



**R E P O R T**

**PHASE I ENGINEERING  
EVALUATION/COST ANALYSIS  
STANDARD MINE SITE  
CRESTED BUTTE, COLORADO**

*Prepared for*  
URS Operating Services, Inc.  
1099 18th Street, Suite 710  
Denver, CO 80202

April 2007

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**PHASE I ENGINEERING EVALUATION/COST ANALYSIS**

**STANDARD MINE  
Crested Butte, Gunnison County, Colorado**

**EPA Contract No. EP-W-05-050  
TDD No. 0509-08**

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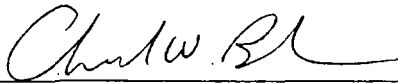


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## **1.1 BACKGROUND**

The Standard Mine is an inactive underground hard rock mine located about 5 miles northwest of Crested Butte, Colorado in the Ruby Range of the Gunnison National Forest, as shown on Figure 1-1. The site is at an elevation of about 11,000 feet and is located on several patented mining claims and surrounding U.S. Forest Service (USFS) land. Historical mining began at the site in about 1874 and continued intermittently through 1966. During this time, lead, zinc, silver, and gold were mined and processed at the site.

The mine consists of numerous open adits and shafts and about 8,400 feet of underground mine workings on six (6) levels. Some of these shafts are filled with water, and groundwater discharges from some of the adits at seasonally variable rates.

Numerous mine waste rock piles and an unlined tailing impoundment are located at the site. The total volume of material in the waste rock piles and tailing impoundment has been estimated by others to be on the order of 80,000 cubic yards.

The mine is located within the Elk Creek watershed and some of the mine facilities and waste materials are located adjacent to the creek. Elk Creek flows into Coal Creek, which serves as a drinking water supply for the Town of Crested Butte, four miles downstream from the Standard Mine. Contaminants of concern associated with the former mine operations are metals, including cadmium, zinc, lead, and copper. The concentrations of these metals at the site are above background levels and some metal concentrations are also elevated at the Coal Creek drinking water intake; however, the drinking water system currently does meet Safe Drinking Water Act standards.

The U.S. Environmental Protection Agency (EPA) has concluded the construction of an on-site repository to consolidate and contain the mine waste would be an effective means to minimize future environmental impacts from the waste rock piles and tailing impoundment.

## **1.2 PURPOSE AND SCOPE**

The purpose of this Phase I Engineering Evaluation/Cost Analysis (EE/CA) was to identify and evaluate several potential sites where an on-site mine waste repository could be constructed to consolidate and contain the Standard Mine waste rock and tailing. EPA, U.S. Forest Service, Colorado Department of Public Health and Environment (CDPHE) plan to use this document along with other factors to select and recommend a preferred repository location. Input from the Standard Mine Advisory Group (SMAG) will be solicited and a final decision made. This potential repository site evaluation was performed as a phased process.

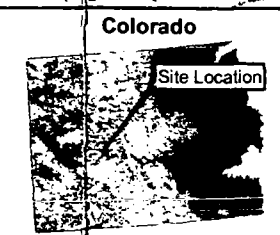
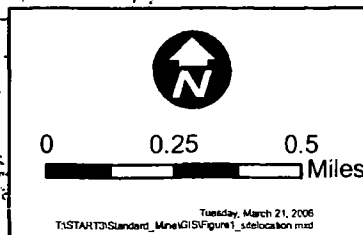
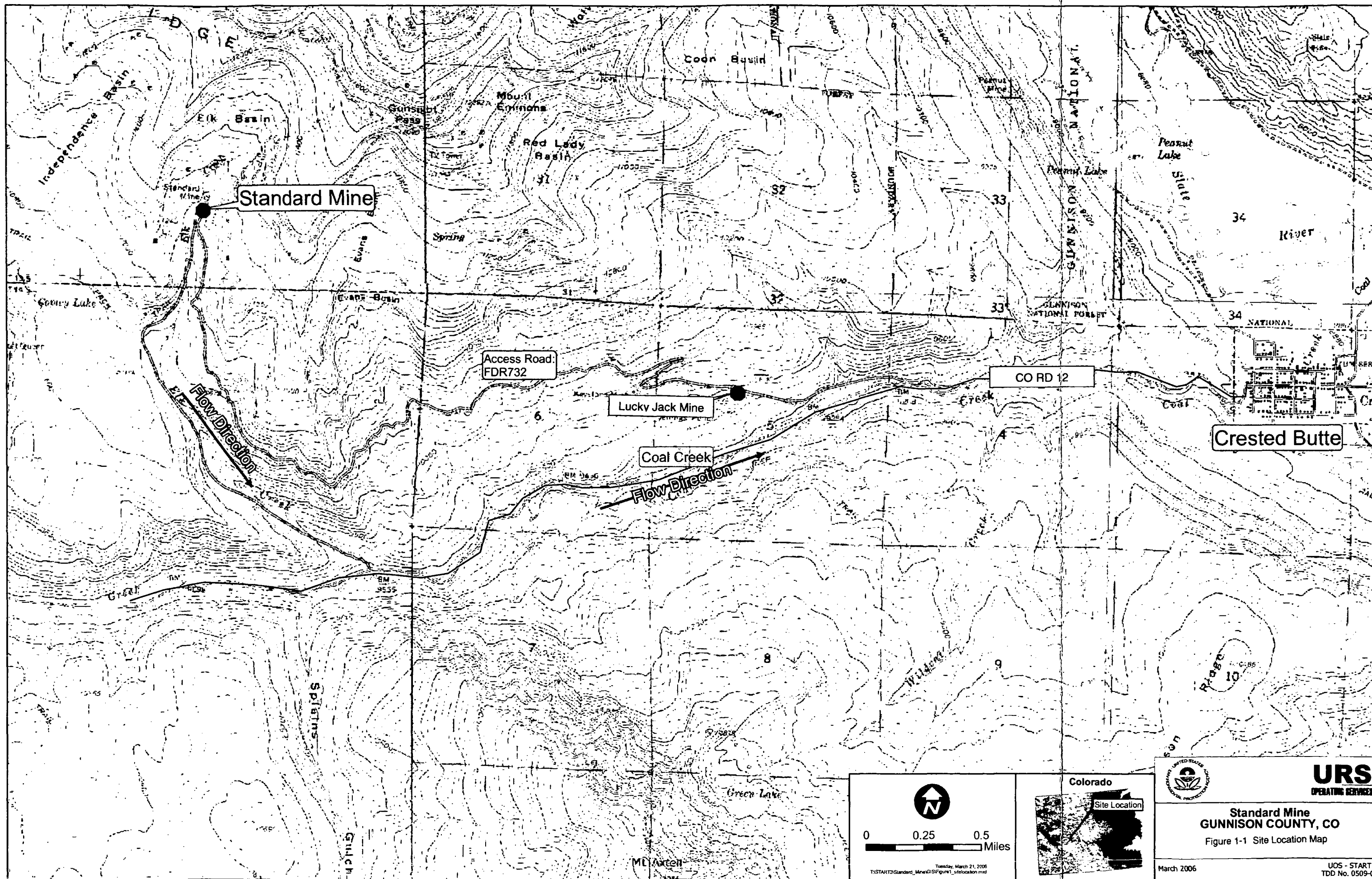
The initial phase consisted of a desktop study to identify potential candidate areas in the vicinity of the Standard Mine where conditions would likely be favorable for the construction of a mine waste repository. This desktop evaluation was performed using Geographic Information Systems (GIS) techniques and a set of site-specific repository screening criteria.


Potential candidate areas identified during the GIS evaluation and other potential repository sites identified by the EPA were then further evaluated during a geologic, ecologic and engineering site reconnaissance. The purpose of this reconnaissance was to:

- "Ground-truth" the information used to identify the candidate areas during the repository desktop study.
- Identify site features not found during the desktop study that could negatively affect a site's use as a repository, including fatal flaws.
- Identify potential construction material borrow sources.
- Assess the presence or absence of any wetlands, other waters of the United States, and threatened and endangered species (TES) at the potential repository and borrow sites.

The results of the site reconnaissance were evaluated and some sites were eliminated from further consideration based on conditions observed during the reconnaissance. Site investigations were then performed at the remaining potential repository sites to evaluate foundation conditions. Site investigations were also performed at potential soil and riprap borrow areas. The site investigations consisted of excavating test pits, collecting soil and/or rock samples, and geotechnical laboratory testing on selected samples. The geotechnical laboratory testing program is on-going and results available to date are included in this report.

Based on the results of the site investigations, the potential repository sites were further evaluated, and any unsuitable sites were eliminated from further consideration. The remaining potential repository sites were then compared and contrasted.



**URS**  
OPERATING SERVICES

**Standard Mine**  
**GUNNISON COUNTY, CO**  
Figure 1-1 Site Location Map

March 2006

UOS - START 3  
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Tuesday, March 21, 2006

## SECTION TWO

## Potential Repository Site Identification

### 2.1 GENERAL

A desktop study (URS Operating Services, 2006a) to identify potential mine waste repository site locations in the vicinity of the Standard Mine was performed using Geographic Information Systems (GIS) techniques. The purpose of this GIS evaluation was to identify potential candidate areas where conditions would likely be favorable for the construction of a mine waste repository and would warrant additional evaluation. This GIS evaluation is summarized below and the complete evaluation is included as Appendix A.

### 2.2 SITE SCREENING CRITERIA

A set of site screening criteria was developed based on repository site evaluation criteria used by the U.S. Forest Service, modified to include specific requirements and conditions at the Standard Mine. These criteria were considered during the GIS and future site evaluations and are described below:

#### *Topography*

**Slope** – Potential sites in the vicinity of the Standard Mine with slopes greater than 20% (5H:1V) were not considered.

**Size** – Potential sites less than two acres were not considered because they would likely not provide adequate storage capacity for the anticipated volume of mine waste from the Standard Mine site.

**Aesthetics** – Although not quantifiable within GIS, aesthetics were considered during the site reconnaissance of the potential repository sites.

#### *Geology*

**Surficial Geologic Units** – Surficial geologic units mapped on available USGS geologic maps (Gaskill et. al 1967, Gaskill et. al 1987) in the vicinity of the Standard Mine site were categorized as “Favorable”, “Less Favorable” or “Not Favorable” based on a qualitative assessment of the geologic units using the descriptions provided on the geologic maps and general knowledge of the regional geology. The various geologic units and their respective categories are shown on Table 2-1. Potential sites located on “Not Favorable” geologic units were not considered, and preference was given to sites located on “Favorable” geologic units.

**Geologic Structures** – Previously mapped geologic structures such as faults and joints were digitized within the GIS. Areas within 300 feet of any of these structures were assigned a negative value; while a given area would not be excluded based upon the presence of a structure, it would be considered “less favorable”. Additionally, the presence of geologic structures such as faults, mineralized faults, shear zones, etc. were considered during the field reconnaissance of the potential repository sites.

**Borrow Soil** – Although not used as a selection criterion within GIS, the availability of on-site borrow soil or the proximity of a potential repository site to an area identified as a borrow source was considered during the evaluation of potential repository sites.

## **SECTION TWO**

## **Potential Repository Site Identification**

### ***Hydrology and Hydrogeology***

**Existing Water Bodies** – Potential sites within 300 feet of existing bodies or sources of water (springs, discharging mine adits, streams, lakes and rivers) were not considered.

**Watershed Area** – Although not used as a selection criterion within GIS, watershed size was considered during the evaluation of potential repository sites

**Depth to Groundwater** – Potential sites within 300 feet of mapped geologic structures such as fault or shear zones were considered to be “Less Favorable” because these geologic structures could potentially serve as conduits for groundwater flow.

### ***Transportation***

**Haul Distance** – The distance from Level 1 of the Standard Mine to potential repository sites was measured; sites within two miles of the site were given preference.

**Existing Roads** – Potential repository sites adjacent to existing roads were given preference.

### ***Cultural Features***

**Mine Structures** – Potential sites within 300 feet of known mine structures (adits and shafts) were not considered.

### ***Vegetation***

**Vegetation Type** – The type of vegetation at potential repository sites was inferred using available aerial photographs. Areas of exposed bedrock or meadowlands were considered “Favorable”, wooded areas were considered “Less Favorable”, and potential wetland areas were considered “Least Favorable”.

## **2.3 RESULTS**

Potential repository candidate areas were identified using a GIS analysis that assigns a rank to different regions based on defined criteria. The GIS analysis used available spatial data including ortho-rectified aerial photography, continuous grids of elevation information (known as Digital Elevation Models or DEMs), and existing geologic maps available from the U.S. Geological Survey.

Thematic layers corresponding to the screening criteria listed above were developed and a numerical rank was assigned to each of the listed criteria within the thematic layer. Locations meeting the “Most Favorable” criteria were assigned the highest numerical values, “Least Favorable” locations were assigned lower numerical values, and “Not Favorable” locations were assigned a numerical value of zero. Using a GIS program, these thematic layers were then multiplied together. The result of this analysis is a grid that displays the most favorable locations with the highest numerical rank and sites with one or more “Not Favorable” rankings would have a numerical rank of zero.

The GIS analysis initially identified more than 650 polygons representing candidate areas for further consideration as potential repository sites. These potential candidate areas were then

## **SECTION TWO**

### **Potential Repository Site Identification**

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evaluated and five preferred potential repository candidate areas were selected in cooperation with the EPA for further evaluation. These sites are shown on Figure 2-1 and include the potential repository candidate areas identified as Areas 69, 99, 225, 245 and 361. These potential repository candidate areas were considered most favorable based on the GIS ranking and their proximity to Level 1 of the Standard Mine. These candidate areas represent locations where conditions are likely to be most favorable for the construction of a mine waste repository based on the information considered as part of the GIS evaluation.

**SECTION TWO****Potential Repository Site Identification****Table 2-1****Surficial Geologic Unit Screening Criteria Used in the GIS Evaluation**

<b>Geologic Unit</b>		<b>Screening Criteria &amp; Explanation</b>
<i>Oh-Be-Joyful Quadrangle (Gaskill et. al 1967)</i>		
Qal	Alluvium	Less Favorable – outwash may be favorable
Ql	Landslide deposits	Not Favorable – unstable
Qm	Glacial deposits	Less Favorable – till and outwash may be favorable
Qt	Talus deposits	Not Favorable – unstable, rock fall hazard
f	Felsite unconformity	Not Favorable – pyrite rich
gp	Granodiorite porphyry unconformity	Favorable
qmp	Quartz monzonite porphyry unconformity	Favorable
Tw	Wasatch Formation	Less Favorable – shale/mudstone may not be favorable
Toc	Ohio Creek Formation	Less Favorable – shale may not be favorable
Kmv	Mesaverde Formation	Less Favorable – shale/coal may not be favorable
Kmvp	Mesaverde Formation, second sandstone unit	Favorable
<i>Mt. Axtell Quadrangle (Gaskill et. al 1987)</i>		
Qa	Alluvial deposits	Less Favorable – outwash may be favorable
Qf	Debris and alluvial fan deposits	Less Favorable – outwash may be favorable
Qs	Bog iron spring deposits	Not Favorable – weathered/altered
Qt	Talus	Not Favorable – unstable, rock fall hazard
Qr	Rock Streams	Not Favorable – unstable
Qlf	Landslide, slump, debris-flow and earthflow complexes	Not Favorable – unstable
Qlu	Landslide deposits, undifferentiated	Not Favorable – unstable
Qdu	Debris slopes, undifferentiated	Not Favorable – unstable
Qmy	Younger glacial deposits	Less Favorable – till and outwash may be favorable
Tp	Granodiorite porphyry and quartz monzonite porphyry	Favorable
Tw	Wasatch Formation	Less Favorable – shale/mudstone may not be favorable
Kmvo	Ohio Creek Member, Mesaverde Formation	Less Favorable – shale may not be favorable
Kmv	Mesaverde Formation, Main body	Less Favorable – shale/coal may not be favorable
m	Mine dump or tailing	Not Favorable

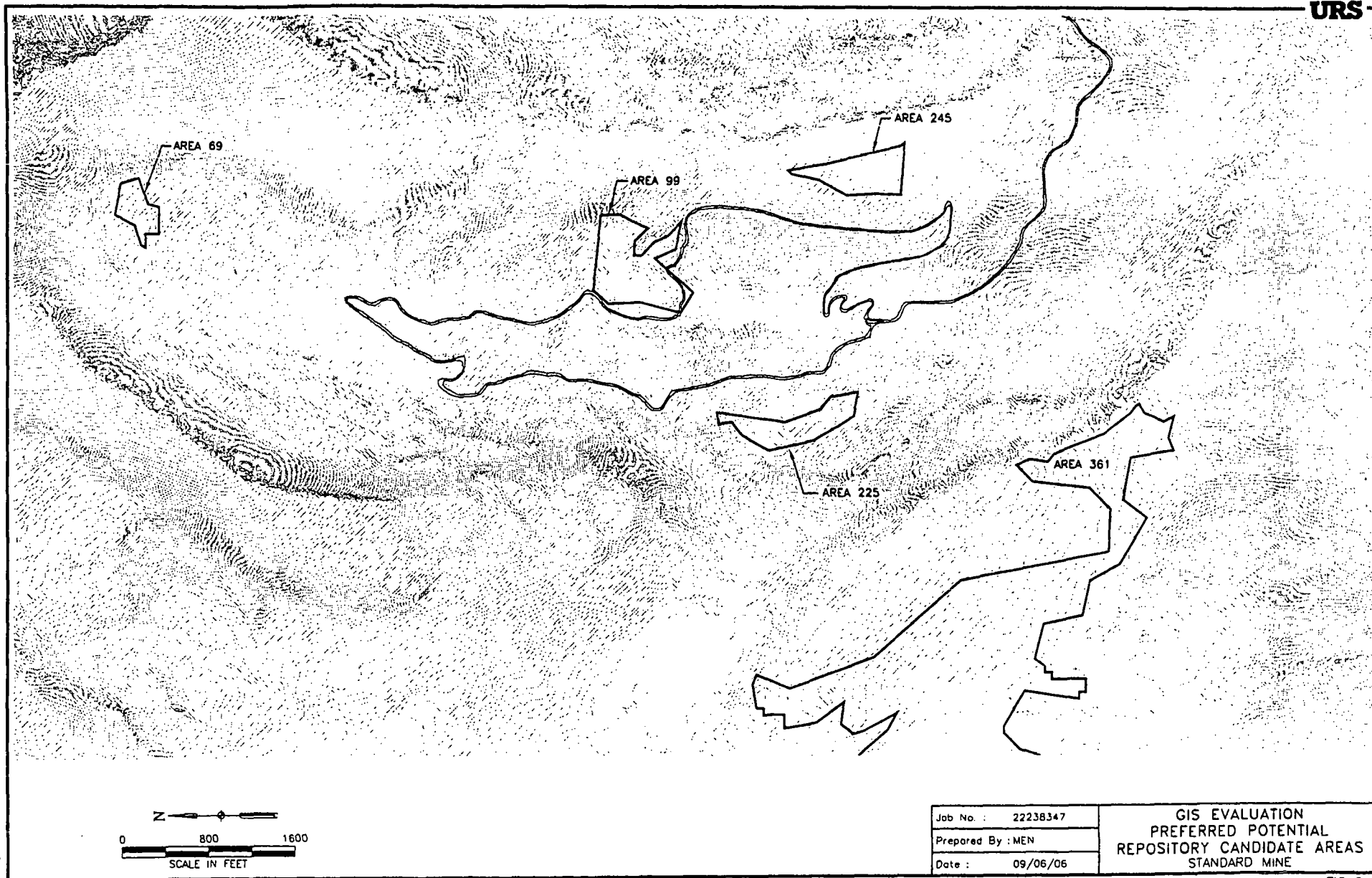


FIG. 2-1



### **3.1 GENERAL**

A geologic, ecologic and engineering site reconnaissance was performed for the five preferred potential repository candidate areas (Areas 69, 99, 225, 245 and 361, located as shown on Figure 3-1) identified as part of the GIS evaluation. The purpose of the site reconnaissance was to:

- "Ground-truth" the information used to make these candidate area selections during the GIS evaluation.
- Identify site features not found during the desktop study that could negatively affect a site's use as a repository, including fatal flaws.
- Identify potential construction material borrow sources.
- Assess the presence or absence of wetlands, other waters of the United States, and threatened and endangered species (TES) at the potential repository and borrow sites.

Based on discussions with the EPA, five additional sites were also evaluated as part of the site reconnaissance. The locations of these sites are shown on Figure 3-1 and include the Standard Mine Level 1 and Level 2 areas, two potential repository sites previously identified by the U.S. Forest Service (USFS Site 1 and USFS Site 2), and the existing reclaimed tailing impoundments at the nearby Lucky Jack Mine.

The reconnaissance of these sites was performed by Dale Baures, Andy Herb, Kevin Klinek, Kirk Palicki, Jim Scott, and Roy Watts of URS during several site visits between July and October 2006.

### **3.2 SITE CONDITIONS**

The Standard Mine is located in the Rocky Mountain Physiographic Province, and the Southern Rocky Mountain Sedimentary Subalpine Forest Ecoregion. This area is characterized by rugged mountains separated by deep glaciated stream valleys. The mountains include a number of peaks eroded into erosion resistant intrusive igneous stocks as well as eroded remnants of the surrounding sedimentary rocks. Glaciation in the region created numerous broad U-shaped valleys, lakes, and cirques.

Elk Creek is a U-shaped glacial valley located on the south side of Scarp Ridge, which is an eroded ridge with numerous glacial cirques and biscuit-board topography. Elk Basin is a broad, flat-bottomed cirque above the Standard Mine. The area is dominated by subalpine forest with openings containing wetlands, waterways, rock outcrops, and areas disturbed by mining activities. The upper reaches of the site are in the Alpine Ecoregion and are dominated by relatively low growing herbaceous and woody plants.

The Standard Mine facilities, including the Level 1 portal, adit, nearby mine rock piles, former mill site, and tailing impoundment, are located in the bottom of Elk Creek valley at an elevation of approximately 11,000 feet.

Nine of the potential repository candidate areas are located in or adjacent to the Elk Creek Valley in terrain that has been glaciated; the Lucky Jack Mine Tailing Impoundment is located in the Coal Creek Valley. Most of the candidate areas contain igneous bedrock with a relatively thin

## SECTION THREE

## Site Reconnaissance

cover of ground moraine. The Standard Mine Level 1, Level 2, and Area 69 candidate areas contain sedimentary bedrock with thin ground moraine.

Site conditions observed during the reconnaissance are described for the various candidate areas below and advantages and disadvantages of each potential repository candidate area based on the site reconnaissance are presented.

The ecological reconnaissance included wetlands, other waters of the United States, and threatened and endangered species evaluations. Wetlands are defined by the U.S. Army Corps of Engineers (Corps) and U.S. Environmental Protection Agency based on the presence of wetland vegetation, wetland hydrology, and hydric soils. Water bodies or "other water features" include any feature that contains open water or, in the absence of open water, has a defined bed and banks, less than 50 percent vegetation cover within the bed, and does not meet the Corps definition of a wetland.

For the purposes of this project, threatened and endangered species (TES) are defined as those species listed as endangered, threatened, candidate, special concern, sensitive, rare, or imperiled by the U.S. Fish and Wildlife Service (USFWS), Colorado Division of Wildlife (CDOW), U.S. Forest Service (USFS), or Colorado Natural Heritage Program (CNHP). The results of the ecological reconnaissance are summarized below for the various sites; the Standard Mine Wetland, Other Water Features, and Threatened and Endangered Species Assessment Report is included as Appendix B.

### 3.2.1 Area 69

Area 69 is located in Elk Basin, a broad and flat, south sloping glacial cirque. Glacial erosion has removed much of the relatively weak interbedded sandstone and shale in the area and relatively strong sandstone now forms the majority of the bottom of the cirque. The sandstone contains a thin partial cover of ground moraine. The basin and Area 69 contains alpine tundra vegetation.

Bedrock at Area 69 consists of brown arkosic sandstone of the Cretaceous age Ohio Creek Formation. The sandstone is moderately strong to strong and hard. The sandstone has been silicified and is mineralized, primarily along widely spaced and nearly vertically oriented joint, shear, and fault zones. The sandstone ranges from thinly to thickly bedded.

The sandstone is overlain in areas by clayey ground moraine with some sand, gravel, cobble, and boulders. The moraine appears to be typically less than 1 foot thick with some areas of greater and unknown thickness. The area contains a number of springs located in the ground moraine and in vertical fractures in the bedrock. Water filled prospect pits and shafts indicate groundwater is at a shallow depth in the bedrock.

## SECTION THREE

## Site Reconnaissance

Based on our reconnaissance, we have developed the following site advantages and disadvantages for Area 69.

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• Large, open site</li><li>• Sandstone bedrock with relatively thin soil cover in most locations</li><li>• Repository with a variable capacity could be designed</li><li>• Relatively small watershed area</li><li>• Almost no tree clearing required, minimal potential impact to forest dwelling TES</li></ul>	<ul style="list-style-type: none"><li>• Groundwater is relatively shallow and springs are present</li><li>• Wetlands areas surround site and would need to be crossed with new access road</li><li>• At the headwaters of the Elk Creek watershed</li><li>• Little soil borrow at site</li><li>• Haul would be up-hill from Level 1</li><li>• Site would be visible from much of the Elk Creek Valley and Basin</li><li>• Alpine environment would make revegetation difficult</li><li>• Potential habitat for TES</li></ul>

Based on the results of the site reconnaissance and discussions with the EPA, it is recommended Area 69 not be given further consideration as a potential repository site because: (1) presence of shallow groundwater and springs would present significant technical and construction difficulties, and could potentially represent a fatal flaw; (2) nearby wetlands and other sensitive alpine environments would be disturbed during construction; (3) the site is located within the headwaters of the Elk Creek watershed; and (4) the site would be highly visible from other portions of the Elk Creek Valley and Basin.

### 3.2.2 Area 99

Area 99 is located on relatively flat and gently rolling topography at the top of the U-shaped inner Elk Creek Valley. The area consists of south sloping "corrugated" topography, including three low ridges separated by two small U-shaped valleys that might have formed due to glacial scouring or a landslide along this side of Elk Creek Valley.

A landslide scarp was mapped by the USGS in this area previously (Gaskill, et al., 1987); however, the conditions observed during the site reconnaissance did not provide conclusive evidence for the presence of a landslide. The ridges and valleys at the site could have resulted from either glacial scour into the surface of the bedrock, or from horst and graben structures resulting from landsliding. Subsurface investigations and monitoring would be necessary to further evaluate the site conditions at this area. The presence of landslide materials at the site would likely represent a fatal flaw.

Bedrock consists of Tertiary age granodiorite porphyry, a relatively strong and hard igneous rock containing a gray fine to medium grained groundmass with large, up to 2-inch long, euhedral potassium feldspar phenocrysts. The granodiorite rock mass is closely to moderately fractured, with two nearly vertical joint sets and numerous randomly oriented joints. Mineralization in the rock appears to be along vertical joints in the rock mass. Bedrock outcrops have been frost shattered into cobble and boulder talus piles. The east side of the valley consists almost entirely of weathered and frost-shattered rock.

## SECTION THREE

## Site Reconnaissance

Based on our reconnaissance, we have developed the following site advantages and disadvantages for Area 99.

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• Favorable topography for repository construction</li><li>• Large site with good access</li><li>• Crystalline bedrock with likely relatively thin soil cover</li><li>• Repository with a variable capacity could be designed</li><li>• Site could be contoured to blend into adjacent talus slope</li><li>• Groundwater is likely deep</li><li>• No evidence of seepage, wetlands</li><li>• Relatively small watershed</li><li>• Some soil borrow may be available on-site</li><li>• Nearby talus could be incorporated into cover system</li><li>• Very little tree clearing required, minimal potential impact to forest dwelling TES</li><li>• Good access from existing roads</li></ul>	<ul style="list-style-type: none"><li>• Potential presence of landslide; could be fatal flaw</li><li>• Haul would be up-hill from Level 1</li><li>• Several active deer and elk trails through the site</li><li>• Potential habitat for several TES, particularly in forested areas</li></ul>

### 3.2.3 Area 225

Area 225 is located on a bench near the bottom of the Elk Creek Valley. The small ridges, sloping areas, and at least one small depression are underlain by ground moraine. The thickness of the moraine is unknown.

Bedrock consists of Tertiary age granodiorite porphyry, a relatively strong and hard igneous rock containing a gray fine to medium grained groundmass with large, up to 2-inch long, euhedral potassium feldspar phenocrysts. The granodiorite rock mass is closely to moderately fractured, with two nearly vertical joint sets and numerous randomly oriented joints. Mineralization in the rock appears to be along vertical joints in the rock mass.

The ground moraine consists of clay and sand with gravel, cobbles, and boulders. The moraine supports a dense growth of mature trees, with numerous downed trees. Surface water and springs were not observed in Area 225; however, a vernal pool was identified in the northern portion of the site, as further described in Appendix B. Based on our reconnaissance, we have developed the following site advantages and disadvantages.

## SECTION THREE

## Site Reconnaissance

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• Favorable topography/geometry for repository construction</li><li>• Large, relatively flat site</li><li>• Crystalline bedrock with likely relatively thin soil cover</li><li>• Repository with a variable capacity could be designed</li><li>• Site could be contoured to blend into adjacent slope</li><li>• Groundwater may be deep</li><li>• No evidence of seepage, wetlands</li><li>• Haul would be down-hill from Level 1</li><li>• Existing trees and position along north-facing hillside would limit view of repository site</li></ul>	<ul style="list-style-type: none"><li>• Small depression area could contain unsuitable sediments</li><li>• Relatively large watershed area</li><li>• Vernal pool identified within the site</li><li>• Little borrow soil at site</li><li>• Dense forest with pockets of old growth forest</li><li>• Substantial deer and elk use</li><li>• Excellent habitat for forest dwelling TES</li><li>• New road over steep terrain would be needed for access</li></ul>

### 3.2.4 Area 245

Area 245 is located on a relatively flat and south sloping ridge between Elk Creek and Evans Creek. Glacial activity is believed to have removed overlying relatively weak rock from the top of this ridge. Bedrock on the ridge is covered with ground moraine and the moraine supports a thick growth of trees.

Bedrock consists of Tertiary age granodiorite porphyry, a relatively strong and hard igneous rock containing a gray fine to medium grained groundmass with large, up to 2-inch long, euhedral potassium feldspar phenocrysts. The granodiorite rock mass is closely to moderately fractured, with two nearly vertical joint sets and numerous randomly oriented joint sets. Mineralization in the rock appears to be along vertical joints in the rock mass.

The bedrock contains a cover of clayey to sandy ground moraine of unknown thickness that contains some to a trace of gravel, cobbles, and boulders. No surface water was observed in the moraine.

## SECTION THREE

## Site Reconnaissance

Based on our reconnaissance, we have developed the following site advantages and disadvantages for Area 245.

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• Large site</li><li>• Crystalline bedrock with likely relatively thin soil cover</li><li>• Repository with a variable capacity could be designed</li><li>• Groundwater is likely deep</li><li>• No evidence of seepage, wetlands</li><li>• Relatively small watershed area</li><li>• Existing trees could limit view of repository site</li><li>• Very little old growth forest; area likely previously burned</li></ul>	<ul style="list-style-type: none"><li>• Entire site is gently sloping</li><li>• Little soil borrow at site</li><li>• Heavily wooded area</li><li>• Haul would be up-hill from Level 1</li><li>• Potential habitat for several forest dwelling TES</li></ul>

### 3.2.5 Area 361

Area 361 is located on relatively flat terrain between Elk Creek and Independence Creek. Glacial activity is believed to have removed the relatively weak sedimentary rock from the top of this flat and south sloping ridge. The ridge top contains two low ridges separated by a shallow alluvium filled valley. The most suitable portion of this area for a repository site is at or near the crest of the two ridges. Bedrock forming the ridges contains a partial cover of ground moraine that supports a thick growth of mature trees.

Bedrock consists of Tertiary age granodiorite porphyry, a relatively strong and hard igneous rock containing a gray fine to medium grained groundmass with large, up to 2-inch long, euhedral potassium feldspar phenocrysts. The granodiorite rock mass is closely to moderately fractured, with two nearly vertical joint sets and numerous randomly oriented joints. Mineralization in the rock appears to be along vertical joints in the rock mass. One area of Ohio Creek Formation arkosic sandstone was observed on the crest of a ridge near the northern end of the site.

Most of the bedrock contains a cover of clayey to sandy ground moraine that may become relatively thick in the alluvium filled valley. The ground moraine contains a trace to some gravel, cobbles, and boulders. Relatively shallow groundwater was observed in existing prospect pits and numerous springs were observed in the shallow alluvial valley.

## SECTION THREE

## Site Reconnaissance

Based on our reconnaissance, we have developed the following site advantages and disadvantages for Area 361.

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• Favorable topography for repository construction</li><li>• Large site</li><li>• Crystalline bedrock with likely relatively thin soil cover in most locations</li><li>• Repository with a variable capacity could be designed</li><li>• Ridge top locations have small watershed areas</li><li>• Some soil borrow may be available from nearby alluvial valley</li><li>• Very little old growth forest; most areas previously logged</li></ul>	<ul style="list-style-type: none"><li>• Groundwater is relatively shallow</li><li>• Wetlands along access route and downgradient of the potential repository</li><li>• Heavily wooded area</li><li>• Heavy deer and elk use</li><li>• Excellent habitat for many TES, including open area, wetland and forest dwelling species</li><li>• Relatively long haul distance from Level 1, and existing roads would require significant improvement</li><li>• Site may be visible from Kebler Pass Road</li></ul>

Based on the results of the site reconnaissance and discussions with the EPA, it is recommended Area 361 not be given further consideration as a potential repository site because: (1) presence of shallow groundwater could present significant technical and construction difficulties; (2) wetlands along the access route and downgradient of the site would be disturbed during construction; (3) the site could be visible from Kebler Pass Road; and (4) the relatively long haul distance compared to other sites under consideration is expected to make the cost of this site high.

### 3.2.6 Standard Mine Level 1

The Standard Mine Level 1 Site includes the Level 1 portal, adit, nearby mine rock piles, former mill site, and tailing impoundment. The site is located in the bottom of Elk Creek Valley and displaces the creek from its natural channel that is likely beneath the mill site and tailing impoundment. Bedrock in the valley bottom contains a partial cover of ground moraine and the stream channel contains alluvium.

Bedrock consists of brown to dark gray arkosic sandstone of the Ohio Creek Formation. The sandstone ranges from thinly to thickly bedded and contains closely to widely spaced nearly vertical joints. The rock mass also contains a number of nearly vertically oriented shear and fault zones that are mineralized and are water bearing. Numerous springs along the valley bottom and walls appear to exit from the shear, fault and fracture zones in the sandstone. These springs are located over a large portion of the Level 1 Area and some were estimated to be flowing at 20 gallons per minute or greater.

The sandstone contains a partial cover of clayey moraine with some sand, gravel, cobbles, and boulders. Moraine near the springs contains black organic soils. Alluvium consists of gravel, cobbles, and boulders with some sand, silt, and clay. The thickness of ground moraine and alluvium at the Level 1 site is estimated to be generally less than 5 feet.

## SECTION THREE

## Site Reconnaissance

Based on our reconnaissance, we have developed the following site advantages and disadvantages for the Level 1 Area.

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• Site mostly clear of large trees or heavy vegetation</li><li>• Short haul distance; some material could be dozer pushed</li><li>• Mine rock would remain in area of historic mining and area of previous disturbance</li><li>• Most areas are previously disturbed and only contain low quality TES habitat</li></ul>	<ul style="list-style-type: none"><li>• Narrow valley and proximity of mine rock piles and tailing impoundment would make concurrent construction activities more difficult</li><li>• Relatively small site allows little flexibility in repository design</li><li>• Shallow groundwater</li><li>• Numerous springs and wet areas</li><li>• Wetlands adjacent to and within the site</li><li>• Site located adjacent to Elk Creek</li><li>• Relatively large watershed area</li><li>• Little borrow soil available</li><li>• Some old growth forest along eastern portion of site</li><li>• Small areas of potential habitat for several TES</li></ul>

Based on the results of the site reconnaissance and discussions with the EPA, it is recommended Standard Mine Level 1 not be given further consideration as a potential repository site because: (1) the presence of shallow groundwater and numerous springs and wet areas would present technical and construction difficulties, and could potentially represent a fatal flaw; (2) wetlands adjacent to and within the site would be disturbed during construction; and (3) the site is located adjacent to Elk Creek.

### 3.2.7 Standard Mine Level 2

The Standard Mine Level 2 Site includes the Level 2 portal, adit, ore bin and mine rock piles. The site is located in the bottom of a small valley that is tributary to Elk Creek and is a few hundred feet east of Elk Creek. The small valley at the Level 2 site appears to be a glacial feature eroded into the bedrock. The site contains a number of bedrock outcrops, including a ridge of bedrock that forms the west side of the small valley and numerous small outcrops exposed in road cuts along the east side of the valley. Bedrock in the valley bottom contains a partial cover of ground moraine and the stream channel contains alluvium.

Bedrock consists of brown to dark gray arkosic sandstone of the Ohio Creek Formation. The sandstone ranges from thinly to thickly bedded and contains closely to widely spaced nearly vertical joints. The rock mass also contains a number of nearly vertically oriented shear and fault zones that are mineralized and are water bearing. The adit at the Level 2 site is probably located in a northeast to southwest trending shear and fault zone. Water reportedly exits from the adit during wet times of the year, such as in the spring. Springs along the valley bottom and walls may also exist at times of the year; however, during the site visit made on September 20, 2006, no springs were observed. The bottom of the valley, which contains a narrow zone of



## SECTION THREE

## Site Reconnaissance

alluvium and slopewash sands and gravels, was observed to be wet at the time of the site visit. No evidence of seepage was observed along the southeastern portion of the site.

The sandstone contains a partial cover of clayey moraine with some sand, gravel, cobbles, and boulders. Alluvium consists of gravel, cobbles, and boulders with some sand, silt, and clay. The thickness of ground moraine and alluvium at the Level 2 site is estimated to be less than 5 feet.

We have developed the following site advantages and disadvantages for the Level 2 Area based on a geological and engineering reconnaissance. An ecological reconnaissance of the Level 2 site was not performed; however, we have used our knowledge of the site and surrounding areas to make some inferences regarding wetlands and TES habitat.

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• About half of site generally clear of large trees or heavy vegetation</li><li>• Short haul distance; some material could be dozer pushed</li><li>• Mine rock would remain in area of historic mining and area of previous disturbance</li><li>• Minimal tree clearing and impacts to forest dwelling TES</li></ul>	<ul style="list-style-type: none"><li>• Narrow valley and proximity of mine rock piles and tailing impoundment would make concurrent construction activities more difficult</li><li>• Relatively large watershed area</li><li>• Relatively small site allows little flexibility in repository design</li><li>• Shallow groundwater</li><li>• Some springs and water exits from adit</li><li>• Site located close to Elk Creek</li><li>• Little borrow soil available</li><li>• Potential habitat for several TES</li></ul>

### 3.2.8 USFS Site 1

USFS Site 1 is located in an area of gently sloping topography. As shown on Figure 3-2, the site has been mapped by the USGS as landslide, slump, debris flow and earthflow material (Gaskill, et. al, 1987). The topographic map of the area includes diverging topographic contours, which are characteristic of landslide topography.

The soils observed in existing roadcuts suggest the site is composed of clayey material, with variable amounts of sand, gravel, cobbles, and boulders. These materials are characteristic of either a glacial outwash fan or non-stratified debris flow deposits. The area down slope of the site has undulating terrain and may indicate local instability, slumping, or landslides. The Elk Creek valley slopes become progressively steeper at lower elevations, in the portion of the valley previously occupied by glaciers.

Due to the presence of landslide, slump, earthflow or debris flow materials, the site may be prone to creep, slumping and landsliding. Extensive site investigations and future monitoring would be necessary to fully evaluate if USFS Site 1 could be used as a mine waste repository. Therefore, it is not recommended that it be given further consideration as a potential repository site.

There appears to be a significant amount of soil in this area that, if processed, could be a source of suitable borrow soils for use in repository construction at another location. The site is accessible by existing roads and no wetlands or other water features were observed during the reconnaissance. Development of a borrow area at this site would require little tree clearing and

have minimal potential impact to lynx and goshawk; however, the site is largely covered by montane grassland that likely provides good forage for many species.

### 3.2.9 USFS Site 2

USFS Site 2 is located on the east side of Elk Creek Valley, about 0.4 miles downstream of the Level 1 area. The site consists of a depression, roughly oval in shape, about 250 feet wide, 400 feet long, and 5 to 10 feet deep. The depression contains a cover of clayey ground moraine.

Bedrock consists of Tertiary age granodiorite porphyry, a relatively strong and hard igneous rock containing a gray fine to medium grained groundmass with large, up to 2-inch long, euhedral potassium feldspar phenocrysts. The granodiorite rock mass is closely to moderately fractured, with two nearly vertical joint sets and numerous randomly oriented joint sets. Mineralization in the rock appears to be along vertical joints in the rock mass.

The granodiorite is covered with clayey to sandy ground moraine containing gravel, cobbles, and boulders. The bottom of the depression may also contain slope wash sediments that could include clay and possibly organic soils. Thickness of the moraine is not known. The valley slope east of the depression contains a thick cover of talus and a rock glacier composed of talus. The bouldery talus is located on a slope above the proposed repository and vegetation on the rock glacier suggests creep or flow of the rock is currently slow to inactive.

Based on our reconnaissance, we have developed the following site advantages and disadvantages for the USFS Site 2.

