian area with the cover soil.

For the reasons stated above, it is recommended that cover soil used in riparian areas be comprised of compost amended B horizon material, which excepting baseline organic matter levels (0.8 %), meets all physical and chemical cover soil criteria.

3.3. Other Considerations

3.3.1 Salvage Operation

Salvage operations should start at the southern end of the project area, where the overall volume of salvageable material, as well as that of the B horizon, is greatest. This will minimize the footprint of disturbance. Coarse fragment size and content is also lower relative to the northern portions of the project area, as is the presence of gravel lenses and mixed alluvium near the surface.

Direct hauling of soil material is preferred to stockpiling. However, if stockpiling is necessary for logistical reasons, it should be limited to the volume required in the short term (2 years), if possible. To minimize the spread of the weed seed bank present in soils at the site (presumed to be predominantly in A horizon soil) and to prevent dilution of organic matter content, the A horizon should be salvaged and stockpiled separately from, and not mixed with, subsoil materials. The B horizon, including the Bt and Bk subhorizons, should be salvaged as one unit.

If cover soil volume requirements for CFROU remediation activities substantially exceed those presented in this report, it may prudent to obtain A and B horizon material from adjacent State land to the north, where soils should essentially be the same as on the project area. This would result in a larger disturbance footprint but may be preferable and more cost-effective than excavating to greater depths in the project area to obtain texturally heterogeneous C/MA material, some of which may have elevated SC levels, and would require substantial addition of organic matter to meet cover soil criteria.

3.3.2 Weed Control

It is recommended that an aggressive weed control program be instated at the project site and immediately adjacent lands prior to salvage of any soil. This program should be maintained during salvage activities. Although this will have a minimal effect on the existing seed bank, it will minimize the amount of weed seeds in soils exposed during the salvage operations.

3.3.3 Quality Control Testing

Quality control testing needs to be carefully planned with salvage operations. It is assumed that a complete sampling and analysis program will be developed prior to salvage operations. The following are some general recommendations.

A Horizon

For the A horizon, testing should focus on organic matter content, to insure the soil is suitable for upland use without compost addition, and total arsenic concentrations. As discussed earlier, on average (mean arsenic = 29.4 mg/kg) the A horizon barely meets the 30 mg/kg threshold for cover soil arsenic. A standard deviation of 4.2 mg/kg indicates that some material will have concentration > 30 mg/kg. For this reason, it would be advisable to perform some focused A horizon sampling and analysis for arsenic prior to salvage operations to better quantify arsenic distribution and refine the delineation of suitable/unsuitable areas and volumes. If the distribution of suitable material is such that it cannot be salvaged in a practical manner, an agency decision needs to be made regarding the acceptable volume of higher arsenic material used for cover soil.

If special handling of the A horizon is deemed practical, a portable XRF unit (calibrated for the site) would allow rapid turnaround time on a high number of samples during salvage operations. Obviously, the choice of sampling approach (i.e. grab samples from a discrete volume of material, or composite samples from several discrete "volumes" of material) will also affect the results.

B Horizon

There were no exceedences of any cover soil criteria for the B horizon. Quality control should focus on organic matter content to insure adequate compost is being added after material is placed. Limited, low frequency arsenic and Specific Conductivity testing should also be performed.

C Horizon

Quality control for any C/MA material to be salvaged should focus on coarse fragment content and Specific Conductivity to attempt to identify discrete intervals within the relatively thick C/MA "horizon". Intentional blending of materials from within the C/MA horizon during salvage would tend to homogenize the texture and dilute SC values. As with the A horizon arsenic concentrations, the type of sampling will affect results.

4. Summary and Recommendations

A soil borrow investigation was performed in July 2008 at the Beck Ranch, approximately 3 miles south-southwest of Deer Lodge, Montana. The project area consists of 343 acres of primarily pivot-irrigated cropland that is located on the eastern foot slopes of the Flint Creek Range. The objectives of the soil borrow investigation were to characterize the physical and chemical characteristics of the soil material relative to the cover soil criteria for the CFROU and to develop estimates of salvageable volume based on these criteria. Work in 2008 included excavation of 29 test pits, description of soil physical characteristics by horizon, and collection and analyses of 42 samples for a suite of physical and chemical parameters. A summary of the key findings of the investigation are presented below. Recommendations regarding cover soil and compost use are also provided.

4.1. Soil Quality

- Five of 14 samples from the A horizon exceeded the minimum cover soil arsenic criteria of 30 mg/kg, with a mean value of 29.4 mg/kg and standard deviation of 4.2 mg/kg. This indicates that while on "average" the A horizon soil would meet cover soil arsenic standards, some material likely would not. The distribution of arsenic concentrations in A horizon soil will affect cover soil salvage operations, use and costs of remediation and should be considered in determining the suitability of the site for cover soil borrow. These points need to be considered with regard to the current estimated volume of "suitable" A horizon soil. A horizon soil had no other chemical or physical limitations for use as cover soil. Organic matter content (mean = 1.8 %) was sufficient for use in upland areas but would require addition of compost in riparian areas.

- With the exception of organic matter content, there were no chemical or physical limitations to the use of B horizon material for cover soil. Two of 5 samples collected at depth in the C/MA material had elevated (< 5.5 dS/cm) Specific Conductivity values, with a single sample exhibiting a loamy sand texture. All other chemical (except organic matter content) and physical criteria were below threshold values for cover soil use.

4.2. Soil Volumes

- Overall, there is adequate volume of chemically and physically suitable soil material available to address the anticipated needs associated with excavation and cover soil use in exposed tailings (upland and riparian) and riparian corridor areas in the CFROU.

- The total volume of A horizon soil is estimated at 375,820 cy. Based on an interpolation of arsenic concentrations, approximately 53 % (198,576 cy) of this material has arsenic concentrations < 30 mg/kg, the CFROU criteria for cover soil use. Volumes and organic matter content (mean = 1.8 %) of suitable (arsenic < 30/mg/kg) A horizon material are sufficient for use as a 6 inch cover soil layer in upland areas (exposed tailings; cover soil organic matter content > 1.5 %) without requiring the addition of compost. The actual volume of practicable salvageable A horizon material will depend largely on distribution of arsenic in soil and the results and standards of quality control sampling.

- Volumes of suitable B horizon soil (919,185 cy) are sufficient to provide the complete estimated volume of cover soil required for exposed tailings/upland areas (438,020) and the riparian corridor (366,630 cy). Compost addition would be necessary to increase mean B horizon organic matter content (0.8 %) for use as a 6 inch surface layer in either the upland or riparian corridor.

- There is an estimated 1,265,794 cy of C horizon and Mixed Alluvium (C/MA), with the greatest amount of material located in the southern portion of the project area.

4.3. Recommendations

4.3.1 Cover Soil and Compost Use

- It is more cost effective and recommended to use on-site A horizon material with > 30 mg/kg arsenic, to reclaim the borrow area to upland (1.5 % OM) or baseline (1.8 %) standards rather than to import compost for addition to subsoil material. This would result in less material handling, a potentially smaller footprint of excavation and would minimize the amount of soil with weed seeds and elevated arsenic concentrations being imported to the floodplain.

- Suitable (arsenic < 30 mg/kg) A horizon soil is recommended for cover soil use in remediated upland (exposed tailings) areas. The relative costs of salvaging and hauling either A or B horizon material from the borrow site and placing it on the floodplain would be similar. B horizon material would, however, require the addition on average of 46 cy/acre of compost at a cost of $ 2,567/acre. Conversely, suitable A horizon material (1.8 % OM) would not require the addition of compost. In conjunction with the reclamation of the borrow area described above, this is the most efficient and cost effective use of the A horizon.

- It is recommended that cover soil used in riparian areas be comprised of compost amended B horizon material. The difference in costs between using A and B horizon material are nominal at the high organic matter content specified for these areas. This would reserve the use of A horizon material for the

reclamation/remediation of the borrow and upland areas. The use of B horizon material would also reduce the chance of importing cover soil with concentrations of arsenic > 30 mg/kg as well as minimize the amount of weed seeds brought into the riparian area with the cover soil. Riparian cover soil organic matter requirements may range up to 7 %. Such levels would require 496 cy/acre of compost added to B horizon soil at an estimated cost of $ 22,816/acre.

- It is recommended that C/MA horizon material be utilized for cover soil only if A and B horizon soils are not available. This is because of the heterogeneous nature and distribution of the Mixed Alluvium beneath the C horizon as well as the presence of some material with SC values in excess of the cover soil criteria. The C/MA material would be best used as general fill beneath the upper 6 inches of cover soil that is required to meet organic matter standards for upland or riparian areas.

4.3.2 Soil Salvage Issues

- Prior to salvage, the collection and analysis of additional A horizon samples for arsenic is recommended to refine the volume estimates of suitable soil, and to identify and confirm that there are discrete, practicable salvage areas with arsenic concentrations < 30 mg/kg. The results of this sampling, in conjunction with the salvage QA/QC sampling methods and criteria employed to identify a particular volume of material as suitable, could affect the ultimate volume of A horizon material available for cover soil use. The costs of remediation (i.e. use of more B horizon material and compost) and cost-effectiveness of using the property as a borrow source would also be affected.

- It is recommended that an aggressive weed control program be instated at the project site borrow area prior to salvage of any soil and be maintained during salvage activities.

- Direct hauling of soil material is preferred to stockpiling. However, if stockpiling is necessary for logistical reasons, it should be limited to the volume required in the short term (2 years), if possible. To minimize the spread of the weed seed bank present in soils at the site and to prevent dilution of organic matter content, the A horizon should be salvaged and stockpiled separately and mixing with subsoil minimized. The B horizon (including subhorizons) should be salvaged as a single discrete unit.

- If possible, salvage operations should start in the southern portion of the project area where the volume of suitable salvageable soil material is greatest and the amount and size of coarse fragments, which generally increase in the northern and western portions of the project area, are less.

- If more cover soil material is needed for CFROU remediation, it may prudent to obtain A and B horizon material from adjacent State land to the north, where soils should essentially be the same as on the project area. This option may be preferable to excavating to greater depths in the project area to obtain texturally heterogeneous alluvium, some of which may have elevated SC levels, and would require substantial addition of organic matter to meet cover soil criteria.

- A comprehensive Quality Assurance and Quality Control Sampling Plan should be developed prior to salvage of any material. The plan should focus on several key criteria including organic matter in all horizons, arsenic in the A horizon, and SC and coarse fragment content in the C/MA material. Lower frequency, periodic testing for all criteria should also be performed. Organic matter results would be used to insure that criteria for cover soil are being met and that compost rates can be accurately calculated. The plan should also include the sample types (composites versus grab samples), sample frequency by volume, and specific criteria for identifying and handling material that does not meet standards, particularly with regard to arsenic concentrations in A horizon samples.

5. References

Atlantic Richfield Company, 2003. Milltown Reservoir Sediments NPL Site, Clark Fork River Operable Unit: *Draft* Charlie Beck Borrow Site Investigation Technical Memorandum; *prepared by* Pioneer Technical Services, Butte, Montana.

Montana Department of Environmental Quality, 2008. Sampling and Analysis Plan for the Beck Ranch Soil Borrow Investigation; *prepared by* PBS&J, Missoula, Montana.

U.S. Environmental Protection Agency, 2004. Clark Fork River Operable Unit of the Milltown reservoir/Clark Fork River Superfund Site: Record of Decision – Part 2: Decision Summary.

Tables

Table 1. Summary of Sampling and Analytical Protocol for the Beck Ranch Cover Soil Investigation.

Sampling Purpose	Sample Type	Number of Samples	Analytical Parameter	Analytical Method
Characterization	Cover Soil and General Fill	42	Saturated paste pH	ASA Monograph # 9, Part 2, Method 10-3.2
		42	Saturated paste Conductivity	ASA Monograph # 9, Part 2, Method 10-3.3
		10	SAR	ASA Monograph # 9, Part 2, Method 10-3.4
		42	Total Cu, As	EPA Method 6200
		9	Total Cd, Pb, Zn	EPA Method 6200
		42	Organic Matter %	ASA Monograph # 9, Part 2, Method 29-3.5.2 (Walkley-Black)
		16	N (nitrate), P, K	ASA Monograph # 9, Part 2: N – Method 38-8.1 P - Method 24-5.4 (Olsen) K – Method 13-3.5
		16	Total Kjeldahl N	ASA Monograph # 9, Part 2, Method 31-3.1
		42	Texture/particle size analysis	ASA Monograph # 9, Part 1, Method 15-5 (Hydrometer)
		6	Lime Equivalent - Calcium Carbonate	USDA Handbook 60, Method 23C
QA/QC	Field Sample Duplicate	1 per 20 samples	paste pH	ASA Monograph # 9, Part 2, Method 10-3.2
	Cross-Contamination Blank		Total Cu	EPA Method 6200

Table 2. Samples by Soil Horizon and Alluvium Type for the Beck Ranch Cover Soil Investigation.

Test Pit	Horizon						
	A	B	C/MA	FA	A/B	A subsamples	B/C
TP-1	X	X	X				X
TP-2	X	X				X	
TP-5	X	X					
TP-7	X	X	X		X	X	
TP-9	X	X	X				X
TP-11	X	X			X X		
TP-13	X	X	X	X			
TP-15	X	X					
TP-17	X	X		X			
TP-19	X	X					
TP-21	X	X	X				
TP-22	X	X					
TP-23	X	X					
TP-24	X	X					

C/MA – C horizon and Mixed Alluvium
FA – Fine Alluvium

Table 3. Suitability Criteria for Floodplain Backfill Materials for Remedial Action of the CFR OU

Parameter	Criteria
Texture	Sandy loam or finer
Particle Size Distribution	Particles > 0.079 inches (2 mm) will constitute < 45% (by volume)
Rock Fragments	Maximum Rock Size is 6 inches (15 cm)
pH	> 6.5 and < 8.5 standard units
Specific Conductivity	< 4.0 dS/m
Organic Matter	> 1.5 % (by weight) in upper 6 inches for upland areas
	Similar to uncontaminated organic matter levels for Riparian areas (5 to 7 %)
Element	*Total Concentration*
As	< 30 mg/kg
Cd	< 4 mg/kg
Cu	< 100 mg/kg
Pb	< 100 mg/kg
Zn	< 250 mg/kg

Table 4. Summary of Analytical Data by Soil Horizon for the Beck Ranch Cover Soil Investigation.

Test Pit	Start Depth (in)	End Depth (in)	Thick. (in)	Horizon	Arsenic mg/kg	Cad. mg/kg	Copper mg/kg	Lead mg/kg	Zinc mg/kg	Organic Matter %	Cond. (dS/m)	pH	Sat. %	NO3+NO2 (mg/kg)	Avail. P (mg/kg)	Avail K (mg/kg)	Kjeldahl N mg/kg	C:N	CaCO3 %	Sand %	Silt %	Clay %	Texture	Coarse Frags.(%)
TP-1	0	10		A	27	< 2	71	21	76	1.6	0.56	7	32.2	3.6	22	360	604	14.9		57.5	28.7	13.8	Sandy Loam	7.7
TP-11	0	9		A	**33**		62			1	0.43	7.2								51.3	33.7	15	Loam	9.5
TP-13	0	8		A	**31**		68			1.8	0.63	7.1								42.5	42.5	15	Loam	2.8
TP-15	0	8		A	29		57			2.4	0.62	7.7								52.5	28.7	18.8	Sandy Loam	16.6
TP-17	0	10	10	A	26	< 2	66	21	77	1.6	0.55	7.6	33.7						1.3	47.5	36.2	16.3	Loam	7
TP-19	0	9	9	A	29		57			1.9	0.69	7.8								55	30	15	Sandy Loam	12
TP-2	0	11	11	A	23		62			2	0.71	7.6								52.5	32.5	15	Sandy Loam	12
TP-21	0	11	11	A	28	< 2	55	22	86	1.8	0.55	7.6	35.3	1.7	25	310	1020	9.9	1.4	52.5	30	17.5	Sandy Loam	9.1
TP-22	0	10	10	A	**34**		73			2	0.55	7.7								50	32.5	17.5	Loam	11.1
TP-23	0	12	12	A	29		68			1.7	0.53	6.8		3	28	260	674	14.2		45	37.5	17.5	Loam	7.3
TP-24	0	8	8	A	25		64			1.7	0.55	7.4		4.7	21	310	322	29.7		57.5	28.7	13.8	Sandy Loam	10.9
TP-5	0	11	11	A	**39**		73			1.5	0.75	6.9		2.9	30	320	878	9.6		50	35	15	Loam	11.4
TP-7	0	11	11	A	26		53			1.8	1	7.8		3.5	16	410	1020	9.9		55	31.2	13.8	Sandy Loam	11.8
TP-9	0	11	11	A	**33**		61			1.8	0.66	7		3.1	20	260	701	14.4		50	33.7	16.3	Loam	7.7
TP-11	0	31	31	A/B	21		23			1	3.16	7.6								37.5	35	27.5	Clay Loam	5.5
TP-7	0	32	32	A/B	22		30			1.4	0.96	7.9		6.5	14	200	770	10.2		55	22.5	22.5	Sa Cl Lo	10.3
TP-13	8	19	11	B	< 10		28			0.3	0.72	7.7								42.5	42.5	15	Loam	12.9
TP-15	8	25	17	B	22		14			1.2	1.14	7.8								52.5	23.7	23.8	Sa Cl Lo	28
TP-24	8	31	23	B	15		24			0.7	2.1	8.1		3.4	7 <	100	356	11.0		58.8	16.2	2.5	Sa Cl Lo	12
TP-11	9	31	22	B	18		14			0.9	3.29	7.8								50	25	25	Sa Cl Lo	5
TP-19	9	28	19	B	14		14			0.9	3.58	7.9								62.5	17.5	20	Sandy Loam	9.1
TP-1	10	23	13	B	18	< 2	25	10	26	0.9	0.86	7.9	35	4	7 <	100	397	12.7		60	18.7	21.3	Sa Cl Lo	12.6
TP-17	10	48	38	B	< 10	< 2	24	10	37	0.5	3.23	7.8	29.1						10	62.5	18.7	18.8	Sandy Loam	9.4
TP-22	10	38	28	B	17		28			0.9	1.74	8.2								43.8	23.7	32.5	Clay Loam	3.6
TP-2	11	40	29	B	11		27			0.7	1.71	8								57.5	23.7	18.8	Sandy Loam	16.8
TP-21	11	33	22	B	12	< 2	12	10	45	0.6	3.49	7.9	38	1	6 <	100	295	11.4	20	57.5	20	22.5	Sa Cl Lo	8.6
TP-5	11	28	17	B	12		16			1.4	0.99	7.9		0.9	8 <	100	388	20.3		62.5	17.5	20	Sandy Loam	15
TP-7	11	32	21	B	17		12			0.8	2.14	7.9								55	22.5	22.5	Sa Cl Lo	7.4
TP-9	11	30	19	B	12		13			0.6	3.07	7.9		0.7	9 <	100	296	11.4		56.3	22.4	21.3	Sa Cl Lo	11.2
TP-23	12	44	32	B	14		24			0.7	2.09	8		0.7	5	110	266			58.8	17.4	23.8	Sa Cl Lo	14.6
TP-9	30	70	40	C/MA	< 10		14			0.3	**4.01**	7.8								62.5	28.7	8.8	Sandy Loam	17
TP-7	32	95	63	C/MA	< 10		11			0.7	3.49	7.9								72.5	17.5	10	Sandy Loam	12.3
TP-21	33	88	55	C/MA	< 10	< 2	13	11	49	0.3	**5.53**	8	28.2						8	70	21.2	8.8	Sandy Loam	19.5
TP-1	48	96	48	C/MA	< 10	< 2	23	10	27	0.2	1.9	8.1	24.1							77.5	16.2	6.3	**Loamy Sand**	8.9
TP-13	52	96	44	C/MA	< 10		28			0.3	2.12	8								55	30	15	Sandy Loam	8.5
TP-17	78	144	66	FA	< 10	< 2	28	13	54	0.1	**5.42**	7.9	34.3						2.2	50	27.5	22.5	Sa Cl Lo	5.4
TP-13	86	132	46	FA	< 10		31			0.2	1.13	7.8								45	45	10	Loam	4.7
TP-11	0	18	18	A/B - partial	**30**		36			1.3	2.53	7.5								45	30	25	Loam	7.3
TP-2	0	6	6	A subsample	21		62			0.8	1.38	7.4								55	27.5	17.5	Sandy Loam	9.8
TP-7	0	6	6	A subsample	25		59			1.7	0.58	7.7		5.4	22	520	1090	8.8		52.5	32.5	15	Sandy Loam	12.2
TP-1	10	48	38	B/C/MA	11	< 2	23	10	23	0.6	1.11	8.1	33	1	4	110	263	12.8		65	18.7	16.3	Sandy Loam	11.3
TP-9	11	41	30	B/C/MA	11		13			0.4	3.46	7.8								55	25	20	Sandy Loam	10.5

MA - Mixed Alluvium
FA - Fine Alluvium
Bold values exceed CFROU cover soil criteria.

Table 5. Statistical Summary of Select Analytical Data for the Beck Ranch Cover Soil Investigation.

Horizon	Number Samples	Arsenic (mg/kg)				Copper (mg/kg)				Organic matter (wt %)				EC (mmhos/cm)				pH			
		min	max	mean	median	min	max	mean	median	min	max	mean	median	min	max	mean	median	min	max	mean	median
A	14	23	39	29.4	29	53	73	63.6	63	1	2.4	1.76	1.8	0.43	0.75	0.59	0.56	6.8	7.8	7.4	7.5
B	14	10	22	14.4	14	12	28	19.6	20	0.3	1.4	0.8	0.8	0.72	3.58	2.15	2.1	7.7	8.2	7.9	7.9
C/MA	5	<10	<10	NA	NA	11	28	17.8	14	0.2	0.7	0.36	0.3	1.9	5.53	3.41	3.49	7.8	8.1	8	8

Table 6. Field Quality Assurance and Quality Control Sample Results for the Beck Ranch Cover Soil Investigation.

Test Pit	Start Depth (in)	End Depth (in)	Arsenic (mg/kg)	RPD	FD minus Sample	Copper (mg/kg)	RPD	FD minus Sample	Cond. (dS/m)	RPD	pH	RPD *(1)*
TP-17 FD	0	10	26	NA	0.0	54	-20.0		0.76	32.1	7.6	0.0
TP-17	0	10	26			66			0.55		7.6	
TP-21 FD	0	11	30	NA	2.0	56	1.8		0.7	24.0	7.7	1.3/-22.3
TP-21	0	11	28			55			0.55		7.6	
TP-22 FD	10	38	19	NA	2.0	13	NA	-15.0	1.29	-29.7	8.2	0.0
TP-22	10	38	17			28			1.74		8.2	
TP-17 BFS	0	10	28	NA	2.0	55	-18.2		0.47	-15.7	7.5	-1.3/24.6
TP-17	0	10	26			66			0.55		7.6	
2X PRDL *(2)*			20			20			NA		NA	

Notes:
(1) - RPD – Relative Percent Difference ≤ 35 %
(2) - 2x PRDL – 2 times the Project Required Detection Limit
- Quality assurance and control criteria based on MDEQ guidance.

Table 7. Volume of Available Cover Soil by Horizon for Major Areas to be Excavated.

Exposed Tailings/Upland Areas							
	Volume (cubic yards)						
		Total Available			Net Excess		
Horizon	*Required (1)*	*Salvage Area*	*As < 30/mg/kg*	*Minus 25' perimeter road (2)*	*Project Area*	*As < 30/mg/kg*	*Minus 25' perimeter road (2)*
A	146,007	375,820	198,576	198,576	229,813	52,569	229,813
B	292,013	919,185	919,185	919,185	627,172	627,172	627,172
C/MA *(3)*	NA	1,265,794	1,265,794	1,228,974	NA	NA	NA
Total	438,020						

Riparian Buffer							
	Volume (cubic yards)						
		Total Available			Net Excess		
Horizon	*Required (4)*	*Salvage Area*	*As < 30/mg/kg*	*Minus 25' perimeter road (2)*	*Project Area*	*As < 30/mg/kg*	*Minus 25' perimeter road (2)*
A	122,210	375,820	198,576	198,576	253,610	76,366	253,610
B	244,420	919,185	919,185	919,185	674,765	674,765	674,765
C/MA *(3)*	NA	1,265,794	1,265,794	1,228,974	NA	NA	NA
Total	366,630						

Total Required							
	Volume (cubic yards)						
		Total Available			Net Excess		
Horizon	Total Required	*Salvage Area*	*As < 30/mg/kg*	*Minus 25' perimeter road (2)*	*Project Area*	*As < 30/mg/kg*	*Minus 25' perimeter road (2)*
A	268,217	375,820	198,576	198,576	107,603	-69,641	107,603
B	536,433	919,185	919,185	919,185	382,752	382,752	382,752
C/MA *(3)*	NA	1,265,794	1,265,794	1,228,974	NA	NA	NA
Total	804,650						

Notes:

C/MA - C horizon/Mixed Alluvium.

(1) - Total required volume based on 18 inch cover soil depth over 181 acres of Exposed Tailings in Reaches A and B; A and B horizon values based on 0.5 and 1.0 foot depths, respectively, over 181 acres; (Exhibit 2-8 in "Record of Decision Part 2: Decision Summary", USEPA 2004).

(2) - Assumes that A and B horizon will be salvaged in road location; volume for A Horizon based on total available material

(3) - C/MA material suitable primarily for general fill to be used only if volumes of A and B horizon insufficient.

(4) - Based on 18 inch cover soil depth over assumed 25 % of 264,000' x 100' riparian corridor; A and B horizon values based on 0.5 and 1.0 foot depths, respectively, in riparian corridor; (Communication with MDEQ and "Record of Decision Part 2: Decision Summary", USEPA 2004).

Table 8a. Volume of Compost Per Acre to Meet Target Organic Matter Content Levels.

Horizon	Target OM %						
	Upland	*Riparian or Adjacent Unimpacted Soil*					
	1.5	*2*	*3*	*4*	*5*	*6*	*7*
A	0	16	96	176	256	336	416
B	56	96	176	256	336	416	496

Assumptions and Supporting Calculations:

Mean Organic Matter Content of A horizon (1)	*1.8*	*% dry wt*
Mean Organic Matter Content of B horizon (1)	*0.8*	*% dry wt*
Thickness of cover soil to be amended with compost (2)	*0.5*	*feet*
Mass of 6 inch thick cover soil per acre	*1,000*	*tons*
Organic Matter Content of Compost (dry weight) (3)	*250*	*lb/cy*

Table 8b. Cost Per Acre of Incorporated Compost to Meet Target Organic Matter Content Levels.

Horizon	Target OM %						
	Upland	*Riparian or Adjacent Unimpacted Soil*					
	1.5	*2*	*3*	*4*	*5*	*6*	*7*
A	0	736	4,416	8,096	11,776	15,456	19,136
B	2,576	4,416	8,096	11,776	15,456	19,136	22,816

Assumptions and Supporting Calculations:

Compost Cost FOB producer (4)	*20*	*$/cy*
Freight Cost to Deer Lodge (4)	*15*	*$/cy*
Application Cost (5)	*10*	*$/cy*
Incorporation Cost (6)	*1*	*$/cy*

Footnotes:

(1) - From results of analyses of Beck Ranch soil samples.

(2) - Cover soil thickness requirements for Exposed Tailings and Replacement Soil in Riparian Corridor (assumed depth); "Record of Decision Part 2: Decision Summary", USEPA 2004).