Advantages	Disadvantages
<ul style="list-style-type: none"><li>• Favorable topography/geometry for repository construction</li><li>• Crystalline bedrock</li><li>• Groundwater is likely deep</li><li>• No evidence of seepage</li><li>• Relatively small watershed</li><li>• Some soil borrow may be available on-site</li><li>• Nearby talus could be incorporated into cover system</li><li>• Good access</li><li>• No wetlands or other water features</li></ul>	<ul style="list-style-type: none"><li>• Relatively small site could make concurrent construction activities more difficult</li><li>• Foundation soils could include clay and organic soils</li><li>• Limited site size would allow less flexibility in repository design</li><li>• Somewhat heavily wooded area with scattered old growth trees</li><li>• Several active deer and elk trails through the site</li><li>• Potential habitat for several open and forest dwelling TES</li></ul>

### 3.2.10 Lucky Jack Mine Tailing Impoundment

The existing tailing impoundment at the nearby Lucky Jack Mine owned by U.S. Energy Corp. was evaluated for potential use as a mine waste repository. The Lucky Jack Mine tailing impoundment is located about 4 miles southeast of the Standard Mine. This existing tailing impoundment is inactive and consists of a series of three adjacent tailing dams that have been reclaimed and revegetated.

The tailing impoundment appears to be in generally good condition, with no significant erosion or evidence of slope instability observed. Seepage from the adjacent hillside was observed to the

north of the westernmost tailing dam (tailing dam No. 1). Surface water runoff on the tailing impoundment is collected in a series of collection pipes and riser structures; an underdrain system conveys subsurface water to the nearby mine water treatment plant.

A mine waste repository constructed atop the existing Lucky Jack Mine tailing impoundment could experience adverse differential settlement due to consolidation of the existing impounded tailing. Geotechnical investigations consisting of drilling several test holes, collecting relatively undisturbed tailing samples, and laboratory testing of the collected samples to evaluate the engineering and index properties would be necessary to evaluate the settlement potential of the repository and to assess if construction of a repository would be feasible. Little repository construction cost savings are expected for this site, as compared to other potential repository sites under consideration. This site would still require site preparation, cover construction, and surface water controls, and in addition, the 4 mile haul distance from the Standard Mine Site to the Lucky Jack Mine tailing impoundment is expected to make this site cost prohibitive. Therefore, it is not recommended the Lucky Jack Mine tailing impoundment be given further consideration as a potential repository site.

### **3.3 RECONNAISSANCE FINDINGS**

As described previously, Area 69, Area 361, Standard Mine Level 1, USFS Site 1 and the Lucky Jack Mine Tailing Impoundment sites were eliminated from further consideration as potential repository sites. The remaining sites, Area 99, Area 225, Area 245, Standard Mine Level 2, and USFS Site 2, were judged potentially suitable repository sites that warranted additional investigation to confirm their suitability. USFS Site 1 was also investigated as a potential soil borrow site. These additional investigations are described in the next section.

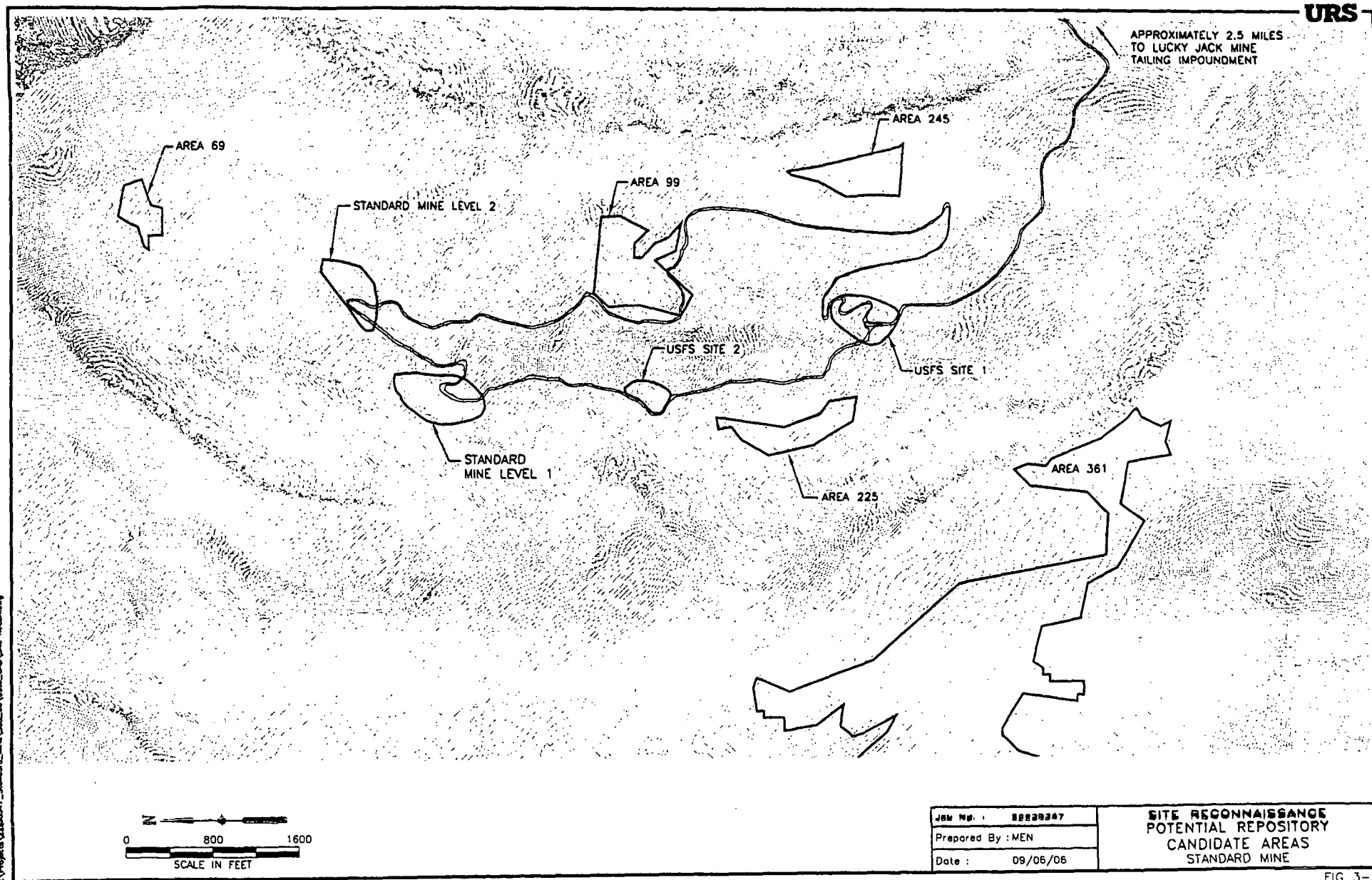


FIG 3-1

#### **4.1 GENERAL**

Site investigations were performed at the five locations judged potentially suitable for use as a mine waste repository based on the results of the site reconnaissance, Area 99, Area 225, Area 245, Standard Mine Level 2, and USFS Site 2, as well as two potential soil and riprap borrow sites, USFS Site 1 and Area 99.

The purpose of these investigations was to evaluate foundation and shallow subsurface conditions at the potential repository sites and to evaluate the characteristics of potential borrow materials. The investigations consisted of the excavation of test pits, collection of soil samples, and geotechnical laboratory testing on the collected samples. The site investigations did not include investigations to evaluate regional groundwater flow patterns, the depth to aquifers, etc.

##### **4.1.1 Test Pit Investigations**

Test pits were excavated at Area 99, Area 225, Area 245, Standard Mine Level 2, USFS Site 2, and USFS Site 1. Approximate test pit locations are shown on Figures 4-1 through 4-6. The test pits in Area 99, USFS Site 1 and USFS Site 2 were excavated using a Caterpillar model 220 hydraulic excavator and the test pits in Area 245 and Level 2 were excavated using a Komatsu PC78US hydraulic excavator. The test pits at Area 225 were excavated using hand tools because the site could not be accessed with the hydraulic excavator.

Test pits varied in depth from 1.5 to 22 feet, with most test pits excavated until excavator refusal. Summary test pit logs are presented on Figures 4-7 through 4-12. No water was encountered in any of the test pits. Soil samples were collected and classified in the field by a URS field engineer in accordance with the Unified Soil Classification System (USCS). Bag and bucket soil samples were collected for geotechnical laboratory analysis.

In addition, rock samples were collected from Area 99 for potential use as riprap. Eight (8) samples were collected for geotechnical laboratory testing. The locations of these samples are also shown on Figure 4-1.

##### **4.1.2 Laboratory Testing**

A geotechnical laboratory testing program was developed to classify and characterize the soil materials encountered at the sites. The geotechnical laboratory testing was performed by Advanced Terra Testing, Inc. of Lakewood, Colorado. Laboratory testing on soil samples included the following index tests:

- Moisture Content (ASTM D 2216)
- Particle Size Analysis (ASTM D 422)
- Atterberg Limits (ASTM D 4318)

In addition, composite soil samples were prepared from samples collected from each site. These composite samples were tested for standard Proctor compaction (ASTM D 698) as well as particle size analysis and Atterberg Limits. The results of the tests are summarized in Tables 4-1 and 4-2, and are included in Appendix C.

Geotechnical laboratory testing was also conducted on rock samples collected from Area 99 to evaluate its suitability for use as riprap. The laboratory testing included the following:

- Point Load (ASTM D 5731)
- Specific Gravity and Absorption (ASTM C 127)
- Los Angeles Abrasion (ASTM C 535)

The results of these tests are summarized in Table 4-3 and are included in Appendix C.

## **4.2 RESULTS**

The results of the site investigations for the five potential repository sites and the two potential borrow sites are described in the following sections.

### **4.2.1 Area 99**

Eight test pits were excavated at Area 99 to evaluate its suitability for use as a mine waste repository. The test pits varied in total depth from 6 to 22 feet, with refusal in 5 of the 8 test pits. Refusal was met in most of the test pits at a depth between 6 and 15.5 feet below the ground surface. At the three locations where refusal was not met, the test pits were excavated to the limits of the Caterpillar 220 hydraulic excavator (approximately 22 feet). Approximate test pit locations are shown on Figure 4-1 and summary test pit logs are presented on Figure 4-7. Groundwater was not encountered in any of the test pits.

The upper twelve inches of material encountered in the test pits consisted of an organic silt growth medium. Soils encountered below the organic silt generally consisted of silty to clayey sand with cobbles and boulders. The proportion of cobble and boulder sized material was visually estimated to be between about 10 and 30 percent. Linear topographic features observed during the reconnaissance of Area 99 were investigated with the test pits. These features were initially interpreted to be possible glacial features, such as *roche moutonnée*, eroded into the surface of the bedrock. The conditions observed in the test pits suggest the linear topographic features are landslide structures, including evidence of a large tension crack.

Test pits excavated along the linear topographic features generally encountered loose materials to a depth of 22 feet, the depth limit of the hydraulic excavator. Bedrock was not encountered in the test pits along the linear topographic features. Additional test pits not excavated along the linear topographic features encountered blocky bedrock at relatively shallow depths, with overlying glacial moraine.

Based on the test pit investigations and the USGS geologic maps for the Standard Mine region (Gaskill, et al., 1987), Area 99 is believed to be part of and located on a relatively large Quaternary age landslide complex. Laboratory testing of the material collected from test pits at Area 99 was not performed as part of this investigation.

In addition to the test pits at Area 99, rock samples were collected from the surface at an outcropping located on the south side of Area 99, as shown on Figure 4-1. Specific gravity, absorption, Los Angeles Abrasion, and point load compressive strength testing has been completed for these samples and the results are summarized in Table 4-3.

**4.2.2 Area 225**

Five test pits were excavated at Area 225 to evaluate its suitability for use as a mine waste repository. The test pits were excavated using hand tools and varied in total depth from 2.5 to 3.5 feet. Approximate test pit locations are shown on Figure 4-2 and summary test pit logs are presented on Figure 4-8. Groundwater was not encountered in any of the test pits.

The test pits generally encountered a thin (one-inch or less) layer of organic silt growth medium, underlain by silty to clayey sand with gravel, cobbles and boulders. The proportion of cobble and boulder sized material was visually estimated to be between about 10 and 35 percent and these soils are believed to be glacial in origin.

Based on laboratory testing of samples of the silty clayey gravel and sand material, the gravel, sand and fines content ranged from 17 to 44, 32 to 44 and 17 to 51 percent, respectively. Atterberg limits testing yielded a plasticity index ranging from 4 to 16, and a liquid limit ranging from 31 to 40. Additionally, test pit samples TP225-1, TP225-4, and TP225-5 were combined for compaction testing. The results of the compaction testing indicated a Standard Proctor maximum dry density of 120.8 pounds per cubic foot (pcf) at an optimum moisture content of 13.9 percent. Laboratory test results are summarized in Tables 4-1 and 4-2.

**4.2.3 Area 245**

Eight test pits were excavated at Area 245 to evaluate its suitability for use as a mine waste repository. The test pits varied in total depth from 3.5 to 7 feet, with refusal met in all of the test pits. Approximate test pit locations are shown on Figure 4-3 and summary test pit logs are presented on Figure 4-9. Groundwater was not encountered in any of the test pits.

The test pits generally encountered a thin (one to three inches thick) layer of organic silt growth medium, underlain by silty to clayey sand or gravel with cobbles and boulders. The proportion of cobble and boulder sized material was visually estimated to be between about 50 and 65 percent, with one test pit (TP245-7) estimated to have encountered as much as 85 percent cobble-sized material. The soils encountered in these test pits are believed to be glacial in origin.

Based on laboratory testing of samples of the silty clayey gravel and sand material, the gravel, sand and fines content ranged from 25 to 47, 34 to 55 and 9 to 24 percent, respectively. Atterberg limits testing yielded a plasticity index ranging from 4 to 8, and a liquid limit ranging from 25 to 32, with three (3) samples yielding non-plastic results. Additionally, test pit samples TP245-1, TP245-5, and TP245-6 (Composite 1) and TP245-2, TP245-3, and TP245-4 (Composite 2) were combined into two composite samples for compaction testing. The results of the compaction testing indicated a Standard Proctor maximum dry density of 135.0 and 130.1 pcf at an optimum moisture content of 8.5 and 10.2 percent for composite samples 1 and 2, respectively. Laboratory test results are summarized in Tables 4-1 and 4-2.

**4.2.4 Standard Mine Level 2**

Eight test pits were excavated at the Standard Mine Level 2 area to evaluate its suitability for use as a mine waste repository. The test pits varied in total depth from 1.5 to 8 feet, with refusal met in all of the test pits. Approximate test pit locations are shown on Figure 4-4 and summary test pit logs are presented on Figure 4-10. Groundwater was not encountered in any of the test pits.

The test pits generally encountered a thin (one to three inches thick) layer of organic silt growth medium, underlain by silty to clayey sand or gravel with cobbles and boulders. The proportion of cobble and boulder sized material was visually estimated to be between about 55 and 70 percent, with one test pit (TPLevel2-5) estimated to have encountered about 25 percent cobble and boulder-sized material. The soils encountered in these test pits are believed to be glacial in origin.

Based on laboratory testing of samples of the silty clayey gravel and sand material, the gravel, sand and fines content ranged from 18 to 63, 18 to 65 and 15 to 39 percent, respectively. Atterberg limits testing yielded a plasticity index ranging from 10 to 20, and a liquid limit ranging from 29 to 48. Additionally, test pit samples TPLEVEL2-1, TPLEVEL2-6, and TPLEVEL2-7 (Composite 1) and TPLEVEL2-3, and TPLEVEL2-5 (Composite 2) were combined into two composite samples for compaction testing. The results of the compaction testing indicated a Standard Proctor maximum dry density of 132.8 and 126.4 pcf at an optimum moisture content of 10.4 and 11.9 percent for composite samples 1 and 2, respectively. Laboratory test results are summarized in Tables 4-1 and 4-2.

#### **4.2.5 USFS Site 1**

Eight test pits were excavated at USFS Site 1 to evaluate the soils for use as construction borrow material. The test pits varied in total depth from 7 to 22 feet, with refusal in 7 of the 8 test pits. Refusal was met in most of the test pits at a depth between 7 and 15 feet below the ground surface. At the location where refusal was not met, the test pit was excavated to the limits of the Caterpillar 220 hydraulic excavator (approximately 22 feet). Approximate test pit locations are shown on Figure 4-5 and summary test pit logs are presented on Figure 4-11. Groundwater was not encountered in any of the test pits.

The upper twelve inches of material encountered in the test pits consisted of an organic silt growth medium. Soils encountered below the organic silt generally consisted of silty to clayey sand or gravel with cobbles and boulders. The proportion of cobble and boulder sized material was visually estimated to be between about 10 and 25 percent, with boulders as large as about six (6) feet in diameter encountered during the excavation of some of the test pits. The soils encountered in these test pits are believed to be landslide or debris flow materials.

Based on laboratory testing of samples of the silty clayey sand and gravel material, the gravel, sand and fines content ranged from 24 to 46, 43 to 63 and 11 to 25 percent, respectively. Atterberg limits testing yielded a plasticity index ranging from 1 to 9, and a liquid limit ranging from 20 to 31, with three (3) samples yielding non-plastic results. The natural moisture content ranged from about 7 to 15 percent. Additionally, test pit samples TP1-6, TP1-7 and TP1-8 (Composite 1) and TP1-2, TP1-3, TP1-5 (Composite 2) were combined into two composite samples for compaction testing. The results of the compaction testing indicated a Standard Proctor maximum dry density of 134.1 and 127.4 pcf at an optimum moisture content of 9.1 and 10.9 percent for composite samples 1 and 2, respectively. Laboratory test results available to date are summarized in Tables 4-1 and 4-2.

#### **4.2.6 USFS Site 2**

Eight test pits were excavated at USFS Site 2 to evaluate its suitability for use as a mine waste repository. The test pits varied in total depth from 4 to 8 feet, with refusal met in all test pits.



Approximate test pit locations are shown on Figure 4-6 and summary test pit logs are presented on Figure 4-12. Groundwater was not encountered in any of the test pits.

The upper twelve inches of material encountered in the test pits consisted of an organic silt growth medium. Soils encountered below the organic silt generally consisted of silty to clayey gravel or sand with cobbles and boulders. The proportion of cobble and boulder sized material was visually estimated to be between about 10 and 35 percent, with a maximum particle size ranging from about 16 to 30 inches in diameter. The soils encountered in these test pits are believed to be glacial in origin.

Based on laboratory testing of samples of the silty clayey gravel and sand material, the gravel, sand and fines content ranged from 22 to 45, 29 to 44 and 18 to 34 percent, respectively. Atterberg limits testing yielded a plasticity index ranging from 6 to 10, and a liquid limit ranging from 25 to 33, with three (3) samples yielding non-plastic results. The natural moisture content ranged from about 12 to 22 percent. Additionally, test pit samples TP2-1, TP2-4, and TP2-5, (Composite 1) and TP2-6, TP2-7, and TP2-8 (Composite 2) were combined into two composite samples for compaction testing. The results of the compaction testing indicated a Standard Proctor maximum dry density of 120.8 and 129.2 pcf at an optimum moisture content of 13.3 and 10.8 percent for composite samples 1 and 2, respectively. Laboratory test results are summarized in Tables 4-1 and 4-2.

#### **4.3 SITE INVESTIGATION FINDINGS**

Based on the results of the site investigations and the geotechnical laboratory test results, Area 225, Area 245, Standard Mine Level 2, and USFS Site 2 were judged to be potentially suitable sites for use as a mine waste repository.

These sites generally have a thin layer of glacial soils consisting of silty and clayey sand and gravel with cobbles and boulders overlying bedrock. No groundwater was encountered in any of the test pits and no fatal flaws or other conditions that would adversely affect a mine waste repository at these sites were observed during the site investigations.

The results of the site investigations at Area 99 indicated the presence of landslide features at the site and landslide or debris flow materials. Due to the presence of these materials, the site may be prone to creep, slumping and landsliding. Extensive site investigations and future monitoring would be necessary to fully evaluate if Area 99 could be used as a mine waste repository. Therefore, it is not recommended that it be given further consideration as a potential repository site.

Test pits at the USFS Site 1 confirmed the presence of landslide or debris flow materials. Due to the presence of these materials, the site may be prone to creep, slumping and landsliding and extensive site investigations and future monitoring would be necessary to fully evaluate if USFS Site 1 could be used as a mine waste repository. Therefore, it is not recommended that it be given further consideration as a potential repository site. However, based on the results of the test pits and available geotechnical laboratory test results, the soils present at USFS Site 1 could be a source of suitable borrow materials for use during construction of a mine waste repository at another location. Depending on the types of materials required as part of construction, the soils at USFS Site 1 might need to be processed prior to use.

Durability testing was performed on the riprap samples collected from Area 99. These samples were tested for specific gravity and absorption, Los Angeles Abrasion and point load index strength. Bulk specific gravity test results varied from 2.49 to 2.60, indicating fair to good rock quality. Absorption test results varied from 0.9 percent to 2.7 percent, and most of the samples had results less than 2 percent absorption, indicating generally fair rock quality. Los Angeles abrasion testing results gave less than 20 percent loss after 1,000 revolutions, indicating good, durable rock. The results of the point load testing gave point load index values ranging from about 210 to 820 pounds per square inch (psi), which correlate to compressive strengths between about 4,400 to 18,900 psi. These compressive strengths generally represent low strength to high strength rock. Based on these test results, the rock tested from Area 99 appears to be moderately durable to durable, and would be suitable for use as riprap.

# SECTION FOUR

## Site Investigations

Table 4-1  
SUMMARY OF GEOTECHNICAL LABORATORY TEST RESULTS – TEST PIT SAMPLES

LOCATION	TEST PIT	DEPTH (feet)	MOISTURE CONTENT (%)	VISUAL ESTIMATE OF > 3-INCH FRACTION (%)	GRAIN SIZE DISTRIBUTION <sup>1</sup>			ATTERBERG LIMITS		USGS CLASSIFICATION
					GRAVEL (%)	SAND (%)	FINES (%)	LL	PI	
USFS Site 1	TP1-1	1-7	15.4	20	26	52	22	NP		SM
USFS Site 1	TP1-2	1-10.5	11.5	20	35	49	16	31	9	SC
USFS Site 1	TP1-3	1-14	12.4	10	24	63	13	26	7	SC-SM
USFS Site 1	TP1-4	1-15	11.5	20	28	54	18	22	3	SM
USFS Site 1	TP1-5	1-12	9.2	20	31	44	25	27	6	SC-SM
USFS Site 1	TP1-6	1-22	12.7	20	29	49	22	NP		SM
USFS Site 1	TP1-7	1-12	6.9	25	46	43	11	NP		GM-GC
USFS Site 1	TP1-8	1-9	11.0	20	31	55	14	20	1	SM
USFS Site 2	TP2-1	1-5	17.2	30	43	31	26	NP		GM
USFS Site 2	TP2-2	1-4	20.3	30	45	29	25	31	6	GM
USFS Site 2	TP2-3	1-8	14.5	30	22	44	34	28	6	SC-SM
USFS Site 2	TP2-4	1-4	21.8	20	38	37	25	NP		GM
USFS Site 2	TP2-5	1-4	16.1	10	39	43	18	NP		SM
USFS Site 2	TP2-6	1-5	11.8	30	42	40	18	25	6	GC-GM
USFS Site 2	TP2-7	1-5	17.0	30	38	32	30	33	10	GC
USFS Site 2	TP2-8	1-7	14.3	35	38	34	27	29	6	GM
Area 225	TP225-1	1-2.5	21.4	32	32	37	31	35	12	SC
Area 225	TP225-2	2.5-3.0	17.9	32	39	44	17	32	4	SM
Area 225	TP225-3	1-3.5	20.1	30	44	37	19	36	6	GM
Area 225	TP225-4	1-3	29.5	10	17	32	51	40	16	CL
Area 225	TP225-5	1-3	17.1	35	24	36	40	31	12	SC
Area 245	TP245-1	1-4	14.0	99	43	48	17	32	8	GM
Area 245	TP245-2	1-4.5	8.9	50	25	55	20	NP		SM

**Table 4-1  
SUMMARY OF GEOTECHNICAL LABORATORY TEST RESULTS – TEST PIT SAMPLES**

LOCATION	TEST PIT	DEPTH (feet)	MOISTURE CONTENT (%)	VISUAL ESTIMATE OF 3-INCH FRACTION <sup>1</sup> (%)	GRAIN SIZE DISTRIBUTION <sup>1</sup>			ATTERBERG LIMITS		USCS CLASSIFICATION
					GRAVEL (%)	SAND (%)	FINES (%)	LL	PI	
Area 245	TP245-3	1-4	11.8	65	32	55	13	NP		SM
Area 245	TP245-4	1-7	10.3	50	39	45	16	NP		SM
Area 245	TP245-5	1-5	14.9	60	38	38	24	28	4	SM
Area 245	TP245-6	1-4	12.5	50	47	34	19	26	4	GM
Area 245	TP245-7	1-3.5	12.8	85	43	39	18	28	8	GC
Area 245	TP245-8	1-4.5	11.2	60	42	49	9	25	4	SP-SC
Standard Mine Level 2	TPLEVEL2-1	1-2.5	27.2	70	62	18	20	43	16	GM
Standard Mine Level 2	TPLEVEL2-2	2.5-3.0	17.8	55	63	25	12	38	16	GP-GC
Standard Mine Level 2	TPLEVEL2-3	1-1.5	12.4	60	26	42	32	34	10	SM
Standard Mine Level 2	TPLEVEL2-4	1-1.5	32.5	55	21	40	39	48	20	SM
Standard Mine Level 2	TPLEVEL2-5	1-8	16.6	25	33	52	15	29	10	SC
Standard Mine Level 2	TPLEVEL2-6	1-2.5	17.2	60	47	33	20	37	11	GM
Standard Mine Level 2	TPLEVEL2-7	1-2.5	17.4	65	44	37	19	40	16	GC
Standard Mine Level 2	TPLEVEL2-8	1-3	18.8	60	18	65	15	35	12	SC

**NOTE:**

1. Grain Size Distribution shown is for material finer than 3-inch size. Portion of sample greater than 3-inch size estimated based on visual observation, as indicated above.

# SECTION FOUR

## Site Investigations

**Table 4-2**  
**SUMMARY OF GEOTECHNICAL LABORATORY TEST RESULTS – COMPOSITE TEST PIT SAMPLES**

LOCATION	TEST PIT	GRAIN SIZE DISTRIBUTION			ATTERBERG LIMITS		STANDARD PROCTOR COMPACTION (ASTM D698)		USCS CLASSIFICATION
		GRAVEL (%)	SAND (%)	FINES (%)	LL	PI	OPTIMUM MOISTURE CONTENT (%)	MAXIMUM DRY DENSITY (pcf)	
Area 245 - Comp. 1	TP245-1, TP245-5, TP245-6	44	36	20	29	3	8.5	135.0	GM
Area 245 - Comp. 2	TP245-2, TP245-3, TP245-4	34	49	17	NP		10.2	130.1	SM
Standard Mine Level 2 - Comp. 1	TP LEVEL2-1, TP LEVEL2-6, TP LEVEL2-7	50	23	27	35	11	10.4	132.8	GC
Standard Mine Level 2 - Comp. 2	TP LEVEL2-3, TP LEVEL2-5	25	45	30	33	12	11.9	126.4	SC
Area 225 - Comp. 1	TP225-1, TP225-4, TP225-5	28	39	33	34	10	13.9	120.8	SM
USFS Site 1 - Comp. 1	TP1-6, TP1-7, TP1-8	32	51	17	24	7	9.1	134.1	SC-SM
USFS Site 1 - Comp. 2	TP1-2, TP1-3, TP1-5	25	56	19	30	10	10.9	127.4	SC
USFS Site 2 - Comp. 1	TP2-1, TP2-4, TP2-5	37	42	21	38	13	13.3	120.8	SM
USFS Site 2 - Comp. 2	TP2-6, TP2-7, TP2-8	39	41	20	37	13	10.8	129.2	SC

Table 4-3

## SUMMARY OF GEOTECHNICAL LABORATORY TEST RESULTS – AREA 99 RIP RAP SAMPLES

LOCATION	SAMPLE	BULK SPECIFIC GRAVITY (SAT. SURFACE DRY AGG.)	ABSORPTION (%)	POINT LOAD INDEX STRENGTH (psi)
Area 99	RR1-1	2.60	0.96	560
Area 99	RR1-2	2.58	1.46	819
Area 99	RR1-3	2.60	1.21	259
Area 99	RR1-4	2.53	1.55	618
Area 99	RR1-5	2.50	2.73	393
Area 99	RR1-6	2.49	2.42	213
Area 99	RR1-7	2.50	2.66	386
Area 99	RR1-8	2.59	0.89	661

LOCATION	SAMPLE	LA ABRASION TESTING	
		200 REVOLUTIONS (% LOSS)	1000 REVOLUTIONS (% LOSS)
Area 99 – Composite 1	RR1-1, RR1-2, RR1-8	4.9	15.6
Area 99 – Composite 2	RR1-5, RR1-6, RR1-7	6.1	19.5
Area 99 – Composite 3	RR1-3, RR1-4	5.1	15.5

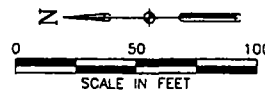
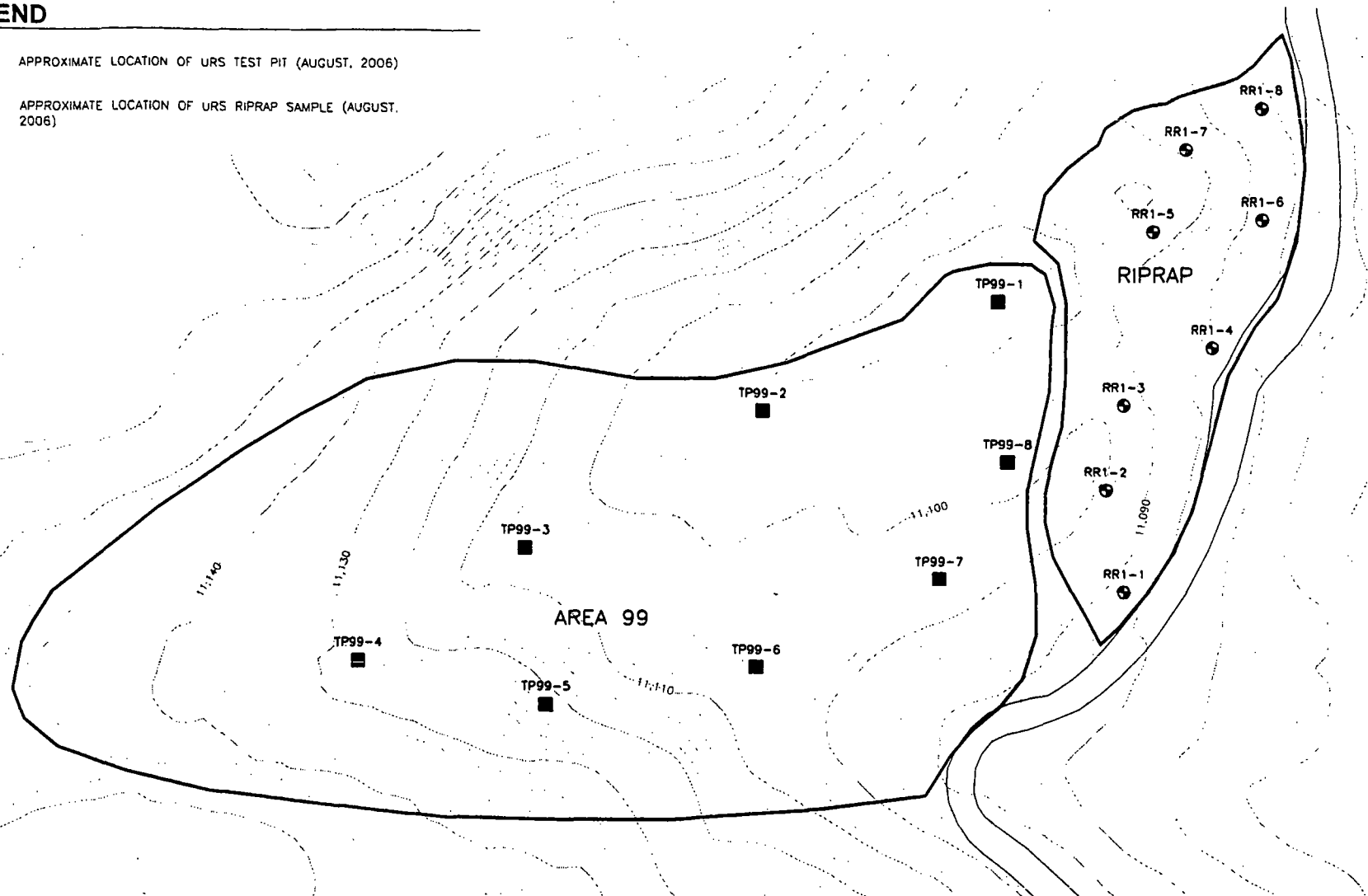
NOTE:

- Field samples were composited into 3 samples for Abrasion testing. The composite sample number represents the sample number as reported by the laboratory, whereas the samples are the field sample numbers

## LEGEND

- TP99-6 ■ APPROXIMATE LOCATION OF URS TEST PIT (AUGUST, 2006)
- RR1-1 ⊕ APPROXIMATE LOCATION OF URS RIPRAP SAMPLE (AUGUST, 2006)

URS



Job No. :	22238347	<b>AREA 99</b> <b>TEST PIT LOCATION MAP</b>  <b>STANDARD MINE</b>
Prepared By :	MEN	
Date :	09/06/06	

FIG. 4-1

URS

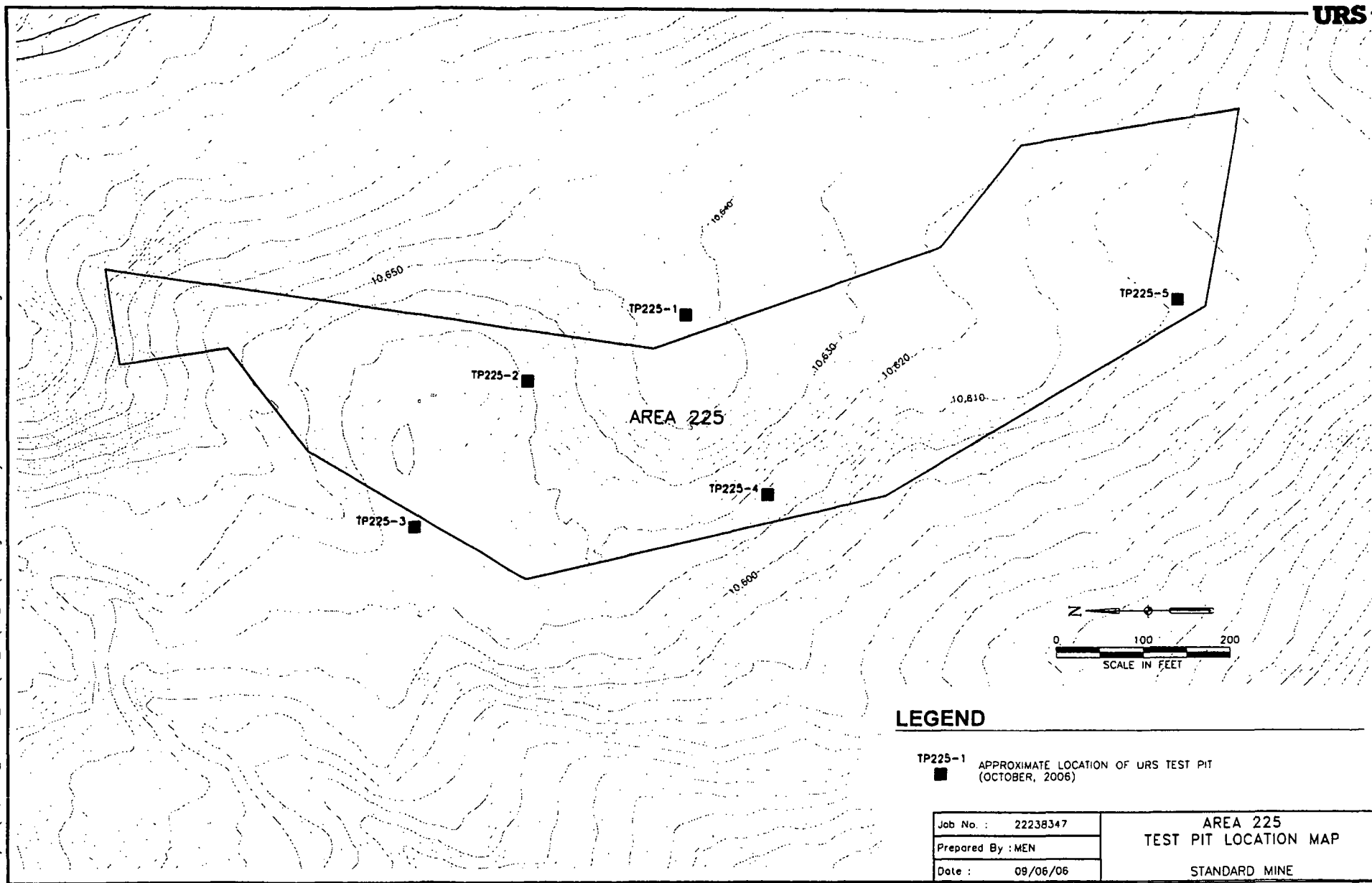


FIG. 4-2



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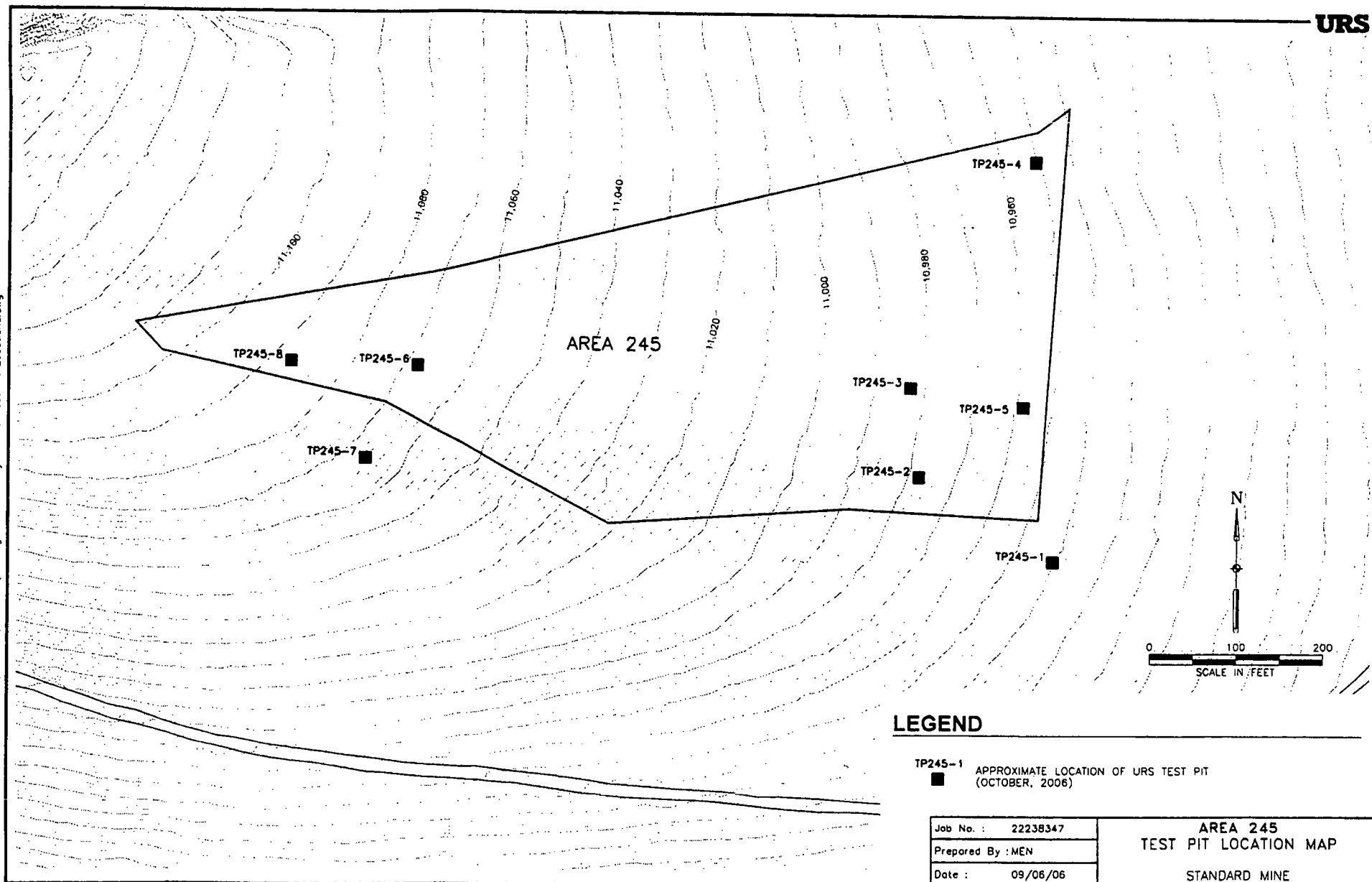
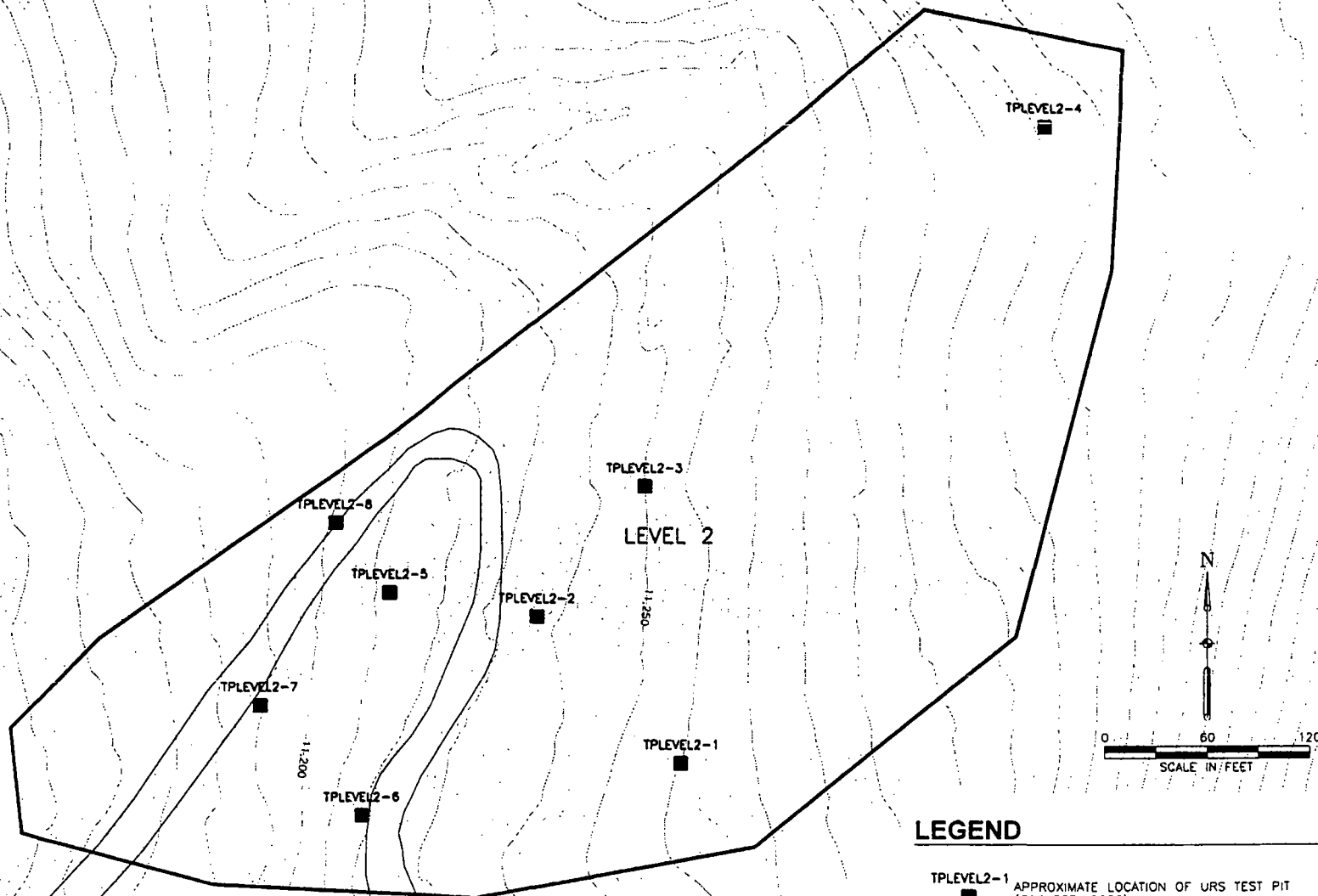


FIG. 4-3

URS



# LEGEND

TPLEVEL2-1  
 ■ APPROXIMATE LOCATION OF URS TEST PIT  
 (OCTOBER, 2006)

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Prepared By :	MEN
Date :	09/06/06

STANDARD MINE LEVEL 2  
 TEST PIT LOCATION MAP

STANDARD MINE

FIG. 4-4

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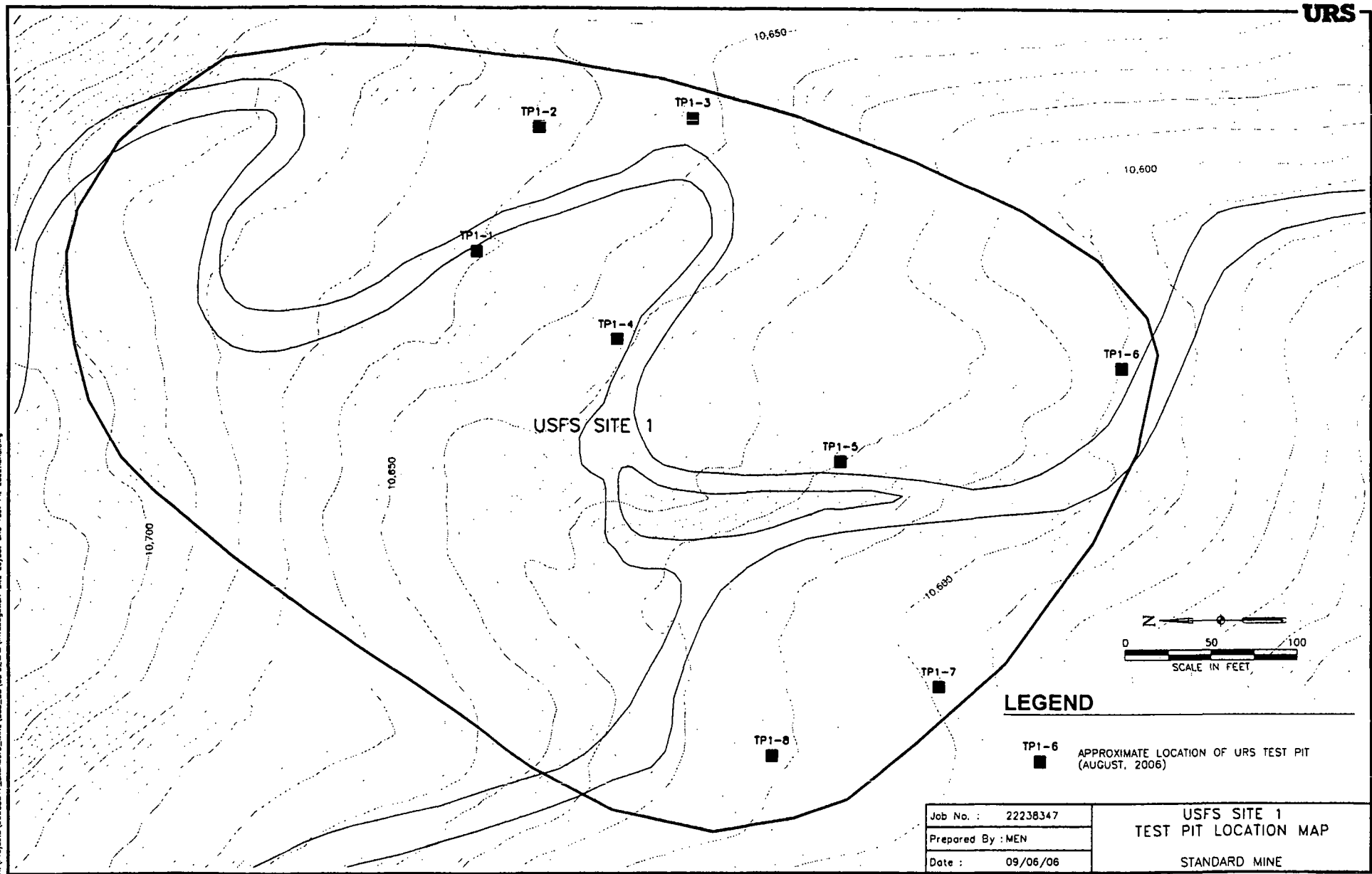


FIG. 4-5

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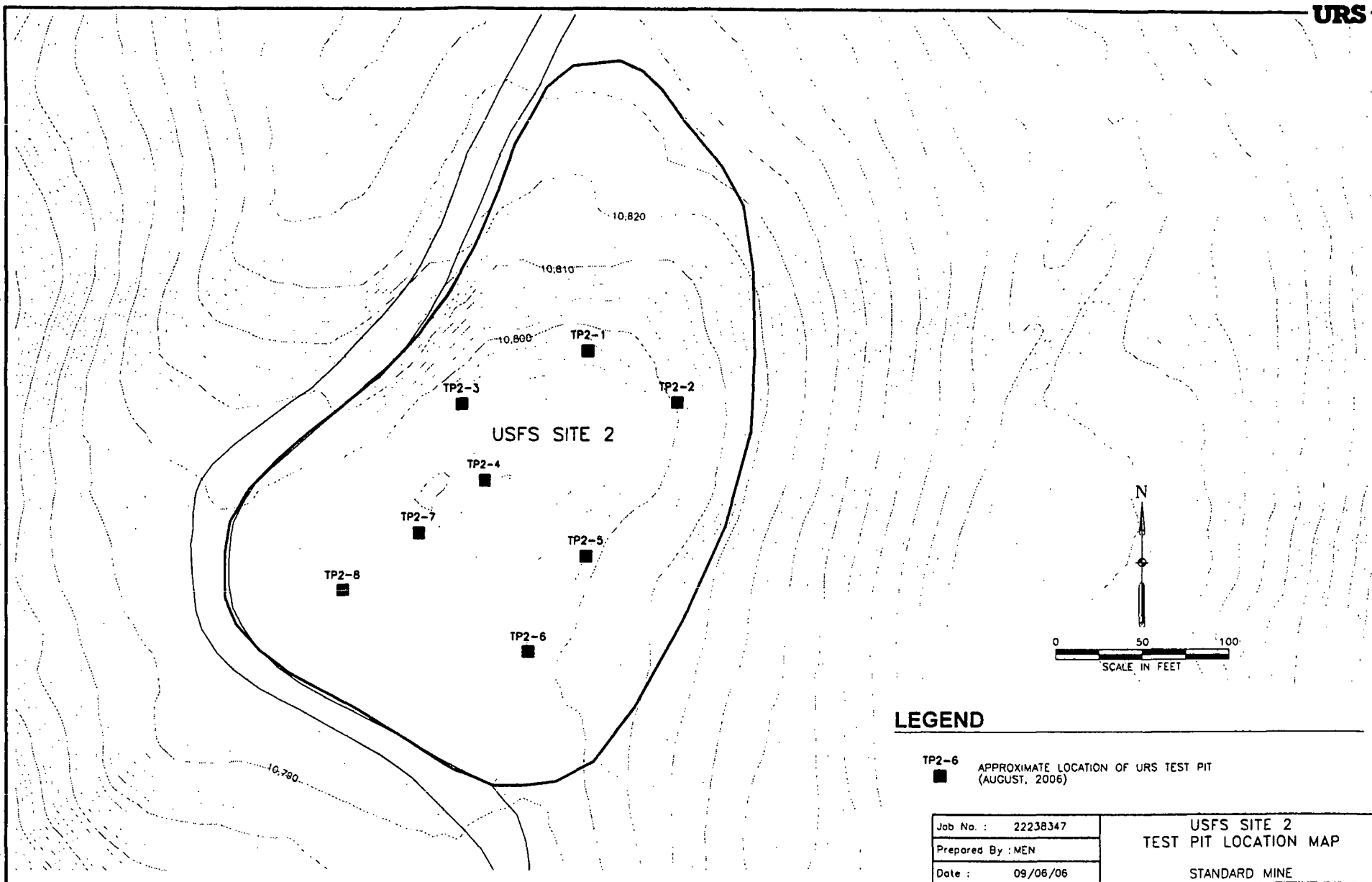
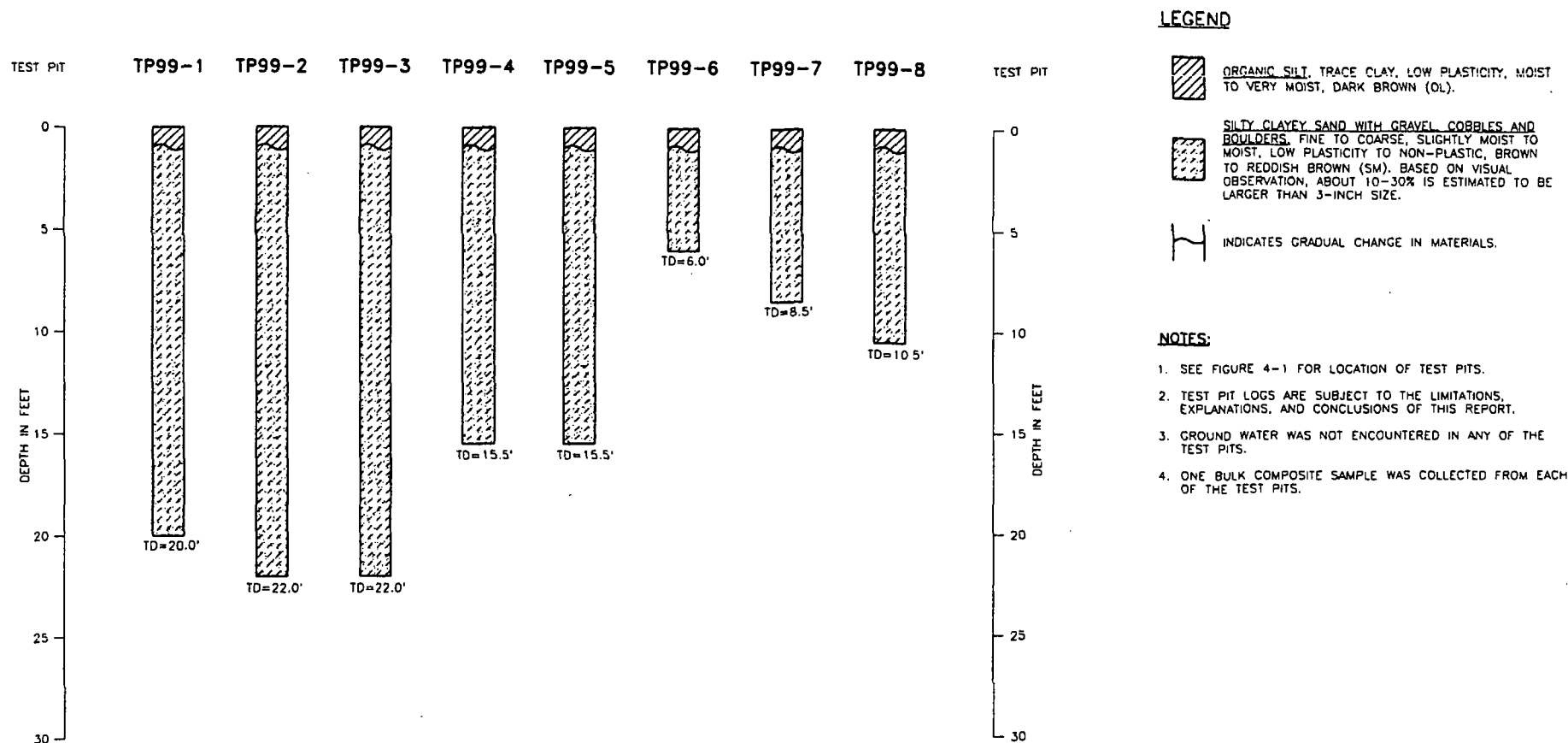
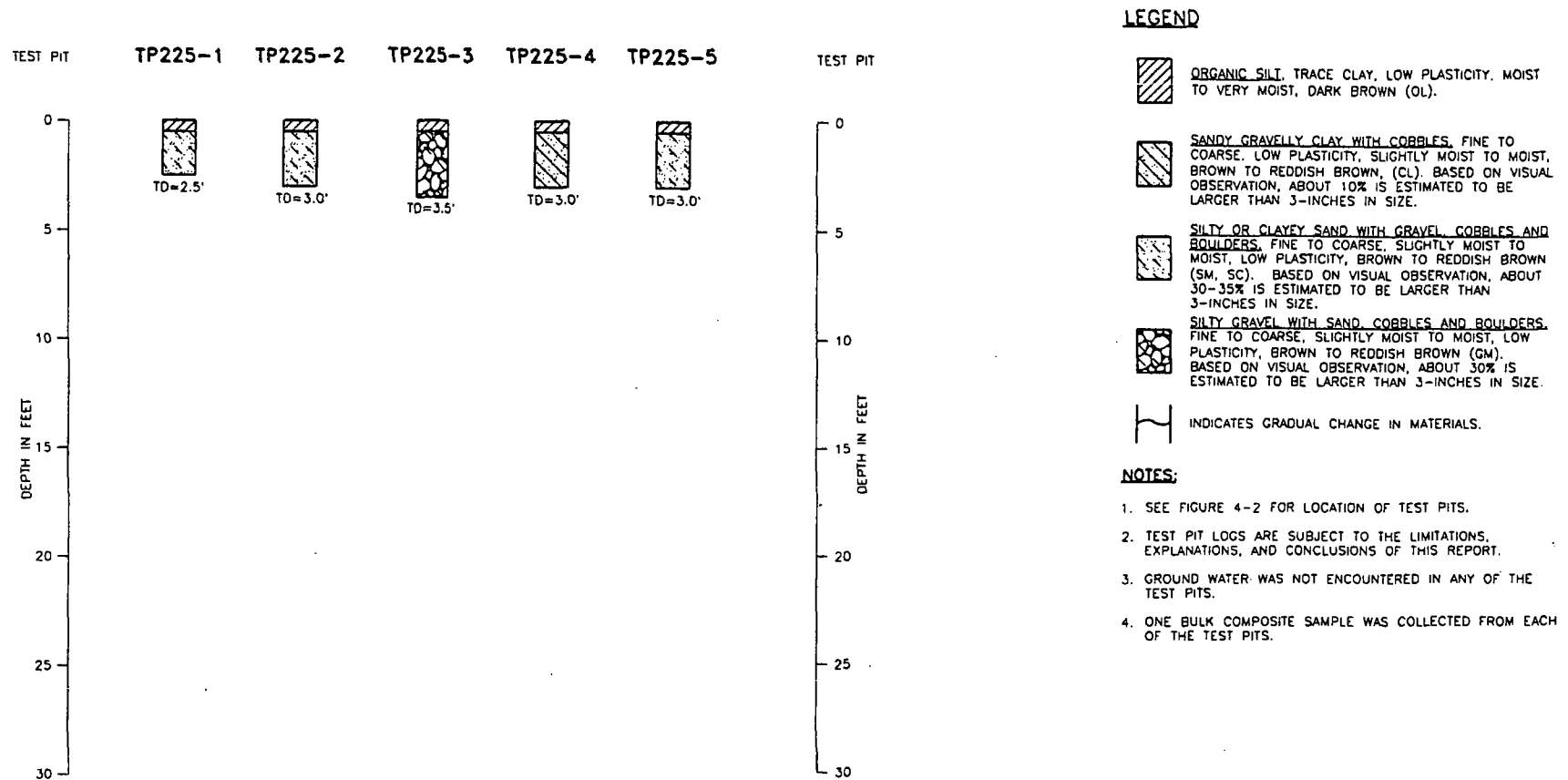


FIG. 4-6



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Date :	11/4/06

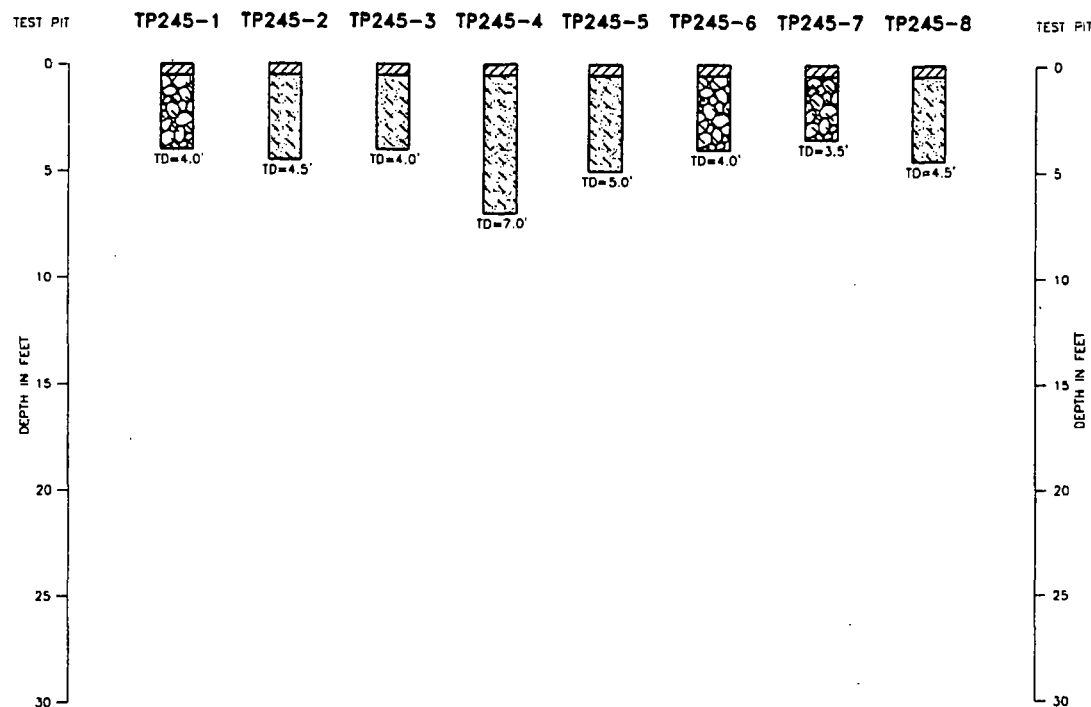
AREA 99 TEST PIT SUMMARY LOGS STANDARD MINE
---------------------------------------------------



Job No. :	22238347
Prepared By :	MEN
Date :	11/4/06

AREA 225 TEST PIT SUMMARY LOGS STANDARD MINE
----------------------------------------------------

FIG. 4-8



## LEGEND



ORGANIC SILT, TRACE CLAY, LOW PLASTICITY, MOIST TO VERY MOIST, DARK BROWN (OL).



SILTY OR CLAYEY SAND WITH GRAVEL, COBBLES AND BOULDERS, FINE TO COARSE, SLIGHTLY MOIST TO MOIST, LOW PLASTICITY TO NON-PLASTIC, BROWN TO REDDISH BROWN (SM, SP-SC). BASED ON VISUAL OBSERVATION, ABOUT 50-65% IS ESTIMATED TO BE LARGER THAN 3-INCH SIZE.



SILTY OR CLAYEY GRAVEL WITH SAND, COBBLES AND BOULDERS, FINE TO COARSE, SLIGHTLY MOIST TO MOIST, LOW PLASTICITY, BROWN TO REDDISH BROWN (GM, GC). BASED ON VISUAL OBSERVATION, ABOUT 50-85% IS ESTIMATED TO BE LARGER THAN 3-INCHES IN SIZE.



INDICATES GRADUAL CHANGE IN MATERIALS.

## NOTES:

1. SEE FIGURE 4-3 FOR LOCATION OF TEST PITS.
2. TEST PIT LOGS ARE SUBJECT TO THE LIMITATIONS, EXPLANATIONS, AND CONCLUSIONS OF THIS REPORT.
3. GROUND WATER WAS NOT ENCOUNTERED IN ANY OF THE TEST PITS.
4. ONE BULK COMPOSITE SAMPLE WAS COLLECTED FROM EACH OF THE TEST PITS.

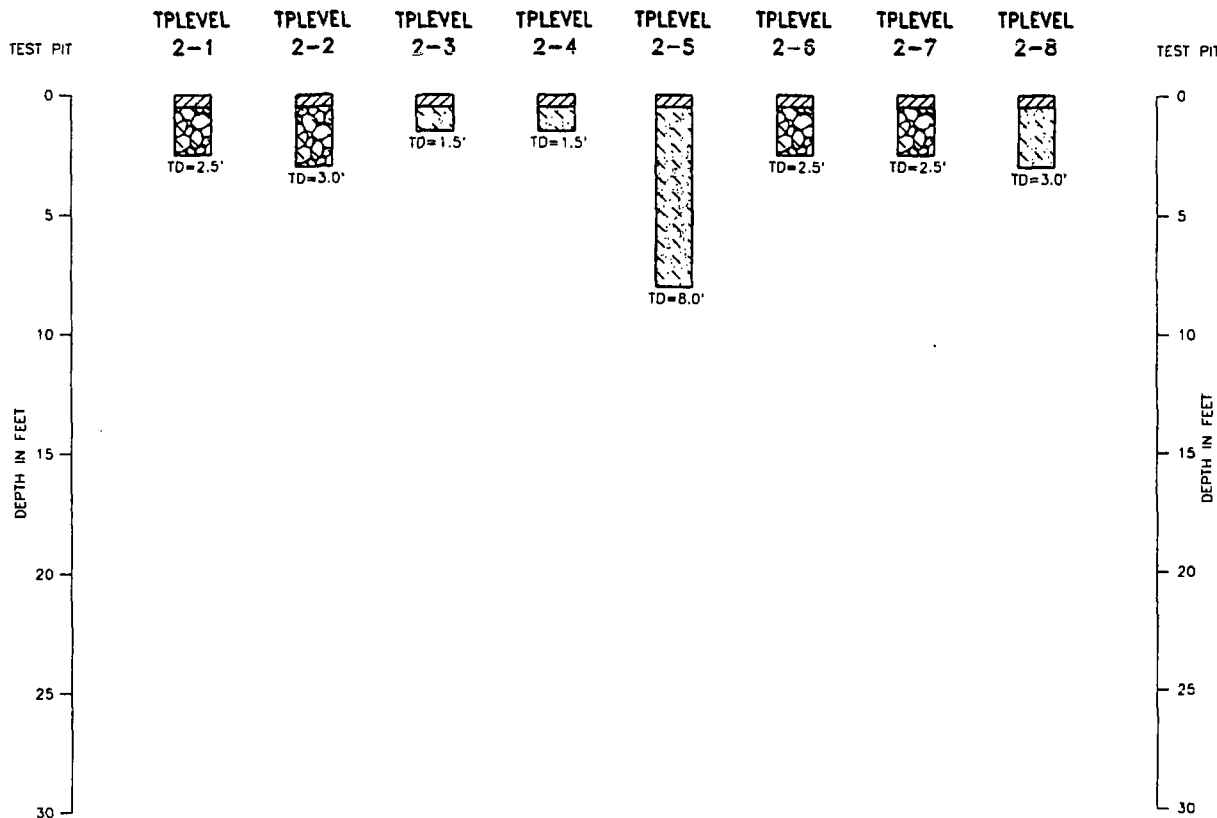
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Date : 11/4/06

# AREA 245 TEST PIT SUMMARY LOGS

STANDARD MINE



**LEGEND**



ORGANIC SILT, TRACE CLAY, LOW PLASTICITY, MOIST TO VERY MOIST, DARK BROWN (OL).



SILTY OR CLAYEY SAND WITH GRAVEL, COBBLES AND BOULDERS, FINE TO COARSE, SLIGHTLY MOIST TO MOIST, LOW PLASTICITY, BROWN TO REDDISH BROWN (SM, SC). BASED ON VISUAL OBSERVATION, ABOUT 25-60% IS ESTIMATED TO BE LARGER THAN 3-INCHES IN SIZE.



SILTY OR CLAYEY GRAVEL WITH SAND, COBBLES AND BOULDERS, FINE TO COARSE, SLIGHTLY MOIST TO MOIST, LOW PLASTICITY TO NON-PLASTIC, BROWN TO REDDISH BROWN (GM, GC, GP-GC). BASED ON VISUAL OBSERVATION, ABOUT 40-85% IS ESTIMATED TO BE LARGER THAN 3-INCHES IN SIZE.



INDICATES GRADUAL CHANGE IN MATERIALS.

**NOTES:**

1. SEE FIGURE 4-4 FOR LOCATION OF TEST PITS.
2. TEST PIT LOGS ARE SUBJECT TO THE LIMITATIONS, EXPLANATIONS, AND CONCLUSIONS OF THIS REPORT.
3. GROUND WATER WAS NOT ENCOUNTERED IN ANY OF THE TEST PITS.
4. ONE BULK COMPOSITE SAMPLE WAS COLLECTED FROM EACH OF THE TEST PITS.

Job No. : 22238347

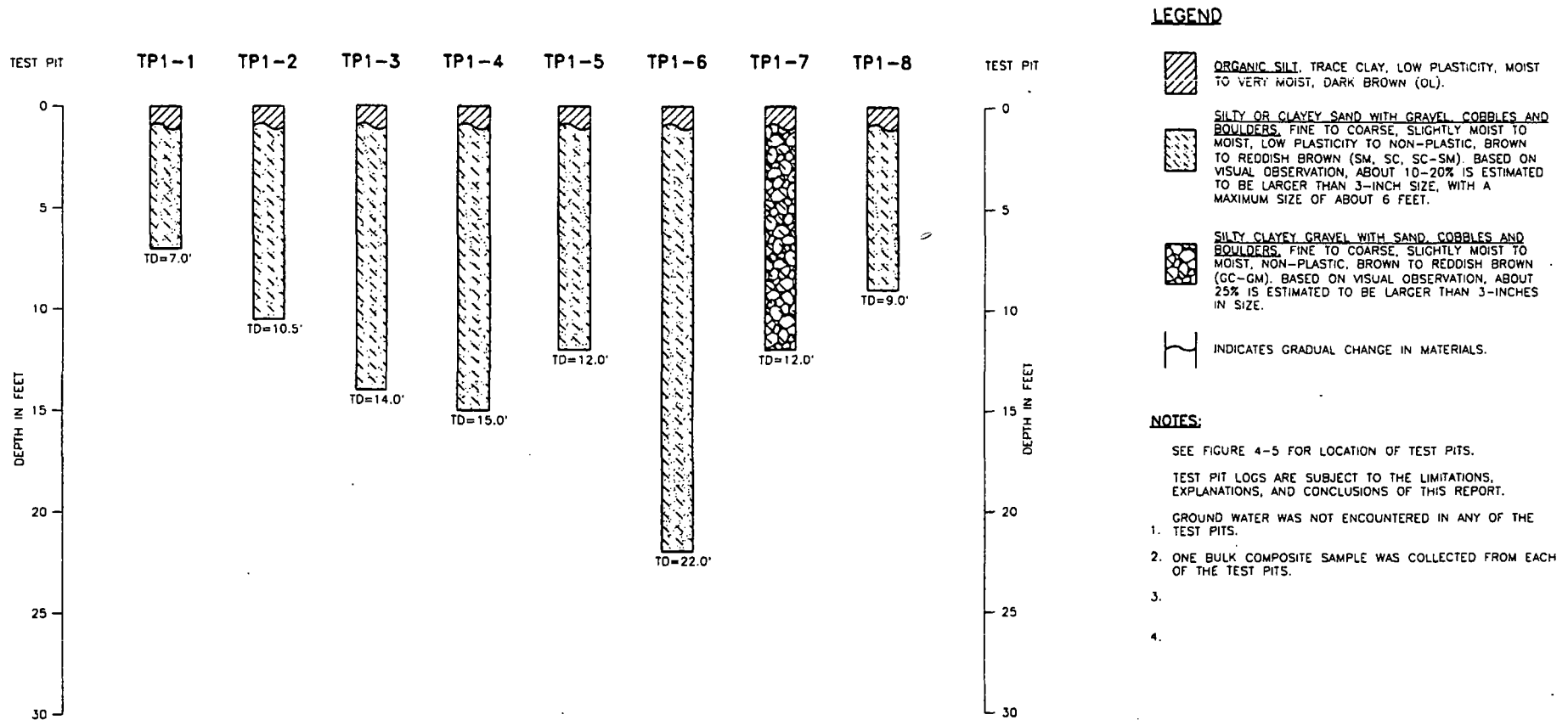
Prepared By : MEN

Date : 11/4/06

STANDARD MINE LEVEL 2  
TEST PIT SUMMARY LOGS

STANDARD MINE





Job No. :	22238347
Prepared By :	MEN
Date :	11/4/06

USFS SITE 1 TEST PIT SUMMARY LOGS STANDARD MINE
-------------------------------------------------------

## LEGEND



ORGANIC SILT, TRACE CLAY, LOW PLASTICITY, MOIST TO VERY MOIST, DARK BROWN (OL).



SILTY OR SILTY CLAYEY SAND WITH GRAVEL, COBBLES AND BOULDERS, FINE TO COARSE, SLIGHTLY MOIST TO MOIST, LOW PLASTICITY TO NON-PLASTIC, BROWN TO REDDISH BROWN (SM, SC-SM). BASED ON VISUAL OBSERVATION, ABOUT 10-30% IS ESTIMATED TO BE LARGER THAN 3-INCH SIZE, WITH A MAXIMUM SIZE OF ABOUT 30 INCHES.



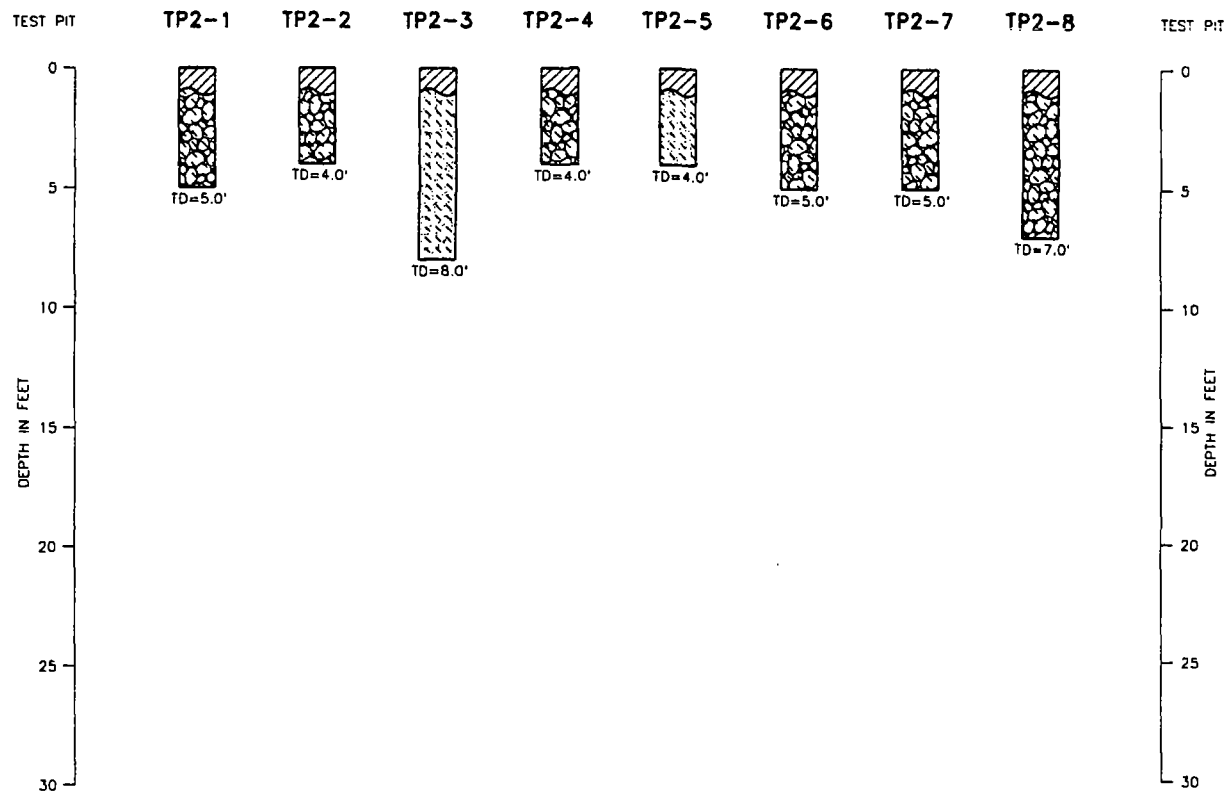
SILTY OR CLAYEY GRAVEL WITH SAND, COBBLES AND BOULDERS, FINE TO COARSE, SLIGHTLY MOIST TO MOIST, LOW PLASTICITY TO NON-PLASTIC, BROWN TO REDDISH BROWN (GM, GC, GC-GM). BASED ON VISUAL OBSERVATION, ABOUT 20-35% IS ESTIMATED TO BE LARGER THAN 3-INCH SIZE, WITH A MAXIMUM SIZE OF ABOUT 30 INCHES.



INDICATES GRADUAL CHANGE IN MATERIALS.

## NOTES:

1. SEE FIGURE 4-8 FOR LOCATION OF TEST PITS.
2. TEST PIT LOGS ARE SUBJECT TO THE LIMITATIONS, EXPLANATIONS, AND CONCLUSIONS OF THIS REPORT.
3. GROUND WATER WAS NOT ENCOUNTERED IN ANY OF THE TEST PITS.
4. ONE BULK COMPOSITE SAMPLE WAS COLLECTED FROM EACH OF THE TEST PITS.



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Date :	11/4/06

USFS SITE 2  
TEST PIT SUMMARY LOGS  
STANDARD MINE

### **5.1 COMPARISON OF SUITABLE SITES**

Area 225, Area 245, Standard Mine Level 2, and USFS Site 2 were judged to be potentially suitable sites for use as a mine waste repository based on the results of the geologic, ecologic and engineering reconnaissance, the site investigations and the available geotechnical laboratory test results. No fatal flaws or conditions that would adversely affect a mine waste repository at these sites were observed at these locations. In addition, preliminary repository volume estimates were performed for these four potentially suitable sites. All four potential repository sites have adequate capacity to accommodate the estimated 80,000 cubic yards of mine waste at the Standard Mine site.

A set of criteria was developed to compare and contrast these four suitable sites. These criteria were derived from the GIS site screening criteria and have been subdivided into four categories: Technical Performance, Construction, Environmental, and Costs. Individual comparison criteria are presented in Table 5-1, as well as qualitative evaluations of the sites against the criteria based on the information considered as part of this report.

Constructability and capital construction cost has been considered as a comparison criterion. Some of the significant constructability factors considered were site constraints such as available construction season, high altitude and weather, haul road condition and length, equipment application and production and available on site cover material. These constructability factors coupled with design concepts for the various depository locations form the basis for ranges of estimated capital construction cost. These preliminary capital construction cost estimates indicated the capital construction costs for a repository at any of the four potentially suitable sites is expected to vary by less than about 15 percent between the sites.

It is important to recognize that the assumptions used in the ideas, concepts and pricing are based on very little engineering and design and are representative of current information and conditions. A more detailed conceptual capital construction cost estimate could be developed for a mine waste repository at one or more of the potentially suitable sites after a conceptual design has been completed. In addition to capital construction cost, other project costs would need to be considered and included. These costs consist of engineering, design, construction management, legal, permits, inflation, operation and maintenance.

Construction schedule is also included as a comparison criterion in Table 5-1. The high altitude location of the Standard Mine results in a relatively short construction season, typically four months between June and September. Major construction activities to be completed during this time include repository site preparation, tailing and mine rock pile dewatering, loading, hauling and placing mine waste in the repository, and repository cover construction. Preliminary schedule estimates indicate there would only be minor differences in the time to complete these work activities at the four potentially suitable sites. However, there appears to be little float time to accommodate unanticipated site conditions, weather delays, etc. The short construction season should be considered during the design of the repository to minimize the use of items that require long lead times, and the use of substitute construction materials that allow rapid installation (i.e. geosynthetic clay liner in lieu of compacted soil) should also be considered.

The criteria included in Table 5-1 were developed to compare and contrast the geological, geotechnical, engineering and environmental issues discussed in this report and is not intended to be fully inclusive of all the issues associated with construction of a mine waste repository at the

# SECTION FIVE

## Suitable Repository Sites

Standard Mine. These criteria could be modified based on input from stakeholders to include additional items, and could also be incorporated into a rating matrix to aid in the selection of a repository site or sites for additional design and construction as a mine waste repository.

**Table 5-1**  
**Repository Site Comparison Criteria**

COMPARISON CRITERIA		Area 225	Area 245	Level 2	USFS Site 2
TECHNICAL PERFORMANCE	Topography	Less Favorable	Favorable	Not Favorable	Favorable
	Foundation Conditions	Favorable	Very Favorable	Less Favorable	Less Favorable
	Ability to Accommodate Variable Waste Volumes	Favorable	Very Favorable	Less Favorable	Less Favorable
	Watershed Area	Relatively Large	Relatively Small	Relatively Small	Relatively Large
	Shallow Groundwater	Not Likely	Not Likely	Possible	Possible
	Seepage/Springs	Not Likely	Not Likely	Possible	Not Likely
	Ease of Design	More Difficult	Average	More Difficult	Average
	Ability to Use of Riprap Cover	Less Favorable	Less Favorable	Less Favorable	Favorable
	Distance to Existing Watercourse	>300'	>300'	Adjacent	>300'
CONSTRUCTION	Topography	Less Favorable	Favorable	Not Favorable	Favorable
	Access	Steep	Good	Acceptable	Good
	On-Site Borrow	Little Available	Little Available	Little Available	Available
	Approximate Mine Waste Haul Distance	0.9 miles	1.7 miles	0.4 miles	0.4 miles
	Mine Waste Haul Difficulty	Downhill from Level 1	Uphill from Level 1	Uphill from Level 1	Downhill from Level 1
	Surface Water Control	More Difficult	Less Difficult	More Difficult	Less Difficult
	Approximate Borrow Material Haul Distance	0.4 miles	0.5 miles	1.2 miles	0.4 miles
	Approximate Additional Access Roads Required	0.25 miles	0.15 miles	None	None
ENVIRONMENTAL	Additional Access Roads	0.25 miles	0.15 miles	None	None
	Existing Tree Removal	Dense Forest	Heavily Wooded	Partially Wooded	Less Heavily Wooded
	Wetlands	Vernal Pool	None	None Likely	None
	Aesthetics/Visibility	Low Visibility	Low Visibility	Visible	Less Visible
	Previous Disturbance	None	None	Disturbed Area Adjacent	None
	TES Habitat	Yes	Yes	Yes	Yes
	Other Wildlife Use	Yes	Yes	Yes	Yes
COSTS	Construction Cost	Preliminary estimated construction costs expected to vary by less than about 15 percent for all sites			
	Operation and Maintenance Cost	More Than Average	Average	Average	Less Than Average
	Schedule	Average	Average	Average	Average

## **SECTION SIX**

### **General Information**

---

Professional judgments on surface conditions and subsurface conditions are presented in this report. They are based partly on the evaluation of technical information gathered and partly on our understanding of the subsurface conditions in the area. The opinions and conclusions expressed are based on the results of site reconnaissance and limited subsurface investigations, and are preliminary in nature. The performance of the project is not guaranteed in any respect, only that our engineering work and judgments rendered meet the standard of care of the profession.

The work herein was performed within the limits prescribed by the client, in a manner consistent with the level of care and skill ordinarily exercised by other professional consultants under similar circumstances. No other representation to the client, expressed or implied, and no warranty or guarantee are included or intended.