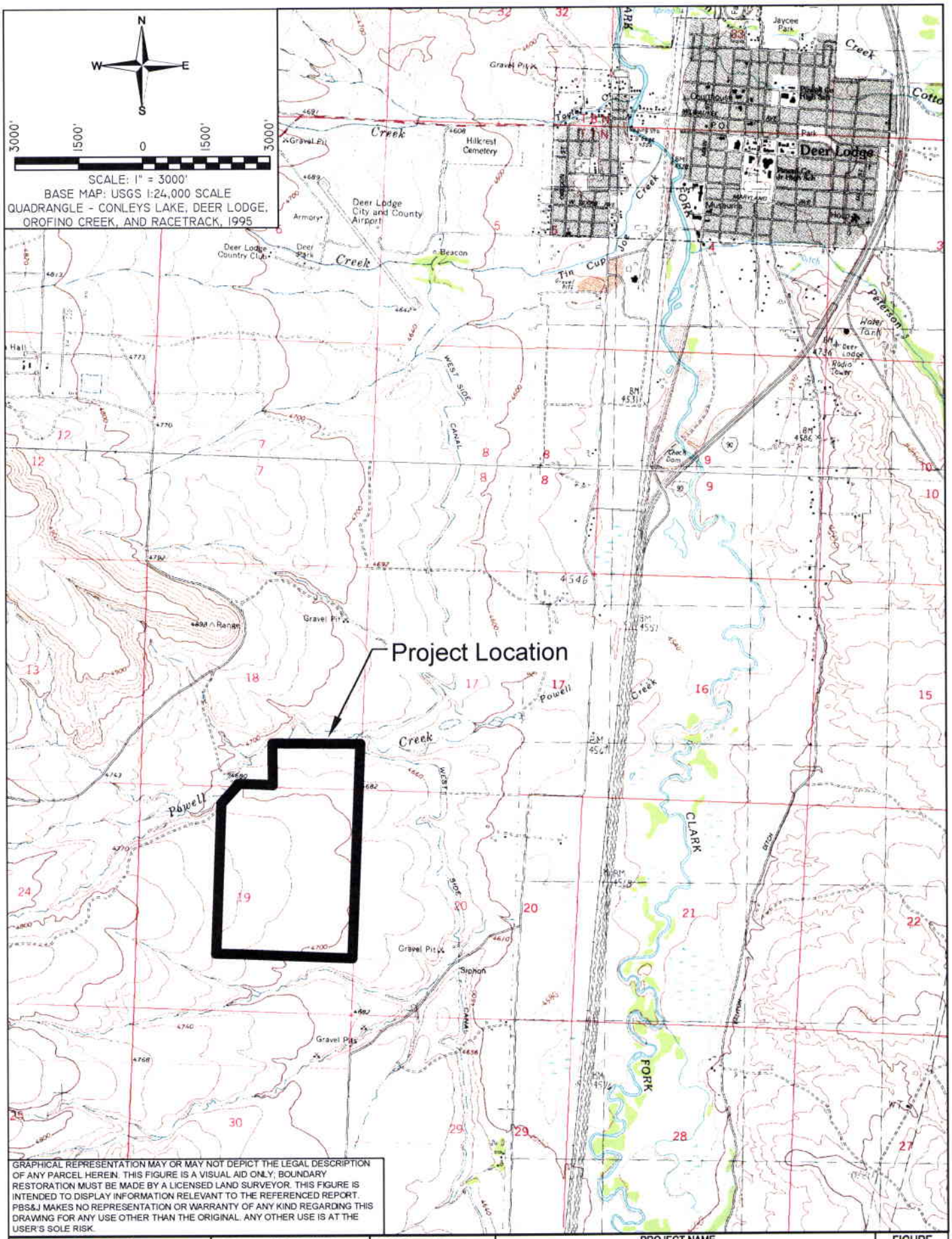
(3) - Bulk density = 1,000 lb/cy; moisture = 50 %; OM = 50 % (representative Montana compost source values)

(4) - Representative costs from Montana compost sources

(5) - Estimate using general equipment costs (loader; manure spreader) to load and spread compost

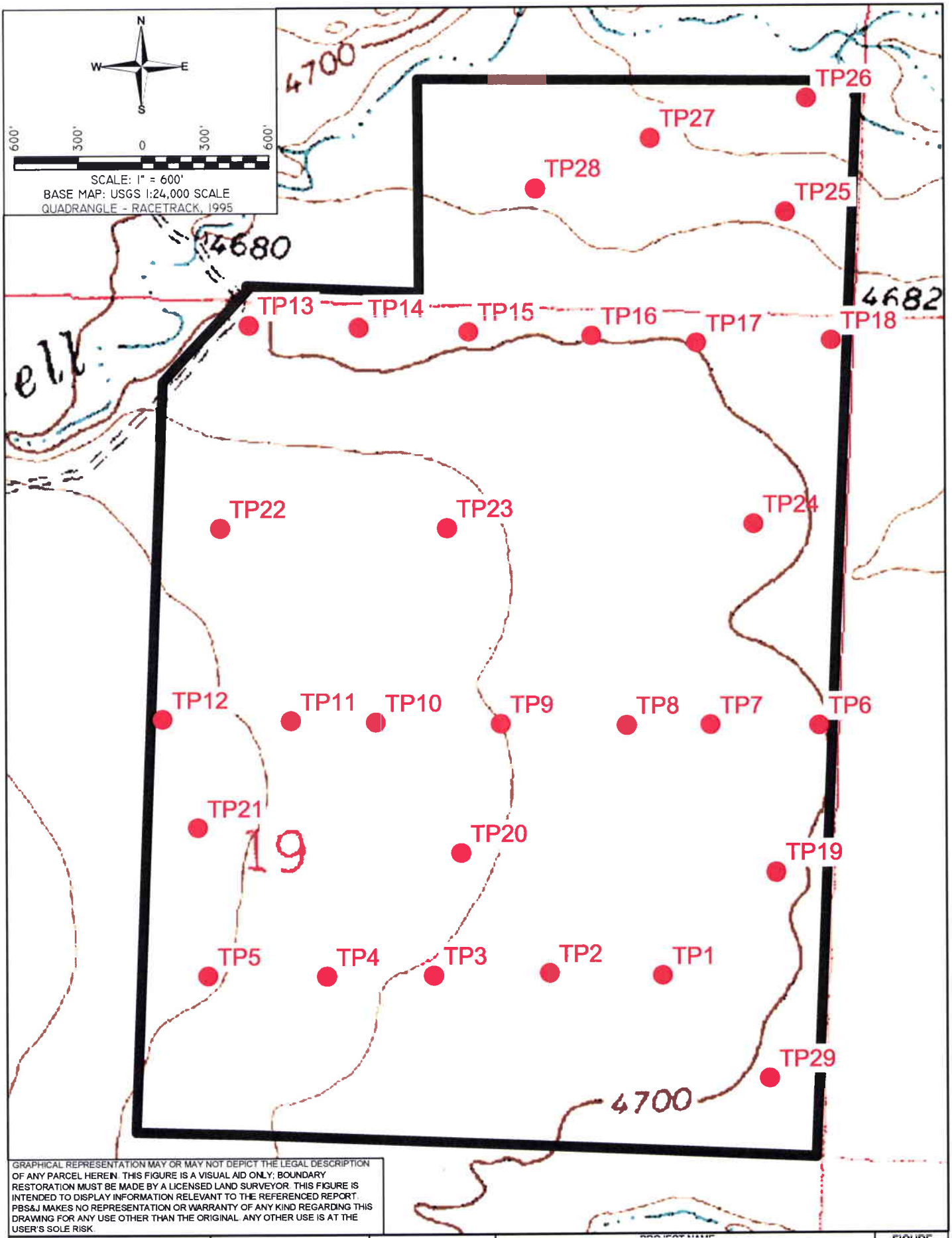
(6) - Estimate using general equipment costs (tractor and plow); assumes between 2 and 4 passes to incorporate

Figures



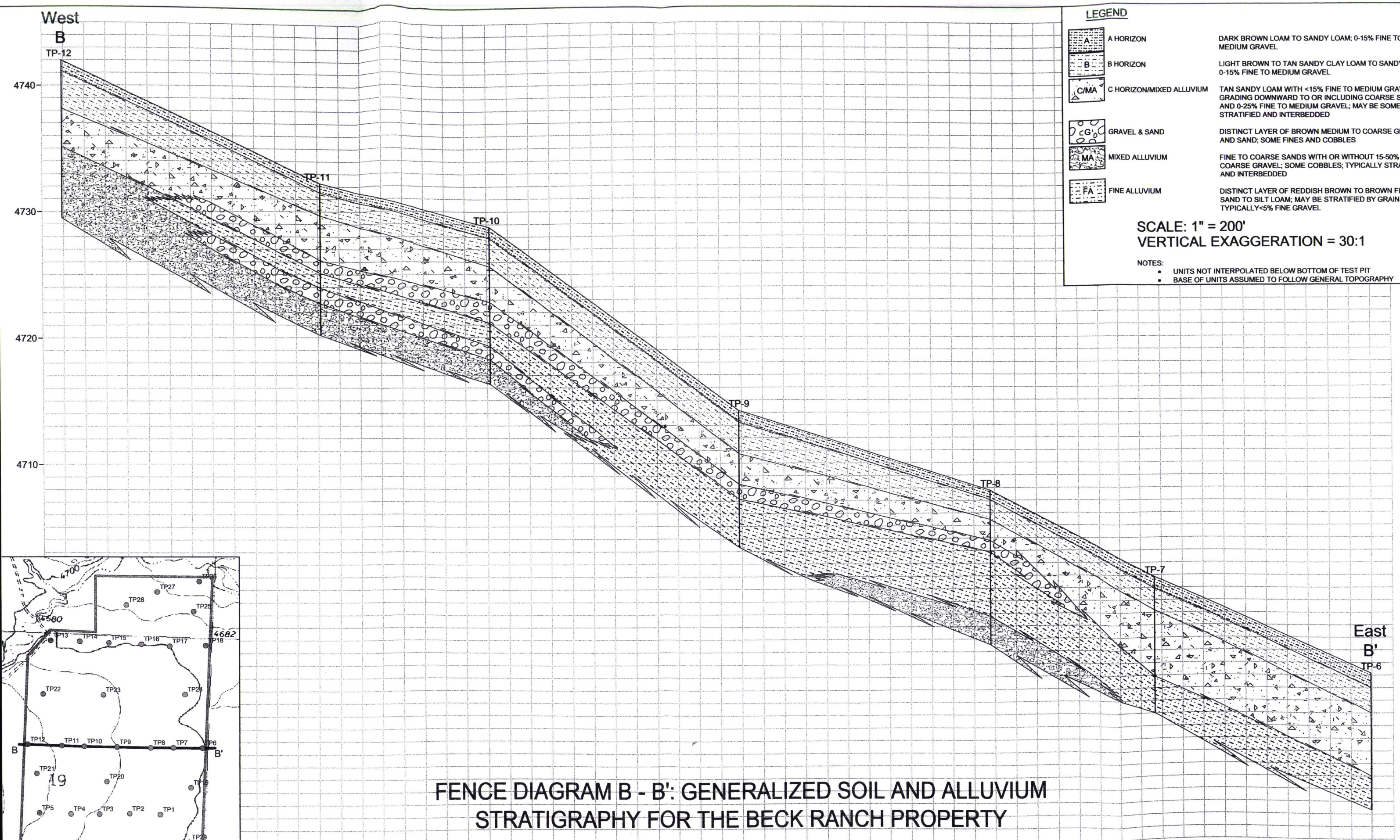
GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

PBSJ 1120 Cedar Missoula, MT 59802	PROJ NO: 100003155	DRAWN: JR	PROJECT NAME: BECK SOIL INVESTIGATION
	LOCATION: DEER LODGE, MT	PROJ MGR: J. DeARMENT	DRAWING TITLE: FIGURE 1. VICINITY MAP
	SCALE: NOTED	CHECKED: ES APPVD: ES	FIGURE 1 OF -
	FILE NAME: loc_map.dwg	DATE: Oct/16/2008	REV -



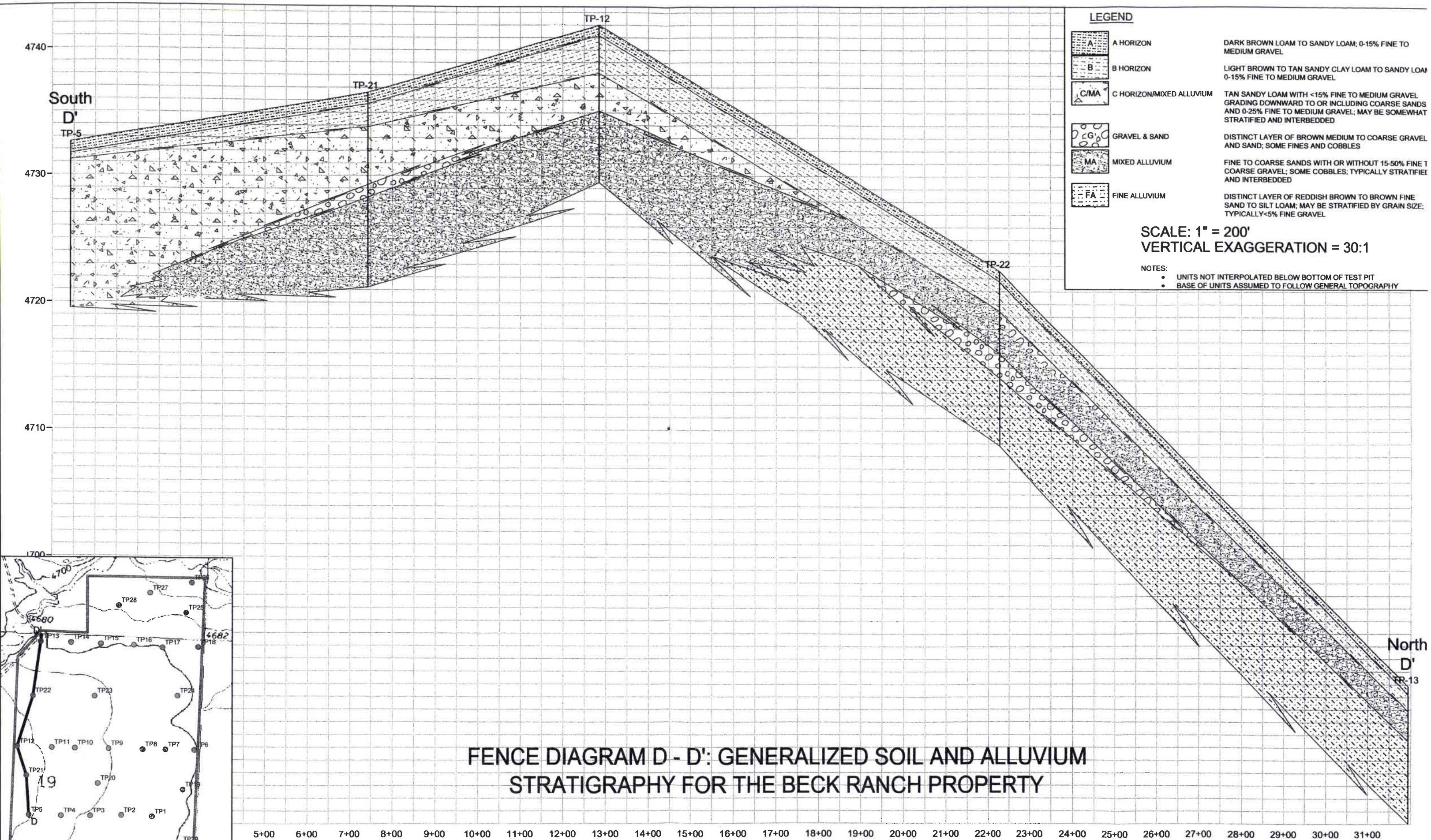
GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

PBSJ 1120 Cedar Missoula, MT 59802	PROJ NO: 100003155	DRAWN: JR	PROJECT NAME: BECK SOIL INVESTIGATION	FIGURE 2 OF -
	LOCATION: DEER LODGE, MT	PROJ MGR: J. DeARMENT		
	SCALE: NOTED	CHECKED: ES APPVD: ES	DRAWING TITLE: FIGURE 2. SOIL PIT LOCATION MAP	REV -
	FILE NAME: loc_map.dwg	DATE: Oct/16/2008		



FENCE DIAGRAM B - B': GENERALIZED SOIL AND ALLUVIUM STRATIGRAPHY FOR THE BECK RANCH PROPERTY

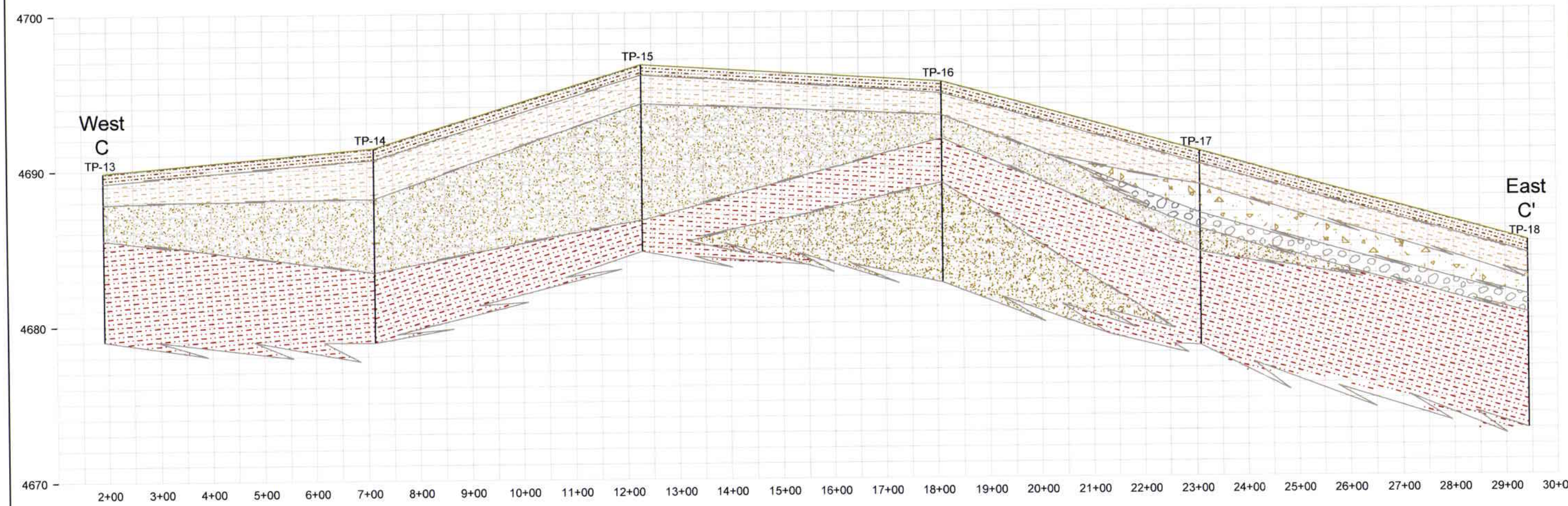
THIS FIGURE IS A VISUAL AID ONLY; THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RI

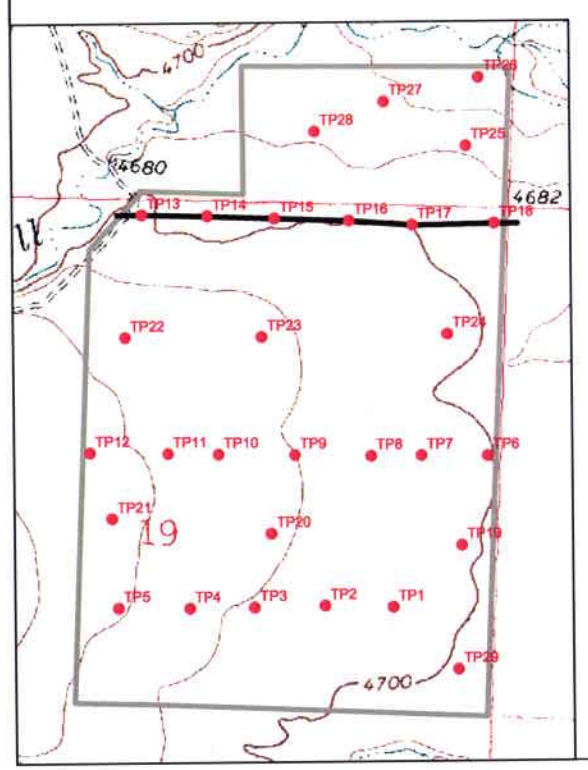


FENCE DIAGRAM D - D': GENERALIZED SOIL AND ALLUVIUM STRATIGRAPHY FOR THE BECK RANCH PROPERTY

THIS FIGURE IS A VISUAL AID ONLY; THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK

FENCE DIAGRAM C - C': GENERALIZED SOIL AND ALLUVIUM STRATIGRAPHY FOR THE BECK RANCH PROPERTY





LEGEND

A	A HORIZON	DARK BROWN LOAM TO SANDY LOAM; 0-15% FINE TO MEDIUM GRAVEL
B	B HORIZON	LIGHT BROWN TO TAN SANDY CLAY LOAM TO SANDY LOAM; 0-15% FINE TO MEDIUM GRAVEL
C/MA	C HORIZON/MIXED ALLUVIUM	TAN SANDY LOAM WITH <15% FINE TO MEDIUM GRAVEL GRADING DOWNWARD TO OR INCLUDING COARSE SANDS AND 0-25% FINE TO MEDIUM GRAVEL; MAY BE SOMEWHAT STRATIFIED AND INTERBEDDED
G	GRAVEL & SAND	DISTINCT LAYER OF BROWN MEDIUM TO COARSE GRAVEL AND SAND; SOME FINES AND COBBLES
MA	MIXED ALLUVIUM	FINE TO COARSE SANDS WITH OR WITHOUT 15-50% FINE TO COARSE GRAVEL; SOME COBBLES; TYPICALLY STRATIFIED AND INTERBEDDED
FA	FINE ALLUVIUM	DISTINCT LAYER OF REDDISH BROWN TO BROWN FINE SAND TO SILT LOAM; MAY BE STRATIFIED BY GRAIN SIZE; TYPICALLY<5% FINE GRAVEL

SCALE: 1" = 200'
VERTICAL EXAGGERATION = 30:1

NOTES:
- UNITS NOT INTERPOLATED BELOW BOTTOM OF TEST PIT
- BASE OF UNITS ASSUMED TO FOLLOW GENERAL TOPOGRAPHY

THIS FIGURE IS A VISUAL AID ONLY; THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

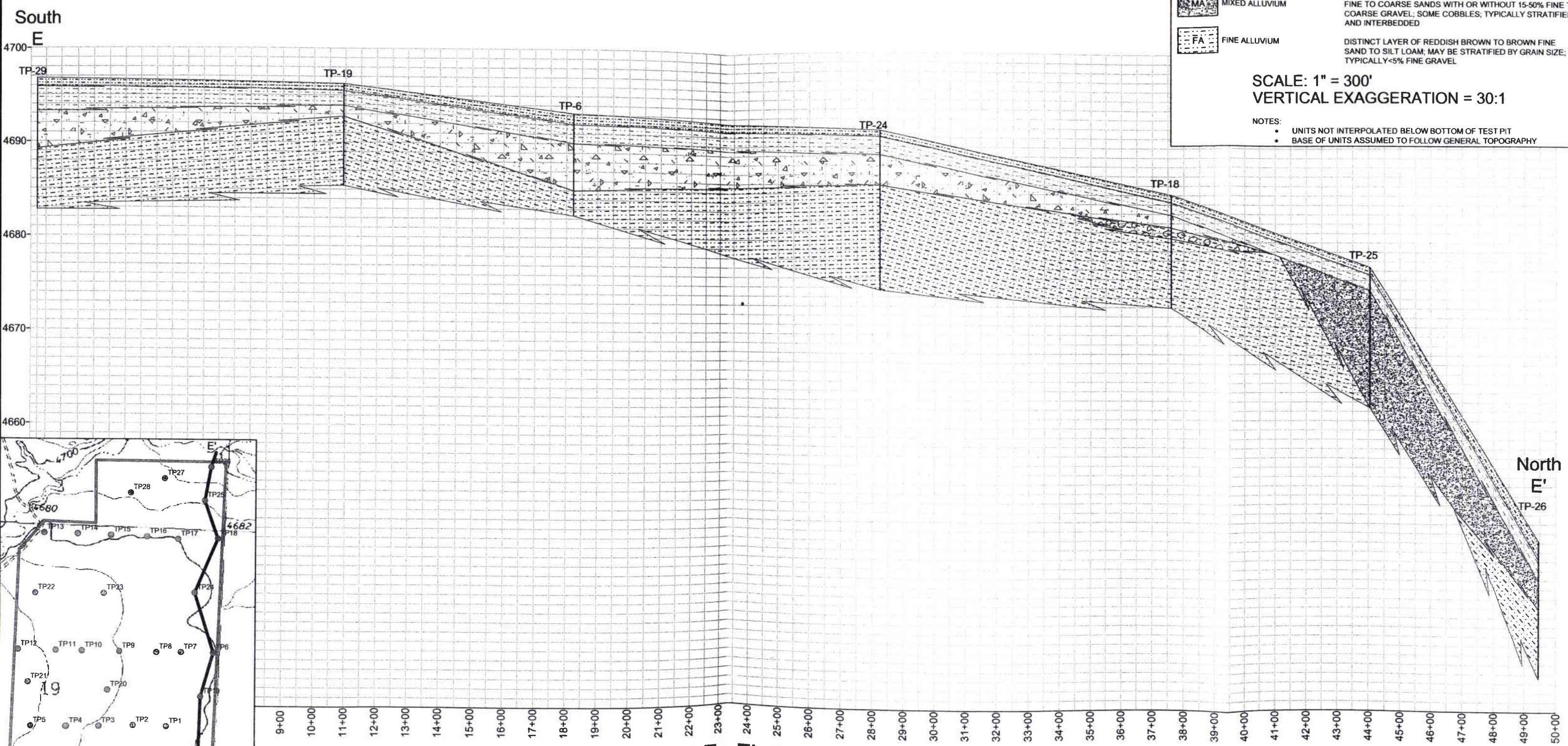
PROJECT NAME
BECK SOIL INVESTIGATION
DRAWING TITLE
FENCE DIAGRAM C - C' - SOIL STRATIGRAPHY AT THE BECK RANCH PROPERTY

DRAWN: JR
PROJ MGR: J. DeARMENT
CHECKED: ES
APPVD: ES

PROJ NO: 100003155
LOCATION: DEER LODGE, MT
SCALE: NOTED
FILE NAME: working_LDD.dwg

PBSJ
1120 Cedar
Missoula, MT 59802

FIGURE
3c OF
REV -
Oct/16/2008



LEGEND

A	A HORIZON	DARK BROWN LOAM TO SANDY LOAM; 0-15% FINE TO MEDIUM GRAVEL
B	B HORIZON	LIGHT BROWN TO TAN SANDY CLAY LOAM TO SANDY LOAM; 0-15% FINE TO MEDIUM GRAVEL
C/MA	C HORIZON/MIXED ALLUVIUM	TAN SANDY LOAM WITH <15% FINE TO MEDIUM GRAVEL GRADING DOWNWARD TO OR INCLUDING COARSE SANDS AND 0-25% FINE TO MEDIUM GRAVEL; MAY BE SOMEWHAT STRATIFIED AND INTERBEDDED
G	G GRAVEL & SAND	DISTINCT LAYER OF BROWN MEDIUM TO COARSE GRAVEL AND SAND; SOME FINES AND COBBLES
MA	MIXED ALLUVIUM	FINE TO COARSE SANDS WITH OR WITHOUT 15-50% FINE TO COARSE GRAVEL; SOME COBBLES; TYPICALLY STRATIFIED AND INTERBEDDED
FA	FINE ALLUVIUM	DISTINCT LAYER OF REDDISH BROWN TO BROWN FINE SAND TO SILT LOAM; MAY BE STRATIFIED BY GRAIN SIZE; TYPICALLY<5% FINE GRAVEL

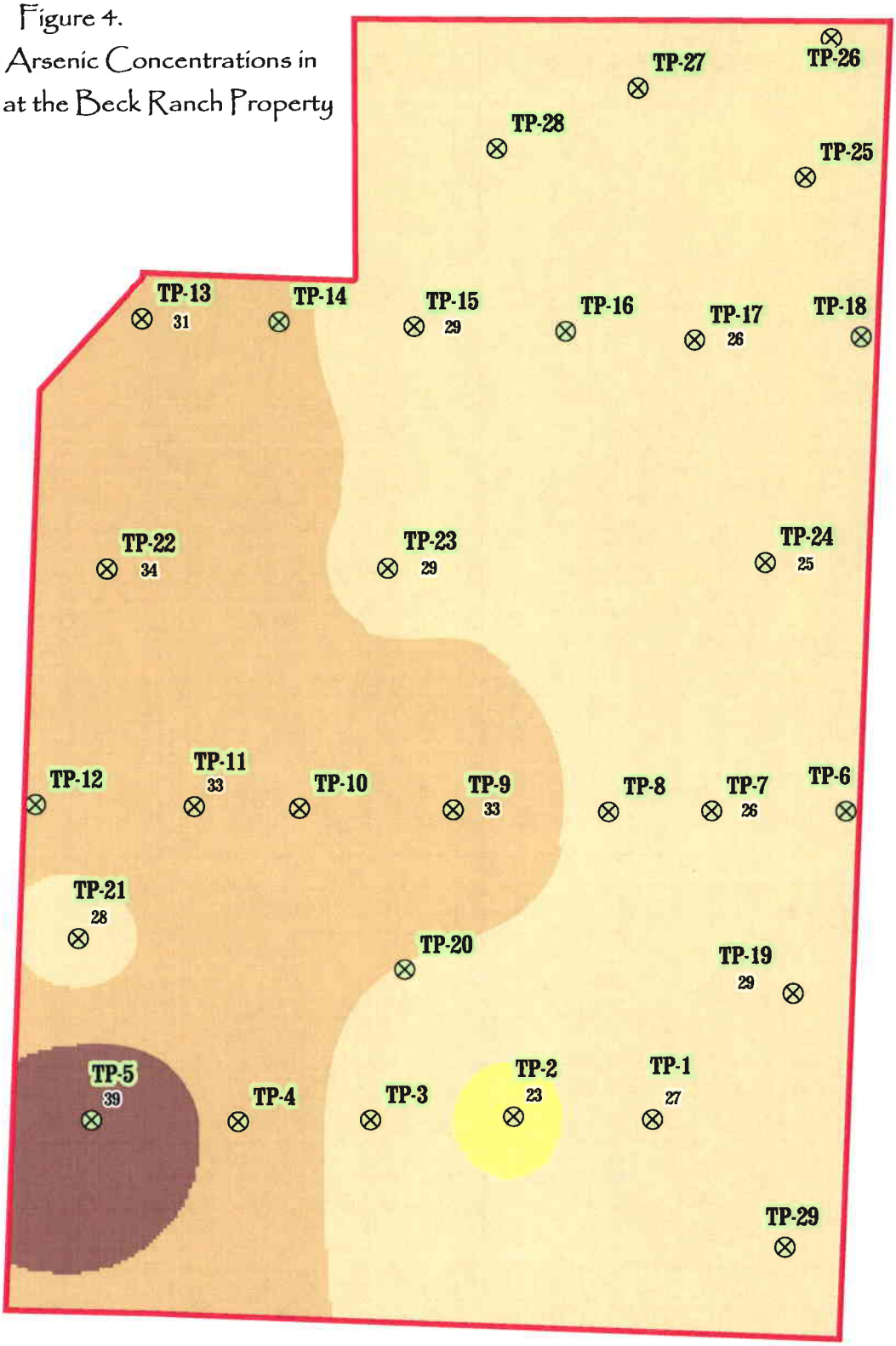
SCALE: 1" = 300'
VERTICAL EXAGGERATION = 30:1

NOTES:
- UNITS NOT INTERPOLATED BELOW BOTTOM OF TEST PIT
- BASE OF UNITS ASSUMED TO FOLLOW GENERAL TOPOGRAPHY

FENCE DIAGRAM E - E': GENERALIZED SOIL AND ALLUVIUM STRATIGRAPHY FOR THE BECK RANCH PROPERTY

THIS FIGURE IS A VISUAL AID ONLY; THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

Figure 4.
Distribution of Arsenic Concentrations in
A Horizon Soil at the Beck Ranch Property



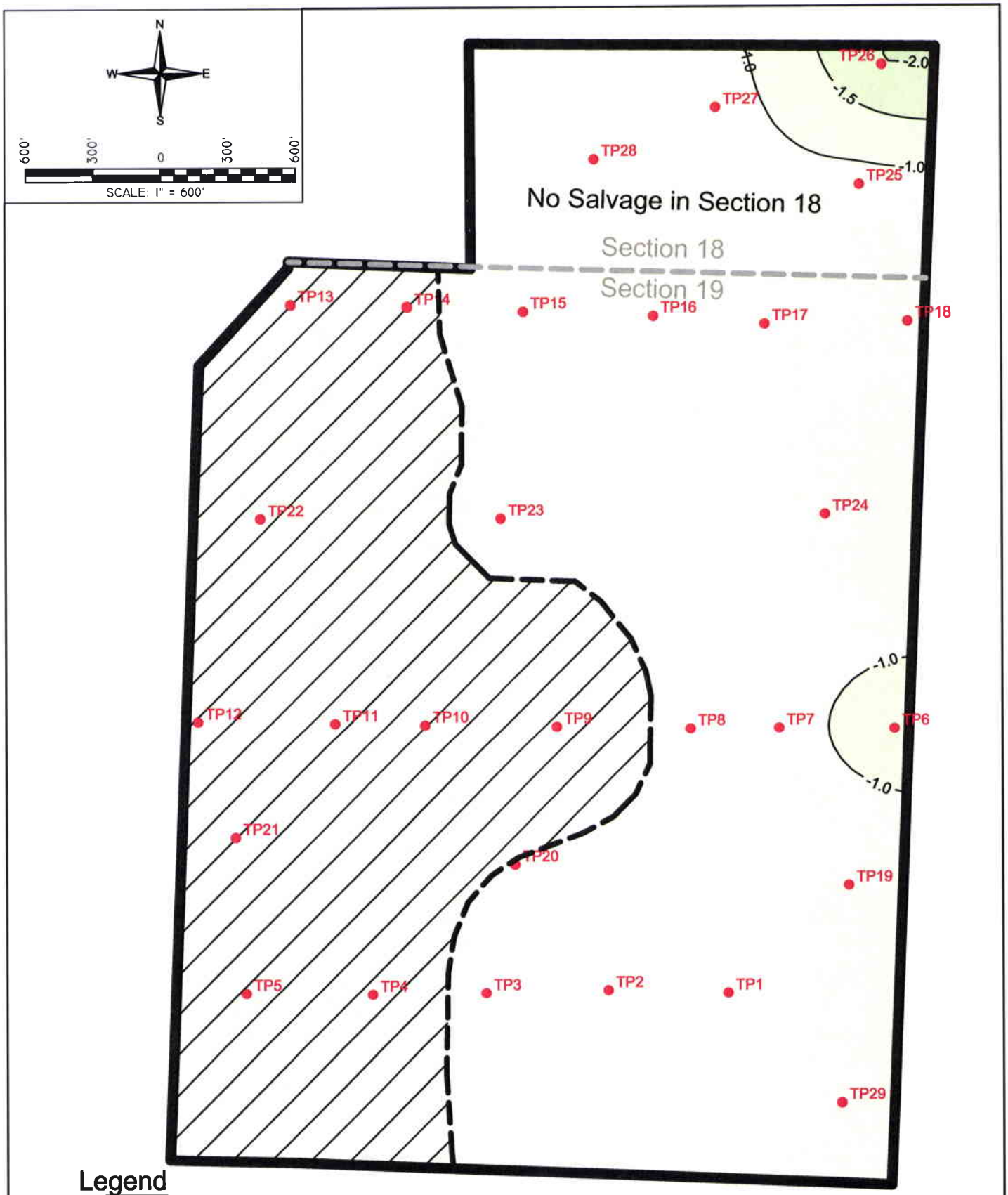
500 250 0 500 1,000
Feet

Legend
Test Pits
Project Boundary
Arsenic Concentrations (mg/kg)
20-24
25-29
30-34
34 - 40

Proj#: 100003155
Date: October 2008
Location: Montana
Proj Manager: J. DeArment
Drawn By: MSA

PBSJ

1120 Cedar Street
Missoula, MT 59802
marthur@pbsj.com



Legend

TP6 Test Pit Location

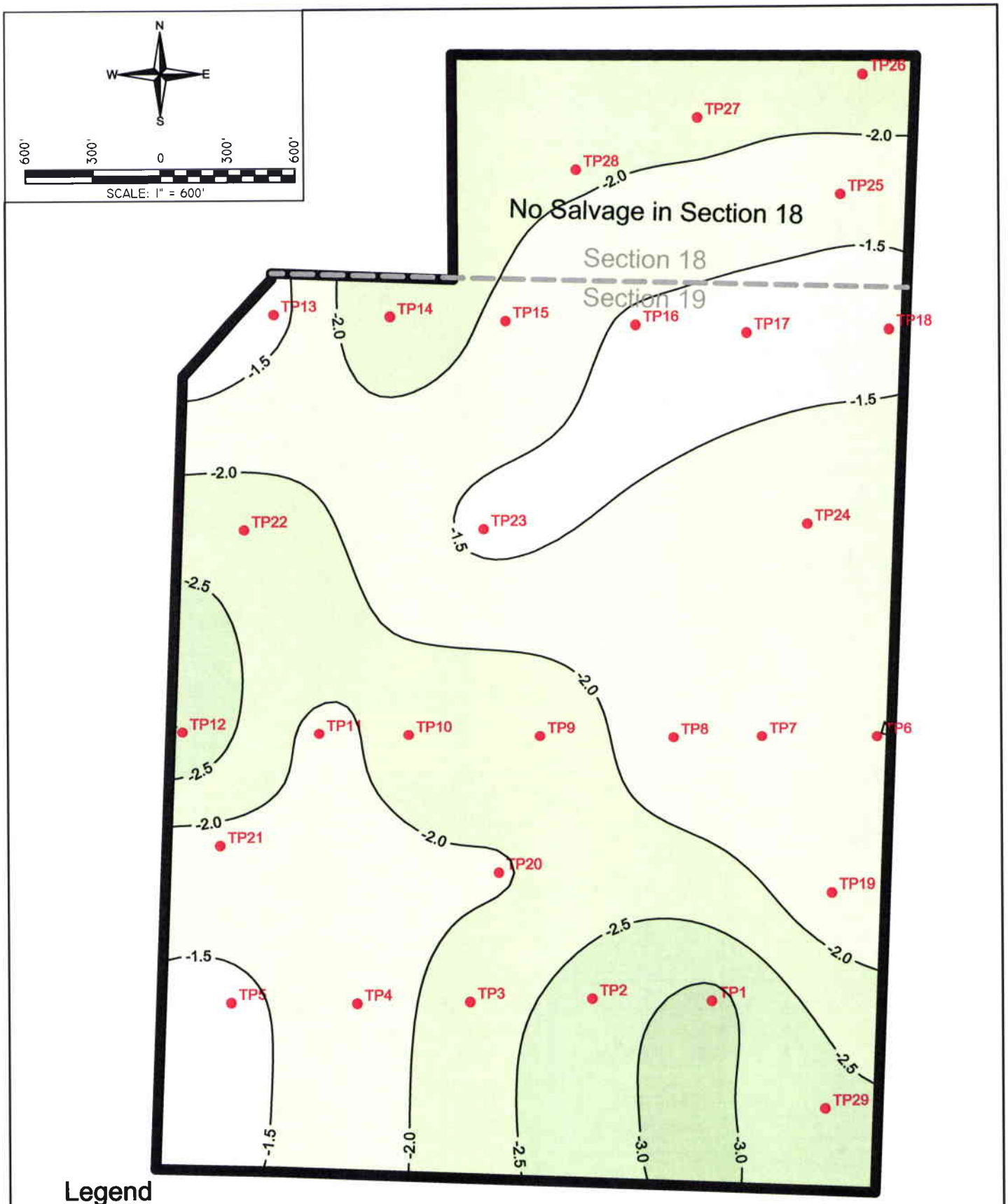
Project Boundary

Arsenic > 30 mg/kg

GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

PBSJ
1120 Cedar
Missoula, MT 59802

PROJ NO: 100003155	DRAWN: JR	PROJECT NAME	FIGURE
LOCATION: DEER LODGE, MT	PROJ MGR: J. DeARMENT	BECK SOIL INVESTIGATION	5a OF -
SCALE: NOTED	CHECKED: ES APPVD: ES	DRAWING TITLE	
FILE NAME: excav_depth A.dwg	DATE: Oct/18/2008	DEPTH OF SALVAGE FOR "A" HORIZON SOIL	REV -



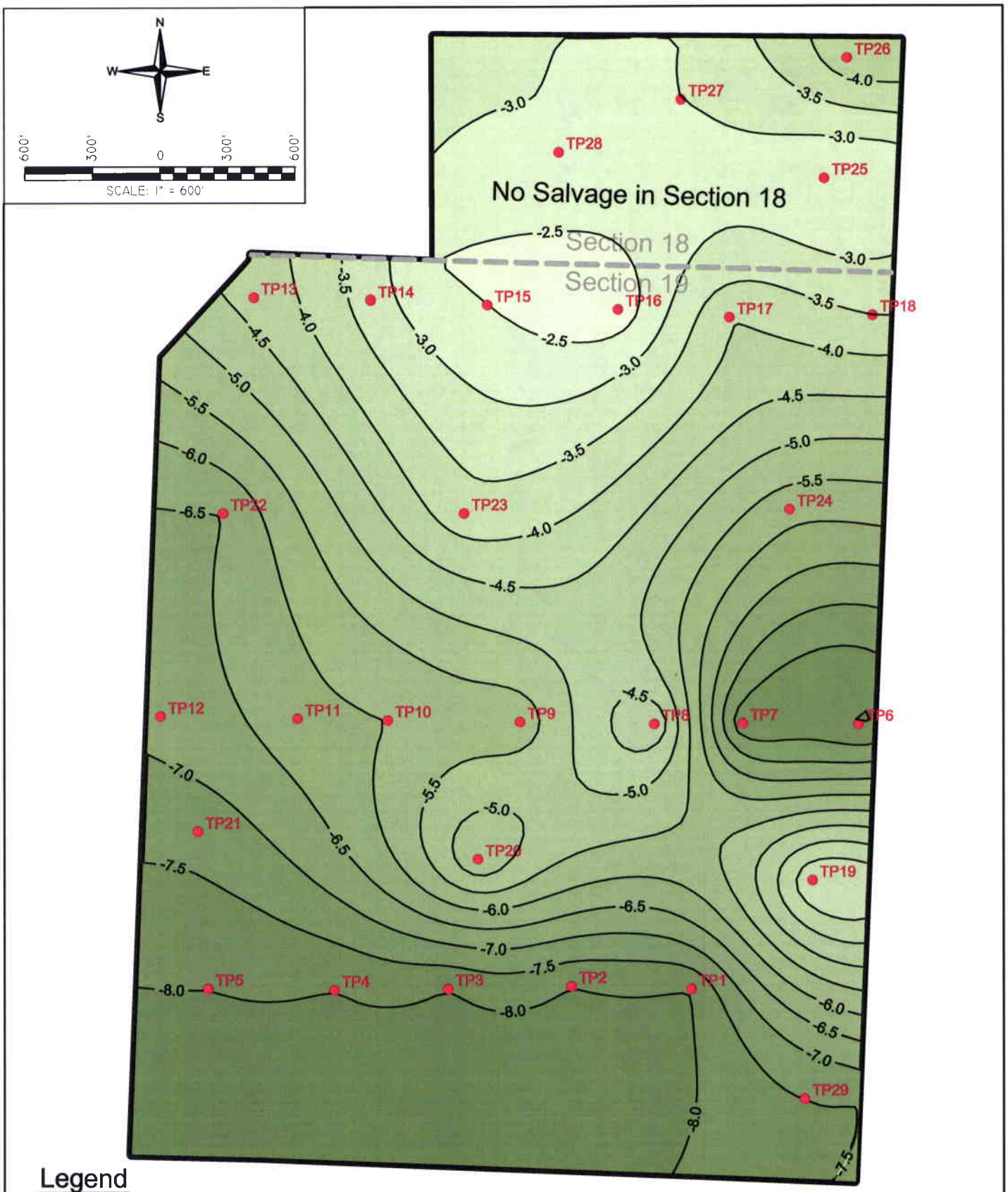
Legend

TP6 Test Pit Location

Project Boundary

GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

PBSJ 1120 Cedar Missoula, MT 59802	PROJ NO: 100003155	DRAWN: JR	PROJECT NAME: BECK SOIL INVESTIGATION	FIGURE 5b OF -
	LOCATION: DEER LODGE, MT	PROJ MGR: J. DeARMENT		
	SCALE: NOTED	CHECKED: ES APPVD: ES	DRAWING TITLE: DEPTH OF SALVAGE FOR "B" HORIZON SOIL	REV -
	FILE NAME: excav_depth B.dwg	DATE: Oct/16/2008		



Legend

TP6 Test Pit Location

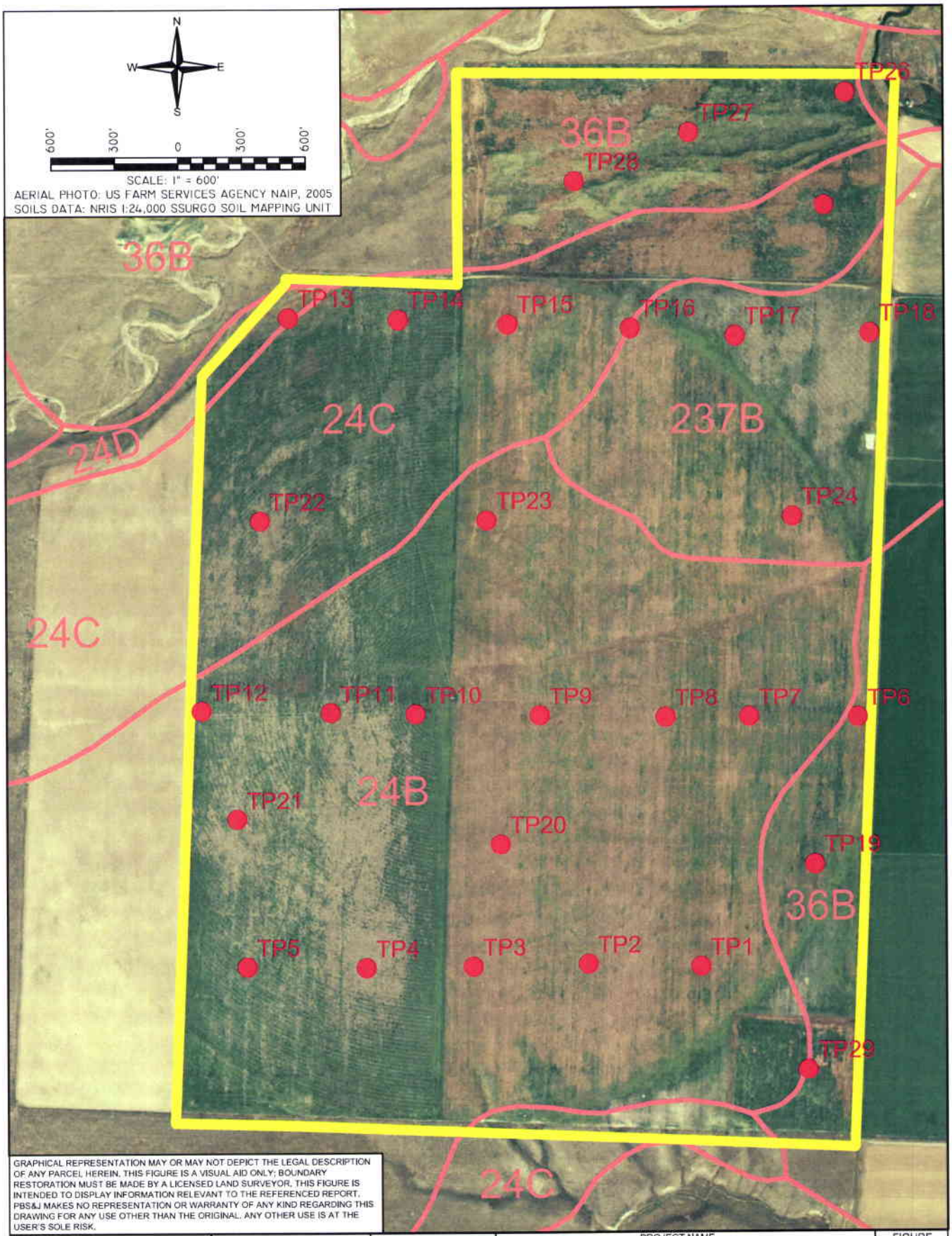
Project Boundary

GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

PBSJ 1120 Cedar Missoula, MT 59802	PROJ NO: 100003155	DRAWN: JR	PROJECT NAME: BECK SOIL INVESTIGATION	FIGURE 5C OF -
	LOCATION: DEER LODGE, MT	PROJ MGR: J. DeARMENT		
	SCALE: NOTED	CHECKED: ES APPVD: ES	DRAWING TITLE: DEPTH OF SALVAGE FOR "C/MA" HORIZON SOIL	REV -
	FILE NAME: excav_depth.dwg	DATE: Oct/16/2008		

APPENDIX A

NRCS Soil Information



GRAPHICAL REPRESENTATION MAY OR MAY NOT DEPICT THE LEGAL DESCRIPTION OF ANY PARCEL HEREIN. THIS FIGURE IS A VISUAL AID ONLY; BOUNDARY RESTORATION MUST BE MADE BY A LICENSED LAND SURVEYOR. THIS FIGURE IS INTENDED TO DISPLAY INFORMATION RELEVANT TO THE REFERENCED REPORT. PBS&J MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND REGARDING THIS DRAWING FOR ANY USE OTHER THAN THE ORIGINAL. ANY OTHER USE IS AT THE USER'S SOLE RISK.

PBSJ 1120 Cedar Missoula, MT 59802	PROJ NO: 100003155	DRAWN: JR	PROJECT NAME: BECK SOIL INVESTIGATION	FIGURE A-1 OF -
	LOCATION: DEER LODGE, MT	PROJ MGR: J. DeARMENT		
	SCALE: NOTED	CHECKED: ES APPVD: ES	DRAWING TITLE: FIGURE A-1. SSURGO SOIL MAP	REV -
	FILE NAME: ssurgo.dwg	DATE: Oct/13/2008		

LOCATION CON MT

Established Series
Rev. HAL-BDD-JAL
03/1999

CON SERIES

The Con series consists of very deep, well drained soils that formed in alluvium. These soils are on alluvial fans and stream terraces. Slopes are 0 to 60 percent. Mean annual precipitation is about 12 inches and mean annual temperature is about 42 degrees F.

TAXONOMIC CLASS: Fine-loamy, mixed, superactive, frigid Aridic Haplustolls

TYPICAL PEDON: Con loam, in cropland (colors are for dry soil unless otherwise noted).

Ap--0 to 7 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak medium granular structure; soft, friable, nonsticky and nonplastic; common fine and very fine roots; 5 percent pebbles; neutral (pH 6.6); clear smooth boundary. (7 to 10 inches thick)

Bw--7 to 11 inches; yellowish brown (10YR 5/4) clay loam, dark brown (10YR 4/3) moist; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky and slightly plastic; common fine and very fine roots; many fine irregular pores; 5 percent pebbles; slightly alkaline (pH 7.4); clear smooth boundary. (4 to 8 inches thick)

Bk1--11 to 21 inches; white (10YR 8/2) loam, very pale brown (10YR 7/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; many fine irregular pores; continuous distinct lime coatings and casts on surface of pebbles; common fine masses of lime; violently effervescent; 5 percent pebbles; moderately alkaline (pH 8.2); clear wavy boundary. (8 to 17 inches thick)

Bk2--21 to 34 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; soft, friable, slightly sticky and nonplastic; few fine and very fine roots; common fine irregular pores; 5 percent pebbles; continuous distinct lime casts and coatings on surface of pebbles; common fine masses of lime; violently effervescent; moderately alkaline (pH 8.2). (10 to 20 inches thick)

Bk3--34 to 60 inches; very pale brown (10YR 7/3) gravelly loam, pale brown (10YR 6/3) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; few fine and very fine roots; common fine irregular pores; 15 percent pebbles; continuous distinct lime casts and coatings on surface of pebbles; common fine masses of lime; violently effervescent; moderately alkaline (pH 8.4).

TYPE LOCATION: Powell County, Montana; 300 feet north and 600 feet east of the SW corner of sec. 24, T.7 N., R.10 W.

RANGE IN CHARACTERISTICS:

Soil temperature - 41 to 46 degrees F.

Moisture control section - between 4 and 12 inches; dry in all parts between four-tenths and five tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.

Mollic epipedon thickness - 7 to 10 inches.

Depth to calcic horizon - 11 to 18 inches.

Ap horizon - Chroma: 1, 2, or 3

Clay content: 18 to 27 percent

Rock fragments: 0 to 35 percent--0 to 20 percent cobbles; 0 to 15 percent pebbles

Reaction: pH 4.5 to 7.3 (4.5 to 6.0 heavy metal phase)

Bw horizon - Value: 4, 5, or 6 dry; 4, or 5 moist

Chroma: 3 or 4

Texture: loam or clay loam

Clay content: 18 to 35 percent

Rock fragments: 0 to 15 percent pebbles

Reaction: pH 6.6 to 7.8

Bk1 horizon - Value: 7 or 8 dry; 5, 6, or 7 moist

Chroma: 2, 3, or 4

Texture: loam, clay loam, or sandy loam

Clay content: 18 to 35 percent

Rock fragments: 0 to 20 percent--0 to 5 percent cobbles; 0 to 15 percent pebbles

Calcium carbonate equivalent: 15 to 40 percent

Reaction: pH 7.9 to 8.4

Bk2 horizon - Value: 5, 6, 7, or 8 dry; 4, 5, or 6 moist

Chroma: 2, 3 or 4

Texture: sandy loam, clay loam, or loam

Clay content: 18 to 35 percent

Rock fragments: 0 to 25 percent--0 to 5 percent cobbles; 0 to 20 percent pebbles

Calcium carbonate equivalent: 15 to 25 percent

Reaction: pH 7.9 to 8.4

Bk3 horizon - Value: 5, 6, 7, or 8 dry; 4 or 6 moist

Chroma: 3 or 4

Texture: sandy loam or loam

Clay content: 18 to 27 percent

Rock fragments: 0 to 25 percent--0 to 5 percent cobbles; 0 to 20 percent pebbles

Calcium carbonate equivalent: 15 to 25 percent

Reaction: pH 7.9 to 8.4

COMPETING SERIES:

Anamac (MT) - does not have a calcic horizon.

Boxwell (MT) - has a paralithic contact at depths of 20 to 40 inches.

Fortbenton (MT) - has a lithologic discontinuity at a depth above 40 inches; does not have a calcic horizon.

Kremlin (MT) - does not have a calcic horizon.

Littlemo (ND) - has a lithologic discontinuity at depths of 20 to 40 inches that has 15 to 70 percent coarse fragments.

Waterhill (UT) - does not have a calcic horizon; has hues of 7.5YR or redder throughout.

GEOGRAPHIC SETTING:

Landform - alluvial fans; stream terraces.

Elevation - 3,600 to 6,400 feet.

Slope- 0 to 60 percent.

Parent material - calcareous alluvium.

Climate - long, cold winters; moist springs; warm summers.

Mean annual precipitation - 10 to 14 inches.

Mean annual temperature - 39 to 44 degrees F.

Frost-free period - 90 to 105 days.

DRAINAGE AND PERMEABILITY: Well drained; moderate permeability.

USE AND VEGETATION: Con soils are used as nonirrigated and irrigated cropland and rangeland. Potential native vegetation is mainly bluebunch wheatgrass, green needlegrass, needleandthread, fringed sagewort, and Sandberg bluegrass.

DISTRIBUTION AND EXTENT: Con soils are of small extent in western Montana valleys.

MLRA OFFICE RESPONSIBLE: Bozeman, Montana

SERIES ESTABLISHED: Powell County, Montana, 1995.

REMARKS: Soil interpretations records: MT1494. Diagnostic horizons and features recognized in this pedon are: a mollic epipedon from the soil surface to 7 inches (Ap horizon); a cambic horizon from 7 to 11 inches (Bw horizon); a calcic horizon from 11 to 60 inches (Bk1, Bk2, and Bk3 horizons); a particle-size control section from 10 to 40 inches (Bw, Bk1, Bk2, and Bk3 horizons). Con soils have a frigid temperature regime and an ustic moisture regime that borders on aridic.

National Cooperative Soil Survey
U.S.A.

LOCATION SIXBEACON MT

Established Series
Rev. HAL-BDD-JAL
03/1999

SIXBEACON SERIES

The Sixbeacon series consists of very deep, well drained soils that formed in gravelly alluvium. These soils are on alluvial fans, stream terraces and valley floors. Slopes are 0 to 60 percent. Mean annual precipitation is about 12 inches and mean annual temperature is about 43 degrees F.

TAXONOMIC CLASS: Loamy-skeletal, mixed, superactive, frigid Aridic Haplustolls

TYPICAL PEDON: Sixbeacon gravelly loam, irrigated hayland (colors are for dry soil unless otherwise noted).

Ap--0 to 4 inches; grayish brown (10YR 5/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine irregular pores; 15 percent pebbles; neutral (pH 6.8); abrupt smooth boundary. (4 to 9 inches thick)

Bw--4 to 10 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine roots; many fine and very fine tubular pores; 5 percent pebbles; neutral (pH 7.2); clear wavy boundary. (4 to 6 inches thick)

Bk1--10 to 12 inches; light brownish gray (10YR 6/2) loam, brown (10YR 5/3) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; many fine and very fine pores; 10 percent pebbles; disseminated lime; strongly effervescent; moderately alkaline (pH 8.0); clear wavy boundary. (2 to 4 inches thick)

2Bk2--12 to 24 inches; white (10YR 8/2) very gravelly sandy loam, light gray (10YR 7/2) moist; weak fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine roots; many fine and very fine tubular pores; 50 percent pebbles; disseminated lime; violently effervescent; moderately alkaline (pH 8.4); clear wavy boundary. (10 to 23 inches thick)

3Bk3--24 to 60 inches; light gray (10YR 7/2) extremely gravelly loamy sand, pale brown (10YR 6/3) moist; single grain; loose, nonsticky and nonplastic; few fine roots; many fine irregular pores; 60 percent pebbles and 10 percent cobbles; disseminated lime; violently effervescent; moderately alkaline (pH 8.4).

TYPE LOCATION: Powell County, Montana; 100 feet north and 1,000 feet west of the SE corner of sec. 23, T. 8 N., R. 9 W.

RANGE IN CHARACTERISTICS:

Soil temperature - 41 to 47 degrees F.

Moisture control section - between 4 and 12 inches; dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at a depth of 20 inches is 41 degrees F or higher.

Mollic epipedon thickness - 7 to 15 inches.

Depth to calcic horizon - 8 to 13 inches.