## SECTION SEVEN

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**Appendix A**  
**Potential Repository Site Evaluation Report**

## Appendix A

### Potential Repository Site Evaluation Report

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# START 3

Superfund Technical Assessment and Response Team 3 -  
Region 8

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United States  
Environmental Protection Agency  
Contract No. EP-W-05-050

## POTENTIAL REPOSITORY SITE EVALUATION

### STANDARD MINE SITE

Crested Butte, Gunnison County, Colorado

TDD No. 0509-08

MAY 19, 2006



**URS**

OPERATING SERVICES, INC.

In association with:

TechLaw, Inc.

LT Environmental, Inc.

TN & Associates, Inc.

Garry Struthers Associates, Inc.

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**POTENTIAL REPOSITORY SITE EVALUATION**

**STANDARD MINE  
Crested Butte, Gunnison County, Colorado**

**EPA Contract No. EP-W-05-050  
TDD No. 0509-08**

**Prepared By:  
Joe Gilbert  
Geologist**

**URS Operating Services, Inc.  
1099 18th Street, Suite 710  
Denver, CO 80202-1908**

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Approved: \_\_\_\_\_ Date: \_\_\_\_\_  
Charles W. Baker, START 3 Program Manager, UOS

Approved: \_\_\_\_\_ Date: \_\_\_\_\_  
Joe Gilbert, Geologist, START 3, UOS

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**SAMPLING ACTIVITIES REPORT**  
  
**STANDARD MINE**  
**Crested Butte, Gunnison County, Colorado**

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**FIGURES**

Figure 1	Site Location Map
Figure 2	Potential Repository Locations
Figure 3	Potential Repository Locations

## **1.0 INTRODUCTION**

Previous investigations at the Standard Mine site (Figure 1) revealed that uncontrolled mine tailings and waste rock piles are present in several site areas (URS Operating Services, Inc. (UOS) 2006). The U.S. Environmental Protection Agency (EPA) determined that construction of an on-site repository that will contain site waste is the most effective solution for managing the tailings and waste piles. There are several considerations for determining the locations of favorable repository sites. Some of these include proximity to surface watercourses, type of bedrock, structural condition of bedrock (the presence of significant fractures or faults), and the availability of roads. For the purposes of the evaluation presented in this report, repository siting criteria were adapted from those used by the U. S. Forest Service.

In order to determine the best possible repository locations within the vicinity of the Standard Mine site, a combination of Geographic Information Systems (GIS) analysis, field testing, and visual observation were employed. The following report addresses the logistical, geologic, and biologic considerations for the location of on-site repository. Subsequent to this analysis, further ground truth and geotechnical analysis will confirm the viability of the identified repository sites.

## **2.0 POTENTIAL REPOSITORY SITE ANALYSIS RESULTS**

Potential repository areas were determined using GIS analysis. GIS is a computer-enhanced methodology for determining the relationships of spatially-related objects. It uses several types of spatial data including ortho-rectified aerial photography, continuous grids of elevation information (known as Digital Elevation Models or DEMs), and thematic layers (a geologic map is a type of thematic layer). This study used a type of GIS analysis that provides a rank to different regions based on defined criteria.

Spatial analysis in a GIS revealed the “most favorable” from the “least favorable” areas within the Standard Mine area by first creating thematic layers for each of the criteria types, and then by assigning a numerical rank to each of the listed criteria within the thematic layer. Using a GIS program, these thematic layers were then multiplied together. The most favorable locations have the highest numerical value as a result of multiplication, whereas the least favorable locations have the lowest values. Values of 0 were excluded entirely. For example, areas that are greater than 300 feet away from wetlands are more favorable than areas close to wetlands, as wetlands are environmentally sensitive areas. Areas greater than 300 feet from wetlands are assigned a value of “2” and areas close to wetlands are assigned “1.”

The GIS analysis initially identified more than 650 polygons that represent favorable areas for further consideration as potential repository sites (Figure 2). From this, three preferred potential repository sites were selected and are referred to collectively as the short list. Additionally, two alternate potential repository sites were selected and will be further evaluated in the event that one or more short-list sites are eliminated from consideration during the 2006 field evaluation.

## **2.1 CRITERIA USED TO DETERMINE REPOSITORY SITES**

The following criteria were included in an ordinal spatial analysis of the Standard Mine/Mt. Emmons area to determine favorable locations for repository sites:

### **Topography**

Areas within the Mount Emmons areas where slope was greater than 20% were excluded.

### **Size**

Areas less than two acres were not considered, as they would be too small to accommodate all tailings from the Standard Mine site. GIS analysis yielded more than 650 individual favorability polygons. Because of the abundance of more favorable sites, a single repository location is logistically the simplest.

### **Aesthetics**

Although not quantifiable within a GIS, aesthetics will be considered during field analysis of the short list.

### **Bedrock Geology**

Areas with alluvial, colluvial, and mineralized geologic units were excluded from the survey. Glacial deposits, the Wasatch, the Ohio Creek, and the Mesa Verde Formations were considered less favorable because they all contain physically stable, yet porous lithologies. The regionally outcropping granodiorite and quartz monzonite units were considered most favorable. These plutonic rocks are generally less fractured and contain hard, more chemically stable mineral suites that are most conducive

to a stable repository.

### **Hydrology and Hydrogeology**

Areas within 300 feet of known watercourses were excluded. This includes springs, discharging mine adits, streams, and rivers. Although limited data exist to determine hydrogeologic conditions, regional studies suggest that large fracture sets are hydrologically conductive, and may be the most important component to the groundwater hydrologic system in the area (Wanty, R. B. *et al* 2003). Therefore all areas within 300 feet of mapped structures were considered to be “less favorable” because they are considered conduits for groundwater in the region.

### **Cultural Features**

Areas within 300 feet of mine structures such as adits, shafts, and prospects were excluded.

### **Vegetation**

Areas where bedrock is exposed were considered to be most favorable and least invasive in terms of native vegetation in the region. Meadowlands were considered favorable, as the need to remove trees and large organic debris is not present. Wooded areas were considered to be less favorable as these areas would be difficult to clear of large trees. Potential wetland vegetation was considered least favorable because of the sensitive nature of wetland systems.

### **Transportation**

Distances to the repository sites were calculated from level 1 where the majority of the mine tailings are located.

### **3.0 THE SHORT LIST – POTENTIAL REPOSITORY SITE LOCATIONS**

As previously mentioned, the short list contains three areas considered most favorable. The three areas are defined as areas 69, 99, and 361 (Figure 3). These three areas were placed on the short list due mainly to their proximity to Level 1 and the other following criteria.

#### **3.1 AREA 69, LOCATED IN THE NORTH CENTRAL PORTION OF ELK BASIN**

**Favorable Criteria:**

- Slope is less than 20%.
- Bedrock geology is the moderately favorable Ohio Creek formation.
- Is in an alpine meadow area with: little vegetation to be removed and no sensitive vegetation detected.
- Farther than 300 feet from any surface water.
- Farther than 300 feet from any mapped geologic structures.
- Is within two miles of existing mine roads (actual distance from nearest established mine road: approximately 790 feet).
- Greater than two acres in size (actual area: 3.20 acres).
- Does not exist within or near existing patented and unpatented mine claims.

**Detrimental Criteria:**

- Has soil and is not directly on outcropping bedrock.
- Is not composed of plutonic rocks.

#### **3.2 AREA 99, LOCATED SOUTH OF STANDARD MINE IN ELK BASIN**

**Favorable Criteria:**

- Slope is less than 20%.
- Bedrock geology is most favorable granodiorite.
- In moderately favorable wooded to meadow area.



- Farther than 300 feet from any surface water.
- Farther than 300 feet from any mapped geologic structures.
- Is within two miles of existing mine roads (actual distance from nearest established mine road: less than 328 feet).
- Greater than two acres in size (actual area: 11.95 acres).
- Does not exist within or near existing patented or unpatented mine claims.

**Detrimental Criteria:**

- Portions of the area may contain as many as three landslide scarps (U.S. Geological Survey (USGS) 1967): potential for future instability.

**3.3 AREA 361, SOUTHWEST OF STANDARD MINE**

**Favorable Criteria:**

- Slope is less than 20%.
- Bedrock geology is most favorable granodiorite.
- Is in a moderately favorable wooded area.
- Farther than 300 feet from any surface water.
- Farther than 300 feet from any mapped geologic structures.
- Greater than two acres in size (actual area: 113 acres) the entire area, or portions of this area may be used.
- Does not exist within or near existing patented or unpatented mine claims.

**Detrimental Criteria:**

- Most of this large area is more than two miles from Level 1 along existing mine roads.
- Roads may not exist within the area itself.
- Area is heavily wooded with climax stage vegetation (large trees).

#### **4.0 ALTERNATE POTENTIAL REPOSITORY SITE LOCATIONS**

Alternate potential repository site locations were evaluated using the same criteria as the short list; however, these locations are listed as alternates primarily because of their proximity to existing roads, and other detrimental criteria as listed below (Figure 3).

##### **4.1 AREA 245, SOUTH OF STANDARD MINE, AND EAST OF ELK CREEK**

**Favorable Criteria:**

- Slope is less than 20%.
- Bedrock geology is most favorable granodiorite.
- Is in a moderately favorable wooded area.
- Farther than 300 feet from any surface water.
- Farther than 300 feet from any mapped geologic structures.
- Greater than two acres in size (actual area: 6.61 acres) the entire area, or portions of this area may be used.
- Does not exist within or near existing patented and unpatented mine claims.

**Detrimental Criteria:**

- Most of this area is more than 1.5 miles from Level 1 along existing mine roads.
- Roads may not exist within the area itself.
- Area is heavily wooded with climax stage vegetation (large trees).

##### **4.2 AREA 225, SOUTH OF STANDARD MINE, AND WEST OF ELK CREEK**

**Favorable Criteria:**

- Slope is less than 20%.
- Bedrock geology is moderately favorable glacial deposits.
- Is in a moderately favorable wooded area.
- Farther than 300 feet from any surface water.

- Farther than 300 feet from any mapped geologic structures.
- Greater than two acres in size (actual area: 6.76 acres) the entire area, or portions of this area may be used.
- Does not exist within or near existing patented or unpatented mine claims.

**Detrimental Criteria:**

- Most of this area is more than one mile from Level 1 along existing mine roads.
- Roads may not exist within the area itself.
- Area is heavily wooded with climax stage vegetation (large trees).

## 5.0 LIST OF REFERENCES

U.S. Geological Survey (USGS). 1967. Geologic Map of the Ob-Be-Joyful Quadrangle, Gunnison, County, Colorado. U.S. Geological Survey Map GQ-578 by D. L. Gaskill, L. H. Godwin, and F. E. Mutschler.

URS Operating Services, Inc. (UOS) 2006. Sampling Activities Report. March 20, 2006.

Wanty, R. B., B. R. Berger, B. A. Kimball, P. L. Verplanck, and M. L. Tuttle (Wanty, R. B. *et al*). 2003. Delineation of environmental tracts in mineralized areas using geologic criteria: Proceedings of the 4th European Conference on Regional Geoscientific Cartography, Bologna, Italy.







**Legend**

**Favorability**

- Less Favorable
- Favorable
- Most Favorable

1000ft Distances

Tailings Areas

0 500 1,000 Feet



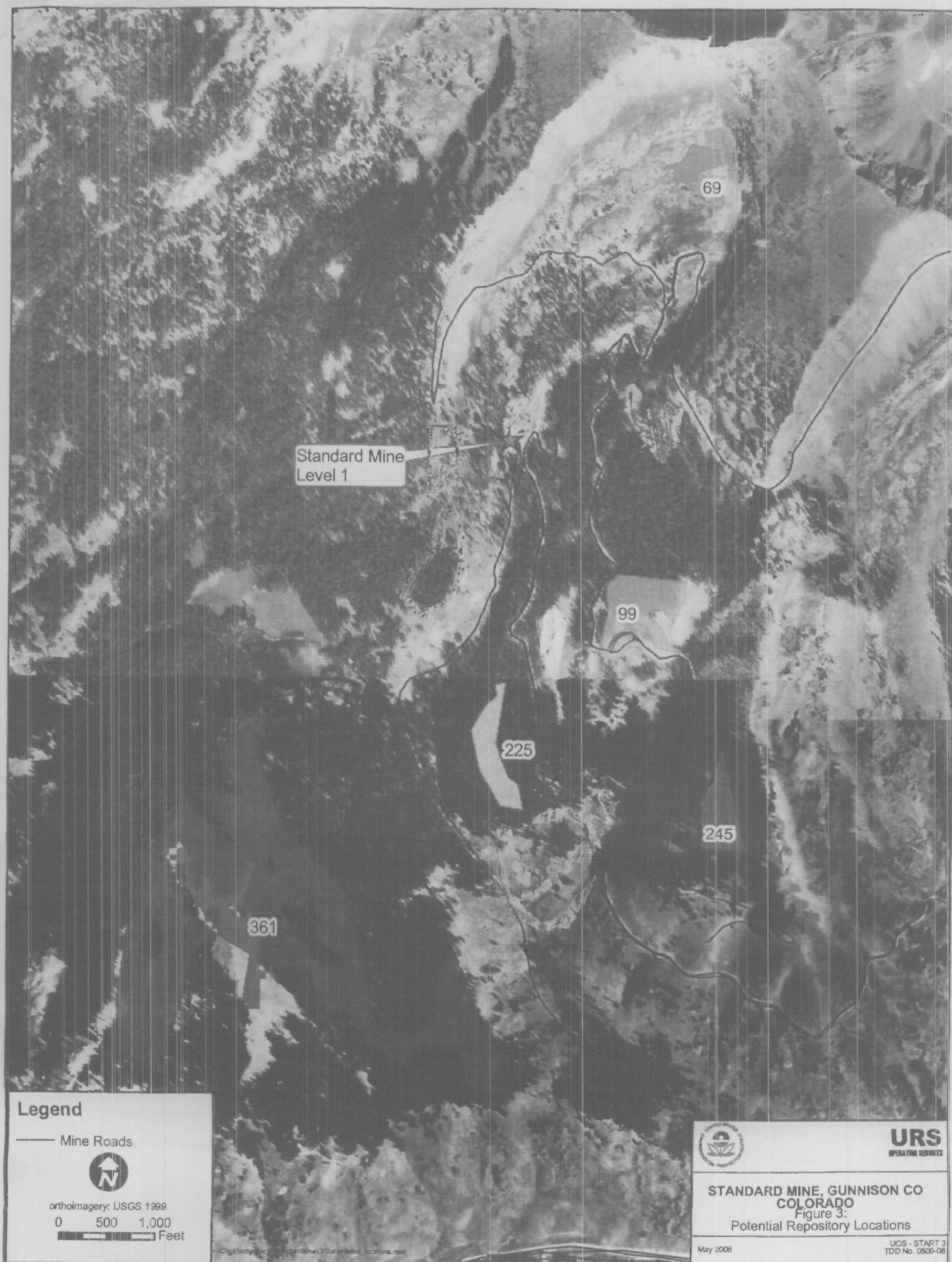
**URS**  
OPERATING SERVICES

**Standard Mine  
GUNNISON, CO**

Figure 2: Potential Repository Locations

May 2006

UOS - START3  
TUD No. U509-06



**Appendix B**  
**Standard Mine Wetland, Other Features, And Threatened And Endangered Species**  
**Assessment**



**Appendix B**  
**Standard Mine Wetland, Other Features, And TES Assessment**

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Photo 1—Wetland 1-1, one of two small channels within the wetland; looking down to Level 1



Photo 2—Wetland 1-1, seep/spring area



Photo 3—Wetland 1-2; Elk Creek, just above Level 1



Photo 4—Wetland 1-2 along Elk Creek at Level 1



Photo 5—Wetland 1-3, seep above Elk Creek at Level 1



Photo 6—Wetland 1-3; confluence of seep and Elk Creek, adjacent to tailings pond at Level 1





Photo 7—Wetland 2-1, small seep just below road near Level 2



Photo 8—Wetland 98-1, small pond and seep along tributary to Elk Creek



Photo 9—Wetland 98-1 along tributary to Elk Creek



Photo 10—Wetland 98-1, small wetland from ponding of water on waste rock



Photo 11—Wetland 98-1 below waste rock piles



Photo 12—Wetland 5-1, below access road



Photo 13—Level 5 Adit

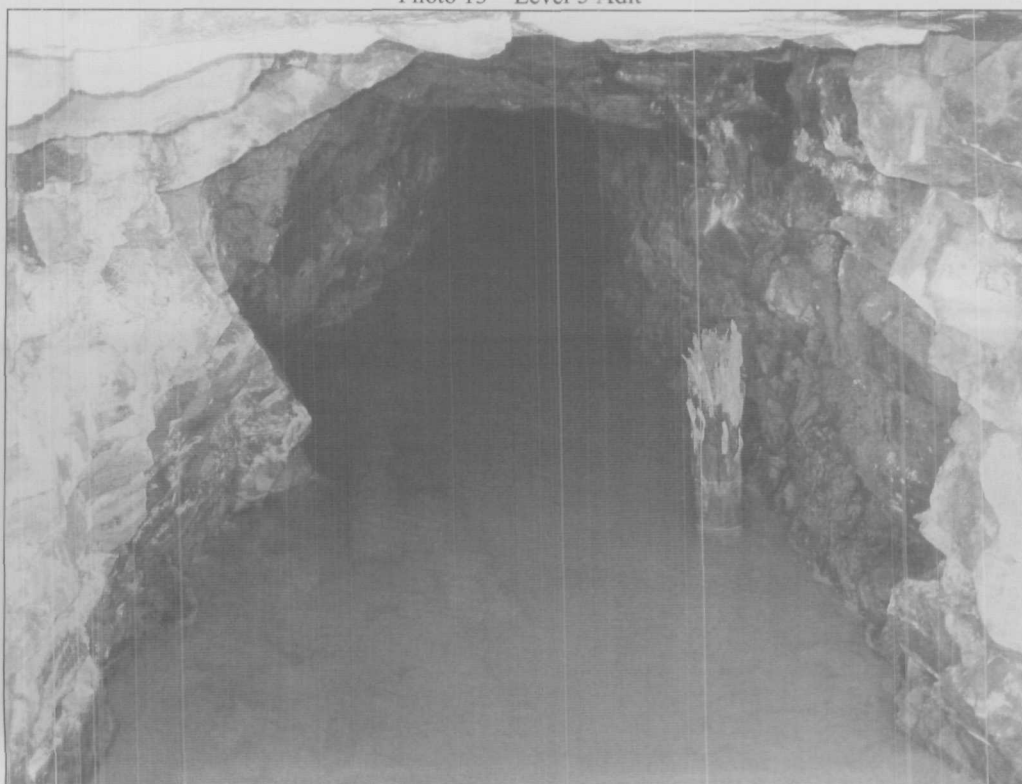


Photo 14—Level 5 Adit





Photo 15—Area 99, looking northeast



Photo 16—Area 99, topographic swale at base of rock outcrop



Photo 17—Area 99, forested ridge with old growth



Photo 18—Area 225, dense forest with large amounts of downfall



Photo 19—Area 225, vernal pool (notice water marks on trees)



Photo 20—Area 225, water marks on trees at vernal pool





Photo 21—Area 245, open area surrounded by relatively young forest



Photo 22—USFS Site 1, looking east at open area



Photo 23—USFS Site 2, denser forest in lower area



Photo 24—USFS Site 2, open perimeter area

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Appendix B—Routine Wetland Determination Forms

The purpose of this report is to describe the biological resources in and around the Standard Mine site that may be impacted by project activities. The report only includes information on wetlands, other water features, and threatened and endangered species (TES). Documenting and understanding these resources should allow the project team to avoid and minimize adverse impacts to the maximum extent practicable.

## **1.1 PROJECT DESCRIPTION**

The Standard Mine is an inactive underground hard rock mine located approximately 10 miles west of Crested Butte, Colorado in the Ruby Range of the Gunnison National Forest (Figure 1). The site is located on several patented mining claims and U.S. Forest Service (USFS) land. Historical mining began at the site in about 1874 and continued intermittently through 1966. During this time, lead, zinc, silver, and gold were mined and processed at the site.

The mine consists of numerous open adits and shafts, and approximately 8,400 feet of underground mine workings on seven levels. Some of these shafts are filled with water, and groundwater discharges from some of the adits at seasonally variable rates.

The mine is located within the Elk Creek watershed and some of the mine facilities and waste materials are located adjacent to the creek. Elk Creek flows into Coal Creek, which serves as a drinking water supply for the Town of Crested Butte, 4 miles downstream from the Standard Mine. Contaminants of concern associated with the former mine operations are metals, including cadmium, zinc, lead, and copper. The concentrations of these metals at the site are above background levels and are also elevated at the Coal Creek drinking water intake.

The U.S. Environmental Protection Agency (EPA) has concluded the construction of an on-site repository to consolidate and contain the mine waste would be an effective means to minimize future environmental impacts from the waste rock piles and tailing impoundment.

## **1.2 SITE DESCRIPTION**

The Standard Mine site is situated between 10,900 and 11,600 feet above mean sea level, and is contained within the Southern Rocky Mountain Sedimentary Subalpine Forest Ecoregion (Chapman et al. 2006). It is generally dominated by subalpine forest with openings containing wetlands, waterways, rock outcrops, and areas disturbed by mining activities. The upper reaches of the site are in the Alpine Ecoregion and are dominated by relatively low growing herbaceous and woody plants.

As mentioned above, the Standard Mine site contains seven levels including (in order from lowest to highest elevation) 1, 2, 3, 4, 98, 5, and 99 (Figure 2). Level 1 contains the largest disturbance area and includes a tailings pond and several buildings. The other levels contain various waste rock piles, small structures, mine shafts, and adits.

The overall project area also includes six potential waste repository/borrow locations. These include Area 99, Area 225, Area 245, USFS Site 1, USFS Site 2, and a site at Level 2 of the mine (Figure 3). Area 99 and USFS Site 1 are likely only to be used as borrow sites, whereas one or more of the other sites may be used for long-term storage of waste material removed from the mine site.



In addition, this report contains a brief discussion of the ecologically unique Mt. Emmons Iron Fen. The fen is located approximately 2 miles southeast of Level 1 of the Standard Mine and approximately 0.3 mile south (downgradient) from the Standard Mine main access road (see Figure 1).

### **1.3 WETLANDS AND OTHER WATER FEATURES**

Wetlands are important biological resources that perform many functions including groundwater recharge, flood flow attenuation, erosion control, and water quality improvement. They also provide habitat for multiple plants and animals, including special status species. They are defined by the U.S. Army Corps of Engineers (Corps) and EPA based on the presence of wetland vegetation, wetland hydrology, and hydric soils.

Water bodies or "other water features" include any feature that contains open water or, in the absence of open water, has a defined bed and banks, evidence of scour, and less than 50 percent vegetation cover within the bed.

### **1.4 THREATENED AND ENDANGERED SPECIES**

For the purposes of this project, TES are defined as those species listed as endangered, threatened, candidate, special concern, sensitive, rare, or imperiled by the U.S. Fish and Wildlife Service (USFWS), Colorado Division of Wildlife (CDOW), USFS, or Colorado Natural Heritage Program (CNHP).

The methods employed for identifying and reporting on wetlands and TES are described in the following sections.

## **2.1 WETLANDS AND OTHER WATER FEATURES**

### **2.1.1 Field Survey Methods**

Wetland areas were delineated within the 26 acre study area shown on Figure 4, including Standard Mine Levels 1, 2, 3, 4, 98, and 5. These areas were field surveyed on July 10, 11, and 12, 2006, by driving and/or walking the area. All wetland areas identified were delineated using the protocol outlined in the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). Information recorded for each wetland area included:

- Dominant wetland vegetation (if greater than 5 percent of the vegetative community)
- Other vegetation (less than 5 percent of the vegetative community)
- Perimeter vegetation
- Noxious weeds
- Wetland community classification, based on Cowardin et al. (1979)
- Hydrological indicators
- Soil characteristics (upland and wetland)
- Physical and biological characteristics of other water features
- Wildlife observed
- Photographs (Appendix A)

Wetlands and other water features in the study area were assigned a unique identification (ID) number. In many cases a wetland with one ID number may have consisted of a complex of small wetlands with similar vegetation and source of hydrology. Generally, the ID numbers for all features are based on the ID numbers used for the different levels of the mine. For example, wetlands at Level 1 would be named Wetland 1-1, Wetland 1-2, etc. Field data forms filled out for each wetland area can be found in Appendix B.

Perennial, intermittent, and ephemeral streams were identified by the presence of a defined bed and bank, evidence of scour, and less than 50 percent vegetative cover. Information recorded for these features included morphology, bank and substrate characteristics, water flow and clarity, and biological characteristics. Biological characteristics included percent cover, adjacent vegetation and overstory, presence of large woody debris, and observance of fish, invertebrates, or other wildlife.

### **2.1.2 Wetland Classification**

During field surveys, wetlands were classified using the Cowardin et al. (1979) and the hydrogeomorphic (HGM) wetland systems (Smith et al. 1995). All of the wetlands in the study area were classified according to Cowardin et al. (1979) as palustrine emergent (PEM). PEM wetlands are defined as those wetlands that are 100 percent dominated by erect, rooted, herbaceous plants. At the elevation of the study area, PEM wetlands are commonly dominated by sedges (*Carex* spp.), rushes (*Juncus* spp.), and various forbs.

The HGM system (Smith et al. 1995) classifies the wetlands in the study area as either slope or riverine. Slope wetlands are located on a topographic slope and receive most of their water from groundwater discharge. Riverine wetlands are associated with a stream channel, floodplain, or terrace and get most of their water from an intermittent, ephemeral, or perennial waterway.

### **2.1.3 Mapping**

Wetlands and other water features were recorded in the field using a global positioning system (GPS) unit accurate to less than 1 meter. A Geographic Information System (GIS) was used to create maps from the field maps and GPS data. Map shapefiles showing wetland and other water features boundaries were created using GIS, and acreages were calculated based on the field maps.

### **2.1.4 Wetland Functional Assessment**

To assist in evaluating the functions of wetlands within the study area, a modified version of the Montana Department of Transportation Wetland Functional Assessment Method (Berglund 1999) was used to determine the high-rated functions of the wetlands within the study area. This method was used because it is efficient and concise, and is generally relevant to the region.

The Montana Method evaluates wetlands based on 10 ecological functions, including:

- Federal TES habitat
- State TES habitat (USFS and CNHP listed species habitat has been included)
- General wildlife habitat
- General fish habitat
- Flood attenuation
- Short- and long-term surface water storage
- Sediment/nutrient/toxicant removal and retention
- Sediment/shoreline stabilization
- Production export/food chain support
- Groundwater discharge/recharge

## **2.2 THREATENED AND ENDANGERED SPECIES EVALUATION**

The study area for the TES evaluation generally includes a 1,000-foot buffer around proposed and existing project facilities. Information on the biology, distribution, and listing history of each TES was obtained from USFWS Federal Register documents; the USFWS, USFS, CDOW, and National Diversity Information Source (NDIS) webpages (USFWS 2006, USFS 2006a, CDOW 2006, NDIS 2006); the CNHP database; various field guides; and communication with field experts at USFS (USFS 2006b).

The study area was reviewed using aerial photographs and topography maps prior to conducting a field survey. Most of the study area (including the mine site, repositories, and borrow areas) was walked and/or driven on June 23 and July 10, 11, 12, and 31, 2006, to identify potential TES

## **SECTION TWO**

### **Methods**

---

habitat. Information regarding dominant vegetation (including the general mapping of vegetation communities), the presence and condition of aquatic habitats, and the presence of wildlife species was recorded. Photographs of habitat types were also taken and representative photos are included in Appendix A.

## SECTION THREE

## Results

The following sections describe the wetlands, other water features, and TES found in the study area, and the repository/borrow areas briefly discussed in Section 1.2 Site Description.

### 3.1 WETLANDS

Wetlands were identified at Levels 1, 2, 98, and 5 (from lowest to highest elevation), and encompass a total of 1.04 acres. The wetlands are listed in Table 1 by location and shown in Figure 4. A summary of each of the wetlands is provided in the following text. More details on each site can be found on the data forms in Appendix B.

Table 1  
Wetlands in the Study Area

Wetland	Size (acres)	Classification <sup>1</sup>	Photo Number (Appendix A)	Notes
<b>Level 1</b>				
1-1	0.45	PEM, Slope	1, 2	Hillside seep/spring; contains multiple parts
1-2	0.01	PEM, Riverine	3, 4	Elk Creek fringe; contains multiple parts
1-3	0.04	PEM, Slope	5, 6	Hillside seep/spring; contains multiple parts
<b>Level 2</b>				
2-1	0.02	PEM, Slope	7	Hillside seep
<b>Level 98</b>				
98-1	0.19	PEM, Slope, Depression, and Riverine	8-11	Hillside seeps and Elk Creek tributary fringe wetlands; contains multiple parts
<b>Level 5</b>				
5-1	0.33	PEM, Slope	12	Hillside seeps; contains multiple parts
<b>Total</b>	<b>1.04</b>			

<sup>1</sup>Classification from Cowardin et al. 1979 and Smith et al. 1995

#### 3.1.1 Level 1 Wetlands

##### Wetland 1-1

Size: 0.45 acre

Classification: PEM, Slope

Primary Functions: Wildlife habitat, production export/food chain support, short- and long-term surface water storage, groundwater discharge

General Description: Hillside seep/spring adjacent to Level 1

Wetland 1-1 is the largest wetland in the study area and encompasses 0.45 acre. It is located between the main mine facility and a mining road at Level 1 (Figure 4). It is classified as a PEM slope wetland and is dominated by marsh marigold (*Caltha leptosepala*), brook saxifrage (*Saxifraga odontoloma*), Sierra fumewort (*Corydalis caseana*), arrowleaf ragwort (*Senecio triangularis*), Fendler's cowbane (*Oxypolis fendleri*), and heartleaf bittercress (*Cardamine cordifolia*), with numerous small pockets of diamondleaf willow (*Salix planifolia*). A list of the most commonly observed plant species in the wetland is provided in Table 2 and a list of those plant species observed along the perimeter of the wetland is provided in Table 3.

The wetland hydrology for the site is provided primarily by groundwater discharge. The wetland contains several small springs that converge into two small channels (Photo 1, Appendix A). These channels discharge along the western edge of the wetland. Most of the site was saturated to the surface, with some areas inundated with up to 4 inches of water.

The soil at Wetland 1-1 is hydric and consists of a silty loam down to 14 inches. The soil has a chroma of 1 (very dark color) (Kollmorgen Instruments, Inc. 1994), indicating reducing conditions. More information on the soils can be found on the data forms in Appendix B.

The primary ecological functions provided by Wetland 1-1 include wildlife habitat, production export/food chain support, short- and long-term surface water storage, and groundwater discharge. These functions are a result of the overall size of the wetland combined with the presence of a perennial water source (seeps and springs). The site discharges a substantial amount of groundwater directly to Elk Creek (via two somewhat restricted outlets), moving nutrients from the terrestrial environment to the aquatic system. The size of the wetland and the restricted outlets result in both short- and long-term storage of groundwater.

**Table 2**  
**Observed Wetland Vegetation**

Common Name	Scientific Name <sup>1</sup>	Indicator Status <sup>2</sup>	Wetland Location and ID					
			Level 1			Level 2	Level 98	Level 5
			1-1	1-2	1-3	2-1	98-1	5-1
Narcissus anemone	<i>Anemone narcissiflora</i>	NL	X				X	
Blue-joint grass	<i>Calamagrostis canadensis</i>	OBL					X	X
White marsh marigold	<i>Caltha leptosepala</i>	OBL	X	X	X	X	X	X
Heartleaf bittercress	<i>Cardamine cordifolia</i>	FACW+	X	X		X	X	
Water sedge	<i>Carex aquatilis</i>	OBL	X	X			X	X
Northern bog sedge	<i>Carex gynocrates (C. dioica)</i>	OBL					X	X
Beaked sedge	<i>Carex rostrata (C. utriculata)</i>	OBL		X	X			X
Splitleaf Indian paintbrush (Rosy paintbrush)	<i>Castilleja rhexiifolia</i>	FACU	X		X			
Sierra fumewort	<i>Corydalis caseana</i>	FACW	X					
Subalpine larkspur	<i>Delphinium barbeyi</i>	FAC	X					
Tufted hairgrass	<i>Deschampsia caespitosa</i>	FACW	X	X	X	X	X	X
Spikerush	<i>Eleocharis sp.</i>	NA					X	

# SECTION THREE

## Results

Common Name	Scientific Name <sup>1</sup>	Indicator Status <sup>2</sup>	Wetland Location and ID					
			Level 1			Level 2	Level 98	Level 5
			1-1	1-2	1-3	2-1	98-1	5-1
Pirnpernel willowherb	<i>Epilobium anagallidifolium</i>	FACW	X			X	X	
Rocky Mountain fringed gentian	<i>Gentianopsis thermalis</i>	OBL					X	
Drummond's rush	<i>Juncus drummondii</i>	FACW*	X	X			X	X
Porter's licorice root	<i>Ligusticum porteri</i>	FACU-	X					
Northern green orchid	<i>Limnorchis aquilonis (L. hyperborean)</i>	NL			X			
Small-flowered woodrush	<i>Luzula parviflora</i>	FAC	X					
Tall fringed bluebells	<i>Mertensia ciliata</i>	OBL	X		X	X		
Seep monkeyflower	<i>Mimulus guttatus</i>	OBL	X		X			
Fendler's cowbane	<i>Oxypolis fendleri</i>	OBL	X	X	X	X	X	
Elephanthead lousewort	<i>Pedicularis groenlandica</i>	OBL	X	X	X		X	X
Penstemon	<i>Penstemon sp.</i>	NA					X	
Buttercup	<i>Ranunculus sp.</i>	NA					X	
Redpod stonecrop	<i>Rhodiola rhodantha</i>	FACW+	X					
Park willow	<i>Salix monticola</i>	OBL					X	X
Diamondleaf willow	<i>Salix planifolia</i>	OBL	X		X		X	
Brook saxifrage	<i>Saxifraga odontoloma</i>	FACW+	X		X	X		
Oregon saxifrage	<i>Saxifraga oregana</i>	OBL					X	
Arrowleaf ragwort	<i>Senecio triangularis</i>	OBL	X	X	X	X	X	X
Felwort (Star gentian)	<i>Swertia perennis</i>	FACW-					X	
Mountain death camas	<i>Zigadenus elegans</i>	FACU		X			X	

<sup>1</sup>Plant nomenclature follows NRCS 2006

<sup>2</sup>Indicator status is based on national indicators for Region 8 developed by Reed (1988). OBL = obligate wetland species, >99% probability of occurring in a wetland; FACW = facultative wetland species, 67-99% probability of occurring in a wetland; FAC = facultative species, 34-66% probability of occurring in a wetland; FACU = facultative upland species, <33% probability of occurring in a wetland. If the species is not included in Reed (1988), then the designation NL, Not Listed, is shown. If insufficient data were available to determine the indicator status of a species, then NI, No Indicator, is shown. If the plant is listed as not occurring in the region, NO, no occurrence is shown. A positive (+) indicates a frequency of occurrence toward the higher end of the category (more frequently found in wetlands) and a negative (-) indicates a frequency of occurrence toward the lower end of the category (less frequently found in wetlands). If an asterisk (\*) follows the indicator, it identifies a tentative assignment, based on limited information. NA, not available, is shown for those plants not identified to the species level.

# SECTION THREE

## Results

**Table 3**  
**Observed Wetland Perimeter Vegetation**

Common Name	Scientific Name <sup>1</sup>	Indicator Status <sup>2</sup>	Wetland ID					
			Level 1			Level 2	Level 98	Level 5
			1-1	1-2	1-3	2-1	98-1	5-1
Alpine avens	<i>Acomastylis rossii</i>	NO	X	X			X	X
Wild chives	<i>Allium schoenoprasum</i>	FACW				X		
Pygmy flower rockjasmine	<i>Androsace septentrionalis</i>	NO	X				X	
Pussytoes	<i>Antennaria</i> sp.	NA					X	
Colorado blue columbine	<i>Aquilegia coerulea</i>	NO			X		X	
Western red columbine	<i>Aquilegia elegantula</i>	NL			X			
Heartleaf arnica	<i>Arnica cordifolia</i>	NL	X					
Rockcress	<i>Boechera drummondii</i>	FACU	X					
Blue-joint grass	<i>Calamagrostis canadensis</i>	OBL			X	X		
Dunhead sedge	<i>Carex phaeocephala</i>	NO	X				X	X
Sulphur paintbrush	<i>Castilleja occidentalis</i>	NO	X				X	
Spittleleaf Indian paintbrush (Rosy paintbrush)	<i>Castilleja rhexiifolia</i>	FACU					X	
Dwarf fireweed	<i>Chamerion subdentatum</i>	NO			X	X		
Sierra fumewort	<i>Corydalis caseana</i>	FACW	X					
Larkspur	<i>Delphinium</i> sp.	NA	X					
Tufted hairgrass	<i>Deschampsia cespitosa</i>	FACW	X		X	X		X
Yellow avalanche-lily	<i>Erythronium grandiflorum</i>	FACU	X	X	X	X	X	X
Virginia strawberry	<i>Fragaria virginiana</i>	FACU	X				X	X
Richardson's geranium	<i>Geranium richardsonii</i>	NO	X		X			
Drummond's rush	<i>Juncus drummondii</i>	FACW*	X					X
Porter's licorice root	<i>Ligusticum porteri</i>	FACU-	X					
Wild honeysuckle	<i>Lonicera involucrata</i>	NO	X		X			
Small-flowered woodrush	<i>Luzula parviflora</i>	FAC	X		X		X	
Spiked woodrush	<i>Luzula spicata</i>	FACU					X	X
Tall fringed bluebells	<i>Mertensia ciliata</i>	OBL	X				X	X
Five-stamened mitrewort	<i>Mitella pentandra</i>	NO	X					
Sickle-top lousewort	<i>Pedicularis racemosa</i>	NL	X		X	X		X
Whipple's penstemon	<i>Penstemon whippleanus</i>	NO					X	
Alpine timothy	<i>Phleum alpinum</i>	NO	X				X	X
Engelmann spruce	<i>Picea engelmannii</i>	NO	X	X	X	X	X	X
Muttongrass	<i>Poa fendleriana</i>	UPL					X	X
Jacob's ladder	<i>Polemonium pulcherrimum</i>	NL	X		X	X	X	X



# SECTION THREE

## Results

Common Name	Scientific Name <sup>1</sup>	Indicator Status <sup>2</sup>	Wetland ID					
			Level 1			Level 2	Level 98	Level 5
			1-1	1-2	1-3	2-1	98-1	5-1
American bistort	<i>Polygonum bistortoides</i>	FAC*			X		X	X
Douglas fir	<i>Pseudotsuga menziesii</i>	NO	X	X	X	X		
Ledge stonecrop (King's crown)	<i>Rhodiola integrifolia</i>	NL	X				X	X
Redpod stonecrop (Queen's crown)	<i>Rhodiola rhodantha</i>	FACW+			X		X	
Gooseberry currant	<i>Ribes montigenum</i>	NL	X		X	X	X	X
Red elderberry	<i>Sambucus microbotrys</i>	NO	X					
Ragwort	<i>Senecio</i> sp.	NA	X	X			X	
Dandelion	<i>Taraxacum officinale</i>	FACU	X				X	
Whortleberry	<i>Vaccinium myrtillus</i>	NO			X		X	X
False hellebore	<i>Veratrum tenuipetalum</i>	NL					X	
Hookedspur violet	<i>Viola adunca</i>	FAC	X	X			X	X

<sup>1</sup>Plant nomenclature follows NRCS 2006

<sup>2</sup>Indicator status is based on national indicators for Region 8 developed by Reed (1988). OBL = obligate wetland species, >99% probability of occurring in a wetland; FACW = facultative wetland species, 67-99% probability of occurring in a wetland; FAC = facultative species, 34-66% probability of occurring in a wetland; FACU = facultative upland species, <33% probability of occurring in a wetland. If the species is not included in Reed (1988), then the designation NL, Not Listed, is shown. If insufficient data were available to determine the indicator status of a species, then NI, No Indicator, is shown. If the plant is listed as not occurring in the region, NO, no occurrence is shown. A positive (+) indicates a frequency of occurrence toward the higher end of the category (more frequently found in wetlands) and a negative (-) indicates a frequency of occurrence toward the lower end of the category (less frequently found in wetlands). If an asterisk (\*) follows the indicator, it identifies a tentative assignment, based on limited information. NA, not available, is shown for those plants not identified to the species level.

### Wetland 1-2

Size: 0.01 acre

Classification: PEM, Riverine

Primary Functions: Sediment/nutrient/toxicant removal and retention

General Description: Numerous small fringe wetlands along Elk Creek, above the tailings pond at Level 1

Wetland 1-2 consists of numerous very small pockets of wetlands immediately adjacent to Elk Creek at Level 1 (Figure 4). The sum of all the wetland parts encompasses approximately 0.01 acre. The wetland is classified as a PEM riverine and is dominated by water sedge, tufted hairgrass, heartleaf bittercress, Drummond's rush, beaked sedge, and Fendler's cowbane. See Tables 2 and 3 for a list of the most commonly observed plant species in and around the wetland.

The wetland hydrology for Wetland 1-2 is provided primarily through capillary action and overbank flooding associated with Elk Creek (Photo 4, Appendix A). Some sheet flow from snowmelt and other precipitation runoff may supplement the hydrology. Most of the site was saturated to the surface, with some areas inundated with up to 4 inches of water.

The soil at Wetland 1-2 was assumed to be hydric due to the distinct wetland boundary, presence of hydrophytic vegetation, and wetland hydrology indicators.

The primary ecological function provided by Wetland 1-2 is sediment/nutrient/toxicant removal and retention. Since this wetland is overall very small and divided into numerous parts, it is not as functional as some of the other wetlands in the study area. As a result of its proximity to Elk Creek and the presence of relatively dense vegetation, it does provide limited water quality improvement by capturing and retaining sediments and toxicants.