Ap horizon - Hue: 10YR or 2.5Y

Chroma: 2 or 3

Texture: loam, fine sandy loam or sandy loam

Clay content: 10 to 27 percent

Rock fragments: 0 to 35 percent--0 to 15 percent cobbles; 0 to 20 percent pebbles

Reaction: pH 6.1 to 7.8

Bw horizon - Hue: 10YR or 2.5Y

Value: 4, 5 or 6 dry; 3 or 4 moist

Chroma: 2, 3, or 4

Texture: loam or sandy loam

Clay content: 18 to 27 percent

Rock fragments: 0 to 35 percent--0 to 10 percent cobbles; 0 to 25 percent pebbles

Reaction: pH 6.6 to 8.4

Bk1 horizon - Hue: 10YR or 2.5Y

Value: 5, 6, 7 or 8 dry, 4, 5, 6 or 7 moist

Chroma: 1, 2, 3, or 4

Texture: loam or sandy loam

Clay content: 10 to 27 percent

Rock fragments: 5 to 35 percent--0 to 5 percent cobbles; 5 to 30 percent pebbles

Calcium carbonate equivalent: 5 to 25 percent

Reaction: pH 7.4 to 8.4

2Bk2 horizon - Hue: 10YR or 2.5Y

Value: 6, 7 or 8 dry; 6 or 7 moist

Chroma: 2, 3, or 4

Texture: sandy loam or loam

Clay content: 10 to 20 percent

Rock fragments: 35 to 60 percent--0 to 10 percent cobbles; 35 to 50 percent pebbles

Calcium carbonate equivalent: 20 to 40 percent

Reaction: pH 7.9 to 8.4

3Bk3 horizon - Value: 5, 6, or 7 dry; 4, 5, or 6 moist

Chroma: 2, 3, or 4

Texture: loamy sand, sandy loam, or loam

Clay content: 0 to 10 percent

Rock fragments: 50 to 80 percent--10 to 20 percent cobbles; 40 to 60 percent pebbles

Calcium carbonate equivalent: 15 to 30 percent

Reaction: pH 7.4 to 9.0

COMPETING SERIES:

Bulltop (ND) - averages more than 18 percent clay in the particle-size control section

Dolus (MT) - has a paralithic contact of semiconsolidated sandstone at depths of 20 to 40 inches.

Frenchcreek (MT) - does not have a horizon of secondary calcium carbonate accumulations or a calcic horizon.

GEOGRAPHIC SETTING:

Landform - alluvial fans, stream terraces and valley floors.

Elevation - 3,600 to 5,800 feet.

Slope- 0 to 60 percent.

Parent material - gravelly alluvium.

Climate - long, cold winters.

Mean annual precipitation - 10 to 14 inches.

Mean annual air temperature - 39 to 45 degrees F.

Frost-free period - 90 to 115 days.

DRAINAGE AND PERMEABILITY: Well drained; moderate permeability above the sandy-skeletal material and rapid in the sandy-skeletal material.

USE AND VEGETATION: Sixbeacon soils are used mainly for rangeland and irrigated cropland. Potential native vegetation is mainly bluebunch wheatgrass, green needlegrass, needleandthread, Sandberg bluegrass, prairie junegrass, and forbs.

DISTRIBUTION AND EXTENT: Sixbeacon soils are of small extent in mountain valleys of western Montana.

MLRA OFFICE RESPONSIBLE: Bozeman, Montana

SERIES ESTABLISHED: Powell County, Montana, 1995.

REMARKS: Soil interpretations record: MT0618, MT8150. Diagnostic horizons and features recognized in this pedon are: a mollic epipedon from the soil surface to 10 inches (A, Bw horizons); a calcic horizon from 12 to 60 inches (2Bk2, 3Bk3 horizons); a particle-size control section from 10 to 40 inches (Bk1, 2Bk2, 3Bk3 horizons). Sixbeacon soils have a frigid temperature regime and an ustic moisture regime that borders on aridic.

National Cooperative Soil Survey
U.S.A.

LOCATION VARNEY MT

Established Series
Rev. JB-GFB-JAL
10/2000

VARNEY SERIES

The Varney series consists of very deep, well drained soils that formed in alluvium. These soils are on alluvial fans, stream terraces, strath terraces, escarpments, knolls and hills. Slopes are 0 to 60 percent. Mean annual precipitation is about 13 inches, and mean annual temperature is about 40 degrees F.

TAXONOMIC CLASS: Fine-loamy, mixed, superactive, frigid Calcidic Argiustolls

TYPICAL PEDON: Varney clay loam, cultivated (colors are for dry soil unless otherwise noted).

Ap--0 to 5 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and very fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; many fine and very fine interstitial pores; 5 percent pebbles; neutral (pH 6.6); clear smooth boundary. (3 to 9 inches thick)

Bt--5 to 16 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; moderate medium and fine subangular blocky structure; hard, friable, moderately sticky and moderately plastic; many fine and very fine roots; common fine tubular pores; continuous, faint clay films on faces of peds; 10 percent pebbles; neutral (pH 7.3); clear irregular boundary. (5 to 15 inches thick)

Bk1--16 to 28 inches; light gray (10YR 7/2) gravelly sandy clay loam, pale brown (10YR 6/3) moist; weak coarse prismatic structure; slightly hard, friable, slightly sticky and nonplastic; common fine and very fine roots; common fine and very fine pores; 15 percent pebbles and 5 percent cobbles; common fine masses of lime; violently effervescent; moderately alkaline (pH 7.9); gradual smooth boundary. (5 to 25 inches thick)

Bk2--28 to 48 inches; very pale brown (10YR 7/3) gravelly sandy loam, pale brown (10YR 6/3) moist; weak, coarse, prismatic structure; soft, friable, slightly sticky and nonplastic; few fine roots; few fine pores; 15 percent pebbles and 5 percent cobbles; disseminated lime; few fine masses of lime; strongly effervescent; moderately alkaline (pH 7.9); clear smooth boundary. (5 to 25 inches thick)

BC--48 to 60 inches; light brown (7.5YR 6/4) stratified gravelly sandy loam and gravelly loamy sand, brown (7.5YR 5/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine roots; few fine pores; 20 percent pebbles and 5 percent cobbles; slightly effervescent; moderately alkaline (pH 8.4).

TYPE LOCATION: Madison County, Montana; 2,400 feet north and 2,300 feet west of the SE corner of Sec. 32, T. 2 S., R. 1 W.

RANGE IN CHARACTERISTICS:

Soil temperature - 40 to 47 degrees F.
Moisture control section - between 4 and 12 inches, dry in all parts between four-tenths and five-tenths of the cumulative days per year when the soil temperature at 20 inches is 41 degrees F or higher.
Mollic epipedon thickness - 7 to 16 inches and includes part of the argillic horizon.

Depth to Bk horizon - 9 to 20 inches (mainly 12 to 17 inches).
Some pedons have a Btk horizon.
Surface stones or boulders - 0 to 0.1 percent
Uncultivated areas have a 2 to 4 inch A horizon that is loam or gravelly loam.

Ap horizon - Hue: 10YR or 2.5Y
Value: 4 or 5 dry; 2 or 3 moist
Chroma: 2 or 3
Texture: clay loam, loam, or sandy clay loam
Clay content: 18 to 35 percent
Rock fragments: 0 to 50 percent--0 to 20 percent cobbles, 0 to 30 percent pebbles
EC: 0 to 2 mmhos/cm
Reaction: pH 6.6 to 7.8

Bt horizon - Hue: 10YR or 2.5Y
Value: 4, 5, or 6 dry; 3, 4, or 5 moist
Chroma: 2, 3, or 4
Texture: clay loam or sandy clay loam
Clay content: 27 to 35 percent
Rock fragments: 0 to 35 percent--0 to 15 percent cobbles, 0 to 30 percent pebbles
EC: 0 to 2 mmhos/cm
Reaction: pH 6.6 to 7.8

Bk1 horizon - Hue: 10YR or 2.5Y
Value: 5, 6, 7, or 8 dry; 4, 5, 6, or 7 moist
Chroma: 2, 3, or 4
Texture: sandy loam, loam, clay loam, or sandy clay loam
Clay content: 10 to 30 percent
Rock fragments: 0 to 35 percent--0 to 5 percent cobbles, 0 to 30 percent pebbles
Calcium carbonate equivalent: 15 to 30 percent
EC: 0 to 2 mmhos/cm
Reaction: pH 7.4 to 8.4

Bk2 horizon - Hue: 10YR or 2.5Y
Value: 6, 7, or 8 dry; 4, 5, 6, or 7 moist
Chroma: 3 or 4
Texture: sandy loam, loam, or sandy clay loam
Clay content: 10 to 30 percent
Rock fragments: 0 to 35 percent--0 to 5 percent cobbles, 0 to 30 percent pebbles
Calcium carbonate equivalent: 5 to 30 percent
EC: 0 to 2 mmhos/cm
Reaction: pH 7.4 to 8.4

BC horizon - Hue: 2.5Y, 10YR or 7.5YR
Value: 5, 6, or 7 dry; 4, 5, or 6 moist
Chroma: 2, 3, or 4
Texture: stratified loamy sand, sandy loam, sandy clay loam or clay loam
Clay content: 5 to 25 percent
Rock fragments: 5 to 35 percent--0 to 5 percent cobbles, 5 to 30 percent pebbles
EC: 0 to 2 mmhos/cm
Calcium carbonate equivalent: 5 to 25 percent
Reaction: pH 7.4 to 8.4

COMPETING SERIES:

Cortyzack (CO) - has hues of 5YR or 7.5YR in the argillic horizon; receives 15 to 20 inches of precipitation.

Emlin (CO) - is not stratified below a depth of 40 inches; is dry in all parts of the moisture control section more than half the cumulative days when the soil temperature at 20 inches is above 41 degrees F.

Morval (NM) - has a 2Bt horizon at depths greater than 46 inches.

Notter (UT) - has loamy-skeletal C horizons.

Nuley (MT) - has a gravelly coarse sand 2C horizon below a depth of 15 inches; has bedrock at depths of 40 to 60 inches.

Thunderhead (MT) - has a paralithic and lithic contact at 22 to 40 inches.

Villa Grove (CO) - has exchangeable sodium percent of 5 to 20 in the argillic horizon.

GEOGRAPHIC SETTING:

Landform - alluvial fans, stream terraces, strath terraces, escarpments, knolls or hills.
Elevation - 2,500 to 6,500 feet.
Slope - 0 to 60 percent.
Parent material - alluvium.
Climate - long, cold winters; moist springs; warm summers.
Mean annual precipitation - 10 to 14 inches.
Mean annual temperature - 38 to 45 degrees F.
Frost-free season - 70 to 130 days.

DRAINAGE AND PERMEABILITY: Well drained; moderate permeability.

USE AND VEGETATION: Varney soils are mainly used for irrigated crops, dryland crops, and as rangeland. The potential native vegetation is mainly bluebunch wheatgrass, western wheatgrass, needleandthread, and green needlegrass.

DISTRIBUTION AND EXTENT: Varney soils are moderately extensive in the intermountain valleys in southwestern Montana.

MLRA OFFICE RESPONSIBLE: Bozeman, Montana

SERIES ESTABLISHED: Madison County Area, Montana, 1983; proposed in Madison County Area, Montana, 1977.

REMARKS: Soil interpretations records: MT0374, MT0670. Diagnostic horizons and features recognized in this pedon are: a mollic epipedon from the soil surface to 7 inches when mixed (Ap and part of Bt horizons); an argillic horizon from 5 to 16 inches (Bt horizon); a particle-size control section that is the argillic horizon; a calcic horizon from 16 to 48 inches (Bk1 and Bk2 horizons). Varney soils have a frigid temperature regime and an ustic moisture regime bordering on aridic.

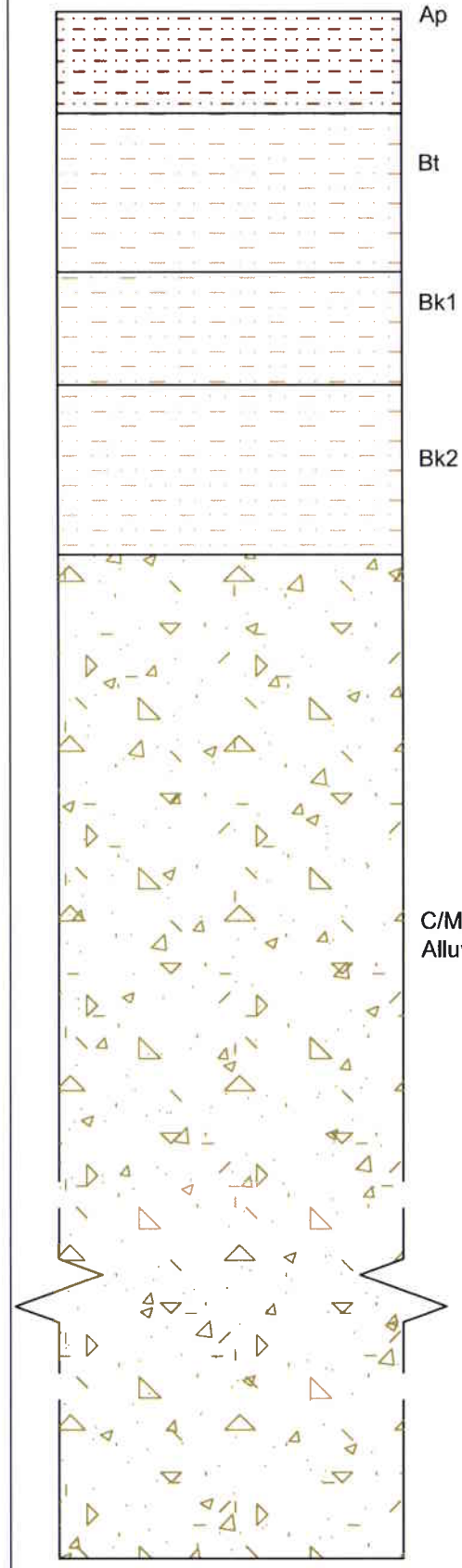
National Cooperative Soil Survey

U.S.A.

APPENDIX B

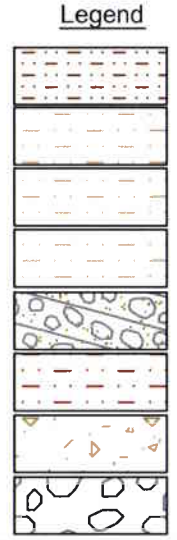
Soil Typifying Pedon Descriptions
and
Soil Pit Horizon Depths

Beck Ranch Soil Investigation TP-1



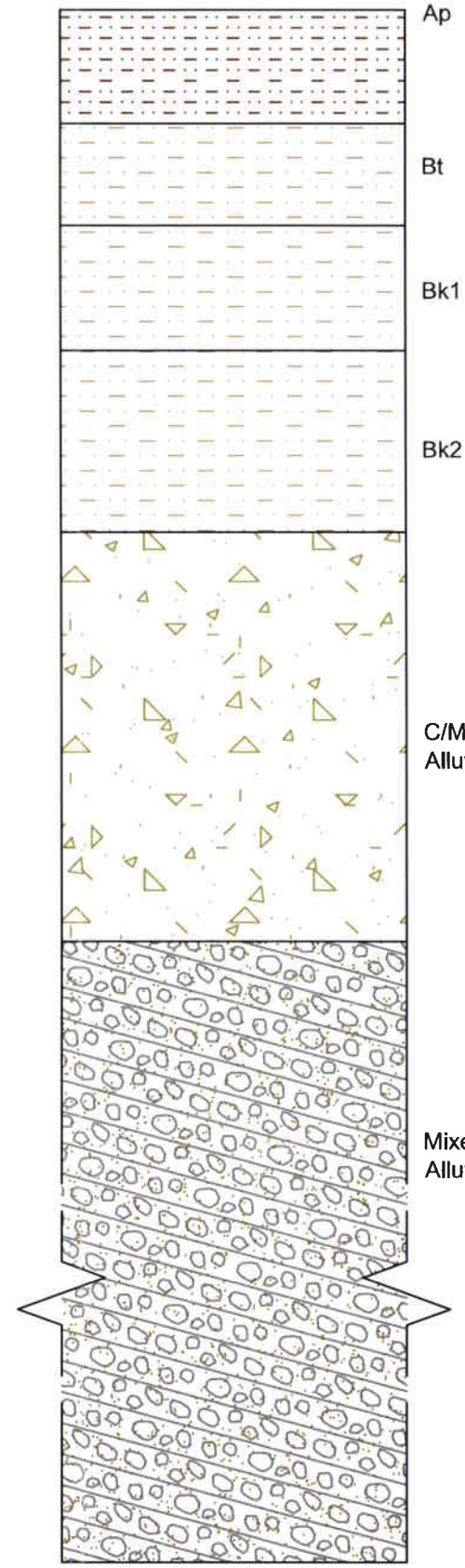
Ap	0 - 10	Dark brown (moist) loam; strong, medium to coarse subangular blocky breaking to moderate medium granular structure; hard; slightly sticky, slightly plastic; non-effervescent; many fine to medium roots; 5 % fine to medium pebbles; clear, wavy boundary.
Bt	10 - 23	Tan sandy clay loam; strong, medium to coarse subangular blocky structure; hard; slightly sticky, slightly plastic; strongly effervescent; many fine to medium roots; 5 % fine to medium pebbles; clear, wavy boundary.
Bk1	23- 38	Tan sandy loam; moderate, medium subangular blocky structure; friable; non-sticky, non-plastic; violently effervescent; common fine to medium roots; 10 % fine to medium pebbles; clear, wavy boundary.
Bk2	38 - 48	Tan sandy loam; weak to moderate, medium subangular blocky structure; friable; non-sticky, non-plastic; violently effervescent; common fine to medium roots; 15 % fine to medium pebbles; diffuse, wavy boundary.
C/Mixed Alluvium	48 - 150	Light brown sandy loam interbedded with fine to medium brown and tan sands; stratified; massive, friable; non-sticky, non-plastic; violently effervescent; few fine to medium roots; 15 % fine to medium pebbles.

Legend



- Ap
- Bt
- Bk1
- Bk2
- Mixed Alluvium
- Fine Alluvium
- C/Mixed Alluvium
- Gravel and Sand

Beck Ranch Soil Investigation TP-12



Ap	0 - 10	Dark brown (moist) loam; strong, medium to coarse subangular blocky breaking to moderate medium granular structure; hard; slightly sticky, slightly plastic; non-effervescent; many fine to medium roots; 5 % fine to medium pebbles; clear, wavy boundary.
Bt	10 - 19	Tan sandy clay loam; strong, medium to coarse subangular blocky structure; hard; slightly sticky, slightly plastic; strongly effervescent; many fine to medium roots; 5 % fine to medium pebbles; clear, wavy boundary.
Bk1	19 - 30	Tan sandy loam; moderate, medium subangular blocky structure; friable; non-sticky, non-plastic; violently effervescent; common fine to medium roots; 10 % fine to medium pebbles; clear, wavy boundary.
Bk2	30 - 46	Light brown loam; strong to moderate fine platy breaking to fine subangular block structure; hard; slightly sticky, slightly plastic; violently effervescent; few fine to medium roots; 15 % fine to medium pebbles; gradual, wavy boundary.
C/Mixed Alluvium	46 - 82	Light brown sandy loam interbedded with fine to medium brown and tan sands; stratified; massive, friable; non-sticky, non-plastic; violently effervescent; few fine to medium roots; 15 % fine to medium pebbles.
Mixed Alluvium	82 - 150	Light brown to tan fine to medium sands and sandy gravel; interbedded; massive, friable; non-sticky, non-plastic; violently effervescent; few fine to medium roots; 30 % fine to medium pebbles.

PROJECT NAME: BECK RANCH SOIL INVESTIGATION

DRAWING TITLE: SOIL PROFILES

DRAWN: JR | PROJ MGR: J. DeARMENT | CHECKED: ES | APPVD: ES

PROJ NO: 100003155 | LOCATION: DEER LODGE, MT | SCALE: NOT TO SCALE | FILE NAME: soils.dwg

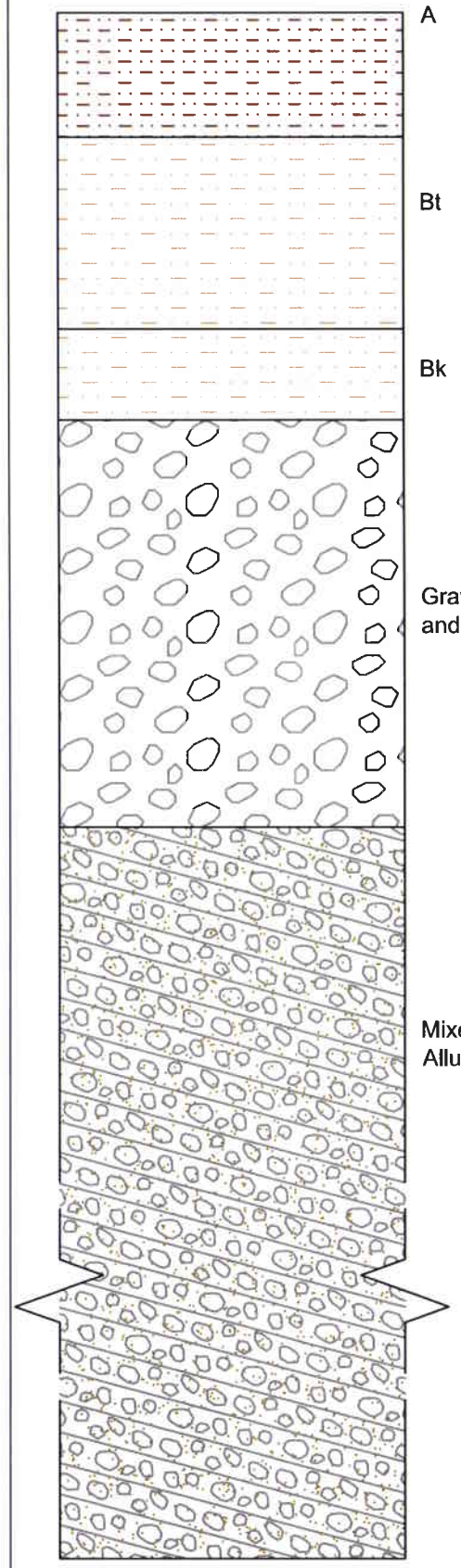
PBSJ 1120 Cedar Missoula, MT 59802

FIGURE B-1

REV -

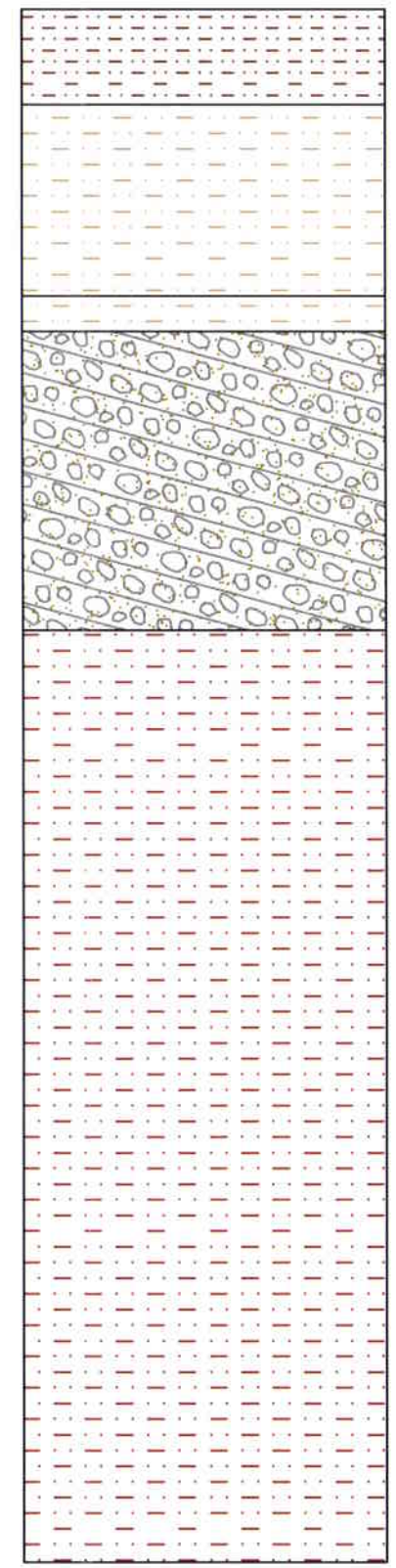
October 17, 2008

Beck Ranch Soil Investigation TP-28



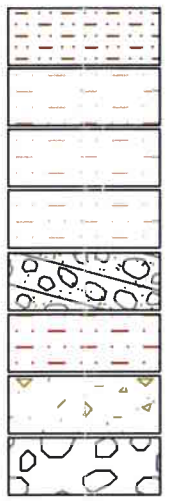
A	0 - 11	Dark brown (moist) loam; strong, medium to coarse subangular blocky breaking to moderate medium granular structure; hard; slightly sticky, slightly plastic; non-effervescent; many fine to medium roots; 15 % fine to coarse pebbles; clear, wavy boundary.
Bt	11 - 28	Tan sandy clay loam; strong, medium to coarse subangular blocky structure; hard; slightly sticky, slightly plastic; strongly effervescent; many fine to medium roots; 20 % fine to coarse pebbles; clear, wavy boundary.
Bk	28 - 36	Tan gravelly sandy loam; moderate, medium subangular blocky structure; friable; non-sticky, non-plastic; violently effervescent; common fine to medium roots; 30 % fine to coarse pebbles; clear, wavy boundary.
Gravel and Sand	36 - 72	Light brown sandy gravel and cobbles; massive; firm; non-sticky, non-plastic; few medium roots; 40 % fine to coarse pebbles; 15 % cobbles; clear, wavy boundary.
Mixed Alluvium	72 - 200	Reddish brown very gravelly sands; friable; massive; few fine to medium roots; 35 % fine to coarse pebbles; 15 % cobbles.

Beck Ranch Soil Investigation TP-13



Ap	0 - 8	Dark brown (moist) loam; strong, medium to coarse subangular blocky breaking to moderate medium granular structure; hard; slightly sticky, slightly plastic; non-effervescent; many fine to medium roots; 5 % fine to medium pebbles; clear, wavy boundary.
Bt	8 - 19	Tan sandy clay loam; strong, medium to coarse subangular blocky structure; hard; slightly sticky, slightly plastic; strongly effervescent; many fine to medium roots; 5 % fine to medium pebbles; clear, wavy boundary.
Bk	19 - 24	Tan gravelly sandy loam; weak moderate, medium subangular blocky structure; friable; non-sticky, non-plastic; strongly effervescent; few fine to medium roots; 30% fine to coarse pebbles; clear, wavy boundary.
Mixed Alluvium	24 - 52	Light brown to tan fine to medium sands and sandy gravel; interbedded; massive, friable; non-sticky, non-plastic; violently effervescent; few fine to medium roots; 30 % fine to coarse pebbles.
Fine Alluvium	52 - 130	Reddish brown to brown fine silt loam and very fine to fine sand; massive, friable; non-sticky, non-plastic; moderately effervescent; few fine to medium roots; < 5 % fine to medium pebbles.