**Wetland 1-3**

**Size:** 0.04 acre

**Classification:** PEM, Slope

**Primary Functions:** Wildlife habitat, groundwater discharge

**General description:** Hillside seep/spring immediately adjacent to Elk Creek at Level 1

Wetland 1-3 is a hillside seep/spring situated at the confluence of Elk Creek and a small tributary immediately west of the tailings pond at Level 1 (Figure 4). The wetland encompasses approximately 0.04 acre and is classified as a PEM slope wetland. The site is dominated by marsh marigold, Fendler's cowbane, brook saxifrage, tufted hairgrass, and beaked sedge. Refer to Tables 2 and 3 for a list of the most commonly observed plant species in and around the wetland.

The wetland hydrology for Wetland 1-3 is provided by groundwater discharge and is likely supplemented by sheetflow during snowmelt and overbank flooding from Elk Creek (Photo 6, Appendix A). Most of the site was saturated to the surface, with some areas inundated with up to 2 inches of water. The soil at Wetland 1-3 was assumed to be hydric due to the distinct wetland boundary, presence of hydrophytic vegetation, and wetland hydrology indicators.

The primary ecological functions provided by Wetland 1-3 include general wildlife habitat and groundwater discharge. These functions are a result of the combination of the presence of a perennial water source (Elk Creek and seep) and the discharge of groundwater. The wetland is also providing some limited production export/food chain support and surface water storage.

**3.1.2 Level 2 Wetland****Wetland 2-1**

**Size:** 0.02 acre

**Classification:** PEM, Slope

**Primary Function:** Groundwater discharge

**General Description:** Hillside seep immediately down gradient from a mining road near Level 2

Wetland 2-1 is a small hillside seep situated just below an existing mining road at Level 2 (Figure 4). The wetland encompasses approximately 0.02 acre and is classified as a PEM slope wetland. The site is dominated by arrowleaf ragwort and heartleaf bittercress, and is closely surrounded by Douglas fir and Englemann spruce (Photo 7, Appendix A). Refer to Tables 2 and 3 for a list of the most commonly observed plant species in and around the wetland.

The wetland hydrology for Wetland 2-1 is provided by groundwater discharge and snowmelt. Most of the site was saturated to the surface, with some areas inundated with up to 2 inches of

water. The soil is hydric and consists of a sandy clay down to 14 inches. The soil has a chroma of 1 (very dark color) (Kollmorgen Instruments 1994), indicating reducing conditions. The soil pit locations are shown on Figure 4 and more detailed information on the soils can be found on the data forms in Appendix B.

The primary ecological function provided by Wetland 2-1 is groundwater discharge. The wetland is very small and somewhat isolated. Based on its proximity to the mining road, it may provide a very limited amount of sediment removal during major storm events.

### **3.1.3 Level 98 Wetland**

#### ***Wetland 98-1***

**Size:** 0.19 acre

**Classification:** PEM, Slope, Riverine, Depression

**Primary Functions:** Wildlife habitat, sediment/nutrient/toxicant removal and retention, sediment/shoreline stabilization, short-term water storage, groundwater discharge

**General description:** Hillside seeps, small depression on waste rock, and Elk Creek tributary fringe wetlands at Level 98

Wetland 98-1 encompasses approximately 0.19 acre. It includes three main seeps (PEM, slope wetlands), several fringe wetlands along a tributary to Elk Creek (PEM, riverine wetlands), and one small PEM depression wetland that is the result of surface water collection on a waste rock pile (Figure 4). The dominant plant species include water sedge, marsh marigold, arrowleaf ragwort, blue-joint grass, and diamondleaf willow. Refer to Tables 2 and 3 for a list of the most commonly observed plant species in and around the wetland.

The wetland hydrology for Wetland 98-1 is provided by groundwater discharge, snowmelt, capillary action, and overbank flooding from the tributary to Elk Creek (Photo 9, Appendix A). Most of the site was saturated to the surface, with some areas inundated with up to 6 inches of water.

The soil at Wetland 98-1 is hydric and consists of a sandy clay loam down to 14 inches. The soil has a chroma of 1 (very dark color) (Kollmorgen Instruments 1994), indicating reducing conditions. The soil pit locations are shown on Figure 4 and more detailed information on the soils can be found on the data forms in Appendix B.

The most important ecological functions provided by Wetland 98-1 include wildlife habitat, sediment/nutrient/toxicant removal and retention, sediment/shoreline stabilization, short-term surface water storage, and groundwater discharge. These functions are the result of the presence of a perennial water source (seeps and tributary to Elk Creek, including two small ponds) and dense vegetation along the banks of a waterway (tributary to Elk Creek).

### **3.1.4 Level 5 Wetland**

#### **Wetland 5-1**

**Size:** 0.33 acre

**Classification:** PEM, Slope

**Primary Functions:** *Wildlife habitat, short- and long-term surface water storage, sediment/nutrient/toxicant removal and retention, groundwater discharge*

**General Description:** *Hillside seeps at Level 5*

Wetland 5-1 encompasses approximately 0.33 acre and is classified as a PEM slope wetland. The site includes three hillside seeps on both sides of the existing mining road at Level 5 (Figure 4). The dominant plant species include water sedge, tufted hairgrass, and beaked sedge. Tables 2 and 3 show the most commonly observed plant species in and around the wetland.

The wetland hydrology for Wetland 5-1 is provided by groundwater discharge and snowmelt. The lower two seeps are connected via flow under the mining road. Most of the site was saturated to the surface, with small areas inundated with up to 2 inches of water.

The soil at Wetland 5-1 is hydric and consists of a sandy clay loam down to 12 inches. The soil has a chroma of 1 (very dark color) (Kollmorgen Instruments 1994), indicating reducing conditions. The soil pit locations are shown on Figure 4 and more detailed information on the soils can be found on the data forms in Appendix B.

The primary ecological functions provided by Wetland 5-1 include wildlife habitat, short- and long-term surface water storage, sediment/nutrient/toxicant removal and retention, and groundwater discharge. These functions are the result of the overall size of the wetland, the presence of a perennial water source (groundwater discharge), and the presence of dense vegetation combined with the input of potentially contaminated water from the Level 5 adit (Photos 13 and 14, Appendix A).

### **3.2 OTHER WATER FEATURES**

Two other water features were identified in the study area, including Elk Creek at Level 1 and its tributary at Level 98 (Figure 4).

Elk Creek is a perennial creek that gets most of its water from snowpack and groundwater discharge from a relatively small watershed. The channel is relatively high-gradient and is comprised of mostly cobble and boulders. During the site visit the channel was 4 to 8 feet wide with water flowing 2 to 10 inches deep. The channel is diverted and heavily disturbed within Level 1.

The tributary to Elk Creek at Level 98 is one of at least three branches of Elk Creek that are present above the main mine site. This tributary bisects the largest seep at Level 98 and consists of a relatively high-gradient channel approximately 3 feet wide (Photo 9, Appendix A). The channel bottom is mostly cobble with some boulders, and water was flowing 6 to 8 inches deep during the field visit. The channel also includes two small ponds (Photo 8, Appendix A) that appear to have been created by mining activities (Figure 4).

## 3.3 THREATENED AND ENDANGERED SPECIES

Based on field evaluations, 51 of the nearly 100 TES species listed as possibly occurring in Gunnison County and the greater Gunnison National Forest have potential habitat in or near the study area. These include 12 bird, seven mammal, two amphibian, two invertebrate, and 28 plant species. Table 4 lists these species, their status, basic habitat requirements, and possibility of occurrence. Those species that have a high likelihood of occurrence (listed as "likely" or "possibly" occurring in Table 4) are discussed below by group. The species listed in Table 4 as "unlikely" to occur in the study area are not discussed further.

Table 4  
TES Occurrence in the Study Area

Common Name	Scientific Name	Status <sup>1</sup>				Habitat	Occurrence in Study Area
		USFWS	CDOW	USFS	CNHP		
Birds							
Northern goshawk	<i>Accipiter gentilis</i>			S		Mostly coniferous forest areas above 7,500 feet	Likely; suitable nesting and foraging habitat
Boreal owl	<i>Aegolius funereus</i>			S	S2	Mature spruce-fir or spruce-fir-lodgepole forest above 9,000 feet	Likely; suitable nesting and foraging habitat; known occurrences nearby
Northern harrier	<i>Circus cyaneus</i>			S		Grasslands, agricultural areas, and marshes	Unlikely; marginal nesting habitat; have been observed in nearby alpine areas foraging during migration
Olive-sided flycatcher	<i>Contopus borealis</i>			S		Mature spruce-fir on steep slopes or near cliffs from 7,000 to 11,000 feet	Possibly; suitable habitat
Black swift	<i>Cypseloides niger</i>			S	S3	Montane and lowland habitats with cliffs and waterfalls	Unlikely; no suitable habitat
Peregrine falcon	<i>Falco peregrinus</i>		SC	S	S2	Nests on cliffs and forages over coniferous and riparian forests	Possibly; no suitable nesting locations, but suitable foraging habitat
Bald eagle	<i>Haliaeetus leucocephalus</i>	T	E	T		Near large lakes, reservoirs, and major rivers in which there are adequate prey, perching areas, and nesting sites	Unlikely; very little suitable nesting or foraging habitat; none observed during field visit
White-tailed ptarmigan	<i>Lagopus leucurus</i>			S		Alpine tundra	Likely; suitable nesting and foraging habitat
Lewis' woodpecker	<i>Melanerpes lewis</i>			S	S4	Lowland and foothill riparian forests, agricultural areas, and urban areas	Unlikely; no suitable habitat
Flammulated owl	<i>Otus flammeolus</i>			S		Ponderosa pine/aspen habitats from 6,000 to 10,000 feet	Unlikely; marginal habitat; no ponderosa pine and very little aspen
Three-toed woodpecker	<i>Picoides tridactylus</i>			S		Primarily spruce-fir forests above 9,000 feet	Possibly; suitable habitat
Purple martin	<i>Progne subis</i>			S		Ponderosa pine/aspen habitats 8,000 to 9,000 feet	Unlikely; no suitable habitat
Mammals							

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# Results

Common Name	Scientific Name	Status <sup>1</sup>				Habitat	Occurrence in Study Area
		USFWS	CDOW	USFS	CNHP		
Townsend's big-eared bat	<i>Corynorhinus townsendii</i>		SC	S	S2	Variety of habitats, including montane and mixed forest to 9,500 feet. Inhabits caves, mines, and buildings.	Possibly; above elevational range, but suitable roosting sites (mine adits)
Wolverine	<i>Gulo gulo</i>		E	S	S1	Forests, marshy areas, and tundra	Possibly; suitable habitat present
Northern river otter	<i>Lutra canadensis</i>		E	S		Riparian areas desert to alpine	Unlikely; require ice-free reaches of streams in winter
Canada lynx	<i>Lynx canadensis</i>	T	E	T	S1	Coniferous forest with open areas; usually occur in areas with healthy snowshoe hare populations	Likely; suitable habitat present; documented occurrences nearby
American marten	<i>Martes americana</i>			S		Subalpine spruce/fir, lodgepole pine, and montane forests	Likely; suitable habitat present
Pygmy shrew	<i>Sorex hoyi montanus</i>			S	S2	Moist habitats in montane and subalpine forests	Likely; suitable habitat present
Dwarf shrew	<i>Sorex nanus</i>				S2	Moist habitats in montane and subalpine forests	Likely; suitable habitat present
<b>Amphibians</b>							
Boreal toad	<i>Bufo boreas</i>		E	S	S1	Subalpine wetlands, streams, and lakes	Likely; suitable habitat present
Northern leopard frog	<i>Rana pipiens</i>		SC	S		Wetlands and shallow ponds from 3,500 to 11,000 feet	Likely; suitable habitat present
<b>Invertebrates</b>							
Northern blue butterfly	<i>Lycaeides idas sublivens</i>				S2S3	Diverse habitats; known in Colorado only from San Juan Mountains	Unlikely; no known occurrences nearby
Hudsonian emerald dragonfly	<i>Somatochlora hudsonica</i>			S		Bogs, fens and ponds with boggy edges	Unlikely; no suitable habitat and no known occurrences nearby
<b>Plants</b>							
Dwarf hawksbeard	<i>Askillia nana</i>				S2	Steep alpine scree and talus	Unlikely; no suitable habitat
Park milkvetch	<i>Astragalus leptaleus</i>			S	S2	Wet meadows and among streamside willows	Possibly; suitable habitat present
Leadville milkvetch	<i>Astragalus molybdenus</i>			S	S2	Rocky slopes and hillsides above timberline	Possibly; suitable habitat present in upper portions of study area
Reflected moonwort	<i>Botrychium echo</i>				S3	Gravelly soil, rocky hillsides, grassy slopes, and meadows from 9,500 to 11,000 feet	Possibly; suitable habitat present
Leathery grape fern	<i>Botrychium multifidum</i>			S	S1	Moist, open, disturbed sites	Unlikely; limited suitable habitat, but no known occurrences in the area
Smooth northern rockcress	<i>Braya glabella</i>			S		Alpine, on dolomite or other calcareous substrates	Unlikely; no suitable habitat
Lesser panicled sedge	<i>Carex diandra</i>			S		Fens and wet meadows with peaty soil	Unlikely; no suitable habitat
Marsh cinquefoil	<i>Comarum palustre</i>				S1S2	Bogs and wet meadows up to subalpine; known only from two Colorado locations (one in Gunnison County)	Possibly; suitable habitat present
Slender rockbrake	<i>Cryptogramma stelleri</i>				S2	Sheltered calcareous cliffs	Unlikely; no suitable habitat
Thickleaf whitlow grass	<i>Draba crassa</i>				S3	Talus and boulder fields on the highest mountains	Unlikely; no suitable habitat

Common Name	Scientific Name	Status <sup>1</sup>				Habitat	Occurrence in Study Area
		USFWS	CDOW	USFS	CNHP		
Roundleaf sundew	<i>Drosera rotundifolia</i>			S	S2	Sphagnum mats in open acid fens and bogs	Unlikely; no suitable habitat
Colorado wild buckwheat	<i>Eriogonum coloradense</i>				S2	Gravelly and sandy soil from 8,500 to 12,500 feet	Possibly; suitable habitat present
Altai cottongrass	<i>Eriophorum altaicum var. neogaeum</i>			S	S3	Margins of pools and fens with slow moving water from 10,500 to 12,600 feet	Unlikely; no suitable habitat
Chamisso's cottongrass	<i>Eriophorum chamissonis</i>			S	S1	Margins of pools and fens with slow moving water from 10,500 to 12,600 feet	Unlikely; no suitable habitat
Slender cottongrass	<i>Eriophorum gracile</i>			S	S2	Fens and margins of lakes and ponds from 8,100 to 12,000 feet	Unlikely; no suitable habitat
Stonecrop gilia	<i>Gilia sedifolia</i>			S	S1	Rocky open alpine slopes on volcanic ash	Unlikely; no suitable habitat
Variegated scouringrush	<i>Hippochaete variegata</i>				S1	Sandy bars of streams	Unlikely; very little suitable habitat
Simple bog sedge	<i>Kobresia simpliciuscula</i>			S		Moist tundra and wetlands with peaty soil from 11,000 to 12,800 feet	Unlikely; no suitable habitat
Northern twayblade	<i>Listera borealis</i>				S2	Moist spruce-fir forest from 8,700 to 10,800 feet	Possibly; suitable habitat present
Colorado lanky aster	<i>Machaeranthera coloradoensis</i>			S	S2	Gravelly places in higher mountain parks and dry tundra	Possibly; suitable habitat in upper, open areas
Tundra saxifrage	<i>Muscaria monticola</i>				S1	Stony tundra	Unlikely; very little suitable habitat
Kotzebue's grass of Parnassus	<i>Parnassia kotzebuei</i>			S		Rocky ledges and rills; subalpine and alpine	Possibly; suitable habitat, but no known occurrences nearby
Grand Mesa penstemon	<i>Penstemon mensarum</i>				S3	Mountain slopes; only known from Grand Mesa	Unlikely; very little suitable habitat; no known occurrences nearby
Silver willow	<i>Salix candida</i>			S	S2	Wet meadows and cold fens; typically on calcareous soils	Unlikely; no suitable habitat
Blueberry willow	<i>Salix myrtilifolia</i>			S	S1	Riparian willows and willow carrs	Unlikely; very little suitable habitat
Autumn willow	<i>Salix serissima</i>			S		Very rare in mountain meadows; one record from Routt County	Possibly; suitable habitat present
Altai chickweed	<i>Stellaria irrigua</i>				S2	Mountain rills and scree from 8,100 to 13,000 feet	Unlikely; no suitable habitat
Lesser bladderwort	<i>Utricularia minor</i>			S	S2	Shallow ponds, lakes, slow-moving streams, fens, and fresh-water wetlands	Possibly; suitable habitat present

<sup>1</sup>Status: E—endangered, T—threatened, S—sensitive, SC—special concern, SI—critically imperiled, S2—imperiled, S3—vulnerable, S4—rare in parts of its range, S1S2 or S2S3—rank falls between the two numbers

Sources: USFS 2003, CNHP 2006, NDIS 2006, USFS 2006b, USFS 2006c, USFS 2007, Fitzgerald et al. 1994, Andrews and Righter 1992, Kingery 1998, Hammerson 1999, Spackman et al. 1997, Weber and Wittmann 1996, NRCS 2006, Packauskas 2005

### 3.3.1 Birds

Based on field evaluations, six of the 12 bird species listed in Table 4 have suitable habitat in the study area. These six species include the northern goshawk, boreal owl, olive-sided flycatcher, peregrine falcon, white-tailed ptarmigan, and the three-toed woodpecker.

The northern goshawk, boreal owl, three-toed woodpecker, and olive-side flycatcher nest mostly in forested sites, while the other two species are most likely to nest in more open areas, cliffs, or on rock outcrops. Although none of these species were observed during the field surveys, they could be present within the study area during nesting and/or foraging. Additionally, the northern goshawk has been observed migrating elevationally and staying in or near nesting locations year-round (USFS 2007).

The boreal owl, white-tailed ptarmigan, and three-toed woodpecker are year-round residents (staying in the general location of their nests all year), whereas the other three species are at least somewhat migratory and travel further south for the winter (Kingery 1998, Andrews and Righter 1992).

### **3.3.2 Mammals**

Based on field evaluations, six of the seven mammal species listed in Table 4 have suitable habitat in the study area. These six species include Townsend's big-eared bat, wolverine, Canada lynx, American marten, pygmy shrew, and dwarf shrew.

The wolverine, lynx, and marten are very mobile species that use relatively large areas and diverse habitats for foraging and denning, whereas the shrews are likely to be found in deeply forested areas. The Townsend's big-eared bat is a generalist in terms of foraging (forest, riparian, open areas), but only hibernates or roosts in old mine shafts, adits, or buildings (Fitzgerald et al. 1994).

All six of these mammals are year-round residents of their Colorado habitats and could potentially be found nesting, denning, and/or roosting in the study area.

### **3.3.3 Amphibians**

Only two amphibians have suitable habitat in the study area (Table 4), including the boreal toad and northern leopard frog. Both species would only be found in wetland or streamside habitats with slow-moving water and deeper pools. The northern leopard frog over-winters at the bottom of bodies of water, whereas the boreal toad spends the winter in a crevice or rock-lined chamber and does not burrow deeply into the soil (Hammerson 1999).

Both the boreal toad and northern leopard frog could potentially be found year-round along Elk Creek, its tributaries, and nearby wetlands in the study area.

### **3.3.4 Plants**

Ten plant species listed in Table 4 have suitable habitat in the study area. Four of the ten species are associated with wetlands and moist mountain meadows, including Park milkvetch, marsh cinquefoil, autumn willow, and lesser bladderwort. Five of the plants are found in areas with gravelly soil or on rocky slopes, including Leadville milkvetch, reflected moonwort, Colorado wild buckwheat, Colorado tansy aster, and Kotzebue's grass of Parnassus. The other species, northern twayblade, is usually found in moist forested sites.

All, some, or none of these plants may occur in their appropriate habitats in the study area. Generally, these plants will not be found in areas that have been previously disturbed by human activity. Thus, the tailings area and waste rock piles are not likely to contain any populations.



However, populations could potentially be found in or around the repository locations and/or in other undisturbed areas in the study area.

### 3.4 REPOSITORY AND BORROW AREAS

#### 3.4.1 Area 99

Area 99 encompasses 11.94 acres and is located at approximately 11,100 feet above sea level. It is approximately 0.25 mile east of Level 1 (Figure 3) and is dominated by a large outcrops of weathered and frost shattered bedrock. The vegetated portions of the site include two small topographic swales on each side of a large bedrock outcrop and a rolling, forested ridge above.

The swales are dominated by grasses and grass-like species with scattered forbs and shrubs. Common species include mountain brome (*Bromus* sp.), muttongrass, alpine timothy, slender wheatgrass (*Elymus trachycaulus*), Drummond's rush, Virginia strawberry, Colorado blue columbine (*Aquilegia coerulea*), tall blacktip ragwort (*Senecio atratus*), common yarrow (*Achillea millefolium*), gooseberry currant, red elderberry, shrubby cinquefoil (*Dasiphora fruticosa*), and American red raspberry (*Rubus idaeus*). The forested areas are dominated by Englemann spruce, Douglas fir, and subalpine fir (*Abies lasiocarpa*), with an understory of sickletop lousewort, whortleberry, Jacob's ladder, and heartleaf arnica.

The forested areas contain many old-growth trees, with a substantial amount of downfall (Photo 17, Appendix A). There are several small forest openings and many contain small rock outcrops. The entire area appears to get heavy mule deer (*Odocoileus hemionus*) and elk (*Cervus elaphus*) use as evidenced by the presence of numerous game trails. Although no wetlands or other water features were identified in Area 99, it is still potential habitat for many TES, including those species that prefer forested or open rocky habitats (see Table 4).

#### 3.4.2 Area 225

Area 225 encompasses 6.75 acres and is located at approximately 10,600 feet above sea level. It is approximately 0.25 mile south of Level 1 (Figure 3) and dominated by spruce-fir forest. The vegetation community is very similar to that of the forested portion of Area 99, but with even more downfall, fewer forest openings (denser canopy), and less understory vegetation. The dominant understory plants observed include tall fringed bluebells, gooseberry currant, Porter's licorice root (*Ligusticum porteri*), Richardson's geranium, and swollen penstemon (*Penstemon rydbergii*). Heavy mule deer and elk use was evident.

Although Area 225 does not contain any wetlands, it does contain a vernal pool that appears to pond water up to 3.5 feet deep (Photos 19 and 20, Appendix A). This pool is located in a closed basin that receives flow from the east. It is mostly devoid of herbaceous vegetation and is surrounded by old growth Englemann spruce and Douglas fir.

Area 225 is potential habitat for those TES that prefer forested habitats (see Table 4).

#### 3.4.3 Area 245

Area 245 encompasses 6.61 acres and is located at approximately 11,000 feet above sea level. It is approximately 0.5 mile southeast of Level 1 (Figure 3) and dominated by upper montane-

subalpine forest. Dominant vegetation is very similar to that of the forested portions of Area 99. Overall, when compared to Area 99, Area 245 has fewer old growth trees, more subalpine fir, less downfall, and very few (if any) rock outcrops. Very few graminoids were observed in the forest understory, with whortleberry and Payson's lousewort (*Pedicularis bracteosa*) dominating most areas. A moderate amount of mule deer and elk use was observed. Based on the overwhelming presence of young trees of similar age (Photo 21, Appendix A), it appears that this area may have been burned in the last 100 years.

No wetlands or other water features were identified in Area 245. However, it is still potential habitat for many TES, including those species that prefer forested or somewhat open habitats (see Table 4).

#### **3.4.4 USFS Site 1**

USFS Site 1 is located approximately 0.5 mile southeast of Level 1 and is situated at the intersection at two mining roads at approximately 10,600 feet above sea level (Figure 3). The site encompasses approximately 5.61 acres and is an active landslide area with undulating topography and is mostly montane grassland-forb mix with scattered Englemann spruce, Douglas fir, and large boulders (Photo 22, Appendix A). Most of the trees on the site are less than 8 inches in diameter (at breast height). Dominant herbaceous vegetation includes Porter's licorice root, muttongrass, whortleberry, slender wheatgrass, and showy daisy (*Aster bracteolatus*). Although very little big game use was observed, the area likely provides substantial forage for many small and large mammals due to the density of herbaceous vegetation.

No wetlands or other water features were identified in USFS Site 1. However, it is still potential habitat for many TES, including those species that prefer open habitats with gravelly soil (see Table 4).

#### **3.4.5 USFS Site 2**

USFS Site 2 encompasses 1.50 acres and is located approximately 0.25 mile south of Level 1 (Figure 3). It is situated at approximately 10,800 feet above sea level and is a closed depression immediately east of the existing access road and at the base of a bedrock outcrop. The site is mostly forested, with a mix of old growth and second growth Englemann spruce and Douglas fir.

Most of the site contains a substantial amount of downfall and the lowest portions of the site (near the center) are generally the most densely forested (Photo 23, Appendix A). The more open perimeter area contains an understory dominated by whortleberry, slender wheatgrass, sickletop lousewort, Jacob's ladder, and heartleaf arnica (Photo 24, Appendix A). The presence of old stumps indicates that the area was partially logged. Several mule deer and elk trails were observed in the site.

Although no wetlands or other water features were identified in USFS Site 2, it is still potential habitat for many TES, including those species that prefer forested and somewhat open habitats (see Table 4).

### **3.4.6 Standard Mine Level 2**

The Level 2 site encompasses 4.36 acres and is located less than 0.25 mile north of Level 1. It is situated at approximately 11,200 feet above sea level and is near the existing access road (Figure 3). This site was not specifically visited to gather ecological field data, but based on a review of aerial photography, is similar to those habitats observed in other upland areas at Levels 2, 3, 4 and 98.

The site is mostly open forest dominated by Englemann spruce and Douglas fir, with a graminoid/forb understory. Based on a review of aerial photographs, the site does not appear to contain wetlands or other water features. However, it is still potential habitat for many TES, including those species that prefer forested, open, and rocky/gravelly habitats (see Table 4).

### **3.5 MOUNT EMMONS IRON FEN**

Fens are defined by the USFWS as wetlands that are groundwater driven and that have accumulated organic material (USFWS 1998). Fens are generally rare in the region and often contain unique biotic assemblages. The soil in most fens meets the Natural Resource Conservation Service definition of a histosol with at least 20 to 30 percent organic matter in at least 16 of the upper 32 inches. As a result of their uniqueness, protection of fens is a priority for the USFWS and other regulatory agencies.

According to Cooper (2003), groundwater discharged from the base of Mt. Emmons produces sheet flow and subsurface flow that perennially saturates the Mount Emmons Iron Fen. Unlike most fens, it contains water with very high concentrations of iron due to the presence of iron pyrite rich bedrock that has been oxidized to create iron-leaching sulfuric acid (Cooper 2003). As a result, the fen has very low pH and supports one of only two known populations of the USFS sensitive roundleaf sundew (*Drosera rotundifolia*).

Although Mt. Emmons Iron Fen is downgradient and within approximately 0.3 mile of the Standard Mine main access road, the work that is being done at the mine and along the access road are not likely to adversely affect the fen. The fen reportedly receives most of its water via groundwater discharge (Cooper 2003), the mine is in a different subwatershed, and the access road improvements (including culvert installation and increased construction traffic) are too minor to have an effect on any surface flows or precipitation infiltration. The 0.3 mile distance between the access road and fen should be adequate to intercept any reasonably foreseeable increase in sediments or other toxicants that may make it through the best management practices that were installed at key runoff locations along the improved access road. In addition, none of the access road improvements should change the quantity or direction of any surface flows in the area.

## SECTION FOUR

## Recommendations

The following section lists recommendations that can be implemented before and during construction to minimize impacts to wetlands, other water features, and TES.

### 4.1 WETLANDS AND OTHER WATER FEATURES

The following recommendations will help minimize overall impact to the wetlands in the study area:

- Avoid wetlands whenever practicable.
- If avoidance is not possible, minimize impacts to wetlands to the maximum extent practicable.
- Provide compensatory wetland mitigation for those impacts that are unavoidable. The mitigation should be done on-site and in-kind, at a minimum ratio of one to one. The primary goal of the mitigation should be to replace the acreage of wetlands permanently lost and the ecological functions lost.
- Minimize indirect and accidental impacts to wetlands and other water features by implementing the following measures:
  - Do not stage or store equipment or construction materials within 50 feet of wetlands or other water features.
  - Do not store temporary fill material in or within 50 feet of wetlands or other water features.
  - Do not use chemicals, such as soil stabilizers, dust inhibitors, and fertilizers within 50 feet of wetlands and other water features.
  - Refuel equipment in designated contained areas, a minimum of 50 feet from wetlands and other water features.
  - Protect the edge of wetlands and other water features from siltation by installing silt fence or other erosion best management practices at the edge of work areas.
  - Work during the low water season whenever possible to avoid unnecessary sedimentation of Elk Creek.
  - Power wash all heavy equipment prior to entering the project area to avoid introducing noxious weed seed and/or other foreign materials.
  - Restore all temporarily impacted wetlands to original contours and conditions immediately after work is complete.

### 4.2 THREATENED AND ENDANGERED SPECIES

The following recommendations will help minimize overall impact to TES in and near the study area.

#### 4.2.1 Birds

- All tree clearing should be done between September 15 and April 1. If this is not practicable, nesting bird surveys should be conducted prior to any tree clearing. These

surveys should focus on the four tree nesting species discussed earlier, including the northern goshawk, boreal owl, three-toed woodpecker, and olive-side flycatcher and should also include all other migratory birds protected under the Migratory Bird Treaty Act (nearly all bird species occurring in this area). If nesting birds are found during the surveys, the USFWS, USFS, and/or CDOW should be contacted to determine the appropriate action. Actions will most likely involve a “no-work” buffer area around the nest(s).

- No earthwork should be conducted in previously undisturbed habitats between April 1 and September 15. If this is not practicable, ground nesting bird surveys should be conducted prior to any earthwork. These surveys should focus on the white-tailed ptarmigan and should also include all other migratory birds protected under the Migratory Bird Treaty Act (nearly all bird species occurring in this area). If nesting birds are found during the surveys, the USFWS, USFS, and/or CDOW should be contacted to determine the appropriate action. Actions will most likely involve a “no-work” buffer area around the nest(s).

#### **4.2.2 Mammals**

- Presence/absence (live-trapping) surveys should be conducted for dwarf and pygmy shrews prior to tree clearing activities. If either species is present, the USFS should be contacted to determine the appropriate action.
- Presence/absence surveys should be conducted for Townsend’s big-eared bat. These surveys should focus on the adits of the mine site and any old buildings that may be removed or damaged during the project. If bats are found, USFS and CDOW should be contacted to determine the appropriate action.
- A den survey should be conducted for the Canada lynx prior to the clearing of any densely forested areas. If a den is found, the USFWS, USFS, and CDOW should be contacted to determine the appropriate actions. Actions will likely include work timing restrictions.
- Unnecessary clearing of forested habitats should be avoided to minimize potential impacts to wolverine, Canada lynx, and American marten.

#### **4.2.3 Amphibians**

- The recommendations listed above for wetlands (see Section 4.1 Wetlands and Other Water Features) would also apply to minimizing the potential for impacts to the boreal toad and northern leopard frog.

#### **4.2.4 Plants**

- Presence/absence surveys should be conducted for the ten plant species that may occur in or near the study area prior to impacting any previously undisturbed habitats. If any of these plant populations are found, the number of plants and extent of the population should be recorded and the USFS should be contacted to determine the appropriate action. Actions may include avoidance, transplanting, or seed bed salvage.

**4.3 MOUNT EMMONS IRON FEN**

The following recommendations will help avoid adverse impacts to Mt. Emmons Iron Fen:

- Regularly inspect and maintain all best management practices that have been installed along the main access road to Standard Mine.
- Minimize the transport of hazardous materials on the main access road.

## SECTION FIVE

## Literature Cited

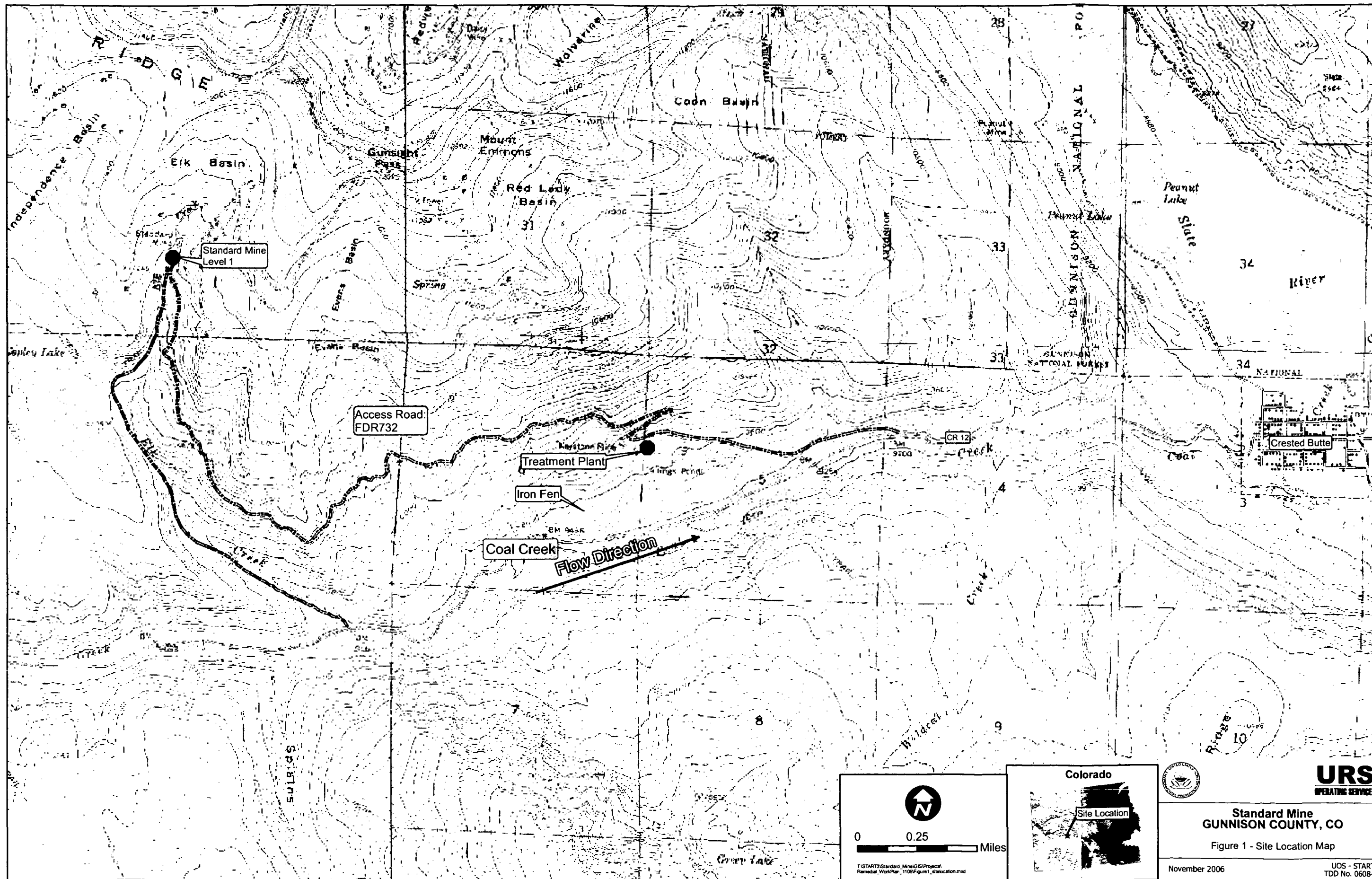
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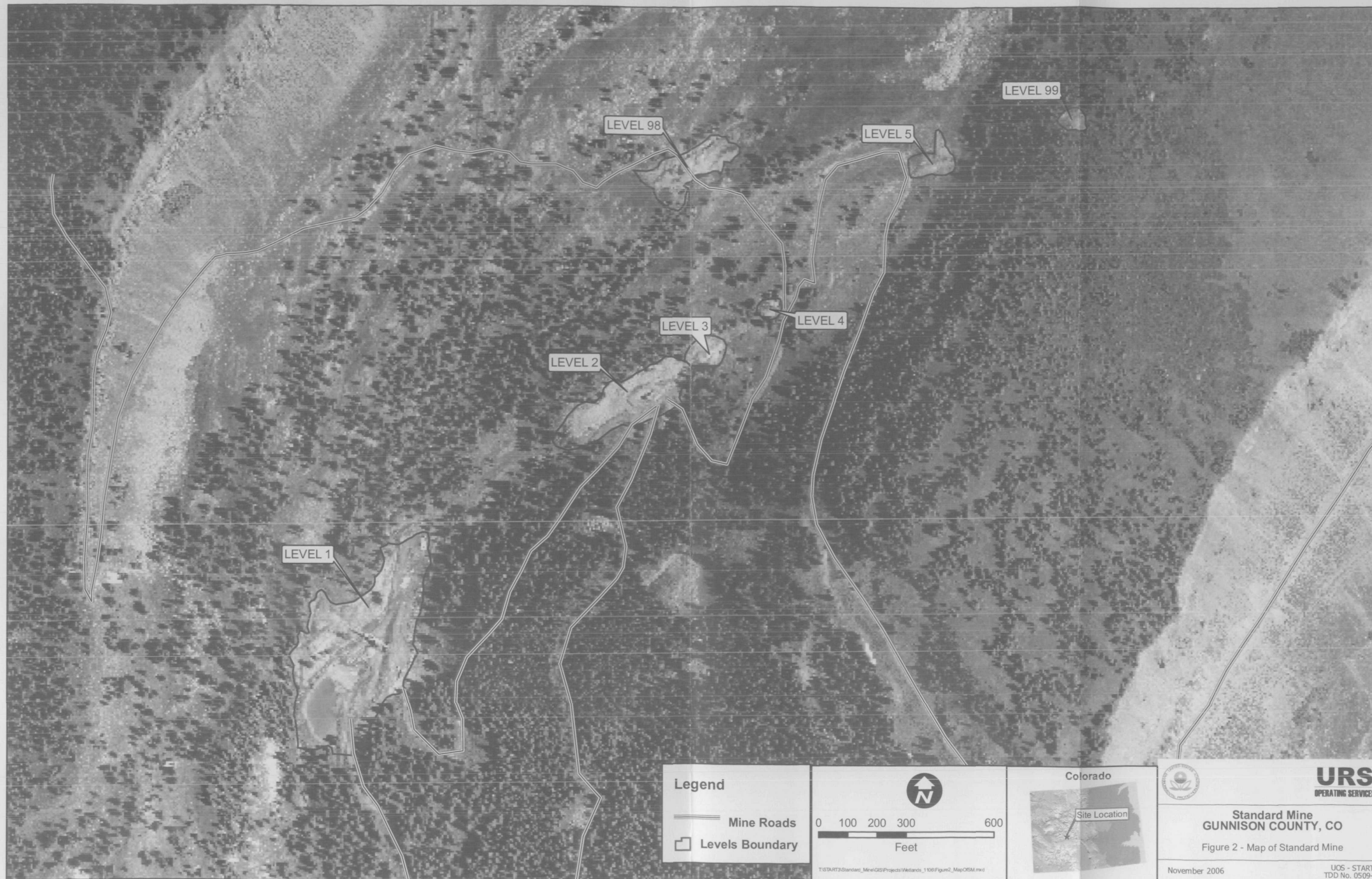
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**Legend**

— Mine Roads

- - Levels Boundary

0 100 200 300 600

Feet

Colorado

Site Location

**URS**  
OPERATING SERVICES

**Standard Mine**  
**GUNNISON COUNTY, CO**

Figure 2 - Map of Standard Mine

November 2006

UCS - START 3  
TDD No. 0509-08





#### Legend

- Photo Point
- Mine Roads
- Repository / Borrow Pit Location



**URS**  
OPERATING SERVICES

**Standard Mine  
GUNNISON COUNTY, CO**

Figure 3 - Map of Repository and Borrow Areas

November 2006

UOS - START 3  
TDD No. 0509-08





**Legend**

- Study Area
- Wetland Area
- Other Water Feature
- Soil Pit
- Photo Point

0 75 150 300 Feet

1 inch equals 300 feet

**URS**  
OPERATING SERVICES

Standard Mine  
GUNNISON COUNTY, CO

Figure 4 Wetland and Other Water Features Map

November 2006

UCS - START 3  
TDD No. 0509-08

**Appendix A**  
**Site Photographs**

# Color Photo(s)

The following pages  
contain color that does  
not appear in the  
scanned images.

To view the actual images, contact  
the Region VIII Records Center at  
(303) 312-6473.



Photo 1—Wetland 1-1, one of two small channels within the wetland; looking down to Level 1



Photo 2—Wetland 1-1, seep/spring area





Photo 3—Wetland 1-2; Elk Creek, just above Level 1



Photo 4—Wetland 1-2 along Elk Creek at Level 1





Photo 5—Wetland 1-3, seep above Elk Creek at Level 1



Photo 6—Wetland 1-3; confluence of seep and Elk Creek, adjacent to tailings pond at Level 1



Photo 7—Wetland 2-1, small seep just below road near Level 2



Photo 8—Wetland 98-1, small pond and seep along tributary to Elk Creek



Photo 9—Wetland 98-1 along tributary to Elk Creek



Photo 10—Wetland 98-1, small wetland from ponding of water on waste rock





Photo 11—Wetland 98-1 below waste rock piles



Photo 12—Wetland 5-1, below access road



Photo 13—Level 5 Adit



Photo 14—Level 5 Adit



Photo 15—Area 99, looking northeast



Photo 16—Area 99, topographic swale at base of rock outcrop





Photo 17—Area 99, forested ridge with old growth



Photo 18—Area 225, dense forest with large amounts of downfall



Photo 19—Area 225, vernal pool (notice water marks on trees)



Photo 20—Area 225, water marks on trees at vernal pool





Photo 21—Area 245, open area surrounded by relatively young forest



Photo 22—USFS Site 1, looking east at open area



Photo 23—USFS Site 2, denser forest in lower area



Photo 24—USFS Site 2, open perimeter area

**Appendix B**  
**Routine Wetland Determination Forms**

**Appendix B**  
**Routine Wetland Determination Forms**

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## DATA FORM

## ROUTINE WETLAND DETERMINATION

(1987 USACE Wetlands Delineation Manual)

Project/Site: Standard Mine		Date: 07-11-06
Applicant/Owner: US Forest Service and others		County: Gunnison
Investigator(s): A. Herb, S. Hall		State: CO
Do Normal Circumstances exist on the site?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Community ID: Slope
Is the site significantly disturbed (Atypical Situation)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Plot ID: WL 1-1
		GPS Coordinates:

## VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
1. <i>Corydalis caseana</i>	H	FACW	10. <i>Saxifraga odontoloma</i>	H	FACW+
2. <i>Caltha leptosepala</i>	H	OBL	11. <i>Anemone narcissiflora</i>	H	NL
3. <i>Pedicularis groenlandica</i>	H	OBL	12. <i>Rhodiola rhodantha</i>	H	FACW+
4. <i>Senecio triangularis</i>	H	OBL	13. <i>Salix planifolia</i>	S	OBL
5. <i>Juncus drummondii</i>	H	FACW+	14. <i>Oxypolis fenderli</i>	H	OBL
6. <i>Mertensia ciliata</i>	H	OBL	15. <i>Mimulus guttatus</i>	H	OBL
7. <i>Deschampsia caespitosa</i>	H	FACW	16.		
8. <i>Cardamine cordifolia</i>	H	FACW+	17.		
9. <i>Delphinium barbeyi</i>	H	FAC	18.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100%

Remarks: Large, lush stand of wetland vegetation on west-facing slope, bordered by road to east and small patches of mixed conifer association. Top of slope dominated by *Corydalis caseana*, *Pedicularis groenlandica*, *Delphinium barbeyi*, and *Mertensia ciliata*. Smaller species appear lower in the site, and along the small channels. 100% PEM.

Perimeter: *Castilleja occidentalis*, *Rhodiola integrifolia*, *Geranium richardsonii*, *Polemonium pulcherrimum*, *Epilobium anagallidifolium*, *Arnica cordifolia*, *Carex phaeocephala*, *Pedicularis racemosa*, *Fragaria virginiana*, *Acomastylis rossii*, *Androsace septentrionalis*, *Phleum alpinum*, *Erythronium grandiflorum*, *Luzula parviflora*, *Viola adunca*, *Ribes montigenum*, *Pseudotsuga menziesii*, *Picea engelmannii*.

## HYDROLOGY

<input checked="" type="checkbox"/> Recorded Data (Describe in Remarks) <input type="checkbox"/> Stream, Lake, or Tide Gauge <input checked="" type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input type="checkbox"/> No Recorded Data Available	<b>Wetland Hydrology Indicators:</b>  <b>Primary Indicators:</b> <input checked="" type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input type="checkbox"/> Drainage Patterns in Wetlands  <b>Secondary Indicators (2 or more Required):</b> <input type="checkbox"/> Oxidized Root Channels in Upper 12 inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
<b>Field Observations:</b> Depth of Surface Water: 3-4 (in.) Depth to Free Water in Pit: NA (in.) Depth to Saturated Soil: 0 (in.)	
Remarks: Source of hydrology is groundwater; seeps and springs within site. Two small channels form within wetland and terminate within disturbed area to west, ultimately to Elk Creek.	

## ROUTINE WETLAND DETERMINATION

## SOILS

## WETLAND DETERMINATION

Hydrophytic Vegetation Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Is this Sampling Point Within a Wetland?  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Wetland Hydrology Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Hydric Soils Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>Remarks:</b> Wetland on west-facing slope east of Level 1 disturbed area. Adjacent to upslope roadway. Hydrological source is groundwater, forming several small channels that terminate within the disturbed area. Robust vegetation dominates area.			

# DATA FORM

## ROUTINE WETLAND DETERMINATION

(1987 USACE Wetlands Delineation Manual)

Project/Site: Standard Mine		Date: 07-11-06
Applicant/Owner: US Forest Service and others		County: Gunnison
Investigator(s): A. Herb, S. Hall		State: CO
Do Normal Circumstances exist on the site?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Community ID: Upper Elk Creek
Is the site significantly disturbed (Atypical Situation)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Plot ID: WL 1-2
		GPS Coordinates:

### VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
1. <i>Carex aquatilis</i>	H	OBL	9. <i>Zigadenus elegans</i>	H	FACU
2. <i>Deschampsia caespitosa</i>	H	FACW	10. <i>Pedicularis groenlandica</i>	H	OBL
3. <i>Cardamine cordifolia</i>	H	FACW+	11.		
4. <i>Senecio triangularis</i>	H	OBL	12.		
5. <i>Juncus drummondii</i>	H	FACW+	13.		
6. <i>Carex rostrata</i>	H	OBL	14.		
7. <i>Oxypolis fenderii</i>	H	OBL	15.		
8. <i>Caltha leptosepala</i>	H	OBL	16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100%

Remarks: Confluence area (Elk Creek and drainage from Level 2) northwest of Level 1 disturbed area. Vegetation drops out above tailings area. 100% PEM.

Perimeter: *Viola adunca*, *Erythronium grandiflorum*, *Picea engelmannii*, *Pseudotsuga menziesii*, *Acomastylis rossii*, *Senecio* sp.

### HYDROLOGY

<input checked="" type="checkbox"/> Recorded Data (Describe in Remarks) <input type="checkbox"/> Stream, Lake, or Tide Gauge <input checked="" type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input type="checkbox"/> No Recorded Data Available	<b>Wetland Hydrology Indicators:</b>  <b>Primary Indicators:</b> <input checked="" type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input type="checkbox"/> Drainage Patterns in Wetlands  <b>Secondary Indicators (2 or more Required):</b> <input type="checkbox"/> Oxidized Root Channels in Upper 12 inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
<b>Field Observations:</b> Depth of Surface Water: 3-4 (in.) Depth to Free Water in Pit: N/A (in.) Depth to Saturated Soil: N/A (in.)	<b>Remarks:</b> Confluence of Elk Creek with flow from Level 2 and other groundwater discharge. Creek enters site from northwest, and is channelized to west edge of Level 1 to the tailings pond. Hydrology for the wetlands is via capillary action and overbank flooding.

# DATA FORM

## ROUTINE WETLAND DETERMINATION

(1987 USACE Wetlands Delineation Manual)

### SOILS

<b>Map Unit Name:</b>			<b>Drainage Class:</b>		
<b>Taxonomy (Subgroup):</b>			<b>Field Observations Confirm Mapped Type?</b> <input type="checkbox"/> Yes <input type="checkbox"/> No		
<b>Profile Description:</b>					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.

**Hydric Soil Indicators:**

<input type="checkbox"/> Histosol	<input type="checkbox"/> Concretions
<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils
<input type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Organic Streaking in Sandy Soils
<input type="checkbox"/> Aquic Moisture regime	<input type="checkbox"/> Listed on Local Hydric Soils List
<input type="checkbox"/> Reducing Conditions	<input type="checkbox"/> Listed on National Hydric Soils List
<input type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Other (Explain in Remarks)

**Remarks:** Hydric soils have been assumed due to a distinct wetland boundary, evidence of wetland hydrology and the dominance of FACW and/or OBL vegetation. Very rocky.

### WETLAND DETERMINATION

<b>Hydrophytic Vegetation Present?</b>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<b>Is this Sampling Point Within a Wetland?</b>  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
<b>Wetland Hydrology Present?</b>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>Hydric Soils Present?</b>	assumed <input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>Remarks:</b> PEM fringe wetland along Elk Creek and at the confluence with Level 2 drainage. Wetland borders northwest corner of Level 1 tailings area. Vegetation drops out above tailings pond.			



## DATA FORM

## ROUTINE WETLAND DETERMINATION

(1987 USACE Wetlands Delineation Manual)

Project/Site: Standard Mine		Date: 07-11-06
Applicant/Owner: US Forest Service and others		County: Gunnison
Investigator(s): A. Herb, S. Hall		State: CO
Do Normal Circumstances exist on the site?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Community ID: Lower Elk Creek
Is the site significantly disturbed (Atypical Situation)?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Plot ID: WL 1-3
		GPS Coordinates:

## VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
1. <i>Oxypholis fenderli</i>	H	OBL	9. <i>Limnorchis aquilonis</i>	H	NL
2. <i>Caltha leptosepala</i>	H	OBL	10. <i>Mertensia ciliata</i>	H	OBL
3. <i>Saxifraga odontoloma</i>	H	FACW+	11. <i>Castilleja rhexifolia</i>	H	FACU
4. <i>Deschampsia caespitosa</i>	H	FACW	12. <i>Salix planifolia</i>	S	OBL
5. <i>Carex rostrata</i>	H	OBL	13. <i>Pedicularis groenlandica</i>	H	OBL
6.			14. <i>Senecio triangularis</i>	H	OBL
7.			15. <i>Juncus drummondii</i>	H	FACW+
8.			16. <i>Mimulus guttatus</i>	H	OBL

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100%

Remarks: Confluence area. Good diversity and overstory. Population of *Limnorchis aquilonis* (also occurs upstream in unnamed creek). Two small disconnected wetlands directly upstream along Elk Creek with *Carex rostrata*.

Perimeter: *Aquilegia elegantula*, *Erythronium grandiflorum*, *Picea engelmannii*, *Pseudotsuga menziesii*, *Polygonum bistortoides*, *Deschampsia caespitosa*, *Calamagrostis canadensis*, *Polemonium pulcherrimum*, *Pedicularis racemosa*, *Rhodiola rhodantha*, *Luzula parviflora*, *Geranium richardsonii*, *Vaccinium myrtillus*, *Lonicera involucrata*, *Ribes montigenum*, *Chamerion subdentatum*.

## HYDROLOGY

<input checked="" type="checkbox"/> Recorded Data (Describe in Remarks) <input type="checkbox"/> Stream, Lake, or Tide Gauge <input checked="" type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input type="checkbox"/> No Recorded Data Available	<b>Wetland Hydrology Indicators:</b>  <b>Primary Indicators:</b> <input checked="" type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input type="checkbox"/> Drainage Patterns in Wetlands  <b>Secondary Indicators (2 or more Required):</b> <input type="checkbox"/> Oxidized Root Channels in Upper 12 inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
<b>Field Observations:</b> Depth of Surface Water: 2 (in.) Depth to Free Water in Pit: N/A (in.) Depth to Saturated Soil: N/A (in.)	<b>Remarks:</b> Source of hydrology - seep directly adjacent to Elk Creek and flows from a small unnamed channel to west of seep. Elk Creek provides secondary hydrology to this area via capillary action and overbank flooding.

# DATA FORM

## ROUTINE WETLAND DETERMINATION

(1987 USACE Wetlands Delineation Manual)

### SOILS

Map Unit Name:			Drainage Class:		
Taxonomy (Subgroup):			Field Observations Confirm Mapped Type? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Profile Description:					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.

**Hydric Soil Indicators:**

<input type="checkbox"/> Histosol	<input type="checkbox"/> Concretions
<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils
<input type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Organic Streaking in Sandy Soils
<input type="checkbox"/> Aquic Moisture regime	<input type="checkbox"/> Listed on Local Hydric Soils List
<input type="checkbox"/> Reducing Conditions	<input type="checkbox"/> Listed on National Hydric Soils List
<input type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Other (Explain in Remarks)

**Remarks:** Hydric soils have been assumed due to a distinct wetland boundary, evidence of wetland hydrology and the dominance of FACW and/or OBL vegetation.

### WETLAND DETERMINATION

Hydrophytic Vegetation Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Is this Sampling Point Within a Wetland?  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Wetland Hydrology Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Hydric Soils Present?	assumed <input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
<p><b>Remarks:</b> Wetland at confluence of unnamed creek and seep above Elk Creek. Also includes a small wetland fringe directly adjacent to tailings pond. Two small disconnected wetlands directly upstream along Elk Creek containing <i>Carex rostrata</i>.</p>			

## DATA FORM

## ROUTINE WETLAND DETERMINATION

(1987 USACE Wetlands Delineation Manual)

Project/Site: Standard Mine		Date: 07-12-06
Applicant/Owner: US Forest Service and others		County: Gunnison
Investigator(s): A. Herb, S. Hall		State: CO
Do Normal Circumstances exist on the site?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Community ID: L2
Is the site significantly disturbed (Atypical Situation)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Plot ID: WL 2-1
		GPS Coordinates:

## VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
1. <i>Cardamine cordifolia</i>	H	FACW+	9. <i>Oxypolis fenderli</i>	H	OBL
2. <i>Senecio triangularis</i>	H	OBL	10. <i>Epilobium anagallidifolium</i>	H	NL
3. <i>Caltha leptosepala</i>	H	OBL	11. <i>Saxifraga odontoloma</i>	H	FACW+
4.			12. <i>Deschampsia caespitosa</i>	H	FACW
5.			13. <i>Mertensia ciliata</i>	H	OBL
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100%

Remarks: Area lies between L2 and L3 on slope adjacent to roadway. Forested perimeter. 100% PEM.

Perimeter: *Polemonium pulcherrimum*, *Picea engelmannii*, *Pseudotsuga menziesii*, *Chamerion subdentatum*, *Pedicularis racemosa*, *Erythronium grandiflorum*, *Ribes montigenum*, *Carex phaeocephala*, Moss sp.

## HYDROLOGY

<input checked="" type="checkbox"/> Recorded Data (Describe in Remarks) <input type="checkbox"/> Stream, Lake, or Tide Gauge <input checked="" type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input type="checkbox"/> No Recorded Data Available	<b>Wetland Hydrology Indicators:</b>  <b>Primary Indicators:</b> <input checked="" type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input type="checkbox"/> Drainage Patterns in Wetlands  <b>Secondary Indicators (2 or more Required):</b> <input type="checkbox"/> Oxidized Root Channels in Upper 12 inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
<b>Field Observations:</b> Depth of Surface Water: <u>2</u> (in.) Depth to Free Water in Pit: <u>None</u> (in.) Depth to Saturated Soil: <u>0</u> (in.)	
Remarks: Source of hydrology is groundwater discharge. Main seep forms very small (<1 foot) channel through site. Water originates below roadway, within wetland. Outflow eventually drains toward Elk Creek, but large area of upland between.	

# DATA FORM

## ROUTINE WETLAND DETERMINATION

(1987 USACE Wetlands Delineation Manual)

### SOILS

Map Unit Name:			Drainage Class:		
Taxonomy (Subgroup):			Field Observations Confirm Mapped Type? <input type="checkbox"/> Yes <input type="checkbox"/> No		
Profile Description:					
Depth (Inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
SP1/0-4					Fibrous
4-8		10YR3/1			Sandy clay
8-14		10YR4/1			Sandy clay

**Hydric Soil Indicators:**

<input type="checkbox"/> Histosol	<input type="checkbox"/> Concretions
<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils
<input checked="" type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Organic Streaking in Sandy Soils
<input type="checkbox"/> Aquic Moisture regime	<input type="checkbox"/> Listed on Local Hydric Soils List
<input type="checkbox"/> Reducing Conditions	<input type="checkbox"/> Listed on National Hydric Soils List
<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Other (Explain in Remarks)

**Remarks:**  
 SP1 - Saturated to surface. Vegetation surrounding pit - *Cardamine cordifolia*, *Senecio triangularis*.

### WETLAND DETERMINATION

Hydrophytic Vegetation Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Is this Sampling Point Within a Wetland?  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Wetland Hydrology Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Hydric Soils Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>Remarks:</b> Small wetland downslope of Level 2 next to roadway. Groundwater discharge is source of hydrology. Similar vegetation community to Wetland 1-1, but not as diverse.			

## DATA FORM

## ROUTINE WETLAND DETERMINATION

(1987 USACE Wetlands Delineation Manual)

Project/Site: Standard Mine		Date: 07-10-06
Applicant/Owner: US Forest Service and others		County: Gunnison
Investigator(s): A. Herb, S. Hall		State: CO
Do Normal Circumstances exist on the site?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Community ID: L98
Is the site significantly disturbed (Atypical Situation)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Plot ID: WL 98-1
		GPS Coordinates:

## VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
1. <i>Carex aquatilis</i>	H	OBL	9. <i>Pedicularis groenlandica</i>	H	OBL
2. <i>Juncus drummondii</i>	H	FACW	10. <i>Cardamine cordifolia</i>	H	FACW+
3. <i>Deschampsia caespitosa</i>	H	FACW	11. <i>Anemone narcissiflora</i>	H	NL
4. <i>Caltha leptosepala</i>	H	OBL	12. Unknown <i>Eleocharis</i> sp.	H	
5. <i>Senecio triangularis</i>	H	OBL	13. <i>Carex gynocrates</i>	H	OBL
6.			14. <i>Zigadenus elegans</i>	H	FACU
7.			15. <i>Salix monticola</i>	S	OBL
8.			16. <i>Ranunculus</i> sp.	H	

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100%

Remarks: Multiple wetlands created by multiple rivulets flowing around spoil areas. Main areas of vegetation above and around upper pond, and below spoil pile. 100% PEM.

Perimeter: *Senecio* sp., *Castilleja rhexiifolia*, *Rhodiola integrifolia*, *Rhodiola rhodantha*, *Polemonium pulcherrimum*, *Mertensia ciliata*, *Polygonum bistortoides*, *Vaccinium myrtillus*, *Penstemon* sp., *Penstemon whippleanus*, *Fragaria virginiana*, *Erythronium grandiflorum*, *Viola adunca*, *Aquilegia coerulea*, *Antennaria* sp., *Carex phaeocephala*, *Acomastylis rossii*

## HYDROLOGY

<input checked="" type="checkbox"/> Recorded Data (Describe in Remarks) <input type="checkbox"/> Stream, Lake, or Tide Gauge <input checked="" type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input type="checkbox"/> No Recorded Data Available	<b>Wetland Hydrology Indicators:</b>  <b>Primary Indicators:</b> <input checked="" type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input type="checkbox"/> Drainage Patterns in Wetlands  <b>Secondary Indicators (2 or more Required):</b> <input type="checkbox"/> Oxidized Root Channels in Upper 12 inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
<b>Field Observations:</b> Depth of Surface Water: 2-6 (in.) Depth to Free Water in Pit: 0 (in.) Depth to Saturated Soil: 0 (in.)	
Remarks: Hydrological sources include groundwater seepage, surface runoff, and snowmelt. Five small channels flowing into site, from L5 and west of site. Three small waterfalls at north and west edges of site and three pools formed within site. Main channel bisects site, forms two pools, and drops out below. West side waterfall and adjacent seeps pond, and seep through spoil to form small wetland on southwest of site.	

# DATA FORM

## ROUTINE WETLAND DETERMINATION

(1987 USACE Wetlands Delineation Manual)

### SOILS

<b>Map Unit Name:</b>			<b>Drainage Class:</b>		
<b>Taxonomy (Subgroup):</b>			Field Observations Confirm Mapped Type? <input type="checkbox"/> Yes <input type="checkbox"/> No		
<b>Profile Description:</b>					
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.
SP1/ 0-2		-			Fibrous (root mass)
2-6		10YR 3/3			Sandy clay loam
> 6					Bedrock
SP2/ 0-2		-			Fibrous (root mass)
2-6		10YR3/3			Sandy clay loam
>6					Bedrock
SP3/ 0-5		10YR2/1			Somewhat fibrous w/soil
5-14		10YR2/1			Sandy clay loam
<b>Hydric Soil Indicators:</b> <div style="display: flex; flex-wrap: wrap;"> <div style="width: 50%;"> <input type="checkbox"/> Histosol  <input type="checkbox"/> Histic Epipedon  <input checked="" type="checkbox"/> Sulfidic Odor  <input type="checkbox"/> Aquic Moisture regime  <input type="checkbox"/> Reducing Conditions  <input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors         </div> <div style="width: 50%;"> <input type="checkbox"/> Concretions  <input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils  <input type="checkbox"/> Organic Streaking in Sandy Soils  <input type="checkbox"/> Listed on Local Hydric Soils List  <input type="checkbox"/> Listed on National Hydric Soils List  <input type="checkbox"/> Other (Explain in Remarks)         </div> </div>					
<b>Remarks:</b> SP1 - Free water at surface, saturated. Vegetation surrounding pit - <i>Juncus drummondii</i> . SP2 - No free water in the pit, saturated to surface. Vegetation surrounding pit - <i>Deschampsia caespitosa</i> . Soil pit within 4 inches (vertica) of rivulet. SP3 - Free water to surface. Vegetation surrounding pit - <i>Senecio triangularis</i>					

### WETLAND DETERMINATION

Hydrophytic Vegetation Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<b>Is this Sampling Point Within a Wetland?</b>  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Wetland Hydrology Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Hydric Soils Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>Remarks:</b> Tailings, spoil and other disturbance divides wetland areas and causes pooling of groundwater and snowmelt. Wetlands present throughout. Good diversity of wetland and upland vegetation. Area dominated by <i>Carex</i> sp.			

## DATA FORM

## ROUTINE WETLAND DETERMINATION

(1987 USACE Wetlands Delineation Manual)

Project/Site: Standard Mine		Date: 07-12-06
Applicant/Owner: US Forest Service and others		County: Gunnison
Investigator(s): A. Herb, S. Hall		State: CO
Do Normal Circumstances exist on the site?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Community ID: L5
Is the site significantly disturbed (Atypical Situation)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Transect ID:
Is the area a potential Problem Area? (If needed, explain on reverse)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Plot ID: WL 5-1
		GPS Coordinates:

## VEGETATION

Dominant Plant Species	Stratum	Indicator	Other Plant Species	Stratum	Indicator
1. <i>Carex aquatilis</i>	H	OBL	9. <i>Carex nova</i>	H	FAC
2. <i>Carex rostrata</i>	H	OBL	10. <i>Calamagrostis canadensis</i>	H	OBL
3. <i>Deschampsia caespitosa</i>	H	FACW	11. <i>Pedicularis groenlandica</i>	H	OBL
4. <i>Juncus drummondii</i>	H	FACW	12. <i>Senecio triangularis</i>	H	OBL
5.			13. <i>Carex gynocrates</i>	H	OBL
6.			14. <i>Caltha leptosepala</i>	H	OBL
7.			15.		
8.			16.		

Percent of Dominant Species that are OBL, FACW, or FAC (excluding FAC-): 100%

Remarks: Two wetland areas: one below tailings pile, one adjacent. Both are 100% PEM.

Perimeter: *Juncus drummondii*, *Erythronium grandiflorum* (very common), *Acomastylis rossii*, *Picea engelmannii*, *Poa fendleriana*, *Polygonum bistortoides*, *Deschampsia caespitosa*, *Rhodiola integrifolia*, *Vaccinium myrtillus*, *Carex phaeocephala*

## HYDROLOGY

<input checked="" type="checkbox"/> Recorded Data (Describe in Remarks) <input type="checkbox"/> Stream, Lake, or Tide Gauge <input checked="" type="checkbox"/> Aerial Photographs <input type="checkbox"/> Other <input type="checkbox"/> No Recorded Data Available	<b>Wetland Hydrology Indicators:</b>  <b>Primary Indicators:</b> <input checked="" type="checkbox"/> Inundated <input checked="" type="checkbox"/> Saturated in Upper 12 inches <input type="checkbox"/> Water Marks <input type="checkbox"/> Drift Lines <input type="checkbox"/> Sediment Deposits <input type="checkbox"/> Drainage Patterns in Wetlands  <b>Secondary Indicators (2 or more Required):</b> <input type="checkbox"/> Oxidized Root Channels in Upper 12 inches <input type="checkbox"/> Water-Stained Leaves <input type="checkbox"/> Local Soil Survey Data <input type="checkbox"/> FAC-Neutral Test <input type="checkbox"/> Other (Explain in Remarks)
<b>Field Observations:</b> Depth of Surface Water: _____ 2 _____ (in.) Depth to Free Water in Pit: _____ 0 _____ (in.) Depth to Saturated Soil: _____ 0 _____ (in.)	
Remarks: Area below tailings pile receives water from adit above tailings pile, which filters through pile. Wetland area adjacent to tailings is fed from groundwater and small channels, most likely from same source, but no direct surface connection observed. Larger rivulet to west marks boundary of study area.	

## DATA FORM

## ROUTINE WETLAND DETERMINATION

(1987 USACE Wetlands Delineation Manual)

## SOILS

Map Unit Name:			Drainage Class:														
Taxonomy (Subgroup):			Field Observations Confirm Mapped Type? <input type="checkbox"/> Yes <input type="checkbox"/> No														
Profile Description:																	
Depth (inches)	Horizon	Matrix Color (Munsell Moist)	Mottle Colors (Munsell Moist)	Mottle (Abundance/Contrast)	Texture, Concretions, Structure, etc.												
SP1/ 0-4		No color - no minerals			Fibrous, organic												
4-7		10YR4/1			Fibrous, some clay												
7-12		10YR3/1			Fibrous, sandy clay loam												
SP2/ 0-12		7.5YR3/3			Sandy clay loam												
SP3/ 0-3					Fibrous												
3-12		7.5YR3/3			Sandy clay loam												
SP4/ 0-4					Fibrous												
4-16		7.5YR3/3			Sandy clay loam												
SP5/ 0-4					Fibrous												
4-12		10YR3/1			Sandy clay loam												
<b>Hydric Soil Indicators:</b> <table style="width:100%; border: none;"> <tr> <td><input type="checkbox"/> Histosol</td> <td><input type="checkbox"/> Concretions</td> </tr> <tr> <td><input type="checkbox"/> Histic Epipedon</td> <td><input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils</td> </tr> <tr> <td><input checked="" type="checkbox"/> Sulfidic Odor</td> <td><input type="checkbox"/> Organic Streaking in Sandy Soils</td> </tr> <tr> <td><input type="checkbox"/> Aquic Moisture regime</td> <td><input type="checkbox"/> Listed on Local Hydric Soils List</td> </tr> <tr> <td><input type="checkbox"/> Reducing Conditions</td> <td><input type="checkbox"/> Listed on National Hydric Soils List</td> </tr> <tr> <td><input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors</td> <td><input type="checkbox"/> Other (Explain in Remarks)</td> </tr> </table>						<input type="checkbox"/> Histosol	<input type="checkbox"/> Concretions	<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils	<input checked="" type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Organic Streaking in Sandy Soils	<input type="checkbox"/> Aquic Moisture regime	<input type="checkbox"/> Listed on Local Hydric Soils List	<input type="checkbox"/> Reducing Conditions	<input type="checkbox"/> Listed on National Hydric Soils List	<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Other (Explain in Remarks)
<input type="checkbox"/> Histosol	<input type="checkbox"/> Concretions																
<input type="checkbox"/> Histic Epipedon	<input type="checkbox"/> High Organic Content in Surface Layer in Sandy Soils																
<input checked="" type="checkbox"/> Sulfidic Odor	<input type="checkbox"/> Organic Streaking in Sandy Soils																
<input type="checkbox"/> Aquic Moisture regime	<input type="checkbox"/> Listed on Local Hydric Soils List																
<input type="checkbox"/> Reducing Conditions	<input type="checkbox"/> Listed on National Hydric Soils List																
<input checked="" type="checkbox"/> Gleyed or Low-Chroma Colors	<input type="checkbox"/> Other (Explain in Remarks)																
<b>Remarks:</b> Could possibly be considered a fen. Borderline Histic Epipedon. SP1 - Free water at the surface. Vegetation surrounding pit - <i>Carex aquatilis</i> . SP2 - Saturated to surface. Vegetation surrounding pit - <i>Deschampsia caespitosa</i> , <i>Erythronium grandiflorum</i> . SP3 - Free water at 6 inches. Vegetation surrounding pit - <i>Deschampsia caespitosa</i> . SP4 - Saturated to surface. Vegetation surrounding pit - <i>Calamagrostis canadensis</i> . SP5 - Saturated to surface. Vegetation surrounding pit - <i>Carex gynocrates</i>																	

## WETLAND DETERMINATION

Hydrophytic Vegetation Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Is this Sampling Point Within a Wetland?  <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Wetland Hydrology Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
Hydric Soils Present?	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	
<b>Remarks:</b> Two areas situated around mine adit near toe slope of ridge. Seepage present throughout forms small channels within the wetlands. Wetland below tailings pile - The extent of <i>Carex</i> marks the true boundaries of this area. Wetland is sustained by water liberated from mine pit through open adit and other seepage. Hydrology and FACW vegetation present below site, but no hydric soils (Recent heavy rains contributing to obvious surface hydrology). Wetland adjacent to tailings - Large and irregular, bordered by two-track to south and small creek to west. Groundwater appears to be main contributor. Area contains nice diversity of wetland and upland vegetation.			



**Appendix C**  
**Geotechnical Laboratory Test Results**

## Appendix C

### Geotechnical Laboratory Test Results

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## **TEST PIT SAMPLES**

*Moisture Content*

*Grain Size Distribution*

*Atterberg Limits*

Moisture Content Determinations  
ASTM D 2216

CLIENT: URS Operating Services  
LOCATION: Standard Mine Project #22238347

JOB NO.: 2562-11

BORING	TP-1	TP-2	TP-3	TP-4
SAMPLE DEPTH	2.5'	3.0'	3.5'	3.0'
SAMPLE NO.	Level 225	Level 225	Level 225	Level 225
DATE SAMPLED				
DATE TESTED	10-18-06 RS	10-18-06 RS	10-18-06 RS	10-18-06 RS
SOIL DESCRIPTION				

MOISTURE DETERMINATIONS

Wt. of Wet Soil & Dish (gms)	838.53	890.22	914.88	808.68
Wt. of Dry Soil & Dish (gms)	693.08	757.02	764.48	627.85
Net Loss of Moisture (gms)	145.45	133.20	150.40	180.83
Wt. of Dish (gms)	14.78	14.40	15.22	14.94
Wt. of Dry Soil (gms)	678.30	742.62	749.26	612.91
Moisture Content (%)	21.4	17.9	20.1	29.5

---

BORING	TP-5
SAMPLE DEPTH	3.0'
SAMPLE NO.	Level 225
DATE SAMPLED	
DATE TESTED	10-18-06 RS
SOIL DESCRIPTION	

MOISTURE DETERMINATIONS

Wt. of Wet Soil & Dish (gms)	808.32
Wt. of Dry Soil & Dish (gms)	692.62
Net Loss of Moisture (gms)	115.70
Wt. of Dish (gms)	15.98
Wt. of Dry Soil (gms)	676.64
Moisture Content (%)	17.1

Data entered by:  
Data checked by: RS  
FileName:

SR  
Date: 10/26/06  
USNOMINC

Date:

10/19/2006

ADVANCED TERRA TESTING, INC

Moisture Content Determinations  
ASTM D 2216

CLIENT: URS Operating Services  
LOCATION: Standard Mine Project #22238347

JOB NO.: 2562-11

BORING	TP-1	TP-2	TP-3	TP-4
SAMPLE DEPTH	4.0'	4.5'	4.0'	7.0'
SAMPLE NO.	Level 245	Level 245	Level 245	Level 245
DATE SAMPLED				
DATE TESTED	10-18-06 RS	10-18-06 RS	10-18-06 RS	10-18-06 RS
SOIL DESCRIPTION				
MOISTURE DETERMINATIONS				
Wt. of Wet Soil & Dish (gms)	829.07	1189.92	1080.06	1109.08
Wt. of Dry Soil & Dish (gms)	723.59	1093.68	967.64	1007.14
Net Loss of Moisture (gms)	105.48	96.24	112.42	101.94
Wt. of Dish (gms)	14.97	15.37	15.72	15.80
Wt. of Dry Soil (gms)	708.62	1078.31	951.92	991.34
Moisture Content (%)	14.9	8.9	11.8	10.3

BORING	TP-5	TP-6	TP-7	TP-8
SAMPLE DEPTH	5.0'	4.0'	3.5'	4.5'
SAMPLE NO.	Level 245	Level 245	Level 245	Level 245
DATE SAMPLED				
DATE TESTED	10-18-06 RS	10-18-06 RS	10-18-06 RS	10-18-06 RS
SOIL DESCRIPTION				
MOISTURE DETERMINATIONS				
Wt. of Wet Soil & Dish (gms)	1053.78	1288.00	1329.25	1344.28
Wt. of Dry Soil & Dish (gms)	919.00	1146.77	1180.06	1210.84
Net Loss of Moisture (gms)	134.78	141.23	149.19	133.44
Wt. of Dish (gms)	15.88	15.94	15.77	15.79
Wt. of Dry Soil (gms)	903.12	1130.83	1164.29	1195.05
Moisture Content (%)	14.9	12.5	12.8	11.2

Data entered by:  
Data checked by: RL  
FileName:

SR  
Date: 10/20/06  
USNOMINA

Date:

10/19/2006

ADVANCED TERRA TESTING, INC

Moisture Content Determinations  
ASTM D 2216

CLIENT: URS Operating Services  
LOCATION: Standard Mine Project #22238347

JOB NO.: 2562-11

BORING	TP-1	TP-2	TP-3	TP-4
SAMPLE DEPTH	2.5'	2.5-3.0'	1.5'	1.5'
SAMPLE NO.	Level 2	Level 2	Level 2	Level 2
DATE SAMPLED				
DATE TESTED	10-18-06 RO	10-18-06 RO	10-18-06 RO	10-18-06 RO
SOIL DESCRIPTION				

MOISTURE DETERMINATIONS

Wt. of Wet Soil & Dish (gms)	964.03	1018.50	885.92	1011.16
Wt. of Dry Soil & Dish (gms)	761.36	866.82	789.85	767.21
Net Loss of Moisture (gms)	202.67	151.68	96.07	243.95
Wt. of Dish (gms)	16.05	15.37	16.21	16.23
Wt. of Dry Soil (gms)	745.31	851.45	773.64	750.98
Moisture Content (%)	27.2	17.8	12.4	32.5

BORING	TP-5	TP-6	TP-7	TP-8
SAMPLE DEPTH	8.0'	2.5'	2.5'	3.0'
SAMPLE NO.	Level 2	Level 2	Level 2	Level 2
DATE SAMPLED				
DATE TESTED	10-18-06 RO	10-18-06 RO	10-18-06 RO	10-18-06 RO
SOIL DESCRIPTION				

MOISTURE DETERMINATIONS

Wt. of Wet Soil & Dish (gms)	1166.13	1059.86	1206.40	1184.31
Wt. of Dry Soil & Dish (gms)	1002.40	906.65	1030.01	999.70
Net Loss of Moisture (gms)	163.73	153.21	176.39	184.61
Wt. of Dish (gms)	15.18	15.33	15.32	15.74
Wt. of Dry Soil (gms)	987.22	891.32	1014.69	983.96
Moisture Content (%)	16.6	17.2	17.4	18.8

Data entered by:  
Data checked by: *RS*  
FileName:

SR  
Date: *10/20/06*  
USNOMINB

10/19/2006

ADVANCED TERRA TESTING, INC

Moisture Content Determinations  
ASTM D 2216

CLIENT: URS Operating Systems JOB NO.: 2562-10  
LOCATION: Standard Mine, P.O.#05-06-P-9587, Project #22238347

BORING	TP1-7	TP2-2	TP2-7	TP1-6
SAMPLE DEPTH	1-12'	1-4'	1-5'	1-22'
SAMPLE NO.	1	1	1	1
DATE SAMPLED				
DATE TESTED	9/1/06 RO	9/1/06 RO	9/1/06 RO	9/1/06 RO
SOIL DESCRIPTION				
MOISTURE DETERMINATIONS				
Wt. of Wet Soil & Dish (gms)	1101.62	968.73	705.69	1081.31
Wt. of Dry Soil & Dish (gms)	1031.48	808.05	605.44	961.23
Net Loss of Moisture (gms)	70.14	160.68	100.25	120.08
Wt. of Dish (gms)	16.31	16.08	16.29	14.40
Wt. of Dry Soil (gms)	1015.17	791.97	589.15	946.83
Moisture Content (%)	6.9	20.3	17.0	12.7

BORING	TP2-4	TP1-2	TP1-4	TP2-6
SAMPLE DEPTH	1-4'	1-10.5'	1-15'	1-5'
SAMPLE NO.	1	1	1	1
DATE SAMPLED				
DATE TESTED	9/1/06 RO	9/1/06 RO	9/1/06 RO	9/1/06 RO
SOIL DESCRIPTION				
MOISTURE DETERMINATIONS				
Wt. of Wet Soil & Dish (gms)	905.07	678.27	1248.78	956.45
Wt. of Dry Soil & Dish (gms)	745.84	609.62	1122.11	857.28
Net Loss of Moisture (gms)	159.23	68.65	126.67	99.17
Wt. of Dish (gms)	15.50	14.20	15.40	15.17
Wt. of Dry Soil (gms)	730.34	595.42	1106.71	842.11
Moisture Content (%)	21.8	11.5	11.45	11.78

Data entered by: PPM  
Data checked by: PPM  
FileName:

RS  
Date: 09/06/06  
USN0SMT2

09/06/2006  
ADVANCED TERRA TESTING, INC

Moisture Content Determinations  
ASTM D 2216

CLIENT: URS Operating Systems      JOB NO.: 2562-10  
LOCATION: Standard Mine, P.O.#05-06-P-9587, Project #22238347

BORING	TP2-8	TP2-3	TP1-5	TP1-8
SAMPLE DEPTH	1-7'	1-8'	1-12'	1-9'
SAMPLE NO.	1	1	1	1
DATE SAMPLED				
DATE TESTED	9/1/06 RO	9/1/06 RO	9/1/06 RO	9/1/06 RO
SOIL DESCRIPTION				

MOISTURE DETERMINATIONS

Wt. of Wet Soil & Dish (gms)	1045.08	1396.54	1133.56	1249.29
Wt. of Dry Soil & Dish (gms)	916.21	1221.19	1039.24	1127.25
Net Loss of Moisture (gms)	128.87	175.35	94.32	122.04
Wt. of Dish (gms)	15.86	15.70	15.96	15.22
Wt. of Dry Soil (gms)	900.35	1205.49	1023.28	1112.03
Moisture Content (%)	14.3	14.5	9.2	11.0

---

BORING	TP1-3	TP1-1	TP2-5	TP2-1
SAMPLE DEPTH	1-14'	1-7'	1-4'	1-5'
SAMPLE NO.	1	1	1	1
DATE SAMPLED				
DATE TESTED	9/1/06 RO	9/1/06 RO	9/1/06 RO	9/1/06 RO
SOIL DESCRIPTION				

MOISTURE DETERMINATIONS

Wt. of Wet Soil & Dish (gms)	980.63	1308.65	1117.39	1138.63
Wt. of Dry Soil & Dish (gms)	874.19	1136.23	964.78	974.09
Net Loss of Moisture (gms)	106.44	172.42	152.61	164.54
Wt. of Dish (gms)	15.68	15.51	15.87	15.73
Wt. of Dry Soil (gms)	858.51	1120.72	948.91	958.36
Moisture Content (%)	12.4	15.4	16.08	17.17

Data entered by:  
Data checked by: DLM  
FileName:

RS      Date: 09/06/06  
USN0SMTP

09/06/2006 .