Legend



- Ap
- Bt
- Bk1
- Bk2
- Mixed Alluvium
- Fine Alluvium
- C/Mixed Alluvium
- Gravel and Sand

PROJECT NAME: BECK RANCH SOIL INVESTIGATION

DRAWING TITLE: SOIL PROFILES

PROJ NO: 100003155 | DRAWN: JR

LOCATION: DEER LODGE, MT | PROJ MGR: J. DeARMENT

SCALE: NOT TO SCALE | CHECKED: ES | APPVD: ES

FILE NAME: soils.dwg

PBSJ 1120 Cedar Missoula, MT 59802

FIGURE B-2

REV -

October 17, 2008

Appendix B

Soil Typifying Pedons: Range in Characteristics

Major Horizons and Alluvium

A Horizon

Thickness: 7 – 14 inches
Texture: loam; sandy loam
Coarse Fragment Content: < 5 – 20 % pebbles; 0 – 5 % cobbles
Effervescence: none to very weak

B Horizon

Total Thickness: 16 – 38 inches
Bt Horizon Texture: loam, sandy clay loam, clay loam
Bk Horizon Texture: loam, sandy loam, sandy clay loam
Coarse Fragment Content: < 5 – 25 % pebbles; 0 – 5 % cobbles
Effervescence: strong to violent

C Horizon/Mixed Alluvium (C/MA)
Thickness: 14 – 132 (base of soil test pit) inches
Texture: loam; sandy loam
Coarse Fragment Content: < 5 – 25 % pebbles
Effervescence: weak to violent

May or may not be stratified and interbedded

Mixed Alluvium (MA)
Thickness: 18 – 150 (base of soil test pit) inches
Texture: sandy loam, very fine sand to coarse sand; gravelly sand
Coarse Fragment Content: 25 – 50 % pebbles; 0 – 20 % cobbles
Effervescence: None to violent

May or may not be stratified and interbedded

Fine Alluvium (FA)

Thickness: 11 – 134 (base of soil test pit) inches
Texture: loam, sandy clay loam, very fine sand
Coarse Fragment Content: 0 – 15 % pebbles
Effervescence: None to moderate

Gravel and Sand

Thickness: 11 – 36 inches
Texture: medium to coarse sand
Coarse Fragment Content: 45 – 65 % pebbles; 0 – 10 % cobbles
Effervescence: None to moderate

APPENDIX B

Beck Ranch Cover Soil Investigation - Summary of Soil Test Pit Horizonation

Test Pit	Horizon	Start Depth (in)	End Depth (in)	Horizon Thickness (in)	Sum B Horizons Thickness (in)
TP-1	A	0	10	10	
	Bt	10	23	13	
	Bk1	23	38	15	
	Bk2	38	48	10	109
	C/MA	48	150	102	
TP-2	A	0	11	11	
	Bt	11	20	9	
	Bk1	20	40	20	
	Bk2	40	44	4	104
	C/MA	44	150	106	
TP-3	A	0	11	11	
	Bt	11	22	11	
	Bk	22	38	16	60
	C/MA	38	150	112	
TP-4	A	0	7	7	
	Bt	7	19	12	
	Bk	19	28	9	47
	C/MA	28	160	132	
TP-5	A	0	11	11	
	Bt	11	20	9	
	Bk	20	28	8	48
	C/MA	28	157	129	
TP-6	A	0	14	14	
	Bt	14	23	9	
	Bk	23	38	15	61
	C/MA	38	98	60	
	FA	98	130	32	
TP-7	A	0	11	11	
	Bt	11	23	12	
	Bk	23	32	9	55
	C/MA	32	95	63	
	FA	95	130	35	

Beck Ranch Cover Soil Investigation - Summary of Soil Test Pit Horizonation

Test Pit	Horizon	Start Depth (in)	End Depth (in)	Horizon Thickness (in)	Sum B Horizons Thickness (in)
TP-8	A	0	9	9	
	Bt	9	28	19	
	Bk	21	28	7	56
	C/MA	28	48	20	
	G	48	59	11	
	FA	59	120	61	
	MA	120	147	27	
TP-9	A	0	11	11	
	Bt	11	41	30	
	Bk1	20	30	10	
	Bk2	30	41	11	112
	C/MA	41	70	29	
	G	70	84	14	
	FA	84	130	46	
TP-10	A	0	11	11	
	Bt	11	22	11	
	Bk1	22	28	6	
	Bk2	28	38	10	88
	C/MA	38	72	34	
	G	72	92	20	
	FA	92	114	22	
	G	114	126	12	
	MA	126	150	24	
TP-11	A	0	9	9	
	Bt	9	17	8	
	Bk	17	31	14	48
	C/MA	31	74	43	
	G	74	86	12	
	FA	86	100	14	
	G	100	115	15	
	MA	115	145	30	
				0	
TP-12	A	0	10	10	
	Bt	10	19	9	
	Bk1	19	30	11	
	Bk2	30	46	16	95
	C/MA	46	82	36	
	MA	82	150	68	

Beck Ranch Cover Soil Investigation - Summary of Soil Test Pit Horizonation

Test Pit	Horizon	Start Depth (in)	End Depth (in)	Horizon Thickness (in)	Sum B Horizons Thickness (in)
TP-13	A	0	8	8	
	Bt	8	19	11	
	Bk	19	24	5	43
	C/MA	24	52	28	
	FA	56	130	74	
TP-14	A	0	9	9	
	Bt	9	19	10	
	Bk1	19	26	7	
	Bk2	26	39	13	84
	MA	39	96	57	
	FA	96	150	54	
TP-15	A	0	8	8	
	Bt	8	20	12	
	Bk	20	30	10	50
	MA	30	120	90	
	FA	120	144	24	
TP-16	A	0	9	9	
	Bt	9	22	13	
	Bk	22	26	4	
	MA	26	44	18	70
	FA	44	78	34	
	MA	78	155	77	
TP-17	A	0	10	10	
	Bt	10	19	9	
	Bk	19	26	7	45
	C/MA	26	48	22	
	G	48	60	12	
	MA	60	78	18	
	FA	78	150	72	
TP-18	A	0	10	10	
	Bt	10	19	9	
	Bk	19	26	7	45
	C/MA	26	42	16	
	G	42	56	14	
	FA	56	145	89	

Beck Ranch Cover Soil Investigation - Summary of Soil Test Pit Horizonation

Test Pit	Horizon	Start Depth (in)	End Depth (in)	Horizon Thickness (in)	Sum B Horizons Thickness (in)
TP-19	A	0	9	9	
	Bt	9	18	9	
	Bk	18	28	10	46
	C/MA	28	42	14	
	FA	42	130	88	
TP-20	A	0	11	11	
	Bt	11	23	12	
	Bk	23	34	11	57
	C/MA	34	54	20	
	MA	54	160	106	
TP-21	A	0	11	11	
	Bt	11	23	12	
	B	23	33	10	56
	C/MA	33	88	55	
	G	88	100	12	
	MA	100	185	85	
TP-22	A	0	10	10	
	Bt	10	24	14	
	Bk	24	38	14	62
	C/MA	38	78	40	
	G	78	101	23	
	FA	101	165	64	
TP-23	A	0	12	12	
	Bt	12	22	10	
	Bk	22	28	6	50
	C/MA	28	44	16	
	MA	44	71	27	
	G	71	84	13	
	FA	84	110	26	
	MA	110	130	20	
	FA	130	150	20	
TP-24	A	0	8	8	
	Bt	8	19	11	
	Bk	19	31	12	50
	C/MA	31	70	39	
	FA	70	204	134	

Beck Ranch Cover Soil Investigation - Summary of Soil Test Pit Horizonation

Test Pit	Horizon	Start Depth (in)	End Depth (in)	Horizon Thickness (in)	Sum B Horizons Thickness (in)
TP-25	A	0	10	10	
	Bt/Bk	10	30	20	30
	MA	30	180	150	
TP-26	A	0	24	24	
	Bt/Bk	24	52	28	52
	G	52	88	36	
	FA	88	176	88	
TP-27	A	0	11	11	
	Bt	11	30	19	
	Bk	30	36	6	66
	G	36	72	36	
	MA	72	200	128	
TP-28	A	0	11	11	
	Bt	11	28	17	
	Bk	28	36	8	64
	G	36	72	36	
	MA	72	200	128	
TP-29	A	0	11	11	
	Bt	11	23	12	
	Bk1	23	28	5	
	Bk2	28	42	14	93
	C/MA	42	90	48	
	FA	90	130	40	

Notes:

C/MA - C horizon and Mixed Alluvium
MA - Mixed Alluvium
G - Sand and Gravel
FA - Fine Alluvium

APPENDIX C

Soil Pit Photographs

TP-2 – Typical soil in southern portion of project area showing horizonation. Note gradual transition between C horizon and Mixed Alluvium (C/MA) approximately one-third of distance from surface, finer grained alluvium at depth, and relatively low coarse fragment content throughout.

TP-2 – Photo showing close-up view of transition from B horizon into C horizon and Mixed Alluvium (C/MA) in lower third of profile.

TP-1 – Similar to TP-2; pedon showing A and B horizons overlying C horizon/Mixed Alluvium (C/MA) at approximately middle of profile. Note strong, coarse subangular blocky structure of A and B horizons.

TP-9 – Pedon showing typical relationship between upper horizons in southern portion of project area and occurrence of distinct gravel lenses in northern potion of project area. Note transition between B/C horizons in upper third of profile and coarse fragments in transition between C horizon and Mixed Alluvium (C/MA) in middle of profile. Sandy gravel lens is between 70 and 84 inches.

TP-12 -- Profile showing presence of strong, medium platy structure at base of B horizon in some pits in the central and eastern portions of the project area. This material is salvageable.

TP-14 – Pedon showing A and B (thin) horizons overlying stratified Mixed Alluvium (MA) with high coarse fragment content at relatively shallow depth (39 inches) in northern portion of the project area. Note fine alluvium (fine sand) with low coarse fragment content at base of pit. This material is present at depth over much of the site.

TP-15 – Pedon typical of A and B horizon material overlying mixed alluvium with high coarse fragment content in northern portion of project area. Note relatively high percentage of coarse fragments in A and B horizons compared to southern portions of the site.

TP-16 – Pedon showing the strong, medium to coarse blocky structure common in the A and B horizons across the site. A horizon often breaks to moderate, medium granular structure. Transition to C/MA horizon with relatively high coarse fragment content evident at base of B horizon.

APPENDIX D

Laboratory Data and QA/QC Report
Sample Chain-of-Custody

NORTHERN
Analytical Laboratories, Inc.

602 South 25th Street
P O Box 30315
Billings, MT 59101
Telephone: (406) 254-7226
Fax: (406) 254-1389

REPORT TO:	ATTN: BRIAN BARTKOWIAK MONTANA DEPT. OF ENVIRONMENTAL QUALITY P.O. BOX 200901 HELENA, MT 59620	**DATE:** **JOB NUMBER:** **PAGE:** **INVOICE NO.:**	August 19, 2008 90-933-27 1 of 66 8070172

REPORT OF: Soil Analysis – Beck Ranch Soil Borrow Investigation

---

CASE NARRATIVE:

On July 24, 2008 these soil samples (laboratory numbers 2008070172-1 through -49) were received in our laboratory for analysis. Tests were conducted in accordance with SW-846 *"Test Methods for Evaluating Solid Waste"*, 3rd Edition, updates I, II, IIA, IIB, III; EPA/600/R-93-100 *"Methods for the Determination of Inorganic Substances in Environmental Samples"*; U.S. Department of Agriculture Handbook No. 60, *"Diagnosis and Improvement of Saline and Alkali Solids"*; American Society of Agronomy, *"Methods of Soil Analysis"*; and American Society for Testing Materials, *"Annual Book of ASTM Standards"*.

The results of the analysis are shown on the following pages. A < sign indicates the value reported was the quantitation limit for this sample using the method described. Concentrations of analyte, if present, below this were not quantifiable. Sample results are not corrected for analyte blank concentrations. Values in brackets are the quality control limits for the associated quality control test. RPD is the abbreviation for relative percent difference.

The condition of the samples upon receipt at the laboratory is noted on the attached sample receipt checklist. Chain of custody documentation is enclosed.

Footnotes used in this report include the following:

J – The associated value is an estimated quantity.

(4) The recovery of this analyte in the matrix spike and/or its spike duplicate did not meet the quality control limits. The recovery of the analyte in the laboratory control sample met the control limits. This indicates the presence of a matrix interference in the sample. The associated sample results have been footnoted with a data qualifier.

(6) The recovery or replication is outside the stated quality control limit. The associated sample results have been footnoted with a data qualifier.

Reviewed by _____
Kathleen A. Smit – Laboratory Manager

CC: Ed Spotts
PBS&J
206 Lupfer Avenue
Whitefish, MT 59937-2448

Attachments: Chain of Custody (5)
Sample Receipt Checklist

nct

As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of our clients and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval. Test results apply specifically to the samples tested only. The entire report shall not be reproduced, except in full, without the written approval of the laboratory. Samples will be disposed of after testing is completed unless other arrangements are agreed to in writing.