ADVANCED TERRA TESTING, INC



**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-1  
DEPTH 2.5'  
SAMPLE NO. Level 225  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 10-26-06 RS  
DATE - #4 WASHED 10-30-06 RO  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 109.01  
Wt. Dry Soil & Pan (g) 104.72  
Wt. Lost Moisture (g) 4.29  
Wt. of Pan Only (g) 3.63  
Wt. of Dry Soil (g) 101.09  
Moisture Content % 4.2

Wt. Total Sample  
Wet (g) 2733.40  
Weight of + #4  
Before Washing (g) 889.20  
Weight of + #4  
After Washing (g) 856.02  
Weight of - #4  
Wet (g) 1844.20  
Weight of - #4  
Dry (g) 1800.95  
Wt. Total Sample  
Dry (g) 2656.97

Wt. Partial - #4 Sample Wet (g) 202.79  
Wt. Partial Sample Dry (g) 194.53

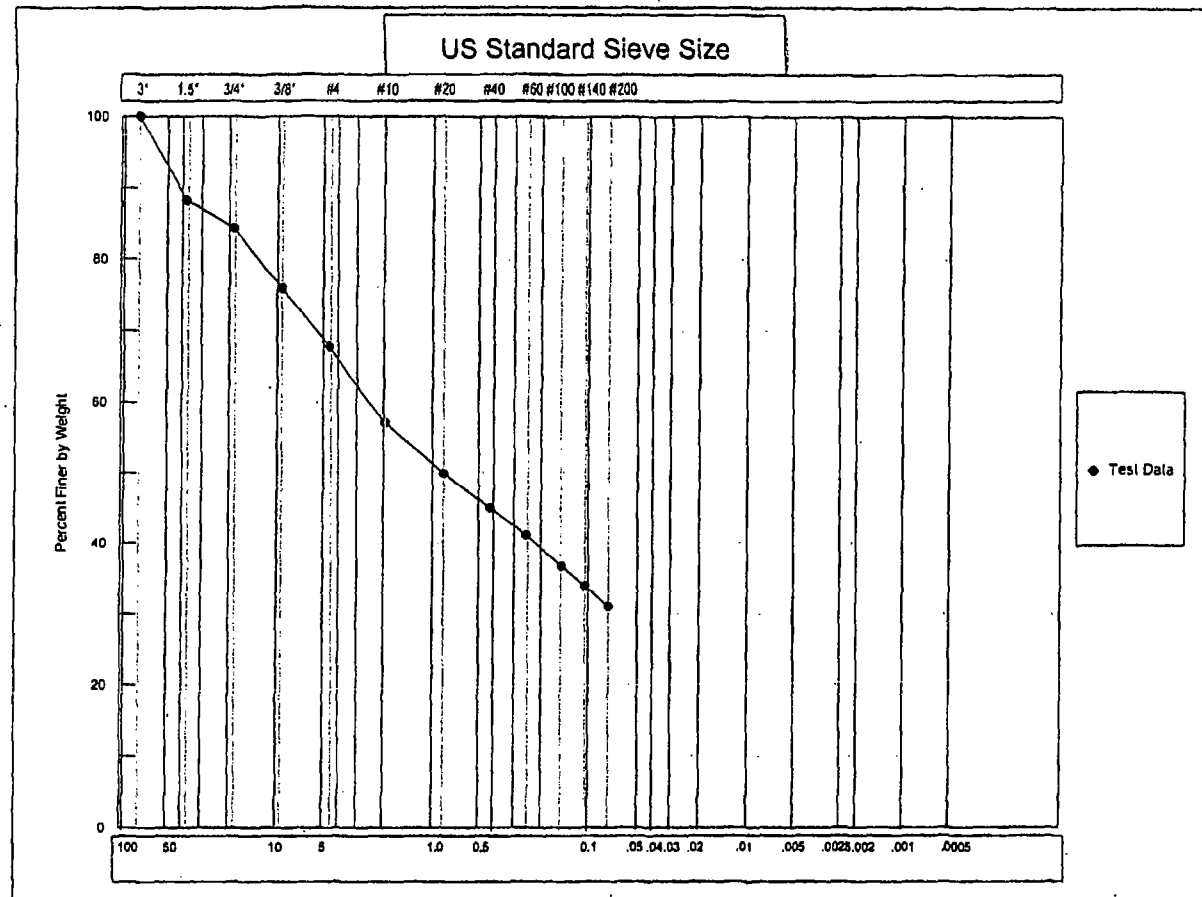
Calc. Wt. "W" (g) 287.00  
Calc. Mass + #4 92.47

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	312.38	312.38	312.38	11.8	88.2
3/4"	0.00	103.60	103.60	415.98	15.7	84.3
3/8"	0.00	224.04	224.04	640.02	24.1	75.9
#4	0.00	216.00	216.00	856.02	32.2	67.8
#10	3.67	34.29	30.62	30.62	42.9	57.1
#20	3.67	24.49	20.82	51.44	50.1	49.9
#40	3.67	17.67	14.00	65.44	55.0	45.0
#60	3.72	15.03	11.31	76.75	59.0	41.0
#100	1.76	14.25	12.49	89.24	63.3	36.7
#140	1.73	9.75	8.02	97.26	66.1	33.9
#200	1.79	9.96	8.17	105.43	69.0	31.0

Data entered by: SR  
Data checked by: RS  
FileName: USM0125

Date: 10/31/2006  
Date: 11/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP-1  
 Job Number: 2562-11    Depth: 2.5'  
 Classification: **Classification Not Performed**

Sample No.: Level 225

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-2  
DEPTH 2.5-3.0'  
SAMPLE NO. Level 225  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 10-26-06 RS  
DATE -#4 WASHED 10-30-06 RO  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 100.86  
Wt. Dry Soil & Pan (g) 98.60  
Wt. Lost Moisture (g) 2.26  
Wt. of Pan Only (g) 3.68  
Wt. of Dry Soil (g) 94.92  
Moisture Content % 2.4

Wt. Total Sample  
Wet (g) 2396.80  
Weight of + #4  
Before Washing (g) 957.00  
Weight of + #4  
After Washing (g) 931.78  
Weight of - #4  
Wet (g) 1439.80  
Weight of - #4  
Dry (g) 1430.95  
Wt. Total Sample  
Dry (g) 2362.73

Wt. Partial -#4 Sample Wet (g) 203.54  
Wt. Partial Sample Dry (g) 198.81

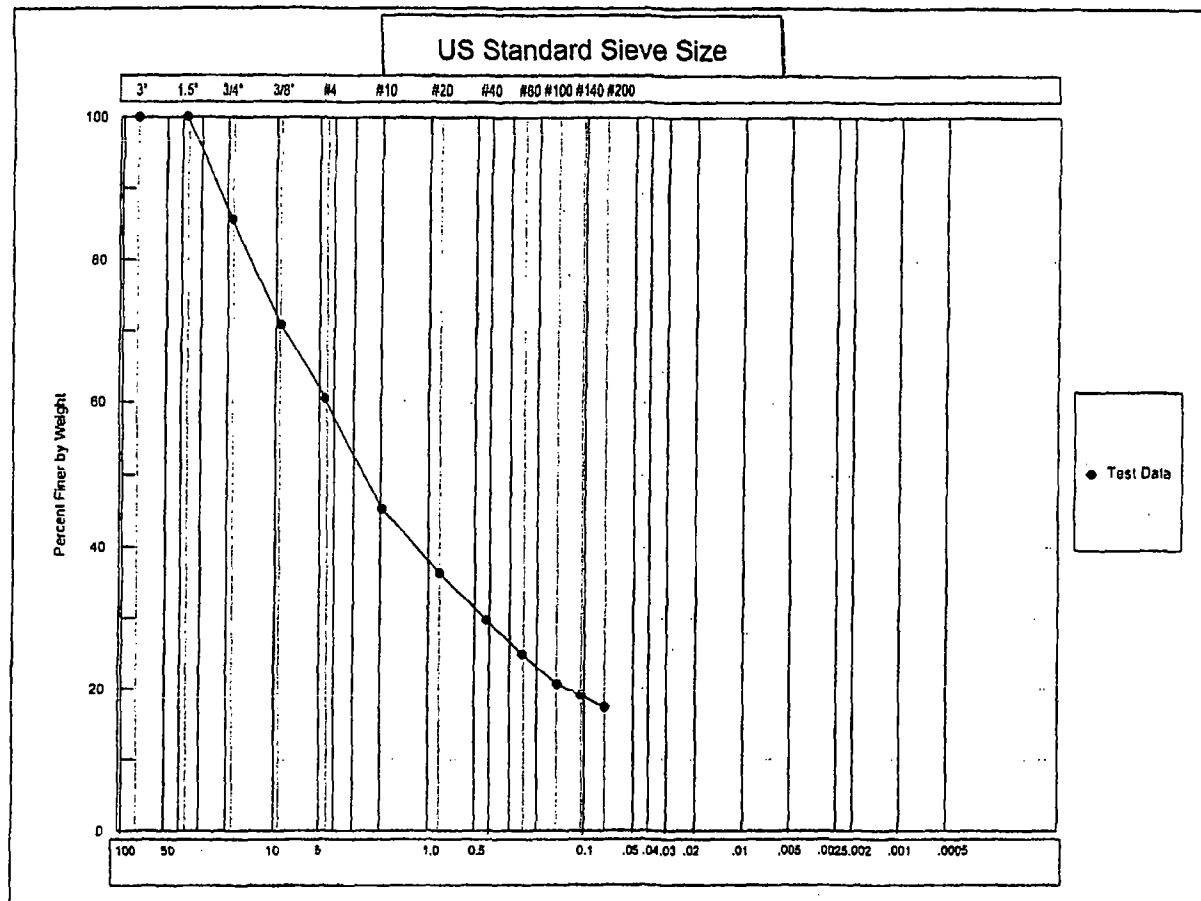
Calc. Wt. "W" (g) 328.26  
Calc. Mass + #4 129.46

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	338.55	338.55	338.55	14.3	85.7
3/8"	0.00	346.53	346.53	685.08	29.0	71.0
#4	0.00	246.70	246.70	931.78	39.4	60.6
#10	1.72	51.57	49.85	49.85	54.6	45.4
#20	1.72	31.34	29.62	79.47	63.6	36.4
#40	1.73	23.18	21.45	100.92	70.2	29.8
#60	1.77	18.04	16.27	117.19	75.1	24.9
#100	1.74	15.61	13.87	131.06	79.4	20.6
#140	1.75	6.91	5.16	136.22	80.9	19.1
#200	1.76	7.24	5.48	141.70	82.6	17.4

Data entered by: SR  
Data checked by: RS  
FileName: USM0225

Date: 10/31/2006  
Date: 11/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY			
	COARSE	FINE	CRS	MEDIUM	FINE				
COBBLES TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE	SILT	CLAY

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP-2  
 Job Number: 2562-11    Depth: 2.5-3.0'  
 Classification: Classification Not Performed

Sample No.: Level 225

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-3  
DEPTH 3.5'  
SAMPLE NO. Level 225  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 10-26-06 RS  
DATE -#4 WASHED 10-30-06 RO  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 95.96  
Wt. Dry Soil & Pan (g) 93.58  
Wt. Lost Moisture (g) 2.38  
Wt. of Pan Only (g) 3.81  
Wt. of Dry Soil (g) 89.77  
Moisture Content % 2.7

Wt. Total Sample  
Wet (g) 2818.00  
Weight of + #4  
Before Washing (g) 1248.60  
Weight of + #4  
After Washing (g) 1215.00  
Weight of - #4  
Wet (g) 1569.40  
Weight of - #4  
Dry (g) 1561.60  
Wt. Total Sample  
Dry (g) 2776.60

Wt. Partial -#4 Sample Wet (g) 229.38  
Wt. Partial Sample Dry (g) 223.46

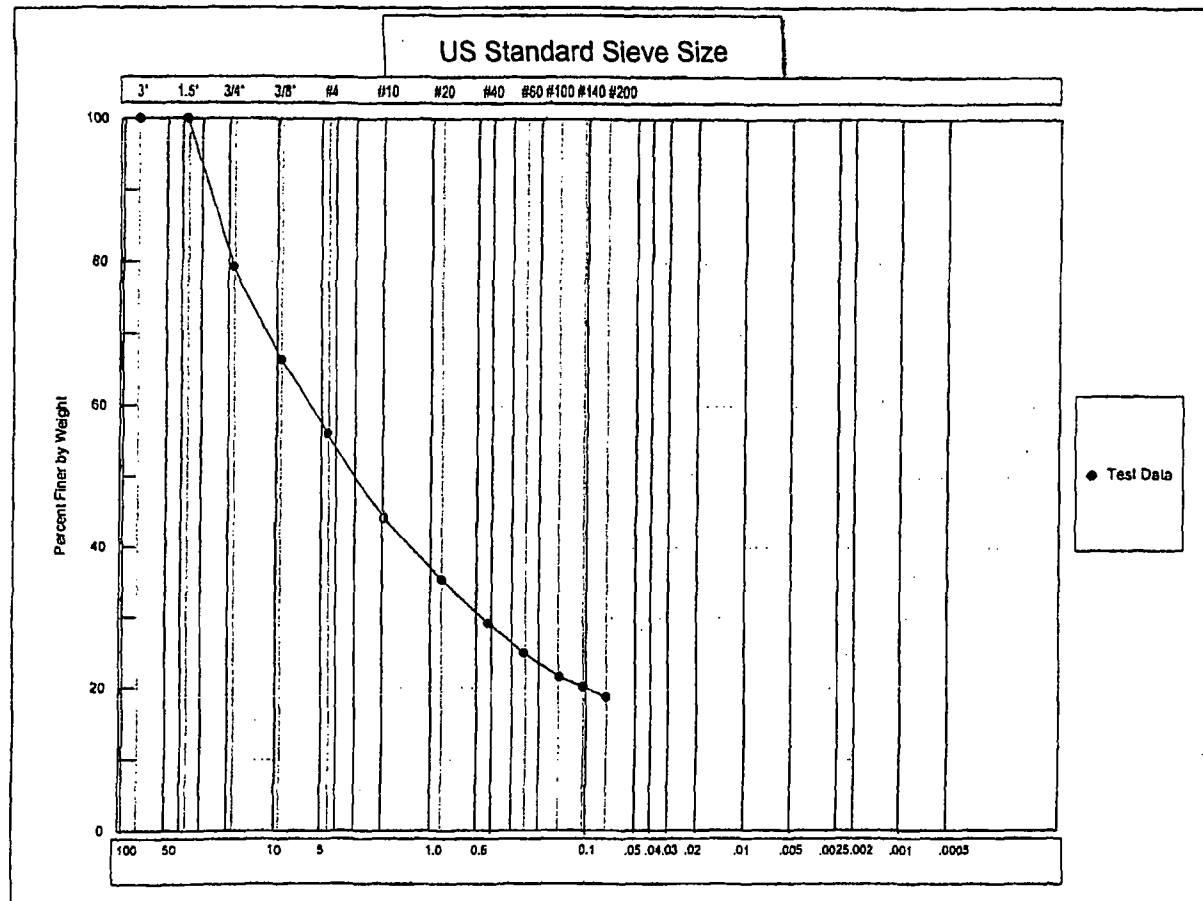
Calc. Wt. "W" (g) 397.32  
Calc. Mass + #4 173.86

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	574.10	574.10	574.10	20.7	79.3
3/8"	0.00	358.18	358.18	932.28	33.6	66.4
#4	0.00	282.72	282.72	1215.00	43.8	56.2
#10	1.77	50.02	48.25	48.25	55.9	44.1
#20	1.79	36.40	34.61	82.86	64.6	35.4
#40	1.77	26.47	24.70	107.56	70.8	29.2
#60	1.76	18.53	16.77	124.33	75.1	24.9
#100	1.77	15.36	13.59	137.92	78.5	21.5
#140	1.77	7.31	5.54	143.46	79.9	20.1
#200	1.77	7.54	5.77	149.23	81.3	18.7

Data entered by: SR  
Data checked by: RS  
FileName: USM0335

Date: 10/31/2006  
Date: 11/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-3  
 Job Number: 2562-11 Depth: 3.5'  
 Classification: **Classification Not Performed**

Sample No.: Level 225

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-4  
DEPTH 3.0'  
SAMPLE NO. Level 225  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+ #4 WASHED 10-23-06 RS  
DATE - #4 WASHED 10-25-06 SR  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 114.62  
Wt. Dry Soil & Pan (g) 107.32  
Wt. Lost Moisture (g) 7.30  
Wt. of Pan Only (g) 3.73  
Wt. of Dry Soil (g) 103.59  
Moisture Content % 7.0

Wt. Total Sample  
Wet (g) 773.80  
Weight of + #4  
Before Washing (g) 130.83  
Weight of + #4  
After Washing (g) 125.06  
Weight of - #4  
Wet (g) 642.97  
Weight of - #4  
Dry (g) 606.03  
Wt. Total Sample  
Dry (g) 731.09

Wt. Partial - #4 Sample Wet (g) 195.93  
Wt. Partial Sample Dry (g) 183.03

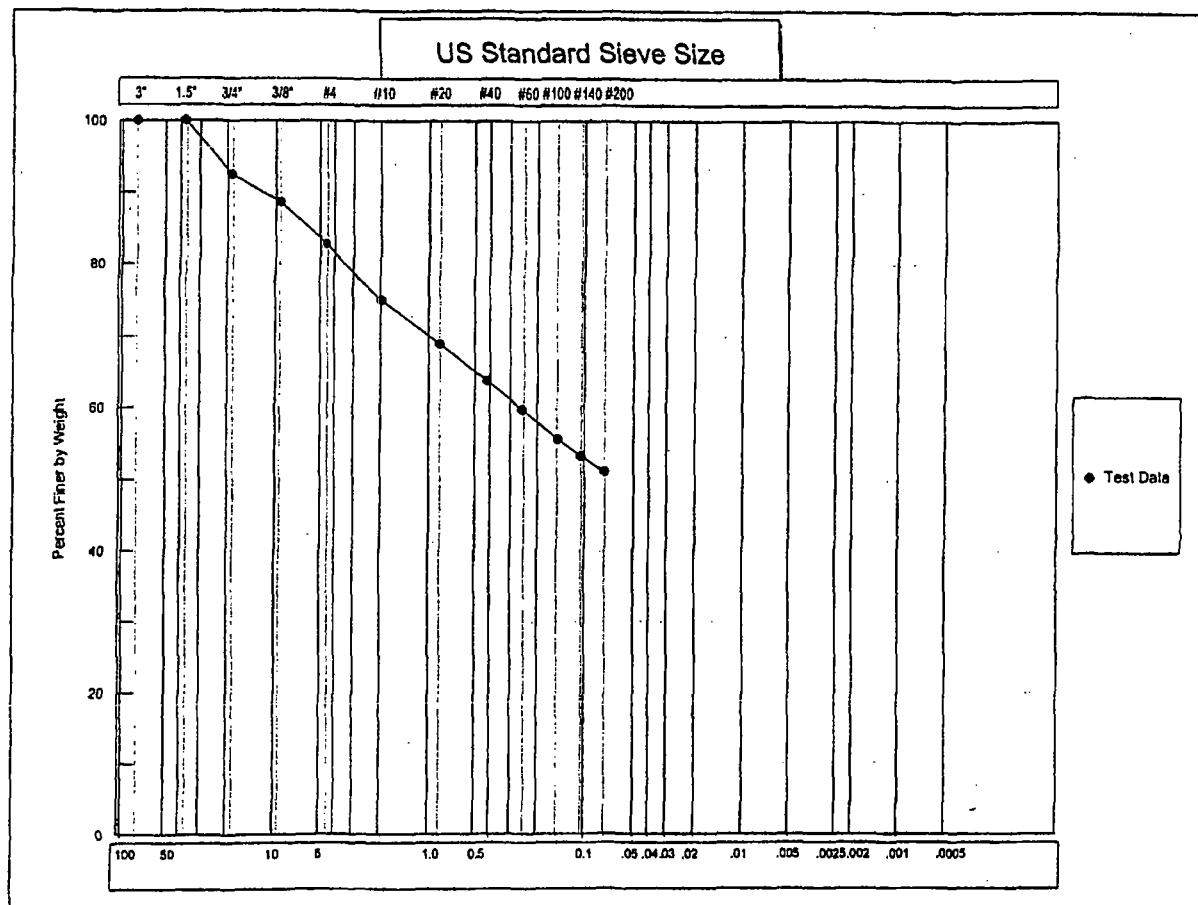
Calc. Wt. "W" (g) 220.80  
Calc. Mass + #4 37.77

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	54.75	54.75	54.75	7.5	92.5
3/8"	0.00	27.76	27.76	82.51	11.3	88.7
#4	0.00	42.55	42.55	125.06	17.1	82.9
#10	3.74	21.02	17.28	17.28	24.9	75.1
#20	3.78	17.05	13.27	30.55	30.9	69.1
#40	3.70	15.16	11.46	42.01	36.1	63.9
#60	3.76	12.72	8.96	50.97	40.2	59.8
#100	3.65	12.66	9.01	59.98	44.3	55.7
#140	3.68	9.05	5.37	65.35	46.7	53.3
#200	3.74	8.39	4.65	70.00	48.8	51.2

Data entered by: SR  
Data checked by: RS  
FileName: USM0TP4

Date: 10/26/2006  
Date: 10/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-4  
 Job Number: 2562-11 Depth: 3.0'  
 Classification: **Classification Not Performed**

Sample No.: Level 225

Advanced Terra Testing, Inc.



**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
**ASTM D 6913**

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-5  
DEPTH 3.0'  
SAMPLE NO. Level 225  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 10-25-06 RS  
DATE -#4 WASHED 10-27-06 SR  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 103.83  
Wt. Dry Soil & Pan (g) 101.80  
Wt. Lost Moisture (g) 2.03  
Wt. of Pan Only (g) 3.67  
Wt. of Dry Soil (g) 98.13  
Moisture Content % 2.1

Wt. Total Sample  
Wet (g) 1912.20  
Weight of + #4  
Before Washing (g) 502.60  
Weight of + #4  
After Washing (g) 443.46  
Weight of - #4  
Wet (g) 1409.60  
Weight of - #4  
Dry (g) 1438.97  
Wt. Total Sample  
Dry (g) 1882.43  
Calc. Wt. "W" (g) 292.72  
Calc. Mass + #4 68.96

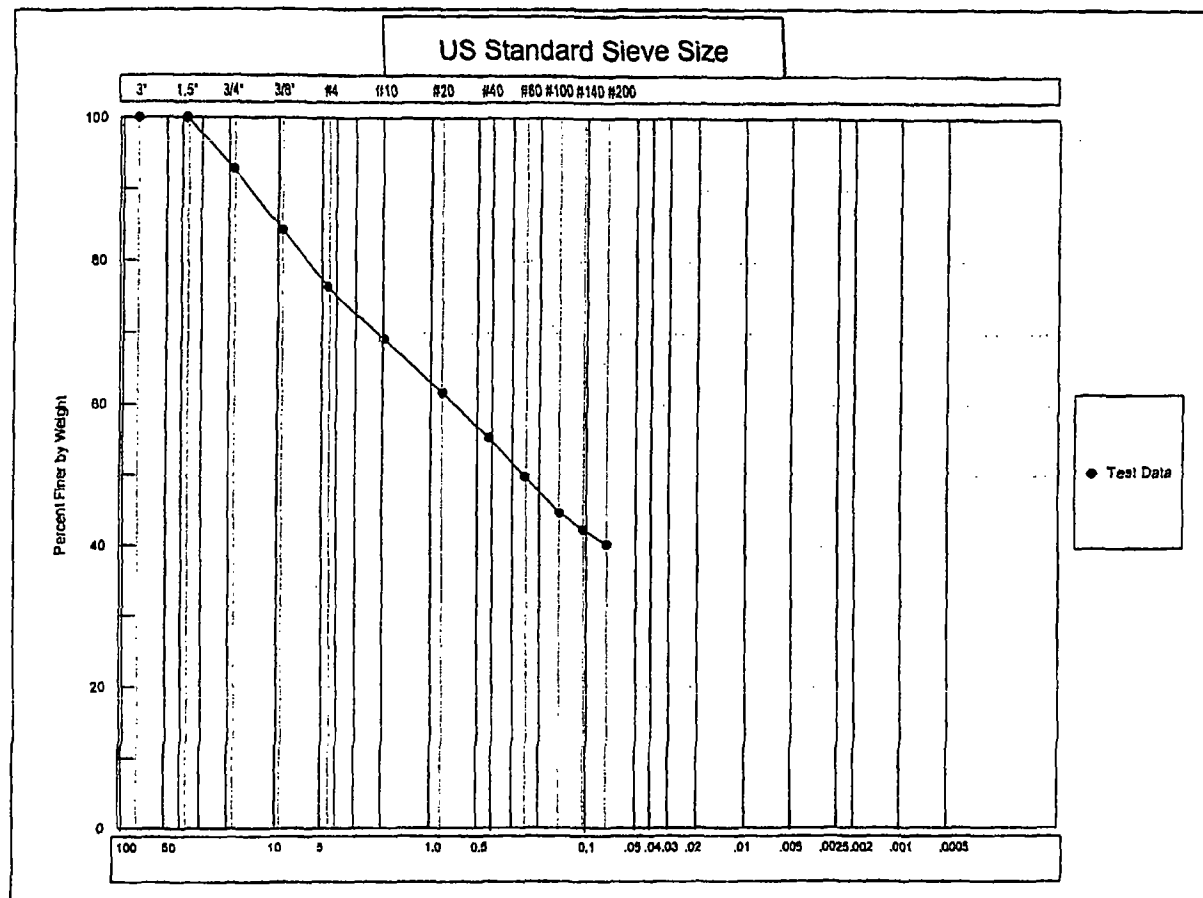
Wt. Partial -#4 Sample Wet (g) 228.39  
Wt. Partial Sample Dry (g) 223.76

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	135.38	135.38	135.38	7.2	92.8
3/8"	0.00	159.62	159.62	295.00	15.7	84.3
#4	0.00	148.46	148.46	443.46	23.6	76.4
#10	3.68	24.93	21.25	21.25	30.8	69.2
#20	3.64	25.63	21.99	43.24	38.3	61.7
#40	3.66	22.12	18.46	61.70	44.6	55.4
#60	3.69	19.99	16.30	78.00	50.2	49.8
#100	3.63	18.73	15.10	93.10	55.4	44.6
#140	3.67	10.68	7.01	100.11	57.8	42.2
#200	3.70	9.69	5.99	106.10	59.8	40.2

Data entered by: RS SR  
Data checked by: RS  
FileName: USM0530

Date: 10/31/2006  
Date: 11/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-5  
 Job Number: 2562-11 Depth: 3.0'  
 Classification: Classification Not Performed

Sample No.: Level 225

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
**ASTM D 6913**

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-1  
 DEPTH 4.0'  
 SAMPLE NO. Level 245  
 SOIL DESCR. Project #22238347  
 LOCATION Standard Mine

SAMPLED  
 DATE+#4 WASHED 10-25-06 RS  
 DATE -#4 WASHED 10-27-06 RO  
 WASH SIEVE Yes  
 DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 77.46  
 Wt. Dry Soil & Pan (g) 76.07  
 Wt. Lost Moisture (g) 1.39  
 Wt. of Pan Only (g) 3.71  
 Wt. of Dry Soil (g) 72.36  
 Moisture Content % 1.9

Wt. Total Sample  
 Wet (g) 2724.50  
 Weight of + #4  
 Before Washing (g) 1178.00  
 Weight of + #4  
 After Washing (g) 1153.85  
 Weight of - #4  
 Wet (g) 1546.50  
 Weight of - #4  
 Dry (g) 1541.05  
 Wt. Total Sample  
 Dry (g) 2694.90

Wt. Partial -#4 Sample Wet (g) 176.75  
 Wt. Partial Sample Dry (g) 173.42

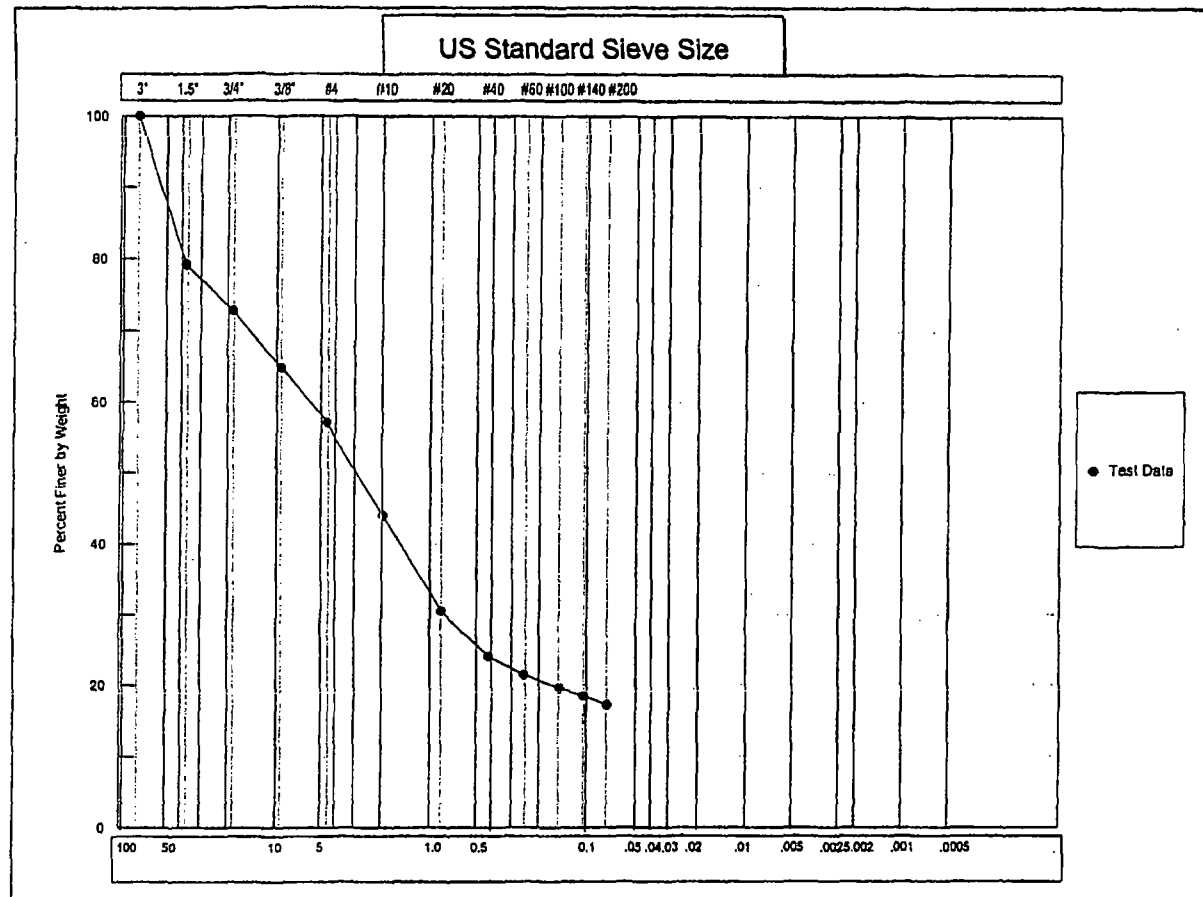
Calc. Wt. "W" (g) 303.26  
 Calc. Mass + #4 129.85

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	559.91	559.91	559.91	20.8	79.2
3/4"	0.00	173.28	173.28	733.19	27.2	72.8
3/8"	0.00	212.95	212.95	946.14	35.1	64.9
#4	0.00	207.71	207.71	1153.85	42.8	57.2
#10	3.72	43.58	39.86	39.86	56.0	44.0
#20	3.66	44.87	41.21	81.07	69.5	30.5
#40	3.71	23.08	19.37	100.44	75.9	24.1
#60	3.63	11.69	8.06	108.50	78.6	21.4
#100	3.65	9.23	5.58	114.08	80.4	19.6
#140	3.71	7.24	3.53	117.61	81.6	18.4
#200	3.77	7.70	3.93	121.54	82.9	17.1

Data entered by: SR  
 Data checked by: RS  
 FileName: USM014

Date: 10/31/2006  
 Date: 11/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	CRS	MEDIUM	FINE	

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-1  
 Job Number: 2562-11 Depth: 4.0'  
 Classification: **Classification Not Performed**

Sample No.: Level 245

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-2  
DEPTH 4.5  
SAMPLE NO. Level 245  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 10-23-06 RS  
DATE - #4 WASHED 10-25-06 SR  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 80.10  
Wt. Dry Soil & Pan (g) 77.55  
Wt. Lost Moisture (g) 2.55  
Wt. of Pan Only (g) 3.69  
Wt. of Dry Soil (g) 73.86  
Moisture Content % 3.5

Wt. Total Sample  
Wet (g) 3085.30  
Weight of + #4  
Before Washing (g) 772.70  
Weight of + #4  
After Washing (g) 744.97  
Weight of - #4  
Wet (g) 2312.60  
Weight of - #4  
Dry (g) 2262.23  
Wt. Total Sample  
Dry (g) 3007.20

Wt. Partial - #4 Sample Wet (g) 208.03  
Wt. Partial Sample Dry (g) 201.09

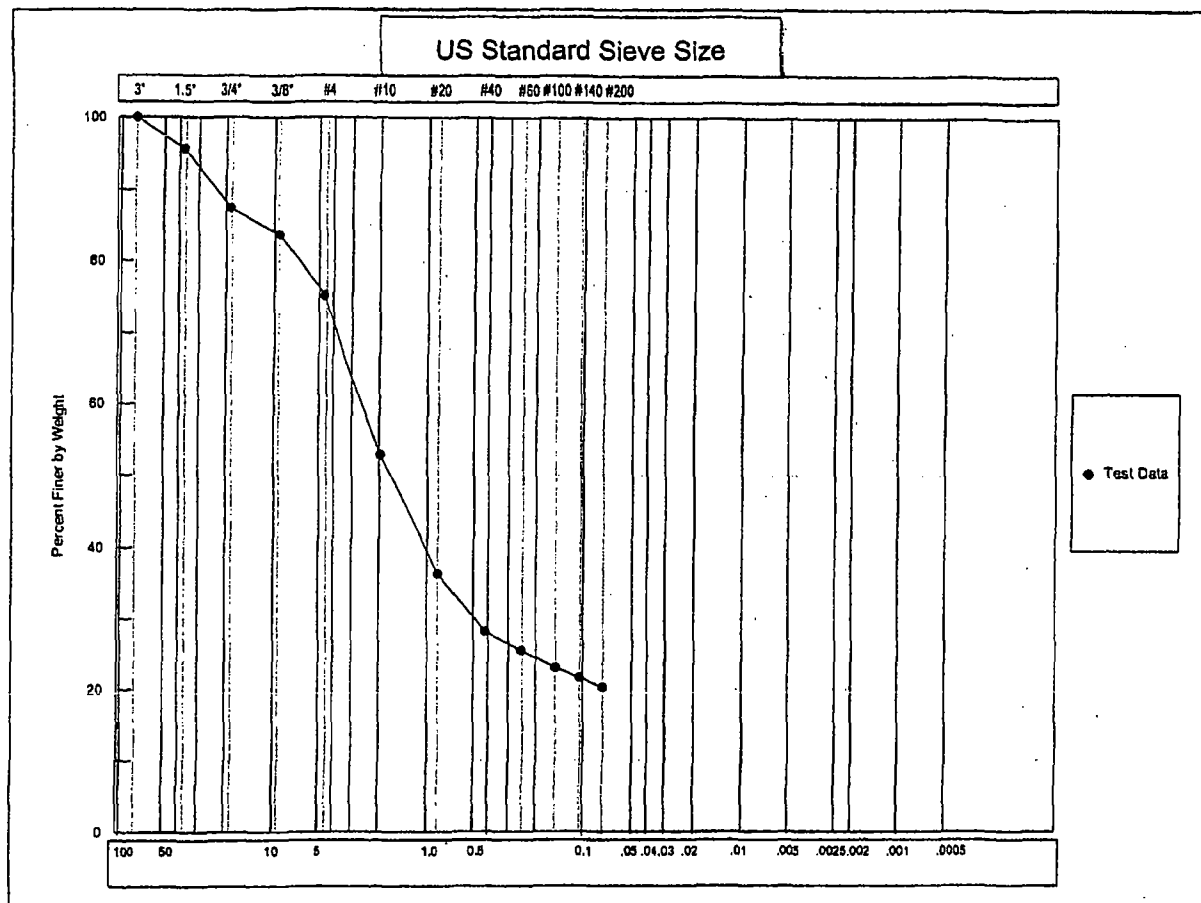
Calc. Wt. "W" (g) 267.31  
Calc. Mass + #4 66.22

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	131.48	131.48	131.48	4.4	95.6
3/4"	0.00	245.96	245.96	377.44	12.6	87.4
3/8"	0.00	111.18	111.18	488.62	16.2	83.8
#4	0.00	256.35	256.35	744.97	24.8	75.2
#10	3.73	63.72	59.99	59.99	47.2	52.8
#20	3.70	47.75	44.05	104.04	63.7	36.3
#40	3.70	25.37	21.67	125.71	71.8	28.2
#60	3.72	11.01	7.29	133.00	74.5	25.5
#100	3.74	10.23	6.49	139.49	77.0	23.0
#140	3.63	7.35	3.72	143.21	78.3	21.7
#200	3.59	7.26	3.67	146.88	79.7	20.3

Data entered by: SR  
Data checked by: RS  
FileName: USM0TP2

Date: 10/26/2006  
Date: 10/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP-2  
 Job Number: 2562-11    Depth: 4.5  
 Classification: Classification Not Performed

Sample No.: Level 245

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-3  
DEPTH 4.0'  
SAMPLE NO. Level 245  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 10-25-06 RS  
DATE -#4 WASHED 10-26-06 SR  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 97.03  
Wt. Dry Soil & Pan (g) 95.26  
Wt. Lost Moisture (g) 1.77  
Wt. of Pan Only (g) 3.73  
Wt. of Dry Soil (g) 91.53  
Moisture Content % 1.9

Wt. Total Sample  
Wet (g) 3838.50  
Weight of + #4  
Before Washing (g) 1220.90  
Weight of + #4  
After Washing (g) 1196.18  
Weight of - #4  
Wet (g) 2617.60  
Weight of - #4  
Dry (g) 2592.19  
Wt. Total Sample  
Dry (g) 3788.37

Wt. Partial -#4 Sample Wet (g) 213.82  
Wt. Partial Sample Dry (g) 209.76

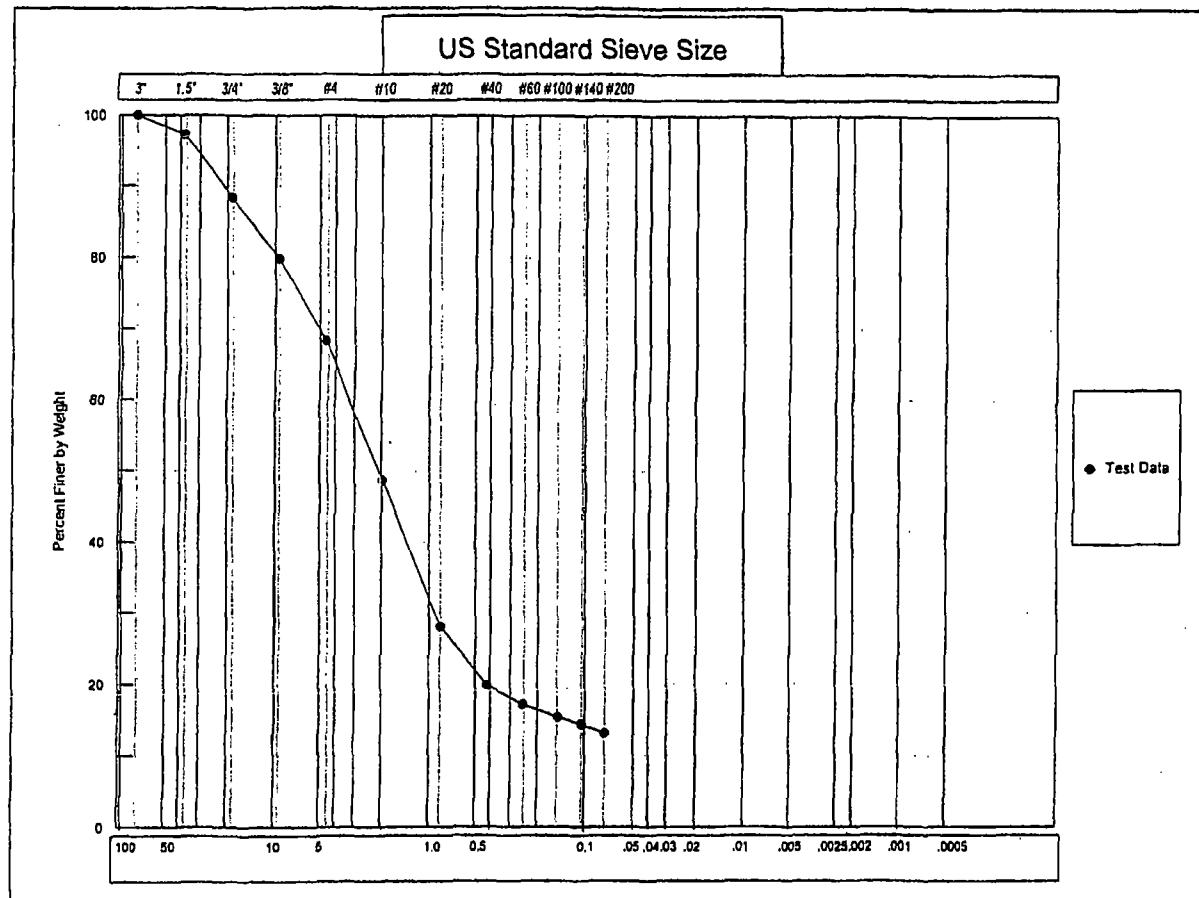
Calc. Wt. "W" (g) 306.56  
Calc. Mass + #4 96.80

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	104.53	104.53	104.53	2.8	97.2
3/4"	0.00	335.42	335.42	439.95	11.6	88.4
3/8"	0.00	325.37	325.37	765.32	20.2	79.8
#4	0.00	430.86	430.86	1196.18	31.6	68.4
#10	3.70	64.15	60.45	60.45	51.3	48.7
#20	3.74	67.05	63.31	123.76	71.9	28.1
#40	3.65	28.92	25.27	149.03	80.2	19.8
#60	3.76	12.08	8.32	157.35	82.9	17.1
#100	3.67	9.14	5.47	162.82	84.7	15.3
#140	3.68	6.76	3.08	165.90	85.7	14.3
#200	3.68	7.37	3.69	169.59	86.9	13.1

Data entered by: SR  
Data checked by: RS  
FileName: USM0P340

Date: 10/27/2006  
Date: 10/27/06

ADVANCED TERRA TESTING, INC.