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-1
Sample Name: TP-7; 0-6'
Sample Date/Time: 07/23/2008 10:58:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.58	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.7	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	-----	---	—	-----	3-5.1	
METALS						
Potassium Available Dry Basis	520	mg/kg	BH	100	13-3.5.2.2	07/30/2008 06:09:00 PM
Arsenic Dry Basis	25	mg/kg	BH	10	6020	08/06/2008 04:45:00 PM
Copper Dry Basis	59	mg/kg	BH	10	6020	08/06/2008 04:45:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	5.4	mg/kg	CC	0.5	33.3.2	07/30/2008 11:09:00 AM
Phosphorus Available Dry Basis	22	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	1090	mg/kg	CC	50	351.2	08/12/2008 04:20:00 PM
ORGANICS						
Organic Matter dry basis	1.7	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	12.2	%	RM	0.1	D421	07/30/2008 09:26:55 AM
Sand	52.5	%	RM	2.5	15-5mod.	07/30/2008 08:48:00 AM
Silt	32.5	%	RM	2.5	15-5mod.	07/30/2008 08:48:00 AM
Clay	15.0	%	RM	2.5	15-5mod.	07/30/2008 08:48:00 AM
Texture	Sandy Loam	---	RM	---	15-5mod.	07/30/2008 08:48:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-2
Sample Name: TP-7; 0-11'
Sample Date/Time: 07/23/2008 10:52:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.52	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.8	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	----	----	---	----	3-5.1	
METALS						
Potassium Available Dry Basis	410	mg/kg	BH	100	13-3.5.2.2	07/30/2008 06:12:00 PM
Arsenic Dry Basis	26	mg/kg	BH	10	6020	08/06/2008 04:49:00 PM
Copper Dry Basis	53	mg/kg	BH	10	6020	08/06/2008 04:49:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	3.5	mg/kg	CC	0.5	33.3.2	07/30/2008 10:20:00 AM
Phosphorus Available Dry Basis	16	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	1020	mg/kg	CC	50	351.2	08/12/2008 04:21:00 PM
ORGANICS						
Organic Matter dry basis	1.8	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	11.8	%	RM	0.1	D421	07/31/2008 08:08:35 AM
Sand	55.0	%	RM	2.5	15-5mod.	07/30/2008 08:52:00 AM
Silt	31.2	%	RM	2.5	15-5mod.	07/30/2008 08:52:00 AM
Clay	13.8	%	RM	2.5	15-5mod.	07/30/2008 08:52:00 AM
Texture	Sandy Loam	----	RM	----	15-5mod.	07/30/2008 08:52:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-3
Sample Name: TP-7; 0-32'
Sample Date/Time: 07/23/2008 10:53:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.96	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.9	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Potassium Available Dry Basis	200	mg/kg	BH	100	13-3.5.2.2	07/30/2008 06:15:00 PM
Arsenic Dry Basis	22	mg/kg	BH	10	6020	08/06/2008 04:53:00 PM
Copper Dry Basis	30	mg/kg	BH	10	6020	08/06/2008 04:53:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	6.5	mg/kg	CC	0.5	33.3.2	07/30/2008 11:11:00 AM
Phosphorus Available Dry Basis	14	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	770	mg/kg	CC	50	351.2	08/12/2008 04:23:00 PM
ORGANICS						
Organic Matter dry basis	1.4	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	10.3	%	RM	0.1	D421	07/31/2008 08:08:38 AM
Sand	55.0	%	RM	2.5	15-5mod.	07/30/2008 08:54:00 AM
Silt	22.5	%	RM	2.5	15-5mod.	07/30/2008 08:54:00 AM
Clay	22.5	%	RM	2.5	15-5mod.	07/30/2008 08:54:00 AM
Texture	Sa Cl Lo	—	RM	—	15-5mod.	07/30/2008 08:54:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-4
Sample Name: TP-7; 11-32'
Sample Date/Time: 07/23/2008 10:53:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	2.14	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.9	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	17	mg/kg	BH	10	6020	08/06/2008 04:57:00 PM
Copper Dry Basis	12	mg/kg	BH	10	6020	08/06/2008 04:57:00 PM
ORGANICS						
Organic Matter dry basis	0.8	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	7.4	%	RM	0.1	D421	07/31/2008 08:08:40 AM
Sand	55.0	%	RM	2.5	15-5mod.	07/30/2008 08:58:00 AM
Silt	22.5	%	RM	2.5	15-5mod.	07/30/2008 08:58:00 AM
Clay	22.5	%	RM	2.5	15-5mod.	07/30/2008 08:58:00 AM
Texture	Sa Cl Lo	—	RM	—	15-5mod.	07/30/2008 08:58:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-5
Sample Name: TP-7; 32-95'
Sample Date/Time: 07/23/2008 10:55:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	3.49	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.9	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	<10	mg/kg	BH	10	6020	08/06/2008 05:01:00 PM
Copper Dry Basis	11	mg/kg	BH	10	6020	08/06/2008 05:01:00 PM
ORGANICS						
Organic Matter dry basis	0.7	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	12.3	%	RM	0.1	D421	07/31/2008 08:07:56 AM
Sand	72.5	%	RM	2.5	15-5mod.	07/30/2008 09:02:00 AM
Silt	17.5	%	RM	2.5	15-5mod.	07/30/2008 09:02:00 AM
Clay	10.0	%	RM	2.5	15-5mod.	07/30/2008 09:02:00 AM
Texture	Sandy Loam	—	RM	—	15-5mod.	07/30/2008 09:02:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-6
Sample Name: TP-21; 0-11'
Sample Date/Time: 07/23/2008 09:07:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	1.4	%	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	0.55	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.6	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Potassium Available Dry Basis	310	mg/kg	BH	100	13-3.5.2.2	07/30/2008 06:28:00 PM
Arsenic Dry Basis	28	mg/kg	BH	10	6020	08/06/2008 05:04:00 PM
Cadmium Dry Basis	<2	mg/kg	BH	2	6020	08/06/2008 05:04:00 PM
Copper Dry Basis	55	mg/kg	BH	10	6020	08/06/2008 05:04:00 PM
Lead Dry Basis	22	mg/kg	BH	10	6020	08/06/2008 05:04:00 PM
Zinc Dry Basis	86	mg/kg	BH	10	6020	08/06/2008 05:04:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	1.7	mg/kg	CC	0.5	33.3.2	07/30/2008 10:31:00 AM
Phosphorus Available Dry Basis	25	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	1020	mg/kg	CC	50	351.2	08/12/2008 04:25:00 PM
ORGANICS						
Organic Matter dry basis	1.8	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	9.1	%	RM	0.1	D421	07/31/2008 08:07:59 AM
Sand	52.5	%	RM	2.5	15-5mod.	07/30/2008 09:05:00 AM
Silt	30.0	%	RM	2.5	15-5mod.	07/30/2008 09:05:00 AM
Clay	17.5	%	RM	2.5	15-5mod.	07/30/2008 09:05:00 AM
Texture	Sandy Loam	---	RM	---	15-5mod.	07/30/2008 09:05:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	0.56	meq/l	BH	0.04	3-5.4	08/06/2008 12:58:00 PM
Saturation	35.3	%	ES	0.1	27A	07/31/2008 09:59:36 AM
Calcium saturated paste	4.45	meq/l	BH	0.05	3-5.4	08/06/2008 12:58:00 PM
Magnesium saturated paste	1.03	meq/l	BH	0.08	3-5.4	08/06/2008 12:58:00 PM
Sodium Adsorption Ratio	0.34	---	BH	0.1	20b	08/06/2008 12:58:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-7
Sample Name: TP-21; 11-33'
Sample Date/Time: 07/23/2008 09:08:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	20	%	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	3.49	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.9	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Potassium Available Dry Basis	<100	mg/kg	BH	100	13-3.5.2.2	07/30/2008 06:34:00 PM
Arsenic Dry Basis	12	mg/kg	BH	10	6020	08/06/2008 05:19:00 PM
Cadmium Dry Basis	<2	mg/kg	BH	2	6020	08/06/2008 05:19:00 PM
Copper Dry Basis	12	mg/kg	BH	10	6020	08/06/2008 05:19:00 PM
Lead Dry Basis	<10	mg/kg	BH	10	6020	08/06/2008 05:19:00 PM
Zinc Dry Basis	45	mg/kg	BH	10	6020	08/06/2008 05:19:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	1.0	mg/kg	CC	0.5	33.3.2	07/30/2008 10:35:00 AM
Phosphorus Available Dry Basis	6	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	295	mg/kg	CC	50	351.2	08/12/2008 03:09:00 PM
ORGANICS						
Organic Matter dry basis	0.6	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	8.6	%	RM	0.1	D421	07/31/2008 08:08:01 AM
Sand	57.5	%	RM	2.5	15-5mod.	07/30/2008 09:15:00 AM
Silt	20.0	%	RM	2.5	15-5mod.	07/30/2008 09:15:00 AM
Clay	22.5	%	RM	2.5	15-5mod.	07/30/2008 09:15:00 AM
Texture	Sa Cl Lo	—	RM	—	15-5mod.	07/30/2008 09:15:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	3.83	meq/l	BH	0.04	3-5.4	08/06/2008 01:03:00 PM
Saturation	38.0	%	ES	0.1	27A	07/31/2008 09:59:36 AM
Calcium saturated paste	28.2	meq/l	BH	0.05	3-5.4	08/06/2008 01:03:00 PM
Magnesium saturated paste	16.9	meq/l	BH	0.08	3-5.4	08/06/2008 01:03:00 PM
Sodium Adsorption Ratio	0.81	—	BH	0.1	20b	08/06/2008 01:03:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-8
Sample Name: TP-21; 33-88'
Sample Date/Time: 07/23/2008 09:10:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	8.0	%	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	5.53	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	8.0	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Arsenic Dry Basis	<10	mg/kg	BH	10	6020	08/06/2008 05:30:00 PM
Cadmium Dry Basis	<2	mg/kg	BH	2	6020	08/06/2008 05:30:00 PM
Copper Dry Basis	13	mg/kg	BH	10	6020	08/06/2008 05:30:00 PM
Lead Dry Basis	11	mg/kg	BH	10	6020	08/06/2008 05:30:00 PM
Zinc Dry Basis	49	mg/kg	BH	10	6020	08/06/2008 05:30:00 PM
ORGANICS						
Organic Matter dry basis	0.3	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	19.5	%	RM	0.1	D421	07/31/2008 09:31:45 AM
Sand	70.0	%	RM	2.5	15-5mod.	07/30/2008 09:18:00 AM
Silt	21.2	%	RM	2.5	15-5mod.	07/30/2008 09:18:00 AM
Clay	8.8	%	RM	2.5	15-5mod.	07/30/2008 09:18:00 AM
Texture	Sandy Loam	----	RM	---	15-5mod.	07/30/2008 09:18:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	19.9	meq/l	BH	0.04	3-5.4	08/06/2008 01:05:00 PM
Saturation	28.2	%	ES	0.1	27A	07/31/2008 09:59:36 AM
Calcium saturated paste	23.0	meq/l	BH	0.05	3-5.4	08/06/2008 01:05:00 PM
Magnesium saturated paste	37.0	meq/l	BH	0.08	3-5.4	08/06/2008 01:05:00 PM
Sodium Adsorption Ratio	3.63	---	BH	0.1	20b	08/06/2008 01:05:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-9
Sample Name: TP-5; 0-11'
Sample Date/Time: 07/23/2008 08:53:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.75	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	6.9	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Potassium Available Dry Basis	320	mg/kg	BH	100	13-3.5.2.2	07/30/2008 06:40:00 PM
Arsenic Dry Basis	39	mg/kg	BH	10	6020	08/06/2008 05:34:00 PM
Copper Dry Basis	73	mg/kg	BH	10	6020	08/06/2008 05:34:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	2.9	mg/kg	CC	0.5	33.3.2	07/30/2008 10:38:00 AM
Phosphorus Available Dry Basis	30	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	878	mg/kg	CC	50	351.2	08/12/2008 04:29:00 PM
ORGANICS						
Organic Matter dry basis	1.5	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	11.4	%	RM	0.1	D421	07/31/2008 08:08:05 AM
Sand	50.0	%	RM	2.5	15-5mod.	07/30/2008 09:21:00 AM
Silt	35.0	%	RM	2.5	15-5mod.	07/30/2008 09:21:00 AM
Clay	15.0	%	RM	2.5	15-5mod.	07/30/2008 09:21:00 AM
Texture	Loam	—	RM	—	15-5mod.	07/30/2008 09:21:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-10
Sample Name: TP-5; 11-28'
Sample Date/Time: 07/23/2008 08:53:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.99	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.9	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Potassium Available Dry Basis	<100	mg/kg	BH	100	13-3.5.2.2	07/30/2008 06:43:00 PM
Arsenic Dry Basis	12	mg/kg	BH	10	6020	08/06/2008 05:38:00 PM
Copper Dry Basis	16	mg/kg	BH	10	6020	08/06/2008 05:38:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	0.9	mg/kg	CC	0.5	33.3.2	07/30/2008 10:40:00 AM
Phosphorus Available Dry Basis	8	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	388	mg/kg	CC	50	351.2	08/12/2008 03:14:00 PM
ORGANICS						
Organic Matter dry basis	1.4	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	15.0	%	RM	0.1	D421	07/31/2008 08:08:08 AM
Sand	62.5	%	RM	2.5	15-5mod.	07/30/2008 09:26:00 AM
Silt	17.5	%	RM	2.5	15-5mod.	07/30/2008 09:26:00 AM
Clay	20.0	%	RM	2.5	15-5mod.	07/30/2008 09:26:00 AM
Texture	Sandy Loam	----	RM	—	15-5mod.	07/30/2008 09:26:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-11
Sample Name: TP-11; 0-9'
Sample Date/Time: 07/23/2008 10:20:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.43	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.2	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Arsenic Dry Basis	33	mg/kg	BH	10	6020	08/06/2008 05:42:00 PM
Copper Dry Basis	62	mg/kg	BH	10	6020	08/06/2008 05:42:00 PM
ORGANICS						
Organic Matter dry basis	1.0	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	9.5	%	RM	0.1	D421	07/31/2008 08:08:11 AM
Sand	51.3	%	RM	2.5	15-5mod.	07/30/2008 09:29:00 AM
Silt	33.7	%	RM	2.5	15-5mod.	07/30/2008 09:29:00 AM
Clay	15.0	%	RM	2.5	15-5mod.	07/30/2008 09:29:00 AM
Texture	Loam	---	RM	---	15-5mod.	07/30/2008 09:29:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-12
Sample Name: TP-11; 0-18'
Sample Date/Time: 07/23/2008 10:33:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	2.53	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.5	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	30	mg/kg	BH	10	6020	08/06/2008 05:46:00 PM
Copper Dry Basis	36	mg/kg	BH	10	6020	08/06/2008 05:46:00 PM
ORGANICS						
Organic Matter dry basis	1.3	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	7.3	%	RM	0.1	D421	07/31/2008 08:08:16 AM
Sand	45.0	%	RM	2.5	15-5mod.	07/30/2008 09:33:00 AM
Silt	30.0	%	RM	2.5	15-5mod.	07/30/2008 09:33:00 AM
Clay	25.0	%	RM	2.5	15-5mod.	07/30/2008 09:33:00 AM
Texture	Loam	----	RM	----	15-5mod.	07/30/2008 09:33:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-13
Sample Name: TP-11; 0-31'
Sample Date/Time: 07/23/2008 10:20:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	3.16	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.6	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	----	----	—	----	3-5.1	
METALS						
Arsenic Dry Basis	21	mg/kg	BH	10	6020	08/06/2008 05:50:00 PM
Copper Dry Basis	23	mg/kg	BH	10	6020	08/06/2008 05:50:00 PM
ORGANICS						
Organic Matter dry basis	1.0	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	5.5	%	RM	0.1	D421	07/31/2008 08:08:19 AM
Sand	37.5	%	RM	2.5	15-5mod.	07/30/2008 09:37:00 AM
Silt	35.0	%	RM	2.5	15-5mod.	07/30/2008 09:37:00 AM
Clay	27.5	%	RM	2.5	15-5mod.	07/30/2008 09:37:00 AM
Texture	Clay Loam	----	RM	----	15-5mod.	07/30/2008 09:37:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-14
Sample Name: TP-11; 9-31'
Sample Date/Time: 07/23/2008 10:20:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	3.29	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.8	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Arsenic Dry Basis	18	mg/kg	BH	10	6020	08/06/2008 05:53:00 PM
Copper Dry Basis	14	mg/kg	BH	10	6020	08/06/2008 05:53:00 PM
ORGANICS						
Organic Matter dry basis	0.9	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	5.0	%	RM	0.1	D421	07/31/2008 08:08:22 AM
Sand	50.0	%	RM	2.5	15-5mod.	07/30/2008 09:39:00 AM
Silt	25.0	%	RM	2.5	15-5mod.	07/30/2008 09:39:00 AM
Clay	25.0	%	RM	2.5	15-5mod.	07/30/2008 09:39:00 AM
Texture	Sa Cl Lo	---	RM	---	15-5mod.	07/30/2008 09:39:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-15
Sample Name: TP-9; 0-11'
Sample Date/Time: 07/23/2008 09:53:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.66	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.0	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Potassium Available Dry Basis	260	mg/kg	BH	100	13-3.5.2.2	07/30/2008 06:46:00 PM
Arsenic Dry Basis	33	mg/kg	BH	10	6020	08/06/2008 06:04:00 PM
Copper Dry Basis	61	mg/kg	BH	10	6020	08/06/2008 06:04:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	3.1	mg/kg	CC	0.5	33.3.2	07/30/2008 10:42:00 AM
Phosphorus Available Dry Basis	20	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	701J	mg/kg	CC	50	351.2	08/12/2008 04:31:00 PM
ORGANICS						
Organic Matter dry basis	1.8	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	7.7	%	RM	0.1	D421	07/31/2008 08:08:26 AM
Sand	50.0	%	RM	2.5	15-5mod.	07/30/2008 09:43:00 AM
Silt	33.7	%	RM	2.5	15-5mod.	07/30/2008 09:43:00 AM
Clay	16.3	%	RM	2.5	15-5mod.	07/30/2008 09:43:00 AM
Texture	Loam	—	RM	—	15-5mod.	07/30/2008 09:43:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-16
Sample Name: TP-9; 11-30'
Sample Date/Time: 07/23/2008 09:53:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	3.07	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.9	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	-----	----	—	-----	3-5.1	
METALS						
Potassium Available Dry Basis	<100	mg/kg	BH	100	13-3.5.2.2	07/30/2008 06:52:00 PM
Arsenic Dry Basis	12	mg/kg	BH	10	6020	08/06/2008 06:12:00 PM
Copper Dry Basis	13	mg/kg	BH	10	6020	08/06/2008 06:12:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	0.7	mg/kg	CC	0.5	33.3.2	07/30/2008 10:46:00 AM
Phosphorus Available Dry Basis	9	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	296J	mg/kg	CC	50	351.2	08/12/2008 03:18:00 PM
ORGANICS						
Organic Matter dry basis	0.6	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	11.2	%	RM	0.1	D421	07/31/2008 08:08:52 AM
Sand	56.3	%	RM	2.5	15-5mod.	07/30/2008 09:50:00 AM
Silt	22.4	%	RM	2.5	15-5mod.	07/30/2008 09:50:00 AM
Clay	21.3	%	RM	2.5	15-5mod.	07/30/2008 09:50:00 AM
Texture	Sa Cl Lo	----	RM	----	15-5mod.	07/30/2008 09:50:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-17
Sample Name: TP-9; 11-41'
Sample Date/Time: 07/23/2008 09:55:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	3.46	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.8	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	----	----	—	-----	3-5.1	
METALS						
Arsenic Dry Basis	11	mg/kg	BH	10	6020	08/06/2008 06:20:00 PM
Copper Dry Basis	13	mg/kg	BH	10	6020	08/06/2008 06:20:00 PM
ORGANICS						
Organic Matter dry basis	0.4	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:50 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	10.5	%	RM	0.1	D421	07/31/2008 08:08:57 AM
Sand	55.0	%	RM	2.5	15-5mod.	07/30/2008 09:53:00 AM
Silt	25.0	%	RM	2.5	15-5mod.	07/30/2008 09:53:00 AM
Clay	20.0	%	RM	2.5	15-5mod.	07/30/2008 09:53:00 AM
Texture	Sandy Loam	----	RM	—	15-5mod.	07/30/2008 09:53:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-18
Sample Name: TP-9; 30-70'
Sample Date/Time: 07/23/2008 09:58:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	4.01	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.8	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	<10	mg/kg	BH	10	6020	08/06/2008 06:23:00 PM
Copper Dry Basis	14	mg/kg	BH	10	6020	08/06/2008 06:23:00 PM
ORGANICS						
Organic Matter dry basis	0.3	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:50 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	17.0	%	RM	0.1	D421	07/31/2008 09:32:15 AM
Sand	62.5	%	RM	2.5	15-5mod.	07/30/2008 09:55:00 AM
Silt	28.7	%	RM	2.5	15-5mod.	07/30/2008 09:55:00 AM
Clay	8.8	%	RM	2.5	15-5mod.	07/30/2008 09:55:00 AM
Texture	Sandy Loam	—	RM	—	15-5mod.	07/30/2008 09:55:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-19
Sample Name: TP-15; 0-8'
Sample Date/Time: 07/23/2008 13:24:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.62	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.7	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	----	----	---	----	3-5.1	
METALS						
Arsenic Dry Basis	29	mg/kg	BH	10	6020	08/06/2008 06:27:00 PM
Copper Dry Basis	57	mg/kg	BH	10	6020	08/06/2008 06:27:00 PM
ORGANICS						
Organic Matter dry basis	2.4	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:50 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	16.6	%	RM	0.1	D421	07/30/2008 03:23:24 PM
Sand	52.5	%	RM	2.5	15-5mod.	07/30/2008 09:59:00 AM
Silt	28.7	%	RM	2.5	15-5mod.	07/30/2008 09:59:00 AM
Clay	18.8	%	RM	2.5	15-5mod.	07/30/2008 09:59:00 AM
Texture	Sandy Loam	----	RM	----	15-5mod.	07/30/2008 09:59:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-20
Sample Name: TP-15; 8-25'
Sample Date/Time: 07/23/2008 13:25:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	1.14	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.8	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	----	----	—	----	3-5.1	
METALS						
Arsenic Dry Basis	22	mg/kg	BH	10	6020	08/06/2008 06:31:00 PM
Copper Dry Basis	14	mg/kg	BH	10	6020	08/06/2008 06:31:00 PM
ORGANICS						
Organic Matter dry basis	1.2	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:50 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	28.0	%	RM	0.1	D421	07/31/2008 08:09:00 AM
Sand	52.5	%	RM	2.5	15-5mod.	07/30/2008 10:03:00 AM
Silt	23.7	%	RM	2.5	15-5mod.	07/30/2008 10:03:00 AM
Clay	23.8	%	RM	2.5	15-5mod.	07/30/2008 10:03:00 AM
Texture	Sa Cl Lo	-----	RM	-----	15-5mod.	07/30/2008 10:03:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-21
Sample Name: TP-2; 0-6'
Sample Date/Time: 07/23/2008 08:31:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	1.38	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.4	S.U.	ES	0.1	21a	07/29/2008 11:52:16 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	21	mg/kg	BH	10	6020	08/07/2008 08:57:00 AM
Copper Dry Basis	62	mg/kg	BH	10	6020	08/07/2008 08:57:00 AM
ORGANICS						
Organic Matter dry basis	0.8	%	MRK	0.1	29-3.5.2	08/04/2008 02:33:23 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	9.8	%	RM	0.1	D421	07/31/2008 08:09:03 AM
Sand	55.0	%	RM	2.5	15-5mod.	07/29/2008 08:24:00 AM
Silt	27.5	%	RM	2.5	15-5mod.	07/29/2008 08:24:00 AM
Clay	17.5	%	RM	2.5	15-5mod.	07/29/2008 08:24:00 AM
Texture	Sandy Loam	—	RM	—	15-5mod.	07/29/2008 08:24:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-22
Sample Name: TP-2; 0-11'
Sample Date/Time: 07/23/2008 08:30:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.71	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.6	S.U.	ES	0.1	21a	07/29/2008 11:52:16 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	23	mg/kg	BH	10	6020	08/07/2008 09:00:00 AM
Copper Dry Basis	62	mg/kg	BH	10	6020	08/07/2008 09:00:00 AM
ORGANICS						
Organic Matter dry basis	2.0	%	MRK	0.1	29-3.5.2	08/04/2008 02:35:18 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	12.0	%	RM	0.1	D421	07/31/2008 08:09:06 AM
Sand	52.5	%	RM	2.5	15-5mod.	07/29/2008 08:28:00 AM
Silt	32.5	%	RM	2.5	15-5mod.	07/29/2008 08:28:00 AM
Clay	15.0	%	RM	2.5	15-5mod.	07/29/2008 08:28:00 AM
Texture	Sandy Loam	----	RM	----	15-5mod.	07/29/2008 08:28:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-23
Sample Name: TP-2; 11-40'
Sample Date/Time: 07/23/2008 08:32:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	1.71	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	8.0	S.U.	ES	0.1	21a	07/29/2008 11:52:17 AM
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Arsenic Dry Basis	11	mg/kg	BH	10	6020	08/07/2008 09:04:00 AM
Copper Dry Basis	27	mg/kg	BH	10	6020	08/07/2008 09:04:00 AM
ORGANICS						
Organic Matter dry basis	0.7	%	MRK	0.1	29-3.5.2	08/04/2008 02:36:28 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	16.8	%	RM	0.1	D421	07/31/2008 08:09:08 AM
Sand	57.5	%	RM	2.5	15-5mod.	07/29/2008 08:32:00 AM
Silt	23.7	%	RM	2.5	15-5mod.	07/29/2008 08:32:00 AM
Clay	18.8	%	RM	2.5	15-5mod.	07/29/2008 08:32:00 AM
Texture	Sandy Loam	---	RM	---	15-5mod.	07/29/2008 08:32:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-24
Sample Name: TP-17; 0-10'
Sample Date/Time: 07/23/2008 13:57:02
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	1.3	%	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	0.55	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.6	S.U.	ES	0.1	21a	07/29/2008 11:52:17 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	26	mg/kg	BH	10	6020	08/07/2008 09:12:00 AM
Cadmium Dry Basis	<2	mg/kg	BH	2	6020	08/07/2008 09:12:00 AM
Copper Dry Basis	66	mg/kg	BH	10	6020	08/07/2008 09:12:00 AM
Lead Dry Basis	21	mg/kg	BH	10	6020	08/07/2008 09:12:00 AM
Zinc Dry Basis	77	mg/kg	BH	10	6020	08/07/2008 09:12:00 AM
ORGANICS						
Organic Matter dry basis	1.6	%	MRK	0.1	29-3.5.2	08/04/2008 02:37:29 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	7.0	%	RM	0.1	D421	07/31/2008 08:11:03 AM
Sand	47.5	%	RM	2.5	15-5mod.	07/29/2008 08:37:00 AM
Silt	36.2	%	RM	2.5	15-5mod.	07/29/2008 08:37:00 AM
Clay	16.3	%	RM	2.5	15-5mod.	07/29/2008 08:37:00 AM
Texture	Loam	—	RM	—	15-5mod.	07/29/2008 08:37:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	0.41	meq/l	BH	0.04	3-5.4	08/06/2008 01:25:00 PM
Saturation	33.7	%	ES	0.1	27A	07/29/2008 03:54:23 PM
Calcium saturated paste	3.99	meq/l	BH	0.05	3-5.4	08/06/2008 01:25:00 PM
Magnesium saturated paste	1.09	meq/l	BH	0.08	3-5.4	08/06/2008 01:25:00 PM
Sodium Adsorption Ratio	0.26	—	BH	0.1	20b	08/06/2008 01:25:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-25
Sample Name: TP-17; 10-48'
Sample Date/Time: 07/23/2008 14:00:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	10	%	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	3.23	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.8	S.U.	ES	0.1	21a	07/29/2008 11:52:17 AM
Sample Preparation	----	---	—	---	3-5.1	
METALS						
Arsenic Dry Basis	<10	mg/kg	BH	10	6020	08/07/2008 09:20:00 AM
Cadmium Dry Basis	<2	mg/kg	BH	2	6020	08/07/2008 09:20:00 AM
Copper Dry Basis	24	mg/kg	BH	10	6020	08/07/2008 09:20:00 AM
Lead Dry Basis	<10	mg/kg	BH	10	6020	08/07/2008 09:20:00 AM
Zinc Dry Basis	37	mg/kg	BH	10	6020	08/07/2008 09:20:00 AM
ORGANICS						
Organic Matter dry basis	0.5	%	MRK	0.1	29-3.5.2	08/04/2008 02:41:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	9.4	%	RM	0.1	D421	07/31/2008 09:32:52 AM
Sand	62.5	%	RM	2.5	15-5mod.	07/29/2008 08:43:00 AM
Silt	18.7	%	RM	2.5	15-5mod.	07/29/2008 08:43:00 AM
Clay	18.8	%	RM	2.5	15-5mod.	07/29/2008 08:43:00 AM
Texture	Sandy Loam	---	RM	---	15-5mod.	07/29/2008 08:43:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	3.54	meq/l	BH	0.04	3-5.4	08/06/2008 01:30:00 PM
Saturation	29.1	%	ES	0.1	27A	07/29/2008 03:54:23 PM
Calcium saturated paste	30.6	meq/l	BH	0.05	3-5.4	08/06/2008 01:30:00 PM
Magnesium saturated paste	13.5	meq/l	BH	0.08	3-5.4	08/06/2008 01:30:00 PM
Sodium Adsorption Ratio	0.75	-----	BH	0.1	20b	08/06/2008 01:30:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-26
Sample Name: TP-17; 78-144'
Sample Date/Time: 07/23/2008 14:01:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	2.2	%	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	5.42	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.9	S.U.	ES	0.1	21a	07/29/2008 11:52:17 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	<10	mg/kg	BH	10	6020	08/07/2008 09:27:00 AM
Cadmium Dry Basis	<2	mg/kg	BH	2	6020	08/07/2008 09:27:00 AM
Copper Dry Basis	28	mg/kg	BH	10	6020	08/07/2008 09:27:00 AM
Lead Dry Basis	13	mg/kg	BH	10	6020	08/07/2008 09:27:00 AM
Zinc Dry Basis	54	mg/kg	BH	10	6020	08/07/2008 09:27:00 AM
ORGANICS						
Organic Matter dry basis	<0.1	%	MRK	0.1	29-3.5.2	08/04/2008 02:43:57 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	5.4	%	RM	0.1	D421	07/31/2008 09:33:10 AM
Sand	50.0	%	RM	2.5	15-5mod.	07/29/2008 08:46:00 AM
Silt	27.5	%	RM	2.5	15-5mod.	07/29/2008 08:46:00 AM
Clay	22.5	%	RM	2.5	15-5mod.	07/29/2008 08:46:00 AM
Texture	Sa Cl Lo	—	RM	—	15-5mod.	07/29/2008 08:46:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	31.5	meq/l	BH	0.04	3-5.4	08/06/2008 01:35:00 PM
Saturation	34.3	%	ES	0.1	27A	07/29/2008 03:54:23 PM
Calcium saturated paste	25.7	meq/l	BH	0.05	3-5.4	08/06/2008 01:35:00 PM
Magnesium saturated paste	19.3	meq/l	BH	0.08	3-5.4	08/06/2008 01:35:00 PM
Sodium Adsorption Ratio	6.64	—	BH	0.1	20b	08/06/2008 01:35:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-27
Sample Name: TP-1; 0-10'
Sample Date/Time: 07/23/2008 07:55:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.56	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.0	S.U.	ES	0.1	21a	07/31/2008 03:13:07 PM
Sample Preparation	-----	-----	—	—	3-5.1	
METALS						
Potassium Available Dry Basis	360	mg/kg	BH	100	13-3.5.2.2	07/30/2008 07:04:00 PM
Arsenic Dry Basis	27	mg/kg	BH	10	6020	08/07/2008 09:38:00 AM
Cadmium Dry Basis	<2	mg/kg	BH	2	6020	08/07/2008 09:38:00 AM
Copper Dry Basis	71	mg/kg	BH	10	6020	08/07/2008 09:38:00 AM
Lead Dry Basis	21	mg/kg	BH	10	6020	08/07/2008 09:38:00 AM
Zinc Dry Basis	76	mg/kg	BH	10	6020	08/07/2008 09:38:00 AM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	3.6	mg/kg	CC	0.5	33.3.2	07/30/2008 10:57:00 AM
Phosphorus Available Dry Basis	22	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	604	mg/kg	CC	50	351.2	08/12/2008 04:42:00 PM
ORGANICS						
Organic Matter dry basis	1.6	%	MRK	0.1	29-3.5.2	08/04/2008 02:45:04 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	7.7	%	RM	0.1	D421	07/31/2008 09:33:27 AM
Sand	57.5	%	RM	2.5	15-5mod.	07/30/2008 08:25:00 AM
Silt	28.7	%	RM	2.5	15-5mod.	07/30/2008 08:25:00 AM
Clay	13.8	%	RM	2.5	15-5mod.	07/30/2008 08:25:00 AM
Texture	Sandy Loam	-----	RM	—	15-5mod.	07/30/2008 08:25:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	0.81	meq/l	BH	0.04	3-5.4	08/06/2008 01:10:00 PM
Saturation	32.2	%	ES	0.1	27A	07/31/2008 09:59:36 AM
Calcium saturated paste	3.71	meq/l	BH	0.05	3-5.4	08/06/2008 01:10:00 PM
Magnesium saturated paste	1.38	meq/l	BH	0.08	3-5.4	08/06/2008 01:10:00 PM
Sodium Adsorption Ratio	0.51	-----	BH	0.1	20b	08/06/2008 01:10:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-28
Sample Name: TP-1; 10-23'
Sample Date/Time: 07/23/2008 07:57:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.86	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.9	S.U.	ES	0.1	21a	07/29/2008 11:52:18 AM
Sample Preparation	-----	-----	---	-----	3-5.1	
METALS						
Potassium Available Dry Basis	<100	mg/kg	BH	100	13-3.5.2.2	07/30/2008 07:07:00 PM
Arsenic Dry Basis	18	mg/kg	BH	10	6020	08/07/2008 09:42:00 AM
Cadmium Dry Basis	<2	mg/kg	BH	2	6020	08/07/2008 09:42:00 AM
Copper Dry Basis	25	mg/kg	BH	10	6020	08/07/2008 09:42:00 AM
Lead Dry Basis	<10	mg/kg	BH	10	6020	08/07/2008 09:42:00 AM
Zinc Dry Basis	26	mg/kg	BH	10	6020	08/07/2008 09:42:00 AM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	4.0	mg/kg	CC	0.5	33.3.2	07/30/2008 10:58:00 AM
Phosphorus Available Dry Basis	7	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	397	mg/kg	CC	50	351.2	08/12/2008 03:23:00 PM
ORGANICS						
Organic Matter dry basis	0.9	%	MRK	0.1	29-3.5.2	08/04/2008 02:51:08 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	12.6	%	RM	0.1	D421	07/31/2008 02:43:01 PM
Sand	60.0	%	RM	2.5	15-5mod.	07/29/2008 08:50:00 AM
Silt	18.7	%	RM	2.5	15-5mod.	07/29/2008 08:50:00 AM
Clay	21.3	%	RM	2.5	15-5mod.	07/29/2008 08:50:00 AM
Texture	Sa Cl Lo	-----	RM	----	15-5mod.	07/29/2008 08:50:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	1.99	meq/l	BH	0.04	3-5.4	08/06/2008 01:37:00 PM
Saturation	35.0	%	ES	0.1	27A	07/29/2008 03:54:23 PM
Calcium saturated paste	5.23	meq/l	BH	0.05	3-5.4	08/06/2008 01:37:00 PM
Magnesium saturated paste	2.11	meq/l	BH	0.08	3-5.4	08/06/2008 01:37:00 PM
Sodium Adsorption Ratio	1.04	-----	BH	0.1	20b	08/06/2007 01:37:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-29
Sample Name: TP-1; 10-48'
Sample Date/Time: 07/23/2008 07:57:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	1.11	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	8.1	S.U.	ES	0.1	21a	07/31/2008 03:13:08 PM
Sample Preparation	-----	-----	---	-----	3-5.1	
METALS						
Potassium Available Dry Basis	110	mg/kg	BH	100	13-3.5.2.2	07/30/2008 07:10:00 PM
Arsenic Dry Basis	11	mg/kg	BH	10	6020	08/07/2008 09:46:00 AM
Cadmium Dry Basis	<2	mg/kg	BH	2	6020	08/07/2008 09:46:00 AM
Copper Dry Basis	23	mg/kg	BH	10	6020	08/07/2008 09:46:00 AM
Lead Dry Basis	<10	mg/kg	BH	10	6020	08/07/2008 09:46:00 AM
Zinc Dry Basis	23	mg/kg	BH	10	6020	08/07/2008 09:46:00 AM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	1.0	mg/kg	CC	0.5	33.3.2	07/30/2008 11:00:00 AM
Phosphorus Available Dry Basis	4	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	263	mg/kg	CC	50	351.2	08/12/2008 03:31:00 PM
ORGANICS						
Organic Matter dry basis	0.6	%	MRK	0.1	29-3.5.2	08/04/2008 03:11:08 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	11.3	%	RM	0.1	D421	07/31/2008 02:43:17 PM
Sand	65.0	%	RM	2.5	15-5mod.	07/30/2008 08:28:00 AM
Silt	18.7	%	RM	2.5	15-5mod.	07/30/2008 08:28:00 AM
Clay	16.3	%	RM	2.5	15-5mod.	07/30/2008 08:28:00 AM
Texture	Sandy Loam	-----	RM	-----	15-5mod.	07/30/2008 08:28:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	2.42	meq/l	BH	0.04	3-5.4	08/06/2008 01:15:00 PM
Saturation	33.0	%	ES	0.1	27A	07/31/2008 09:59:36 AM
Calcium saturated paste	4.88	meq/l	BH	0.05	3-5.4	08/06/2008 01:15:00 PM
Magnesium saturated paste	4.28	meq/l	BH	0.08	3-5.4	08/06/2008 01:15:00 PM
Sodium Adsorption Ratio	1.13	-----	BH	0.1	20b	08/06/2008 01:15:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-30
Sample Name: TP-1; 48-96'
Sample Date/Time: 07/23/2008 08:00:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	1.90	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	8.1	S.U.	ES	0.1	21a	07/29/2008 11:52:18 AM
Sample Preparation	----	----	---	----	3-5.1	
METALS						
Arsenic Dry Basis	<10	mg/kg	BH	10	6020	08/07/2008 09:50:00 AM
Cadmium Dry Basis	<2	mg/kg	BH	2	6020	08/07/2008 09:50:00 AM
Copper Dry Basis	23	mg/kg	BH	10	6020	08/07/2008 09:50:00 AM
Lead Dry Basis	<10	mg/kg	BH	10	6020	08/07/2008 09:50:00 AM
Zinc Dry Basis	27	mg/kg	BH	10	6020	08/07/2008 09:50:00 AM
ORGANICS						
Organic Matter dry basis	0.2	%	MRK	0.1	29-3.5.2	08/04/2008 03:11:55 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	8.9	%	RM	0.1	D421	07/31/2008 09:34:41 AM
Sand	77.5	%	RM	2.5	15-5mod.	07/29/2008 08:53:00 AM
Silt	16.2	%	RM	2.5	15-5mod.	07/29/2008 08:53:00 AM
Clay	6.3	%	RM	2.5	15-5mod.	07/29/2008 08:53:00 AM
Texture	Loamy Sand	----	RM	----	15-5mod.	07/29/2008 08:53:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	3.07	meq/l	BH	0.04	3-5.4	08/06/2008 01:40:00 PM
Saturation	24.1	%	ES	0.1	27A	07/29/2008 03:54:23 PM
Calcium saturated paste	6.46	meq/l	BH	0.05	3-5.4	08/06/2008 01:40:00 PM
Magnesium saturated paste	11.6	meq/l	BH	0.08	3-5.4	08/06/2008 01:40:00 PM
Sodium Adsorption Ratio	1.02	----	BH	0.1	20b	08/06/2008 01:40:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-31
Sample Name: TP-13; 0-8'
Sample Date/Time: 07/23/2008 12:45:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.63	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.1	S.U.	ES	0.1	21a	07/29/2008 11:52:18 AM
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Arsenic Dry Basis	31	mg/kg	BH	10	6020	08/07/2008 09:53:00 AM
Copper Dry Basis	68	mg/kg	BH	10	6020	08/07/2008 09:53:00 AM
ORGANICS						
Organic Matter dry basis	1.8	%	MRK	0.1	29-3.5.2	08/04/2008 03:18:53 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	2.8	%	RM	0.1	D421	07/31/2008 09:35:08 AM
Sand	42.5	%	RM	2.5	15-5mod.	07/29/2008 08:57:00 AM
Silt	42.5	%	RM	2.5	15-5mod.	07/29/2008 08:57:00 AM
Clay	15.0	%	RM	2.5	15-5mod.	07/29/2008 08:57:00 AM
Texture	Loam	---	RM	---	15-5mod.	07/29/2008 08:57:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-32
Sample Name: TP-13; 8-19'
Sample Date/Time: 07/23/2008 12:45:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.72	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.7	S.U.	ES	0.1	21a	07/29/2008 11:52:18 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	<10	mg/kg	BH	10	6020	08/07/2008 09:57:00 AM
Copper Dry Basis	28	mg/kg	BH	10	6020	08/07/2008 09:57:00 AM
ORGANICS						
Organic Matter dry basis	0.3	%	MRK	0.1	29-3.5.2	08/04/2008 03:17:49 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	12.9	%	RM	0.1	D421	07/31/2008 09:35:30 AM
Sand	42.5	%	RM	2.5	15-5mod.	07/29/2008 09:02:00 AM
Silt	42.5	%	RM	2.5	15-5mod.	07/29/2008 09:02:00 AM
Clay	15.0	%	RM	2.5	15-5mod.	07/29/2008 09:02:00 AM
Texture	Loam	—	RM	—	15-5mod.	07/29/2008 09:02:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-33
Sample Name: TP-13; 52-96'
Sample Date/Time: 07/23/2008 12:48:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	2.12	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	8.0	S.U.	ES	0.1	21a	07/29/2008 11:52:19 AM
Sample Preparation	----	----	---	----	3-5.1	
METALS						
Arsenic Dry Basis	<10	mg/kg	BH	10	6020	08/07/2008 10:01:00 AM
Copper Dry Basis	28	mg/kg	BH	10	6020	08/07/2008 10:01:00 AM
ORGANICS						
Organic Matter dry basis	0.3	%	MRK	0.1	29-3.5.2	08/04/2008 03:18:55 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	8.5	%	RM	0.1	D421	07/31/2008 09:35:53 AM
Sand	55.0	%	RM	2.5	15-5mod.	07/29/2008 09:05:00 AM
Silt	30.0	%	RM	2.5	15-5mod.	07/29/2008 09:05:00 AM
Clay	15.0	%	RM	2.5	15-5mod.	07/29/2008 09:05:00 AM
Texture	Sandy Loam	----	RM	----	15-5mod.	07/29/2008 09:05:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-34
Sample Name: TP-13; 86-132'
Sample Date/Time: 07/23/2008 12:48:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	1.13	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.8	S.U.	ES	0.1	21a	07/29/2008 11:52:19 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	<10	mg/kg	BH	10	6020	08/07/2008 10:05:00 AM
Copper Dry Basis	31	mg/kg	BH	10	6020	08/07/2008 10:05:00 AM
ORGANICS						
Organic Matter dry basis	0.2	%	MRK	0.1	29-3.5.2	08/04/2008 03:51:11 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	4.7	%	RM	0.1	D421	07/31/2008 09:36:21 AM
Sand	45.0	%	RM	2.5	15-5mod.	07/29/2008 09:08:00 AM
Silt	45.0	%	RM	2.5	15-5mod.	07/29/2008 09:08:00 AM
Clay	10.0	%	RM	2.5	15-5mod.	07/29/2008 09:08:00 AM
Texture	Loam	—	RM	—	15-5mod.	07/29/2008 09:08:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-35
Sample Name: TP-23; 0-12'
Sample Date/Time: 07/23/2008 11:58:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.53	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	6.8	S.U.	ES	0.1	21a	07/29/2008 11:52:19 AM
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Potassium Available Dry Basis	260	mg/kg	BH	100	13-3.5.2.2	07/30/2008 07:14:00 PM
Arsenic Dry Basis	29	mg/kg	BH	10	6020	08/07/2008 10:09:00 AM
Copper Dry Basis	68	mg/kg	BH	10	6020	08/07/2008 10:09:00 AM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	3.0	mg/kg	CC	0.5	33.3.2	07/30/2008 11:02:00 AM
Phosphorus Available Dry Basis	28	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	674J	mg/kg	CC	50	351.2	08/12/2008 04:43:00 PM
ORGANICS						
Organic Matter dry basis	1.7	%	MRK	0.1	29-3.5.2	08/04/2008 03:53:59 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	7.3	%	RM	0.1	D421	07/31/2008 09:36:38 AM
Sand	45.0	%	RM	2.5	15-5mod.	07/29/2008 09:13:00 AM
Silt	37.5	%	RM	2.5	15-5mod.	07/29/2008 09:13:00 AM
Clay	17.5	%	RM	2.5	15-5mod.	07/29/2008 09:13:00 AM
Texture	Loam	---	RM	---	15-5mod.	07/29/2008 09:13:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-36
Sample Name: TP-23; 12-44'
Sample Date/Time: 07/23/2008 11:59:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	2.09	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	8.0	S.U.	ES	0.1	21a	07/29/2008 11:52:20 AM
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Potassium Available Dry Basis	110	mg/kg	BH	100	13-3.5.2.2	07/30/2008 07:20:00 PM
Arsenic Dry Basis	14	mg/kg	BH	10	6020	08/07/2008 10:24:00 AM
Copper Dry Basis	24	mg/kg	BH	10	6020	08/07/2008 10:24:00 AM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	0.7	mg/kg	CC	0.5	33.3.2	07/30/2008 11:04:00 AM
Phosphorus Available Dry Basis	5	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	256	mg/kg	CC	50	351.2	08/12/2008 03:36:00 PM
ORGANICS						
Organic Matter dry basis	0.7	%	MRK	0.1	29-3.5.2	08/04/2008 03:57:20 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	14.6	%	RM	0.1	D421	07/31/2008 08:07:20 AM
Sand	58.8	%	RM	2.5	15-5mod.	07/29/2008 09:18:00 AM
Silt	17.4	%	RM	2.5	15-5mod.	07/29/2008 09:18:00 AM
Clay	23.8	%	RM	2.5	15-5mod.	07/29/2008 09:18:00 AM
Texture	Sa Cl Lo	---	RM	---	15-5mod.	07/29/2008 09:18:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-37
Sample Name: TP-22; 0-10'
Sample Date/Time: 07/23/2008 12:18:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.55	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.7	S.U.	ES	0.1	21a	07/29/2008 11:52:20 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	34	mg/kg	BH	10	6020	08/07/2008 10:31:00 AM
Copper Dry Basis	73	mg/kg	BH	10	6020	08/07/2008 10:31:00 AM
ORGANICS						
Organic Matter dry basis	2.0	%	MRK	0.1	29-3.5.2	08/04/2008 03:59:08 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	11.1	%	RM	0.1	D421	07/31/2008 08:07:46 AM
Sand	50.0	%	RM	2.5	15-5mod.	07/29/2008 09:22:00 AM
Silt	32.5	%	RM	2.5	15-5mod.	07/29/2008 09:22:00 AM
Clay	17.5	%	RM	2.5	15-5mod.	07/29/2008 09:22:00 AM
Texture	Loam	—	RM	—	15-5mod.	07/29/2008 09:22:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-38
Sample Name: TP-22; 10-38'
Sample Date/Time: 07/23/2008 12:18:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	1.74	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	8.2	S.U.	ES	0.1	21a	07/29/2008 11:52:20 AM
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Arsenic Dry Basis	17	mg/kg	BH	10	6020	08/07/2008 10:35:00 AM
Copper Dry Basis	28	mg/kg	BH	10	6020	08/07/2008 10:35:00 AM
ORGANICS						
Organic Matter dry basis	0.9	%	MRK	0.1	29-3.5.2	08/04/2008 04:00:11 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	3.6	%	RM	0.1	D421	07/29/2008 04:07:21 PM
Sand	43.8	%	RM	2.5	15-5mod.	07/29/2008 09:24:00 AM
Silt	23.7	%	RM	2.5	15-5mod.	07/29/2008 09:24:00 AM
Clay	32.5	%	RM	2.5	15-5mod.	07/29/2008 09:24:00 AM
Texture	Clay Loam	---	RM	---	15-5mod.	07/29/2008 09:24:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-39
Sample Name: TP-24; 0-8'
Sample Date/Time: 07/23/2008 11:42:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.55	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.4	S.U.	ES	0.1	21a	07/29/2008 11:52:20 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Potassium Available Dry Basis	310	mg/kg	BH	100	13-3.5.2.2	07/30/2008 07:26:00 PM
Arsenic Dry Basis	25	mg/kg	BH	10	6020	08/07/2008 10:39:00 AM
Copper Dry Basis	64	mg/kg	BH	10	6020	08/07/2008 10:39:00 AM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	4.7	mg/kg	CC	0.5	33.3.2	07/30/2008 11:06:00 AM
Phosphorus Available Dry Basis	21	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	322	mg/kg	CC	50	351.2	08/12/2008 04:47:00 PM
ORGANICS						
Organic Matter dry basis	1.7	%	MRK	0.1	29-3.5.2	08/04/2008 04:01:42 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	10.9	%	RM	0.1	D421	07/31/2008 09:38:27 AM
Sand	57.5	%	RM	2.5	15-5mod.	07/29/2008 09:28:00 AM
Silt	28.7	%	RM	2.5	15-5mod.	07/29/2008 09:28:00 AM
Clay	13.8	%	RM	2.5	15-5mod.	07/29/2008 09:28:00 AM
Texture	Sandy Loam	—	RM	—	15-5mod.	07/29/2008 09:28:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-40
Sample Name: TP-24; 8-31'
Sample Date/Time: 07/23/2008 11:43:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	2.10	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	8.1	S.U.	ES	0.1	21a	07/29/2008 11:52:21 AM
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Potassium Available Dry Basis	<100	mg/kg	BH	100	13-3.5.2.2	07/30/2008 07:29:00 PM
Arsenic Dry Basis	15	mg/kg	BH	10	6020	08/07/2008 10:43:00 AM
Copper Dry Basis	24	mg/kg	BH	10	6020	08/07/2008 10:43:00 AM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	3.4	mg/kg	CC	0.5	33.3.2	07/30/2008 11:08:00 AM
Phosphorus Available Dry Basis	7	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	356	mg/kg	CC	50	351.2	08/12/2008 03:40:00 PM
ORGANICS						
Organic Matter dry basis	0.7	%	MRK	0.1	29-3.5.2	08/04/2008 04:07:37 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	12.0	%	RM	0.1	D421	07/31/2008 09:37:14 AM
Sand	58.8	%	RM	2.5	15-5mod.	07/29/2008 09:33:00 AM
Silt	16.2	%	RM	2.5	15-5mod.	07/29/2008 09:33:00 AM
Clay	2.50	%	RM	2.5	15-5mod.	07/29/2008 09:33:00 AM
Texture	Sa Cl Lo	-----	RM	-----	15-5mod.	07/29/2008 09:33:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-41
Sample Name: TP-19; 0-9'
Sample Date/Time: 07/23/2008 11:21:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.69	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.8	S.U.	ES	0.1	21a	07/31/2008 03:13:08 PM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	29	mg/kg	BH	10	6020	08/06/2008 08:50:00 PM
Copper Dry Basis	57	mg/kg	BH	10	6020	08/06/2008 08:50:00 PM
ORGANICS						
Organic Matter dry basis	1.9	%	MRK	0.1	29-3.5.2	08/04/2008 04:45:07 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	12.0	%	RM	0.1	D421	07/31/2008 09:37:28 AM
Sand	55.0	%	RM	2.5	15-5mod.	07/30/2008 08:32:00 AM
Silt	30.0	%	RM	2.5	15-5mod.	07/30/2008 08:32:00 AM
Clay	15.0	%	RM	2.5	15-5mod.	07/30/2008 08:32:00 AM
Texture	Sandy Loam	—	RM	—	15-5mod.	07/30/2008 08:32:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-42
Sample Name: TP-19; 9-28'
Sample Date/Time: 07/23/2008 11:21:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	3.58	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.9	S.U.	ES	0.1	21a	07/31/2008 03:13:08 PM
Sample Preparation	----	----	—	----	3-5.1	
METALS						
Arsenic Dry Basis	14	mg/kg	BH	10	6020	08/06/2008 09:05:00 PM
Copper Dry Basis	14	mg/kg	BH	10	6020	08/06/2008 09:05:00 PM
ORGANICS						
Organic Matter dry basis	0.9	%	MRK	0.1	29-3.5.2	08/04/2008 04:46:03 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	9.1	%	RM	0.1	D421	07/31/2008 09:37:47 AM
Sand	62.5	%	RM	2.5	15-5mod.	07/30/2008 08:39:00 AM
Silt	17.5	%	RM	2.5	15-5mod.	07/30/2008 08:39:00 AM
Clay	20.0	%	RM	2.5	15-5mod.	07/30/2008 08:39:00 AM
Texture	Sandy Loam	----	RM	----	15-5mod.	07/30/2008 08:39:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-43
Sample Name: TP-17 FD; 0-10'
Sample Date/Time: 07/23/2008 14:03:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.76	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.6	S.U.	ES	0.1	21a	07/31/2008 03:13:08 PM
Sample Preparation	-----	-----	---	-----	3-5.1	
METALS						
Arsenic Dry Basis	26	mg/kg	BH	10	6020	08/06/2008 09:12:00 PM
Copper Dry Basis	54	mg/kg	BH	10	6020	08/06/2008 09:12:00 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	4.0	%	RM	0.1	D421	07/31/2008 02:56:17 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-44
Sample Name: TP-21 FD; 0-11'
Sample Date/Time: 07/23/2008 09:15:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.70	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.7	S.U.	ES	0.1	21a	07/31/2008 03:13:09 PM
Sample Preparation	---	----	--	---	3-5.1	
METALS						
Arsenic Dry Basis	30	mg/kg	BH	10	6020	08/06/2008 09:16:00 PM
Copper Dry Basis	56	mg/kg	BH	10	6020	08/06/2008 09:16:00 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	9.8	%	RM	0.1	D421	07/31/2008 02:56:37 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-45
Sample Name: TP-22 FD; 10-38'
Sample Date/Time: 07/23/2008 12:20:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	1.29	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	8.2	S.U.	ES	0.1	21a	07/31/2008 03:13:09 PM
Sample Preparation	-----	-----	---	-----	3-5.1	
METALS						
Arsenic Dry Basis	19	mg/kg	BH	10	6020	08/06/2008 09:20:00 PM
Copper Dry Basis	13	mg/kg	BH	10	6020	08/06/2008 09:20:00 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	6.8	%	RM	0.1	D421	07/31/2008 02:56:51 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-46
Sample Name: FIELD SPLIT
Sample Date/Time: 07/23/2008 14:31:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.47	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.5	S.U.	ES	0.1	21a	07/31/2008 03:13:09 PM
Sample Preparation	----	----	---	----	3-5.1	
METALS						
Arsenic Dry Basis	28	mg/kg	BH	10	6020	08/06/2008 09:24:00 PM
Copper Dry Basis	55	mg/kg	BH	10	6020	08/06/2008 09:24:00 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	6.6	%	RM	0.1	D421	07/31/2008 02:57:03 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-47
Sample Name: CCB-1
Sample Date/Time: 07/23/2008 10:02:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
METALS						
Arsenic Dry Basis	<10	mg/kg	BH	10	6020	08/06/2008 09:28:00 PM
Copper Dry Basis	<10	mg/kg	BH	10	6020	08/06/2008 09:28:00 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	<0.1	%	RM	0.1	D421	07/31/2008 02:57:20 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-48
Sample Name: CCB-2
Sample Date/Time: 07/23/2008 12:41:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
METALS						
Arsenic Dry Basis	<10	mg/kg	BH	10	6020	08/06/2008 09:32:00 PM
Copper Dry Basis	<10	mg/kg	BH	10	6020	08/06/2008 09:32:00 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	<0.1	%	RM	0.1	D421	07/31/2008 02:57:31 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-49
Sample Name: CCB-3
Sample Date/Time: 07/23/2008 14:39:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
METALS						
Arsenic Dry Basis	<10	mg/kg	BH	10	6020	08/06/2008 09:35:00 PM
Copper Dry Basis	<10	mg/kg	BH	10	6020	08/06/2008 09:35:00 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	<0.1	%	RM	0.1	D421	07/31/2008 02:57:45 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-50
Sample Name: DUPLICATE OF 2008070172-06
Sample Date/Time: 07/23/2008 09:07:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	2*	RPD [0-20]	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	0.55	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.5	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	—	-----	---	—	3-5.1	
METALS						
Potassium Available Dry Basis	300	mg/kg	BH	100	13-3.5.2.2	07/30/2008 06:31:00 PM
Arsenic Dry Basis	4*	RPD [0-20]	BH	10	6020	08/06/2008 05:08:00 PM
Cadmium Dry Basis	0*	RPD [0-20]	BH	2	6020	08/06/2008 05:08:00 PM
Copper Dry Basis	4*	RPD [0-20]	BH	10	6020	08/06/2008 05:08:00 PM
Lead Dry Basis	0*	RPD [0-20]	BH	10	6020	08/06/2008 05:08:00 PM
Zinc Dry Basis	3*	RPD [0-20]	BH	10	6020	08/06/2008 05:08:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	1.8	mg/kg	CC	0.5	33.3.2	07/30/2008 10:33:00 AM
Phosphorus Available Dry Basis	27	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	973	mg/kg	CC	50	351.2	08/12/2008 04:26:00 PM
ORGANICS						
Organic Matter dry basis	1.9	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:50 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	—	—	-----	—	—
Sand	52.5	%	RM	2.5	15-5mod.	07/30/2008 09:11:00 AM
Silt	30.0	%	RM	2.5	15-5mod.	07/30/2008 09:11:00 AM
Clay	17.5	%	RM	2.5	15-5mod.	07/30/2008 09:11:00 AM
Texture	Sandy Loam	-----	RM	—	15-5mod.	07/30/2008 09:11:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	17*	RPD [0-25]	BH	0.04	3-5.4	08/06/2008 01:01:00 PM
Saturation	36.8	%	ES	0.1	27A	07/31/2008 09:59:36 AM
Calcium saturated paste	2*	RPD [0-25]	BH	0.05	3-5.4	08/06/2008 01:01:00 PM
Magnesium saturated paste	0*	RPD [0-25]	BH	0.08	3-5.4	08/06/2008 01:01:00 PM
Sodium Adsorption Ratio	16*	RPD [0-25]	BH	0.1	20b	08/06/2008 01:01:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-51
Sample Name: MATRIX SPIKE OF 2008070172-07
Sample Date/Time: 07/23/2008 09:08:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	82	% [72-128]	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	NA	---	---	---	---	---
pH Saturated Paste	NA	---	---	---	---	---
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Potassium Available Dry Basis	95	% [75-125]	BH	100	13-3.5.2.2	07/30/2008 06:37:00 PM
Arsenic Dry Basis	115	% [72-125]	BH	10	6020	08/06/2008 05:23:00 PM
Cadmium Dry Basis	113	% [76-125]	BH	2	6020	08/06/2008 05:23:00 PM
Copper Dry Basis	110	% [62-128]	BH	10	6020	08/06/2008 05:23:00 PM
Lead Dry Basis	115	% [76-125]	BH	10	6020	08/06/2008 05:23:00 PM
Zinc Dry Basis	114	% [71-136]	BH	10	6020	08/06/2008 05:23:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	90	% [75-125]	CC	0.5	33.3.2	07/30/2008 10:37:00 AM
Phosphorus Available Dry Basis	96	% [75-125]	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	79	% [61-128]	CC	50	351.2	08/12/2008 04:28:00 PM
ORGANICS						
Organic Matter dry basis	95	% [75-125]	MRK	0.1	29-3.5.2	08/01/2008 05:37:50 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	---	---	---	---	---
Sand	NA	---	---	---	---	---
Silt	NA	---	---	---	---	---
Clay	NA	---	---	---	---	---
Texture	NA	---	---	---	---	---
SATURATED PASTE ANALYTES						
Sodium saturated paste	100	% [75-125]	BH	0.04	3-5.4	08/06/2008 01:12:00 PM
Saturation	NA	---	---	---	---	---
Calcium saturated paste	98	% [75-125]	BH	0.05	3-5.4	08/06/2008 01:12:00 PM
Magnesium saturated paste	100	% [75-125]	BH	0.08	3-5.4	08/06/2008 01:12:00 PM
Sodium Adsorption Ratio	NA	---	---	---	---	

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-52
Sample Name: DUPLICATE OF 2008070172-15
Sample Date/Time: 07/23/2008 09:53:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.68	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.0	S.U.	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Potassium Available Dry Basis	270	mg/kg	BH	100	13-3.5.2.2	07/30/2008 06:49:00 PM
Arsenic Dry Basis	0*	RPD [0-20]	BH	10	6020	08/06/2008 06:08:00 PM
Copper Dry Basis	0*	RPD [0-20]	BH	10	6020	08/06/2008 06:08:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	3.0	mg/kg	CC	0.5	33.3.2	07/30/2008 10:44:00 AM
Phosphorus Available Dry Basis	22	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	868 (6)	mg/kg	CC	50	351.2	08/12/2008 04:32:00 PM
ORGANICS						
Organic Matter dry basis	1.9	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:50 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	—	—	—	—	—
Sand	50.0	%	RM	2.5	15-5mod.	07/30/2008 09:47:00 AM
Silt	33.7	%	RM	2.5	15-5mod.	07/30/2008 09:47:00 AM
Clay	16.3	%	RM	2.5	15-5mod.	07/30/2008 09:47:00 AM
Texture	Loam	—	RM	—	15-5mod.	07/30/2008 09:47:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-53
Sample Name: MATRIX SPIKE OF 2008070172-16
Sample Date/Time: 07/23/2008 09:53:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	NA	—	—	—	—	—
pH Saturated Paste	NA	—	—	—	—	—
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Potassium Available Dry Basis	89	% [75-125]	BH	100	13-3.5.2.2	07/30/2008 06:55:00 PM
Arsenic Dry Basis	120	% [72-125]	BH	10	6020	08/06/2008 06:16:00 PM
Copper Dry Basis	115	% [62-128]	BH	10	6020	08/06/2008 06:16:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	90	% [75-125]	CC	0.5	33.3.2	07/30/2008 10:55:00 AM
Phosphorus Available Dry Basis	84	% [75-125]	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	60(4)	% [61-128]	CC	50	351.2	08/12/2008 04:34:00 PM
ORGANICS						
Organic Matter dry basis	109	% [75-125]	MRK	0.1	29-3.5.2	08/01/2008 05:37:50 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	—	—	—	—	—
Sand	NA	—	—	—	—	—
Silt	NA	—	—	—	—	—
Clay	NA	—	—	—	—	—
Texture	NA	—	—	—	—	—

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-54
Sample Name: DUPLICATE OF 2008070172-24
Sample Date/Time: 07/23/2008 13:57:02
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	1.4	%	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	0.55	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.5	S.U.	ES	0.1	21a	07/29/2008 11:52:21 AM
Sample Preparation	----	—	---	—	3-5.1	
METALS						
Arsenic Dry Basis	4*	RPD [0-20]	BH	10	6020	08/07/2008 09:16:00 AM
Cadmium Dry Basis	0*	RPD [0-20]	BH	2	6020	08/07/2008 09:16:00 AM
Copper Dry Basis	5*	RPD [0-20]	BH	10	6020	08/07/2008 09:16:00 AM
Lead Dry Basis	5*	RPD [0-20]	BH	10	6020	08/07/2008 09:16:00 AM
Zinc Dry Basis	7*	RPD [0-20]	BH	10	6020	08/07/2008 09:16:00 AM
ORGANICS						
Organic Matter dry basis	1.4	%	MRK	0.1	29-3.5.2	08/04/2008 02:41:01 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	----	—	----	—	—
Sand	47.5	%	RM	2.5	15-5mod.	07/29/2008 08:39:00 AM
Silt	36.2	%	RM	2.5	15-5mod.	07/29/2008 08:39:00 AM
Clay	16.3	%	RM	2.5	15-5mod.	07/29/2008 08:39:00 AM
Texture	Loam	—	RM	—	15-5mod.	07/29/2008 08:39:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	16*	RPD [0-25]	BH	0.04	3-5.4	08/06/2008 01:27:00 PM
Saturation	33.4	%	ES	0.1	27A	07/29/2008 03:54:23 PM
Calcium saturated paste	0*	RPD [0-25]	BH	0.05	3-5.4	08/06/2008 01:27:00 PM
Magnesium saturated paste	2*	RPD [0-25]	BH	0.08	3-5.4	08/06/2008 01:27:00 PM
Sodium Adsorption Ratio	17*	RPD [0-25]	BH	0.1	20b	08/06/2008 01:27:00 PM

Northern Analytical Laboratories, Inc.
Batch Duplicate

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-55
Sample Name: MATRIX SPIKE OF 2008070172-25
Sample Date/Time: 07/23/2008 14:00:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	82	% [72-128]	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	NA	—	—	—	—	—
pH Saturated Paste	NA	—	—	—	—	—
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Arsenic Dry Basis	100	% [72-125]	BH	10	6020	08/07/2008 09:24:00 AM
Cadmium Dry Basis	100	% [76-125]	BH	2	6020	08/07/2008 09:24:00 AM
Copper Dry Basis	98	% [62-128]	BH	10	6020	08/07/2008 09:24:00 AM
Lead Dry Basis	101	% [76-125]	BH	10	6020	08/07/2008 09:24:00 AM
Zinc Dry Basis	102	% [71-136]	BH	10	6020	08/07/2008 09:24:00 AM
ORGANICS						
Organic Matter dry basis	96	% [75-125]	MRK	0.1	29-3.5.2	08/04/2008 02:43:01 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	—	—	—	—	—
Sand	NA	—	—	—	—	—
Silt	NA	—	—	—	—	—
Clay	NA	—	—	—	—	—
Texture	NA	—	—	—	—	—
SATURATED PASTE ANALYTES						
Sodium saturated paste	100	% [75-125]	BH	0.04	3-5.4	08/06/2008 01:32:00 PM
Saturation	NA	—	—	—	—	—
Calcium saturated paste	97	% [75-125]	BH	0.05	3-5.4	08/06/2008 01:32:00 PM
Magnesium saturated paste	100	% [75-125]	BH	0.08	3-5.4	08/06/2008 01:32:00 PM
Sodium Adsorption Ratio	NA	—	—	—	—	

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-56
Sample Name: DUPLICATE OF 2008070172-35
Sample Date/Time: 07/23/2008 11:58:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.54	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	6.8	S.U.	ES	0.1	21a	07/29/2008 11:52:22 AM
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Potassium Available Dry Basis	250	mg/kg	BH	100	13-3.5.2.2	07/30/2008 07:17:00 PM
Arsenic Dry Basis	0*	RPD [0-20]	BH	10	6020	08/07/2008 10:13:00 AM
Copper Dry Basis	1*	RPD [0-20]	BH	10	6020	08/07/2008 10:13:00 AM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	NA	—	-----	—	—	
Phosphorus Available Dry Basis	0*	RPD [0-20]	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	839 (6)	mg/kg	CC	50	351.2	08/12/2008 04:45:00 PM
ORGANICS						
Organic Matter dry basis	1.6	%	MRK	0.1	29-3.5.2	08/04/2008 03:56:38 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	-----	—	—	—	—
Sand	45	%	RM	2.5	15-5mod.	07/29/2008 09:15:00 AM
Silt	37.5	%	RM	2.5	15-5mod.	07/29/2008 09:15:00 AM
Clay	17.5	%	RM	2.5	15-5mod.	07/29/2008 09:15:00 AM
Texture	Loam	—	RM	—	15-5mod.	07/29/2008 09:15:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-57
Sample Name: MATRIX SPIKE OF 2008070172-36
Sample Date/Time: 07/23/2008 11:59:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	NA	—	—	—	—	—
pH Saturated Paste	NA	—	—	—	—	—
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Potassium Available Dry Basis	97	% [75-125]	BH	100	13-3.5.2.2	07/30/2008 07:23:00 PM
Arsenic Dry Basis	114	% [72-125]	BH	10	6020	08/07/2008 10:27:00 AM
Copper Dry Basis	113	% [62-128]	BH	10	6020	08/07/2008 10:27:00 AM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	NA	—	—	—	—	
Phosphorus Available Dry Basis	84	% [75-125]	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	84	% [61-128]	CC	50	351.2	08/12/2008 03:37:00 PM
ORGANICS						
Organic Matter dry basis	92	% [75-125]	MRK	0.1	29-3.5.2	08/04/2008 03:56:42 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	—	—	—	—	—
Sand	NA	—	—	—	—	—
Silt	NA	—	—	—	—	—
Clay	NA	—	—	—	—	—
Texture	NA	—	—	—	—	—

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-58
Sample Name: DUPLICATE OF 2008070172-41
Sample Date/Time: 07/23/2008 11:21:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	0.70	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	7.8	S.U.	ES	0.1	21a	07/31/2008 03:13:09 PM
Sample Preparation	—	----	—	—	3-5.1	
METALS						
Arsenic Dry Basis	0*	RPD [0-20]	BH	10	6020	08/06/2008 08:54:00 PM
Copper Dry Basis	2*	RPD [0-20]	BH	10	6020	08/06/2008 08:54:00 PM
ORGANICS						
Organic Matter dry basis	NA	----	—	—	—	
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	----	—	—	----	—
Sand	55.0	%	RM	2.5	15-5mod.	07/30/2008 08:37:00 AM
Silt	30.0	%	RM	2.5	15-5mod.	07/30/2008 08:37:00 AM
Clay	15.0	%	RM	2.5	15-5mod.	07/30/2008 08:37:00 AM
Texture	Sandy Loam	—	RM	—	15-5mod.	07/30/2008 08:37:00 AM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-59
Sample Name: MATRIX SPIKE OF 2008070172-42
Sample Date/Time: 07/23/2008 11:21:00
Collected by: CLIENT
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
INORGANICS						
Electrical Conductivity Saturated Paste	NA	----	---	----	---	---
pH Saturated Paste	NA	----	---	----	---	---
Sample Preparation	---	----	--	----	3-5.1	
METALS						
Arsenic Dry Basis	115	% [72-125]	BH	10	6020	08/06/2008 09:09:00 PM
Copper Dry Basis	112	% [62-128]	BH	10	6020	08/06/2008 09:09:00 PM
ORGANICS						
Organic Matter dry basis	NA	----	---	----	---	
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	----	---	----	---	---
Sand	NA	----	---	----	---	---
Silt	NA	----	---	----	---	---
Clay	NA	---	---	---	---	---
Texture	NA	---	---	---	----	----

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-60
Sample Name: METHOD BLANK
Sample Date/Time: —— ——
Collected by: PREPARED BY LAB
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	<0.1	%	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	<0.01	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	NA	——	——	——	——	——
Sample Preparation	——	——	—	——	3-5.1	
METALS						
Potassium Available Dry Basis	<1	mg/l	BH	1	13-3.5.2.2	07/30/2008 06:00:00 PM
Arsenic Dry Basis	<0.1	mg/l	BH	0.1	6020	08/06/2008 04:34:00 PM
Cadmium Dry Basis	<0.02	mg/l	BH	0.02	6020	08/06/2008 04:34:00 PM
Copper Dry Basis	<0.1	mg/l	BH	0.1	6020	08/06/2008 05:27:00 PM
Lead Dry Basis	<0.1	mg/l	BH	0.1	6020	08/06/2008 04:34:00 PM
Zinc Dry Basis	<0.1	mg/l	BH	0.1	6020	08/06/2008 04:34:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extraclable, dry basis)	<0.5	mg/kg	CC	0.5	33.3.2	07/30/2008 10:09:00 AM
Phosphorus Available Dry Basis	<4	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	<50	mg/kg	CC	50	351.3	08/12/2008 02:47:00 PM
ORGANICS						
Organic Matter dry basis	<0.1	%	MRK	0.1	29-3.5.2	08/01/2008 05:37:50 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	——	——	——	——	——
Sand	NA	——	——	——	——	——
Silt	NA	——	——	——	——	——
Clay	NA	——	——	——	——	——
Texture	NA	——	——	——	——	——
SATURATED PASTE ANALYTES						
Sodium saturated paste	<0.04	meq/l	BH	0.04	3-5.4	08/06/2008 12:17:00 PM
Saturation	NA	——	——	——	——	——
Calcium saturated paste	<0.05	meq/l	BH	0.05	3-5.4	08/06/2008 12:17:00 PM
Magnesium saturated paste	<0.08	meq/l	BH	0.08	3-5.4	08/06/2008 12:17:00 PM
Sodium Adsorption Ratio	<0.2	——	BH	0.1	20b	08/06/2008 12:17:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-61
Sample Name: LABORATORY CONTROL SAMPLE
Sample Date/Time: ---- ----
Collected by: PREPARED BY LAB
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	101	% [72-128	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	109	% [49-151]	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	101	% [94-106]	ES	0.1	21a	07/30/2008 11:21:36 AM
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Potassium Available Dry Basis	95	% [82-118]	BH	100	13-3.5.2.2	07/30/2008 06:06:00 PM
Arsenic Dry Basis	116	% [79-117]	BH	10	6020	08/06/2008 04:37:00 PM
Cadmium Dry Basis	114	% [80-119]	BH	2	6020	08/06/2008 04:37:00 PM
Copper Dry Basis	115	% [78-120]	BH	10	6020	08/06/2008 04:37:00 PM
Lead Dry Basis	115	% [81-119]	BH	10	6020	08/06/2008 04:37:00 PM
Zinc Dry Basis	117	% [80-120]	BH	10	6020	08/06/2008 04:37:00 PM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	83	% [74-126]	CC	0.5	33.3.2	07/30/2008 10:13:00 AM
Phosphorus Available Dry Basis	99	% [54-146]	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	100	% [79-121]	CC	50	351.2	08/12/2008 02:48:00 PM
ORGANICS						
Organic Matter dry basis	107	% [62-138]	MRK	0.1	29-3.5.2	08/01/2008 05:37:50 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	---	---	---	---	---
Sand	75	% [0-200]	RM	2.5	15-5mod.	07/30/2008 08:45:00 AM
Silt	132	% [55-145]	RM	2.5	15-5mod.	07/30/2008 08:45:00 AM
Clay	85	% [74-126]	RM	2.5	15-5mod.	07/30/2008 08:45:00 AM
Texture	Silty Clay	----	RM	----	15-5mod.	07/30/2008 08:45:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	102	% [70-130]	BH	0.04	3-5.4	08/06/2008 12:56:00 PM
Saturation	108	% [86-114]	ES	0.1	27A	07/31/2008 09:59:36 AM
Calcium saturated paste	109	% [76-124]	BH	0.05	3-5.4	08/06/2008 12:56:00 PM
Magnesium saturated paste	93	% [74-126]	BH	0.08	3-5.4	08/06/2008 12:56:00 PM
Sodium Adsorption Ratio	100	% [78-122]	BH	0.1	20b	08/06/2008 12:56:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-62
Sample Name: METHOD BLANK
Sample Date/Time: ----- ----
Collected by: PREPARED BY LAB
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	<0.1	%	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	<0.01	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	NA	---	---	---	---	---
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Potassium Available Dry Basis	NA	---	---	---	---	
Arsenic Dry Basis	<0.1	mg/l	BH	0.1	6020	08/07/2008 08:32:00 AM
Cadmium Dry Basis	<0.02	mg/l	BH	0.02	6020	08/07/2008 08:32:00 AM
Copper Dry Basis	<0.1	mg/l	BH	0.1	6020	08/07/2008 09:08:00 AM
Lead Dry Basis	<0.1	mg/l	BH	0.1	6020	08/07/2008 08:32:00 AM
Zinc Dry Basis	<0.1	mg/l	BH	0.1	6020	08/07/2008 08:32:00 AM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	NA	---	---	---	---	
Phosphorus Available Dry Basis	<4	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	NA	---	---	---	---	
ORGANICS						
Organic Matter dry basis	<0.1	%	MRK	0.1	29-3.5.2	08/04/2008 02:27:31 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	---	---	---	---	
Sand	NA	---	---	---	---	---
Silt	NA	---	---	---	---	---
Clay	NA	---	---	---	---	---
Texture	NA	---	---	---	---	---
SATURATED PASTE ANALYTES						
Sodium saturated paste	<0.04	meq/l	BH	0.04	3-5.4	08/06/2008 12:17:00 PM
Saturation	NA	---	---	---	---	---
Calcium saturated paste	<0.05	meq/l	BH	0.05	3-5.4	08/06/2008 12:17:00 PM
Magnesium saturated paste	<0.08	meq/l	BH	0.08	3-5.4	08/06/2008 12:17:00 PM
Sodium Adsorption Ratio	<0.2	---	BH	0.1	20b	08/06/2008 12:17:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-63
Sample Name: LABORATORY CONTROL SAMPLE
Sample Date/Time: ----- -----
Collected by: PREPARED BY LAB
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	101	% [72-128	ES	0.1	23C	07/30/2008 06:37:00 PM
INORGANICS						
Electrical Conductivity Saturated Paste	113	% [49-151]	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	99	% [94-106]	ES	0.1	21a	07/29/2008 11:52:23 AM
Sample Preparation	---	---	---	---	3-5.1	
METALS						
Potassium Available Dry Basis	NA	---	---	---	---	
Arsenic Dry Basis	100	% [79-117]	BH	10	6020	08/07/2008 08:35:00 AM
Cadmium Dry Basis	101	% [80-119]	BH	2	6020	08/07/2008 08:35:00 AM
Copper Dry Basis	106	% [78-120]	BH	10	6020	08/07/2008 08:35:00 AM
Lead Dry Basis	100	% [81-119]	BH	10	6020	08/07/2008 08:35:00 AM
Zinc Dry Basis	101	% [80-120]	BH	10	6020	08/07/2008 08:35:00 AM
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	NA	---	---	---	---	
Phosphorus Available Dry Basis	99	% [54-146]	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	NA	---	---	---	---	
ORGANICS						
Organic Matter dry basis	87	% [62-138]	MRK	0.1	29-3.5.2	08/04/2008 02:30:16 PM
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	---	---	---	---	
Sand	112	% [0-200]	RM	2.5	15-5mod.	07/29/2008 08:39:00 AM
Silt	122	% [55-145]	RM	2.5	15-5mod.	07/29/2008 09:15:00 AM
Clay	87	% [74-126]	RM	2.5	15-5mod.	07/29/2008 09:15:00 AM
Texture	Silty Clay	---	RM	---	USDA	07/29/2008 09:15:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	85	% [70-130]	BH	0.04	3-5.4	08/06/2008 01:08:00 PM
Saturation	103	% [86-114]	ES	0.1	27A	07/29/2008 03:54:23 PM
Calcium saturated paste	90	% [76-124]	BH	0.05	3-5.4	08/06/2008 01:08:00 PM
Magnesium saturated paste	76	% [74-126]	BH	0.08	3-5.4	08/06/2008 01:08:00 PM
Sodium Adsorption Ratio	92	% [78-122]	BH	0.1	20b	08/06/2008 01:08:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-64
Sample Name: METHOD BLANK
Sample Date/Time: ---- ----
Collected by: PREPARED BY LAB
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	NA	—	—	—	—	—
INORGANICS						
Electrical Conductivity Saturated Paste	<0.01	mmhos/cm	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	NA	—	—	—	—	—
Sample Preparation	—	—	—	—	3-5.1	
METALS						
Potassium Available Dry Basis	NA	—	—	—	—	
Arsenic Dry Basis	<0.1	mg/l	BH	0.1	6020	08/06/2008 08:39:00 PM
Cadmium Dry Basis	NA	—	—	—	—	
Copper Dry Basis	<0.1	mg/l	BH	0.1	6020	08/06/2008 08:39:00 PM
Lead Dry Basis	NA	—	—	—	—	
Zinc Dry Basis	NA	—	—	—	—	
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	NA	—	—	—	—	
Phosphorus Available Dry Basis	<4	mg/kg	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	NA	—	—	—	—	
ORGANICS						
Organic Matter dry basis	NA	—	—	—	—	
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	—	—	—	—	
Sand	NA	—	—	—	—	—
Silt	NA	—	—	—	—	—
Clay	NA	—	—	—	—	—
Texture	NA	—	—	—	—	—
SATURATED PASTE ANALYTES						
Sodium saturated paste	<0.04	meq/l	BH	0.04	3-5.4	08/06/2008 12:17:00 PM
Saturation	NA	—	—	—	—	—
Calcium saturated paste	<0.05	meq/l	BH	0.05	3-5.4	08/06/2008 12:17:00 PM
Magnesium saturated paste	<0.08	meq/l	BH	0.08	3-5.4	08/06/2008 12:17:00 PM
Sodium Adsorption Ratio	<0.2	—	BH	0.1	20b	08/06/2008 12:17:00 PM

Client: MT DEPT. OF ENVIRONMENTAL QUALITY
Project Name: BECK RANCH SOIL BORROW INVESTIGATION
Project No.: NONE GIVEN
Laboratory No.: 2008070172-65
Sample Name: LABORATORY CONTROL SAMPLE
Sample Date/Time: ---- ----
Collected by: PREPARED BY LAB
Sample Type: SOIL

PARAMETER	MEASURED VALUE	UNITS	ANALYST	REPORTING LIMIT	METHOD NUMBER	DATE/TIME ANALYZED
CATIONS						
Calcium Carbonate	NA	---	---	---	---	---
INORGANICS						
Electrical Conductivity Saturated Paste	92	% [49-151]	RM	0.01	10-3.3	08/01/2008 09:45:00 AM
pH Saturated Paste	101	% [94-106]	ES	0.1	21a	07/31/2008 03:13:10 PM
Sample Preparation	-----	---	---	---	3-5.1	
METALS						
Potassium Available Dry Basis	NA	---	---	---	---	
Arsenic Dry Basis	112	% [79-117]	BH	10	6020	08/06/2008 08:43:00 PM
Cadmium Dry Basis	NA	---	---	---	---	
Copper Dry Basis	114	% [78-120]	BH	10	6020	08/06/2008 08:43:00 PM
Lead Dry Basis	NA	---	---	---	---	
Zinc Dry Basis	NA	---	---	---	---	
NUTRIENTS						
Nitrate + Nitrite (KCL Extractable, dry basis)	NA	---	---	---	---	
Phosphorus Available Dry Basis	99	% [54-146]	ES	4	24.5.4	08/04/2008 10:30:00 AM
Total Kjeldahl Nitrogen as N dry basis	NA	---	---	---	---	
ORGANICS						
Organic Matter dry basis	NA	---	---	---	---	
PARTICLE SIZE ANALYSIS						
Coarse Fragment Content	NA	---	---	---	---	
Sand	94	% [0-200]	RM	2.5	15-5mod.	07/30/2008 08:21:00 AM
Silt	125	% [55-145]	RM	2.5	15-5mod.	07/30/2008 08:21:00 AM
Clay	87	% [74-126]	RM	2.5	15-5mod.	07/30/2008 08:21:00 AM
Texture	Silty Clay	---	RM	---	15-5mod.	07/30/2008 08:21:00 AM
SATURATED PASTE ANALYTES						
Sodium saturated paste	104	% [70-130]	BH	0.04	3-5.4	08/06/2008 01:18:00 PM
Saturation	NA	---	---	---	---	---
Calcium saturated paste	114	% [76-124]	BH	0.05	3-5.4	08/06/2008 01:18:00 PM
Magnesium saturated paste	97	% [74-126]	BH	0.08	3-5.4	08/06/2008 01:18:00 PM
Sodium Adsorption Ratio	100	% [78-122]	BH	0.1	20b	08/06/2008 01:18:00 PM

LABORATORIES

PLEASE PRINT, provide as much information as possible. Refer to corresponding notes on reverse side.

90-933-12

Company Name: PBS&J	Project Name, PWS #, Permit #, Etc.: Beck Ranch Soil Borrow Investigation
Report Mail Address: 206 Lupfer Ave Whitefish MT 59937-2448	Contact Name, Phone, Fax, E-mail: Ed Spotts 261-2303
	Sampler Name if other than Contact: Samples sent in 2 coolers w/ custody seal via Greyhound
Invoice Address: Brian Bartkowiak MDEQ 1100 Lastchance Gulch Helena MT	Invoice Contact & Phone #: Brian Bartkowiak
	Purchase Order #:
	ELI Quote #: B-S from missoula

Report Required For: POTW/WWTP ☐ DW ☐ Other Soils

Special Report Formats - ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☐

Other _____

EDD/EDT ☐ Format _____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments: Determine % of all material >2mm; disaggregate all sample prior to analysis; include

Receipt Temp _____ °C

Cooler ID(s) _____

Custody Seal Y N

Intact Y N

Signature Y N

Match 2008

Lab ID 0701

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V S O; Air Water Soils/Solids Vegetation Bioassay Other)	Total Cu, As	Total Cd, Pb, Zn	Saturated pH/Cond./B	N P K (TKN+NO3/NH3)	Organic Matter	SAR	Lime % (CaCO3 equiv)	Particle Size (inches 2 mm)	Lime Requirement S. Frac	SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LABORATORY USE ONLY
1	TP-7; 0-6"	7/23/08	10:58	Soil	X		X	X	X			X			X		1
2	" ; 0-11"		10:52		X		X	X	X			X			X		2
3	" ; 0-32"		10:53		X		X	X	X			X					3
4	" ; 11-32"		10:53		X		X		X			X					4
5	" ; 32-95"		10:55		X		X		X			X					5
6	TP-21; 0-11"		9:07		X	X	X	X	X	X	X	X					6
7	" ; 11-33"		9:08		X	X	X	X	X	X	X	X					7
8	" ; 33-88"		9:10		X	X	X		X	X	X	X					8
9	TP-5 0-11"		9:53		X		X	X	X	X		X					9
10	" 11-28"		8:54		X		X	X	X			X					10

Custody Record MUST be Signed

Relinquished by: Ed Spotts (Ed Spotts)	Date/Time: 7/23/08 19:45	Shipped by: Same	Received by: / Date/Time:
Relinquished by: BUS	Date/Time: 7/24/08 1215	Shipped by:	Received by: [signature] Date/Time: 7/24/08 1215

Sample Disposal: Return to client: _____ Lab Disposal: _____

LABORATORY USE ONLY

Sample Type: _____ # of fractions _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, & links

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT- Provide as much information as possible.

Company Name:	Project Name, PWS, Permit, Etc.	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: SEE Page 1 of 5	Contact Name: Phone/Fax: See Page 1	Email:	Sampler: (Please Print)
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

Special Report/Formats – ELI must be notified prior to sample submittal for the following:

☐ DW ☐ A2LA
☐ GSA ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: _____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

Number of Containers
Sample Type: A W S V B O
Air Water Soils/Solids Vegetation Bioassay Other

RUSH: Contact ELI prior to RUSH sample submittal for charges and scheduling – See Instruction Page

Comments: See page 1; Archive all samples

Shipped by:
Cooler ID(s):
Receipt Temp ____ °C
On Ice: Yes No
Custody Seal Y N
Intact Y N
Signature Match Y N

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Total Cu, As	Total Cd, Pb, Zn	Sat. Paste pH / Cond.	N, P, K (TKN + NO_3/NO_2)	Organic Matter	Size	Lime % (Ca CO_3 equiv.)	Particle Size (72 mesh)	Lime Requirement/S. Grav.	SEE ATTACHED	Normal Turnaround (TAT)	LABORATORY USE ONLY
1	TP-11; 0-9"	7/23/08	10:20	Soil	X		X		X			X			X	11
2	" ; 0-18"		10:33		X		X		X			X			X	12
3	" ; 0-31"		10:20		X		X		X			X			X	13
4	" ; 9-31"		10:20		X		X		X			X			X	14
5	TP-9; 0-11"		9:53		X		X	X	X			X			X	15
6	" ; 11-30"		9:53		X		X	X	X			X			X	16
7	" ; 11-41"		9:55		X		X		X			X			X	17
8	" ; 30-70"		9:58		X		X		X			X			X	18
9	TP-15; 0-8"		13:24		X		X		X			X			X	19
10	" ; 8-25"		13:25		X		X		X			X			X	20

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Ed Spotts	7/23/08 7:45 PM	[signature]			
Relinquished by (print): Bus	Date/Time: 7/24/08 1215	Signature:	Received by (print): Steve [signature]	Date/Time: 7/24/08 1215	Signature:
			Received by Laboratory:	Date/Time:	Signature:

Sample Disposal: Return to Client: _____ Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report. Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT- Provide as much information as possible.

Company Name:	Project Name, PWS, Permit, Etc.	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: See Page 7	Contact Name: Phone/Fax: See Page 1	Email:	Sampler: (Please Print)
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

Special Report/Formats – ELI must be notified prior to sample submittal for the following:

☐ DW ☐ A2LA
☐ GSA ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: _____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

RUSH: Contact ELI prior to RUSH sample submittal for charges and scheduling – See Instruction Page

Comments: See Page 1+2

Shipped by:
Cooler ID(s):
Receipt Temp ____ °C
On Ice: Yes No
Custody Seal Y N
Intact Y N
Signature Match Y N

ANALYSIS REQUESTED

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	Total Cr, As	Total Cd, Pb, Zn	Salt Parts, pH, Cond.	N, P, K (TKN, NO_3, NO_2)	Organic Matter	SAR	Lime % ($CaCO_3$ Equiv.)	Particle Size (including 7.5 mm)	Lime Requirement (S-Buffer)	SEE ATTACHED	Normal Turnaround (TAT)	RUSH	Comments	LABORATORY USE ONLY
1	TP-2 ; 0-6"	7/23/08	8:31	Soil	X		X		X			X			X			21
2	" ; 0-11"		8:30		X		X		X			X			X			22
3	" ; 11-40"		8:32		X		X		X			X			X			23
4	TP-17 ; 0-10"		13:57		X	X	X		X	X	X	X			X			24
5	" ; 10-48		14:00		X	X	X		X	X	X	X			X			25
6	" ; 78-144"		14:01		X	X	X		X	X	X	X			X			26
7	TP-1 ; 0-10"		7:55		X	X	X	X	X	X		X			X			27
8	; 10-23"		7:57		X	X	X	X	X	X		X			X			28
9	; 10-48"		7:57		X	X	X	X	X	X		X			X			29
10	; 48-96"		8:00		X	X	X		X	X		X			X			30

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Ed Spotts	7/23/08 7:45 PM				
Relinquished by (print): Bus	Date/Time: 7/24/08 1215	Signature:	Received by (print):	Date/Time: 7/24/08 1215	Signature:
			Received by Laboratory:	Date/Time:	Signature:

Sample Disposal: Return to Client: _____ Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report. Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

ENERGY LABORATORIES

Chain of Custody and Analytical Request Record

PLEASE PRINT- Provide as much information as possible.

Company Name:	Project Name, PWS, Permit, Etc.	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: See Page 1	Contact Name: Phone/Fax: See Page 1	Email:	Sampler: (Please Print)
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

Special Report/Formats – ELI must be notified prior to sample submittal for the following:

☐ DW ☐ GSA ☐ POTW/WWTP ☐ State: _____ ☐ Other: _____

☐ A2LA ☐ EDD/EDT (Electronic Data) Format: _____ ☐ LEVEL IV ☐ NELAC

RUSH: Contact ELI prior to RUSH sample submittal for charges and scheduling – See Instruction Page

Comments: See Page 1 & 2

Shipped by:

Cooler ID(s):

Receipt Temp _____ °C

On Ice: Yes No

Custody Seal Y N

Intact Y N

Signature Match Y N

ANALYSIS REQUESTED

SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air Water Soils/Solids Vegetation Bioassay Other)	Total Cu, As	Total Cd, Pb, Zn	Sat. Paste / Conductivity	N, P, K, TKN + NO3/NO2	Organic Matter	SAR	Lime % (Calc. Equiv.)	Particle Size (Incl. 2.0 mm, 75 mm, 5-Fract.)	Lime Requirement	SEE ATTACHED	Normal Turnaround (TAT)	LABORATORY USE ONLY
1 TP-13 ; 0-8"	7/23/08	12:45	Soil	X		X		X			X			X	31
2 " ; 8-19"		12:45		X		X		X			X				32
3 " ; 52-96"		12:48		X		X		X			X				33
4 " ; 86-132"		13:02		X		X		X			X				34
5 TP-23 ; 0-12"		11:58		X		X	X	X			X				35
6 " ; 12-44"		11:59		X		X	X	X			X				36
7 TP-22 ; 0-10"		12:18		X		X		X			X				37
8 " ; 10-38"		12:18		X		X		X			X				38
9 TP-24 ; 0-8"		11:42		X		X	X	X			X				39
10 " ; 8-31"		11:43		X		X	X	X			X				40

Custody Record MUST be Signed

Relinquished by (print):	Date/Time:	Signature:	Received by (print):	Date/Time:	Signature:
Ed Spotts	7/23/08 7:45 AM				
Relinquished by (print): BUS	Date/Time: 7/24/08 1215	Signature:	Received by (print): Steve Smith	Date/Time: 7/24/08 1215	Signature:
			Received by Laboratory:	Date/Time:	Signature:

Sample Disposal: Return to Client: _____ Lab Disposal: _____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report. Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

Chain of Custody and Analytical Request Record

ENERGY LABORATORIES

PLEASE PRINT- Provide as much information as possible.

Company Name:	Project Name, PWS, Permit, Etc.	Sample Origin State: MT	EPA/State Compliance: Yes ☐ No ☐
Report Mail Address: See Page 1	Contact Name: See Page 1 Phone/Fax:	Email:	Sampler: (Please Print)
Invoice Address:	Invoice Contact & Phone:	Purchase Order:	Quote/Bottle Order:

Special Report/Formats – ELI must be notified prior to sample submittal for the following:

☐ DW ☐ A2LA
☐ GSA ☐ EDD/EDT (Electronic Data)
☐ POTW/WWTP Format: _____
☐ State: _____ ☐ LEVEL IV
☐ Other: _____ ☐ NELAC

Number of Containers
Sample Type: A W S V B O
Air Water Soils/Solids Vegetation Biossay Other

ANALYSIS REQUESTED

RUSH

Contact ELI prior to RUSH sample submittal for charges and scheduling – See Instruction Page

Comments: See Page 1 of 2

Shipped by:

Cooler ID(s):

Receipt Temp _____ °C

On Ice: Yes No

Custody Seal Y N
Intact Y N
Signature Match Y N

	SAMPLE IDENTIFICATION (Name, Location, Interval, etc.)	Collection Date	Collection Time	MATRIX	Total Cu, As	Total Cd, Pb, Zn	Soil Paste pH / Cond, SMP	N, P, K (TKN + NO3/NO2)	Organic Matter	SMP	Lime % (CaCO3 equiv)	Particle Size (include Texture)	Lime Requirement / Sofran	SEE ATTACHED	Normal Turnaround (TAT)	RUSH	Comments	LABORATORY USE ONLY
1	TP-19 ; 0-9"	7/23/08	11:21	Soil	X		X		X			X			X			41
2	" ; 9-28"		11:21		X		X		X			X						42
3	TP-17 FD ; 0-10"		14:03		X		X					X						43
4	TP-21 FD ; 0-11"		9:15		X		X					X						44
5	TP-22 FD ; 16-38"		12:20		X		X					X						45
6	Field Split		24:31		X		X					X						46
7	CCB-1		10:02		X		X					X						47
8	CCB-2		12:41		X		X					X						48
9	CCB-3		14:39		X		X					X						49
10																		~~50~~

Custody Record MUST be Signed

Relinquished by (print): Ed Spotts Date/Time: 7/23/08 7:45PM Signature:
Relinquished by (print): Bus Date/Time: 7/24/08 1215 Signature:
Received by (print): Date/Time: Signature:
Received by (print): Date/Time: 7/24/08 1215
Received by Laboratory: Date/Time: Signature:

Sample Disposal: Return to Client: _____ Lab Disposal: _____

Dup 6-50. MS 7-51 Dup 15-52 MS 16-53 Dup 24-5 MS 25-5 Dup 41-55 MS 42-56 MS 60

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.
Visit our web site at www.energylab.com for additional information, downloadable fee schedule, forms, and links.

NORTHERN
Analytical Laboratories, Inc.

SAMPLE RECEIPT CHECKLIST

Dear Valued Client: This checklist documents the condition of your sample(s) as it (they) arrived at our lab. Please review it and familiarize yourself with its contents. Should you have any questions or comments, please contact us. Thank you for your use of our services.

Client Name: PBS&J MDEQ

Date/Time Received: 7/24/08 1215 (Date / Time)

Project: Beck Ranch

Received by: SHS

Laboratory Number(s): 200807072

Carrier Name: bus

Checklist Completed by: SH 7/24/08 (Initials / Date)

Sample Type: Soil

	YES	NO
1. Shipping container in good condition?	✓	
2. Custody seals present on shipping container? Condition: Intact ✓ Broken ____	✓	
3. Chain of custody present?	✓	
4. Chain of custody signed when relinquished and received?	✓	
5. Chain of custody agrees with sample labels?	✓	
6. Custody seals on sample bottles? Condition: Intact ____ Broken ____		✓
7. Samples in proper container/bottle?*	✓	
8. Sample containers intact?*	✓	
9. Sufficient sample volume for indicated test?*	✓	
10. Ice/Frozen Blue Ice present in shipping container? (circle one)		✓
container temperature 1. 24.1 2. 25.0 3. ____ * (if <0 or>10)		
11. All samples rec'd within holding time?*	✓	
12. VOA vials have zero headspace? * (if contains >5mm headspace)	NA	
13. Trip Blank received?	✓	

	YES	NO
14. pH check performed by: ____		
15. Metals bottle(s) pH <2?	NA	
16. Nutrient bottle(s) pH <2?	✓	
17. Cyanide bottle(s) pH >12?	✓	
18. Sulfide bottle(s) pH >9?	✓	
19. TOC bottle(s) pH <2?	✓	
20. Phenolics bottle(s) pH <2?	✓	
21. Oil & grease bottle(s) pH <2? (checked by analyst)	✓	
22. EPH/DRO bottle(s) pH <2? (checked by analyst)	✓	
23. Volatiles (VOA) pH <2? (checked by analyst)	✓	
24. Semivolatiles (525) pH <2? (checked by analyst)	✓	
25. Other test types	✓	
26. Client contacted?	✓	
27. Person contacted	ed. Spotts	
28. Date contacted	7/25/08 email	

NOTES: **Samples may be affected when not transported at the temperature recommended by the EPA for the test you've selected. Please contact the lab if you have concerns about the temperature of your samples.**

*** Critical item - if marked "NO" contact lab manager.**

COMMENTS: Samples out of temp range

APPENDIX E

Statistical Analyses

Test Pit	A Horizon	B Horizon
	Copper (mg/kg)	
TP-1	71	28
TP-11	62	14
TP-13	68	24
TP-15	57	14
TP-17	66	14
TP-19	57	25
TP-2	62	24
TP-21	55	28
TP-22	73	27
TP-23	68	12
TP-24	64	16
TP-5	73	12
TP-7	53	13
TP-9	61	24

Anova: Single Factor - Horizon (Depth)

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Column 1	14	890	63.57143	43.18681
Column 2	14	275	19.64286	42.24725

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	13508.04	1	13508.04	316.2213	4.52E-16	4.225201
Within Groups	1110.643	26	42.71703			
Total	14618.68	27				

Arsenic - A Horizon	
Mean	29.42857
Standard Error	1.132508
Median	29
Mode	29
Standard Deviation	4.237457
Sample Variance	17.95604
Kurtosis	0.550204
Skewness	0.727469
Range	16
Minimum	23
Maximum	39
Sum	412
Count	14
Confidence Level(95.0%)	2.446635

Arsenic - B Horizon	
Mean	14.42857
Standard Error	0.953388
Median	14
Mode	12
Standard Deviation	3.56725
Sample Variance	12.72527
Kurtosis	-0.28054
Skewness	0.597452
Range	12
Minimum	10
Maximum	22
Sum	202
Count	14
Confidence Level(95.0%)	2.059669

Note: Arsenic concentrations below detection (< 10 mg/kg) in all C/MA horizon samples.

Copper - A Horizon	
Mean	63.57143
Standard Error	1.756352
Median	63
Mode	62
Standard Deviation	6.571667
Sample Variance	43.18681
Kurtosis	-1.129223
Skewness	-0.040811
Range	20
Minimum	53
Maximum	73
Sum	890
Count	14
Confidence Level(95.0%)	3.794368

Copper - B Horizon	
Mean	19.64286
Standard Error	1.737142
Median	20
Mode	14
Standard Deviation	6.499789
Sample Variance	42.24725
Kurtosis	-2.01846
Skewness	0.063429
Range	16
Minimum	12
Maximum	28
Sum	275
Count	14
Confidence Level(95.0%)	3.752866

Copper - C/MA Horizon	
Mean	17.8
Standard Error	3.277194
Median	14
Mode	#N/A
Standard Deviation	7.328028
Sample Variance	53.7
Kurtosis	-1.743703
Skewness	0.764392
Range	17
Minimum	11
Maximum	28
Sum	89
Count	5
Confidence Level(95.0%)	9.098949

Organic Matter - A Horizon	
Mean	1.757143
Standard Error	0.083016
Median	1.8
Mode	1.8
Standard Deviation	0.310618
Sample Variance	0.096484
Kurtosis	2.895418
Skewness	-0.484008
Range	1.4
Minimum	1
Maximum	2.4
Sum	24.6
Count	14
Confidence Level(95.0%)	0.179345

Organic Matter - B Horizon	
Mean	0.792857
Standard Error	0.074468
Median	0.75
Mode	0.9
Standard Deviation	0.278635
Sample Variance	0.077637
Kurtosis	0.894518
Skewness	0.558532
Range	1.1
Minimum	0.3
Maximum	1.4
Sum	11.1
Count	14
Confidence Level(95.0%)	0.160879

Organic Matter - C/MA Horizon	
Mean	0.36
Standard Error	0.087178
Median	0.3
Mode	0.3
Standard Deviation	0.194936
Sample Variance	0.038
Kurtosis	4.168975
Skewness	1.943959
Range	0.5
Minimum	0.2
Maximum	0.7
Sum	1.8
Count	5
Confidence Level(95.0%)	0.242045

Specific Conductivity - A Horizon	
Mean	0.592857
Standard Error	0.023286
Median	0.555
Mode	0.55
Standard Deviation	0.087128
Sample Variance	0.007591
Kurtosis	-0.290609
Skewness	0.199974
Range	0.32
Minimum	0.43
Maximum	0.75
Sum	8.3
Count	14
Confidence Level(95.0%)	0.050306

Specific Conductivity - B Horizon	
Mean	2.153571
Standard Error	0.273312
Median	2.095
Mode	#N/A
Standard Deviation	1.022641
Sample Variance	1.045794
Kurtosis	-1.488237
Skewness	0.07452
Range	2.86
Minimum	0.72
Maximum	3.58
Sum	30.15
Count	14
Confidence Level(95.0%)	0.590455

Specific Conductivity - C/MA Horizon	
Mean	3.41
Standard Error	0.663513
Median	3.49
Mode	#N/A
Standard Deviation	1.483661
Sample Variance	2.20125
Kurtosis	-0.700096
Skewness	0.530097
Range	3.63
Minimum	1.9
Maximum	5.53
Sum	17.05
Count	5
Confidence Level(95.0%)	1.842208

pH - A Horizon	
Mean	7.371429
Standard Error	0.09575
Median	7.5
Mode	7.6
Standard Deviation	0.358262
Sample Variance	0.128352
Kurtosis	-1.617247
Skewness	-0.301828
Range	1
Minimum	6.8
Maximum	7.8
Sum	103.2
Count	14
Confidence Level(95.0%)	0.206854

pH - B Horizon	
Mean	7.914286
Standard Error	0.034541
Median	7.9
Mode	7.9
Standard Deviation	0.129241
Sample Variance	0.016703
Kurtosis	0.800633
Skewness	0.6923
Range	0.5
Minimum	7.7
Maximum	8.2
Sum	110.8
Count	14
Confidence Level(95.0%)	0.074622

pH - C/MA Horizon	
Mean	7.96
Standard Error	0.05099
Median	8
Mode	8
Standard Deviation	0.114018
Sample Variance	0.013
Kurtosis	-0.177515
Skewness	-0.404796
Range	0.3
Minimum	7.8
Maximum	8.1
Sum	39.8
Count	5
Confidence Level(95.0%)	0.141571