**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-4  
DEPTH 7.0'  
SAMPLE NO. Level 245  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 10-23-06 RS  
DATE - #4 WASHED 10-25-06 SR  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 108.82  
Wt. Dry Soil & Pan (g) 105.50  
Wt. Lost Moisture (g) 3.32  
Wt. of Pan Only (g) 3.72  
Wt. of Dry Soil (g) 101.78  
Moisture Content % 3.3

Wt. Total Sample  
Wet (g) 5638.40  
Weight of + #4  
Before Washing (g) 2255.20  
Weight of + #4  
After Washing (g) 2167.06  
Weight of - #4  
Wet (g) 3383.20  
Weight of - #4  
Dry (g) 3361.68  
Wt. Total Sample  
Dry (g) 5528.74

Wt. Partial -#4 Sample Wet (g) 199.72  
Wt. Partial Sample Dry (g) 193.41

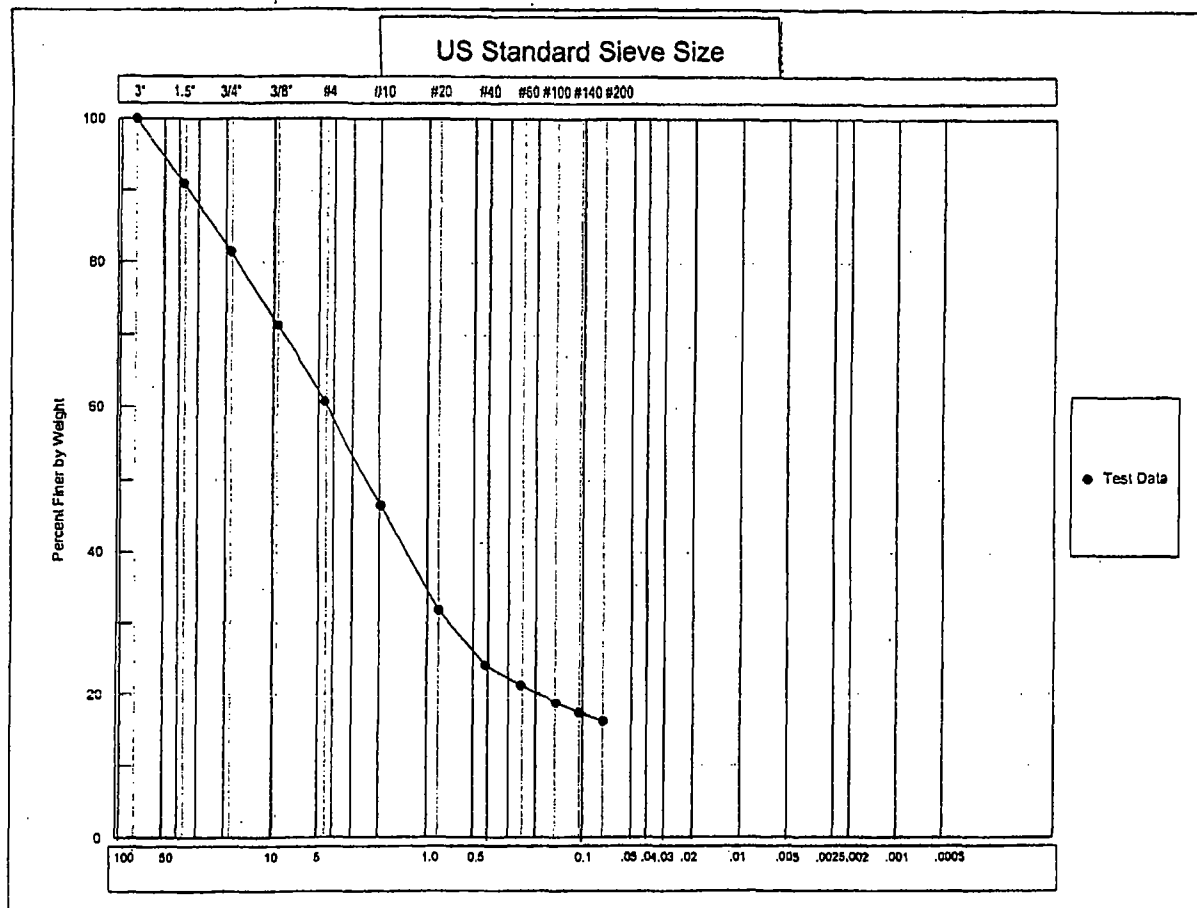
Calc. Wt. "W" (g) 318.09  
Calc. Mass + #4 124.68

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	499.66	499.66	499.66	9.0	91.0
3/4"	0.00	523.82	523.82	1023.48	18.5	81.5
3/8"	0.00	565.85	565.85	1589.33	28.7	71.3
#4	0.00	577.73	577.73	2167.06	39.2	60.8
#10	3.66	48.90	45.24	45.24	53.4	46.6
#20	3.62	50.58	46.96	92.20	68.2	31.8
#40	4.04	28.81	24.77	116.97	76.0	24.0
#60	3.69	12.75	9.06	126.03	78.8	21.2
#100	3.70	11.27	7.57	133.60	81.2	18.8
#140	3.75	8.40	4.65	138.25	82.7	17.3
#200	3.70	7.48	3.78	142.03	83.8	16.2

Data entered by: SR  
Data checked by: RS  
FileName: USM0P470

Date: 10/26/2006  
Date: 10/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP-4  
 Job Number: 2562-11    Depth: 7.0'  
 Classification: Classification Not Performed

Sample No.: Level 245

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
**ASTM D 6913**

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-5  
DEPTH 5.0'  
SAMPLE NO. Level 245  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 10-25-06 RS  
DATE - #4 WASHED 10-26-06 SR  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes  
NATURAL No

Wt. Wet Soil & Pan (g) 60.16  
Wt. Dry Soil & Pan (g) 58.52  
Wt. Lost Moisture (g) 1.64  
Wt. of Pan Only (g) 3.69  
Wt. of Dry Soil (g) 54.83  
Moisture Content % 3.0

Wt. Total Sample Wet (g) 2682.99  
Weight of + #4 Before Washing (g) 1040.69  
Weight of + #4 After Washing (g) 993.55  
Weight of - #4 Wet (g) 1642.30  
Weight of - #4 Dry (g) 1640.38  
Wt. Total Sample Dry (g) 2633.93  
Calc. Wt. "W" (g) 275.64  
Calc. Mass + #4 103.98

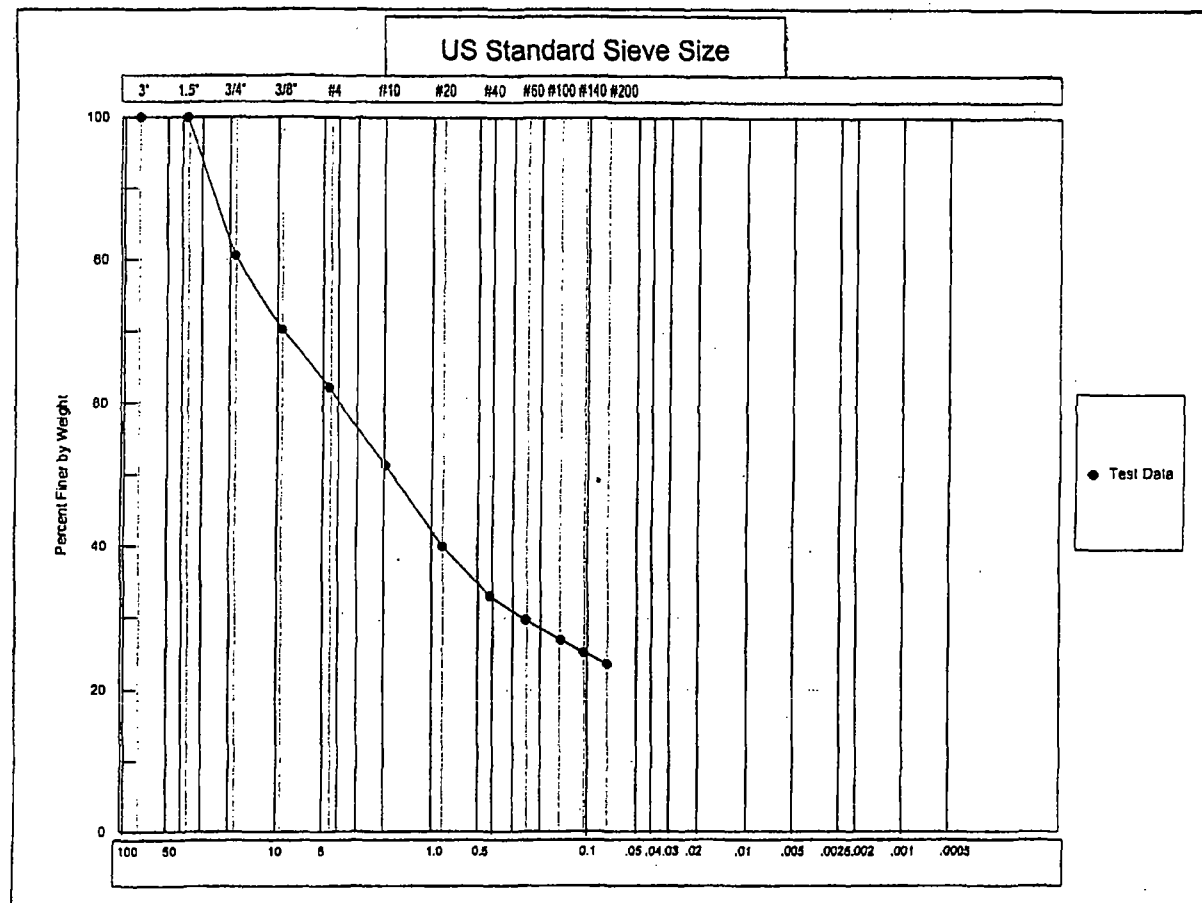
Wt. Partial - #4 Sample Wet (g) 176.80  
Wt. Partial Sample Dry (g) 171.67

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	510.61	510.61	510.61	19.4	80.6
3/8"	0.00	271.15	271.15	781.76	29.7	70.3
#4	0.00	211.79	211.79	993.55	37.7	62.3
#10	3.64	33.54	29.90	29.90	48.6	51.4
#20	3.61	35.13	31.52	61.42	60.0	40.0
#40	3.71	22.71	19.00	80.42	66.9	33.1
#60	3.60	12.94	9.34	89.76	70.3	29.7
#100	3.67	11.47	7.80	97.56	73.1	26.9
#140	3.69	8.48	4.79	102.35	74.9	25.1
#200	3.72	8.17	4.45	106.80	76.5	23.5

Data entered by: SR  
Data checked by: RS  
FileName: USM0P550

Date: 10/27/2006  
Date: 10/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-5  
 Job Number: 2562-11 Depth: 5.0'  
 Classification: Classification Not Performed

Sample No.: Level 245

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-6  
DEPTH 4.0'  
SAMPLE NO. Level 245  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 10-25-06 RS  
DATE - #4 WASHED 10-26-06 SR  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 114.79  
Wt. Dry Soil & Pan (g) 112.34  
Wt. Lost Moisture (g) 2.45  
Wt. of Pan Only (g) 3.67  
Wt. of Dry Soil (g) 108.67  
Moisture Content % 2.3

Wt. Total Sample  
Wet (g) 3634.91  
Weight of + #4  
Before Washing (g) 1759.27  
Weight of + #4  
After Washing (g) 1698.55  
Weight of - #4  
Wet (g) 1875.64  
Weight of - #4  
Dry (g) 1893.67  
Wt. Total Sample  
Dry (g) 3592.22

Wt. Partial - #4 Sample Wet (g) 217.75  
Wt. Partial Sample Dry (g) 212.95

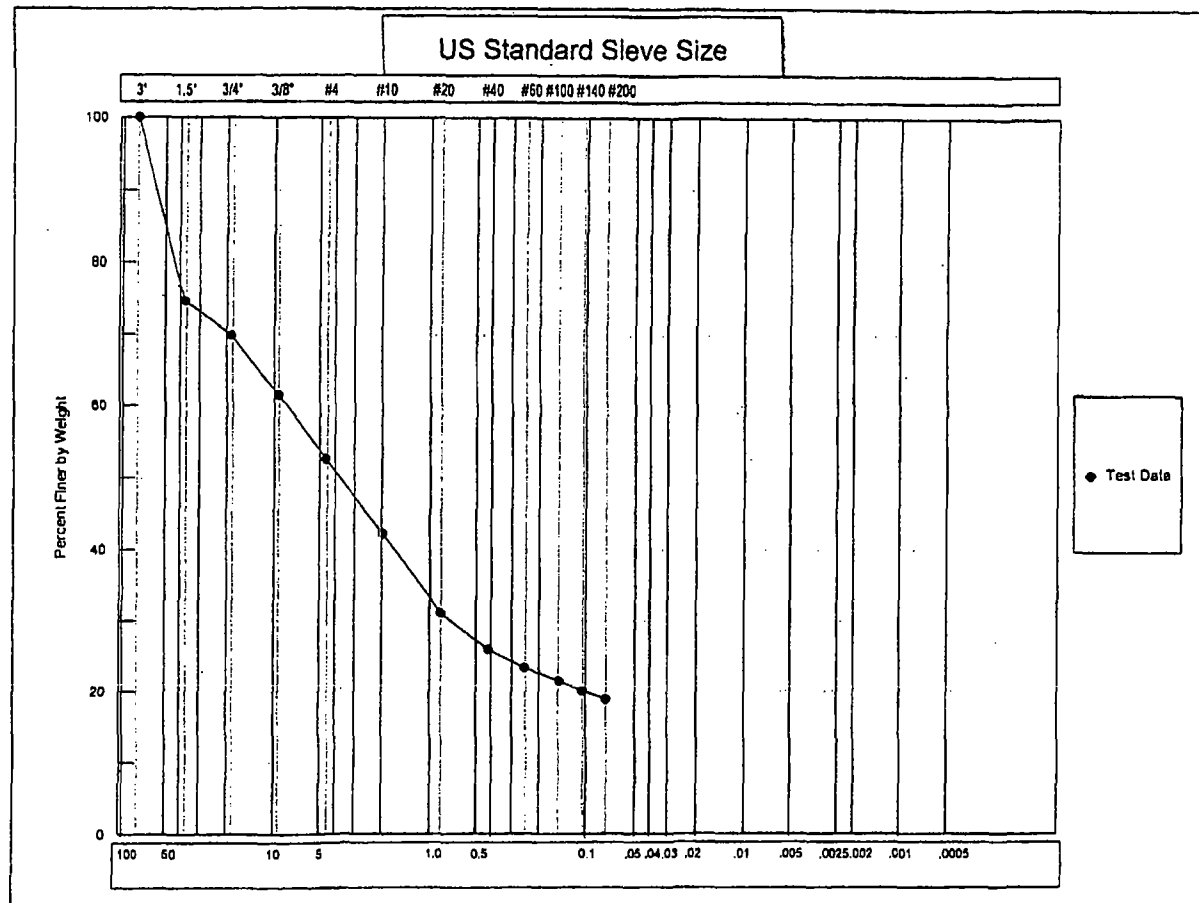
Calc. Wt. "W" (g) 403.96  
Calc. Mass + #4 191.01

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	909.59	909.59	909.59	25.3	74.7
3/4"	0.00	173.56	173.56	1083.15	30.2	69.8
3/8"	0.00	300.06	300.06	1383.21	38.5	61.5
#4	0.00	315.34	315.34	1698.55	47.3	52.7
#10	3.60	45.99	42.39	42.39	57.8	42.2
#20	3.58	48.34	44.76	87.15	68.9	31.1
#40	3.56	24.75	21.19	108.34	74.1	25.9
#60	3.72	14.24	10.52	118.86	76.7	23.3
#100	3.73	11.46	7.73	126.59	78.6	21.4
#140	3.68	9.20	5.52	132.11	80.0	20.0
#200	3.62	8.46	4.84	136.95	81.2	18.8

Data entered by: SR  
Data checked by: RLS  
FileName: USM0P640

Date: 10/27/2006  
Date: 10/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-6  
 Job Number: 2562-11 Depth: 4.0'  
 Classification: **Classification Not Performed**

Sample No.: Level 245

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-7  
DEPTH 3.5'  
SAMPLE NO. Level 245  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 10-27-06 RS  
DATE -#4 WASHED 10-30-06 RO  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 95.67  
Wt. Dry Soil & Pan (g) 93.64  
Wt. Lost Moisture (g) 2.03  
Wt. of Pan Only (g) 3.65  
Wt. of Dry Soil (g) 89.99  
Moisture Content % 2.3

Wt. Total Sample  
Wet (g) 3556.10  
Weight of + #4  
Before Washing (g) 1555.10  
Weight of + #4  
After Washing (g) 1509.11  
Weight of - #4  
Wet (g) 2001.00  
Weight of - #4  
Dry (g) 2001.83  
Wt. Total Sample  
Dry (g) 3510.94

Wt. Partial -#4 Sample Wet (g) 175.06  
Wt. Partial Sample Dry (g) 171.20

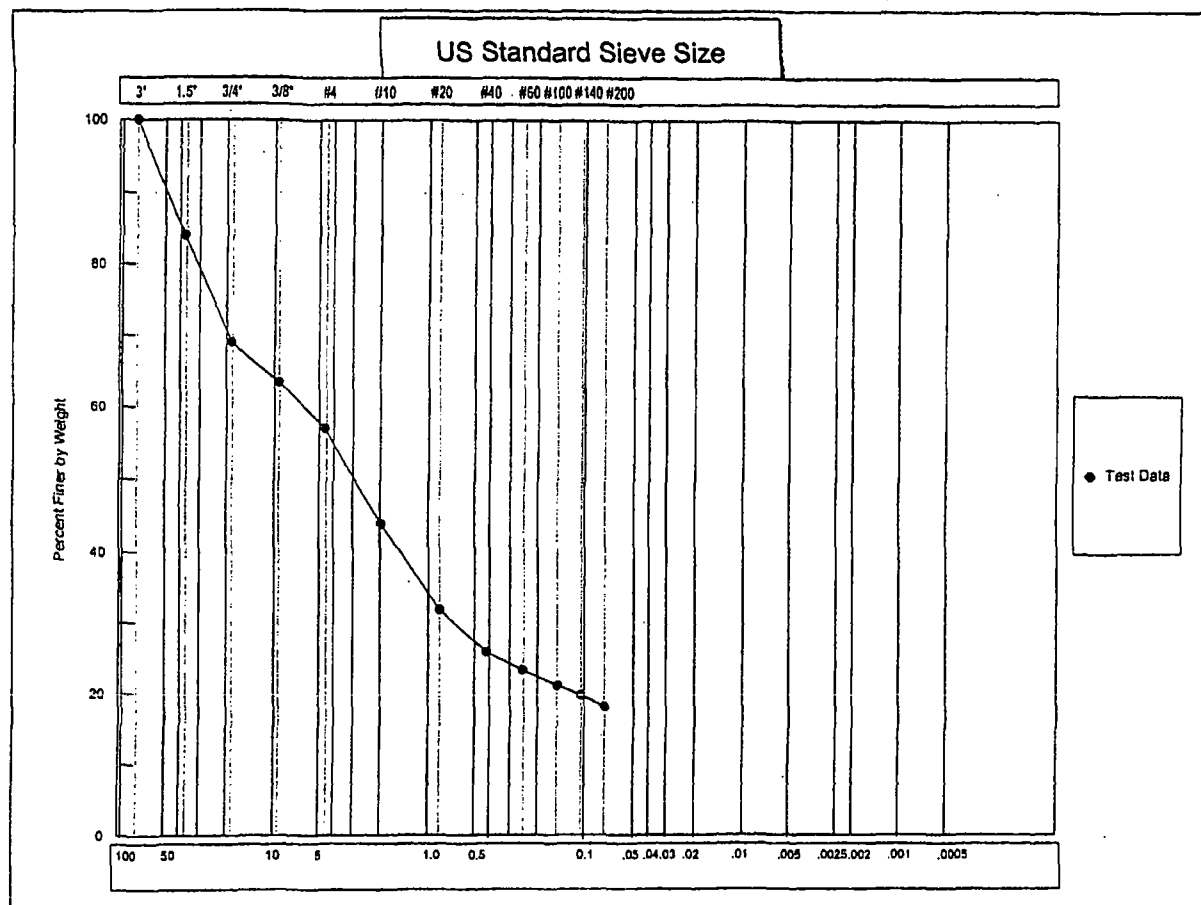
Calc. Wt. "W" (g) 300.26  
Calc. Mass + #4 129.06

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	559.75	559.75	559.75	15.9	84.1
3/4"	0.00	526.21	526.21	1085.96	30.9	69.1
3/8"	0.00	195.74	195.74	1281.70	36.5	63.5
#4	0.00	227.41	227.41	1509.11	43.0	57.0
#10	1.77	41.12	39.35	39.35	56.1	43.9
#20	1.80	38.11	36.31	75.66	68.2	31.8
#40	1.75	19.78	18.03	93.69	74.2	25.8
#60	1.81	9.57	7.76	101.45	76.8	23.2
#100	1.76	8.35	6.59	108.04	79.0	21.0
#140	1.78	5.82	4.04	112.08	80.3	19.7
#200	1.77	6.74	4.97	117.05	82.0	18.0

Data entered by: SR  
Data checked by: RS  
FileName: USM0735

Date: 10/31/2006  
Date: 11/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP-7  
 Job Number: 2562-11    Depth: 3.5'  
 Classification: Classification Not Performed

Sample No.: Level 245

Advanced Terra Testing, Inc.



**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-8  
DEPTH 4.5'  
SAMPLE NO. Level 245  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 10-25-06 RS  
DATE -#4 WASHED 10-25-06 SR  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 134.44  
Wt. Dry Soil & Pan (g) 131.44  
Wt. Lost Moisture (g) 3.00  
Wt. of Pan Only (g) 3.64  
Wt. of Dry Soil (g) 127.80  
Moisture Content % 2.3

Wt. Total Sample  
Wet (g) 3781.42  
Weight of + #4  
Before Washing (g) 1615.01  
Weight of + #4  
After Washing (g) 1579.72  
Weight of - #4  
Wet (g) 2166.41  
Weight of - #4  
Dry (g) 2151.20  
Wt. Total Sample  
Dry (g) 3730.92

Wt. Partial -#4 Sample Wet (g) 271.31  
Wt. Partial Sample Dry (g) 265.09

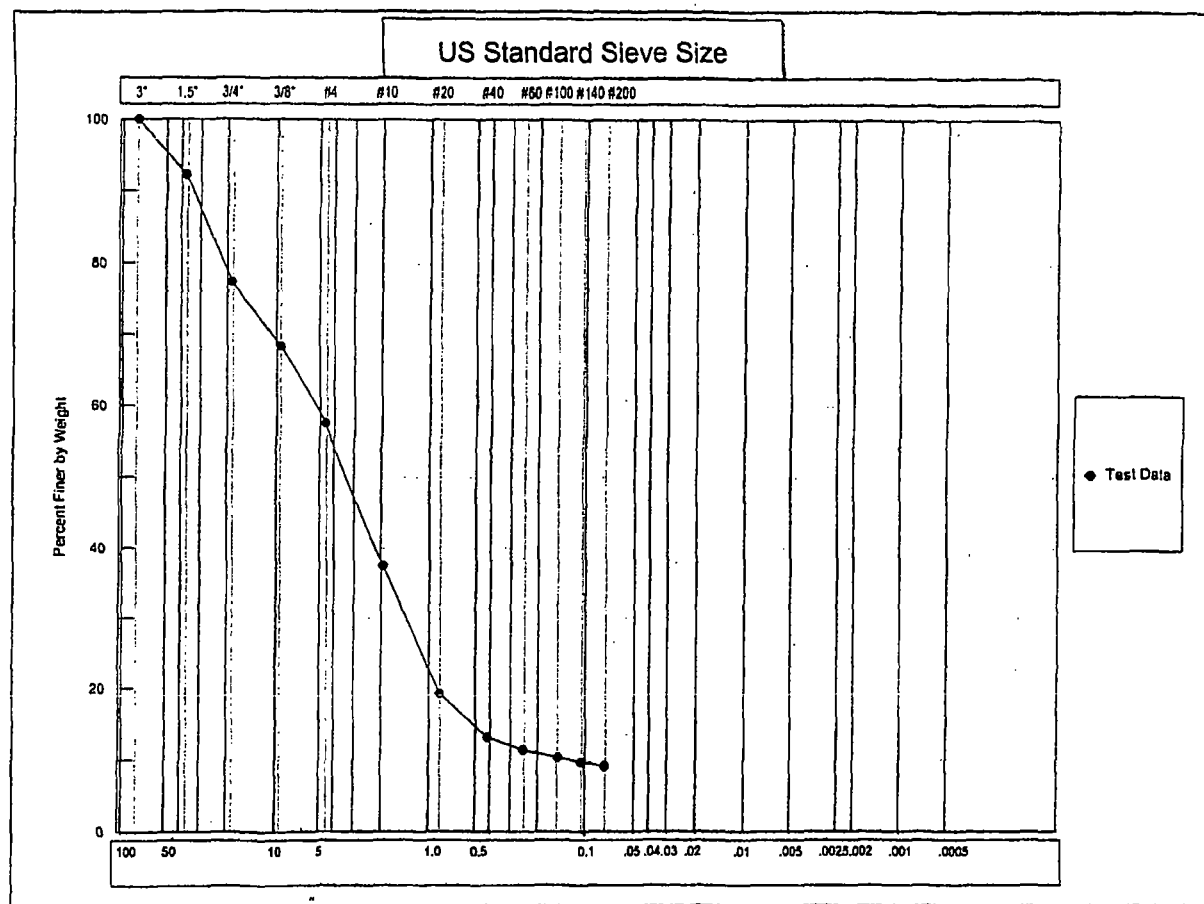
Calc. Wt. "W" (g) 459.75  
Calc. Mass + #4 194.66

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	289.35	289.35	289.35	7.8	92.2
3/4"	0.00	556.54	556.54	845.89	22.7	77.3
3/8"	0.00	332.33	332.33	1178.22	31.6	68.4
#4	0.00	401.50	401.50	1579.72	42.3	57.7
#10	3.76	96.89	93.13	93.13	62.6	37.4
#20	3.69	87.48	83.79	176.92	80.8	19.2
#40	3.65	32.00	28.35	205.27	87.0	13.0
#60	3.78	11.70	7.92	213.19	88.7	11.3
#100	3.78	8.89	5.11	218.30	89.8	10.2
#140	3.65	6.44	2.79	221.09	90.4	9.6
#200	3.73	6.32	2.59	223.68	91.0	9.0

Data entered by: SR  
Data checked by: *RS*  
FileName: USM0P845

Date: 10/27/2006  
Date: 10/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-8  
 Job Number: 2562-11 Depth: 4.5'  
 Classification: **Classification Not Performed**

Sample No.: Level 245

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-1  
DEPTH 2.5'  
SAMPLE NO. Level 2  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 10-26-06 RS  
DATE -#4 WASHED 10-30-06 RO  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 105.50  
Wt. Dry Soil & Pan (g) 99.17  
Wt. Lost Moisture (g) 6.33  
Wt. of Pan Only (g) 3.67  
Wt. of Dry Soil (g) 95.50  
Moisture Content % 6.6

Wt. Total Sample  
Wet (g) 3720.10  
Weight of + #4  
Before Washing (g) 2290.60  
Weight of + #4  
After Washing (g) 2239.01  
Weight of - #4  
Wet (g) 1429.50  
Weight of - #4  
Dry (g) 1389.02  
Wt. Total Sample  
Dry (g) 3628.03

Wt. Partial -#4 Sample Wet (g) 189.16  
Wt. Partial Sample Dry (g) 177.40

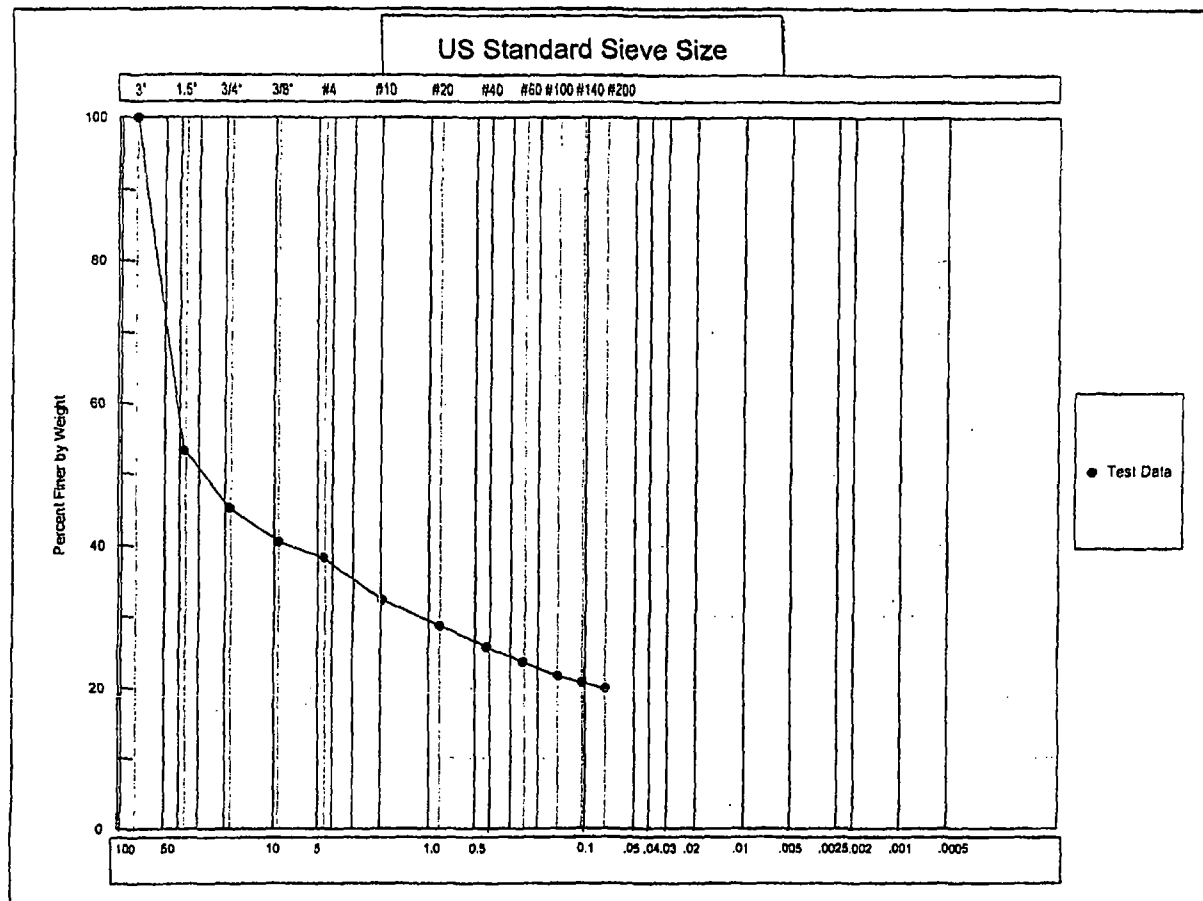
Calc. Wt. "W" (g) 463.36  
Calc. Mass + #4 285.96

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	1694.34	1694.34	1694.34	46.7	53.3
3/4"	0.00	290.56	290.56	1984.90	54.7	45.3
3/8"	0.00	173.82	173.82	2158.72	59.5	40.5
#4	0.00	80.29	80.29	2239.01	61.7	38.3
#10	3.68	31.27	27.59	27.59	67.7	32.3
#20	3.67	20.68	17.01	44.60	71.3	28.7
#40	3.66	17.24	13.58	58.18	74.3	25.7
#60	3.63	13.70	10.07	68.25	76.4	23.6
#100	3.68	12.89	9.21	77.46	78.4	21.6
#140	3.69	7.91	4.22	81.68	79.3	20.7
#200	3.77	7.61	3.84	85.52	80.2	19.8

Data entered by: SR  
Data checked by: RS  
FileName: USM01252

Date: 10/31/2006  
Date: 11/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-1  
 Job Number: 2562-11 Depth: 2.5'  
 Classification: **Classification Not Performed**

Sample No.: Level 2

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
**ASTM D 6913**

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-2  
DEPTH 2.5-3.0'  
SAMPLE NO. Level 2  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 10-25-06 RS  
DATE -#4 WASHED 10-27-06 RO  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 115.52  
Wt. Dry Soil & Pan (g) 109.43  
Wt. Lost Moisture (g) 6.09  
Wt. of Pan Only (g) 3.57  
Wt. of Dry Soil (g) 105.86  
Moisture Content % 5.8

Wt. Total Sample  
Wet (g) 2968.10  
Weight of + #4  
Before Washing (g) 1937.50  
Weight of + #4  
After Washing (g) 1835.05  
Weight of - #4  
Wet (g) 1030.60  
Weight of - #4  
Dry (g) 1071.41  
Wt. Total Sample  
Dry (g) 2906.46

Wt. Partial -#4 Sample Wet (g) 186.98  
Wt. Partial Sample Dry (g) 176.81

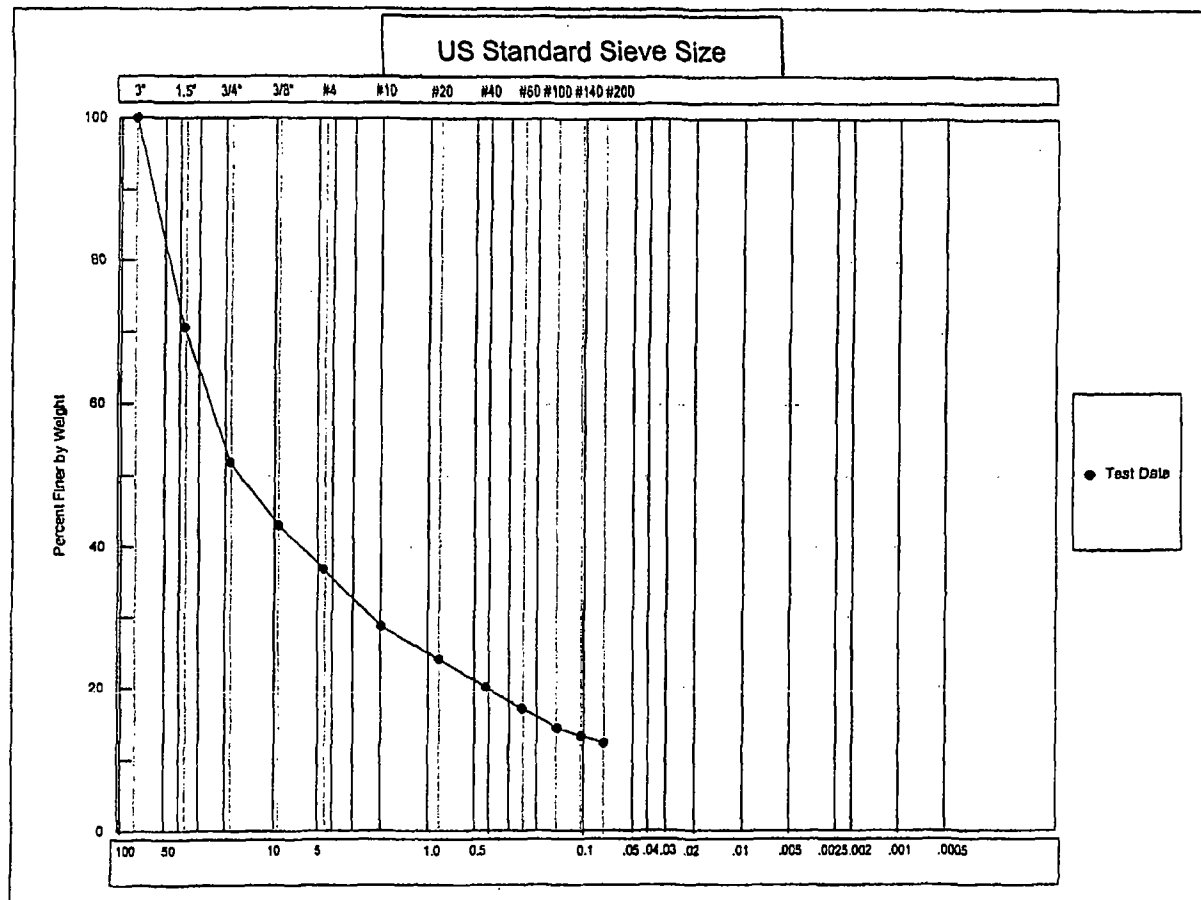
Calc. Wt. "W" (g) 479.63  
Calc. Mass + #4 302.83

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	853.38	853.38	853.38	29.4	70.6
3/4"	0.00	546.77	546.77	1400.15	48.2	51.8
3/8"	0.00	257.39	257.39	1657.54	57.0	43.0
#4	0.00	177.51	177.51	1835.05	63.1	36.9
#10	3.68	42.68	39.00	39.00	71.3	28.7
#20	3.70	25.91	22.21	61.21	75.9	24.1
#40	3.70	23.42	19.72	80.93	80.0	20.0
#60	3.66	18.08	14.42	95.35	83.0	17.0
#100	3.61	16.69	13.08	108.43	85.7	14.3
#140	3.58	8.86	5.28	113.71	86.8	13.2
#200	3.66	8.36	4.70	118.41	87.8	12.2

Data entered by: RS SR  
Data checked by:             
FileName: USM0230

Date: 10/31/2006  
Date: 10/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-2  
 Job Number: 2582-11 Depth: 2.5-3.0'  
 Classification: **Classification Not Performed**

Sample No.: Level 2

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-3  
DEPTH 1.5'  
SAMPLE NO. Level 2  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 10-25-06 JJL  
DATE - #4 WASHED 10-26-06 RS  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 68.25  
Wt. Dry Soil & Pan (g) 64.94  
Wt. Lost Moisture (g) 3.31  
Wt. of Pan Only (g) 3.67  
Wt. of Dry Soil (g) 61.27  
Moisture Content % 5.4

Wt. Total Sample Wet (g) 2760.56  
Weight of + #4 Before Washing (g) 728.06  
Weight of + #4 After Washing (g) 680.29  
Weight of - #4 Wet (g) 2032.50  
Weight of - #4 Dry (g) 1973.65  
Wt. Total Sample Dry (g) 2653.94

Wt. Partial - #4 Sample Wet (g) 298.84  
Wt. Partial Sample Dry (g) 283.52

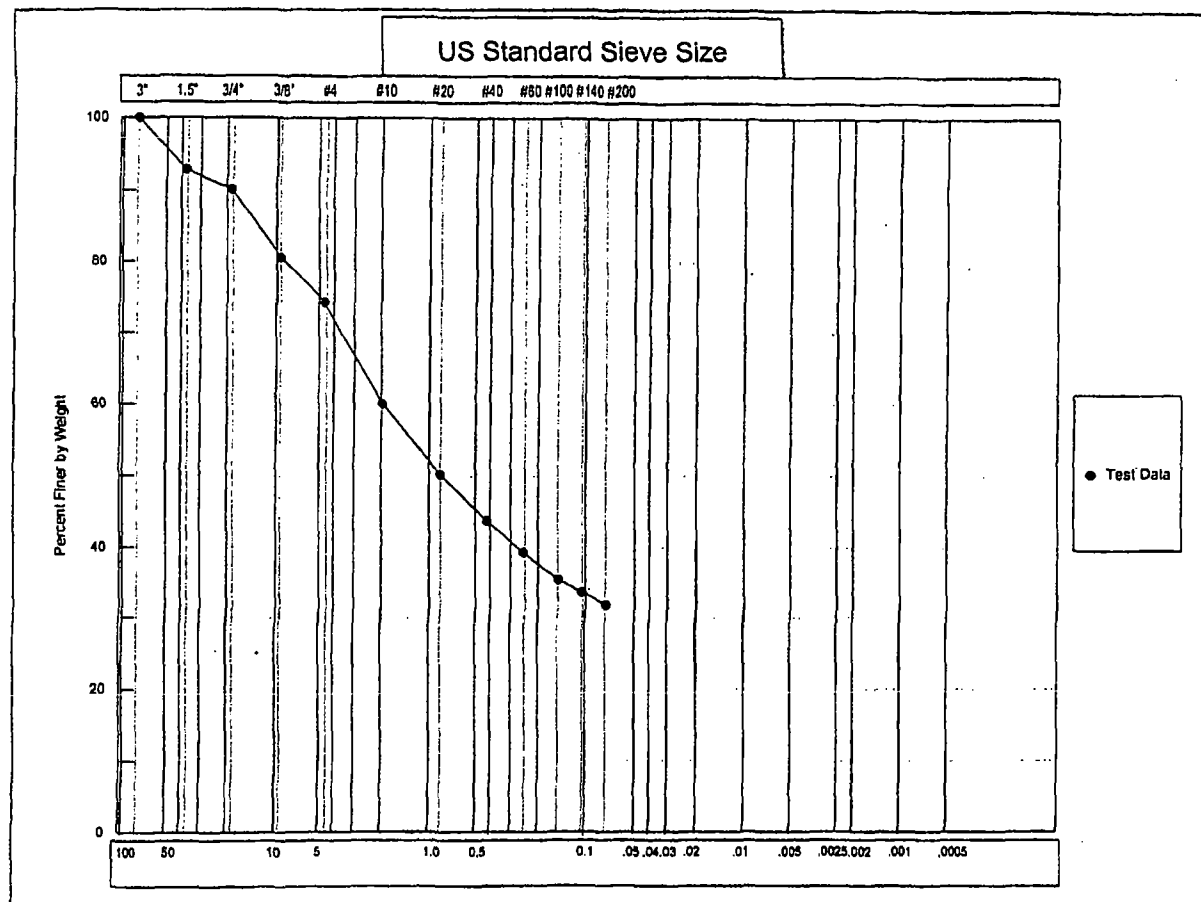
Calc. Wt. "W" (g) 381.25  
Calc. Mass + #4 97.73

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	191.64	191.64	191.64	7.2	92.8
3/4"	0.00	71.72	71.72	263.36	9.9	90.1
3/8"	0.00	253.39	253.39	516.75	19.5	80.5
#4	0.00	163.54	163.54	680.29	25.6	74.4
#10	3.70	58.26	54.56	54.56	39.9	60.1
#20	3.69	41.30	37.61	92.17	49.8	50.2
#40	1.73	26.46	24.73	116.90	56.3	43.7
#60	1.77	18.58	16.81	133.71	60.7	39.3
#100	1.76	16.47	14.71	148.42	64.6	35.4
#140	1.77	8.75	6.98	155.40	66.4	33.6
#200	1.77	8.60	6.83	162.23	68.2	31.8

Data entered by: SR  
Data checked by: RS  
FileName: USM0315

Date: 10/31/2006  
Date: 11/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP-3  
 Job Number: 2562-11    Depth: 1.5'  
 Classification: Classification Not Performed

Sample No.: Level 2

Advanced Terra Testing, Inc.



MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-4  
DEPTH 1.5'  
SAMPLE NO. Level 2  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 10-26-06 RS  
DATE - #4 WASHED 10-30-06 RO  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 98.18  
Wt. Dry Soil & Pan (g) 91.92  
Wt. Lost Moisture (g) 6.26  
Wt. of Pan Only (g) 3.69  
Wt. of Dry Soil (g) 88.23  
Moisture Content % 7.1

Wt. Total Sample  
Wet (g) 1941.50  
Weight of + #4  
Before Washing (g) 404.90  
Weight of + #4  
After Washing (g) 391.02  
Weight of - #4  
Wet (g) 1536.60  
Weight of - #4  
Dry (g) 1447.76  
Wt. Total Sample  
Dry (g) 1838.78  
Calc. Wt. "W" (g) 224.90  
Calc. Mass + #4 47.83

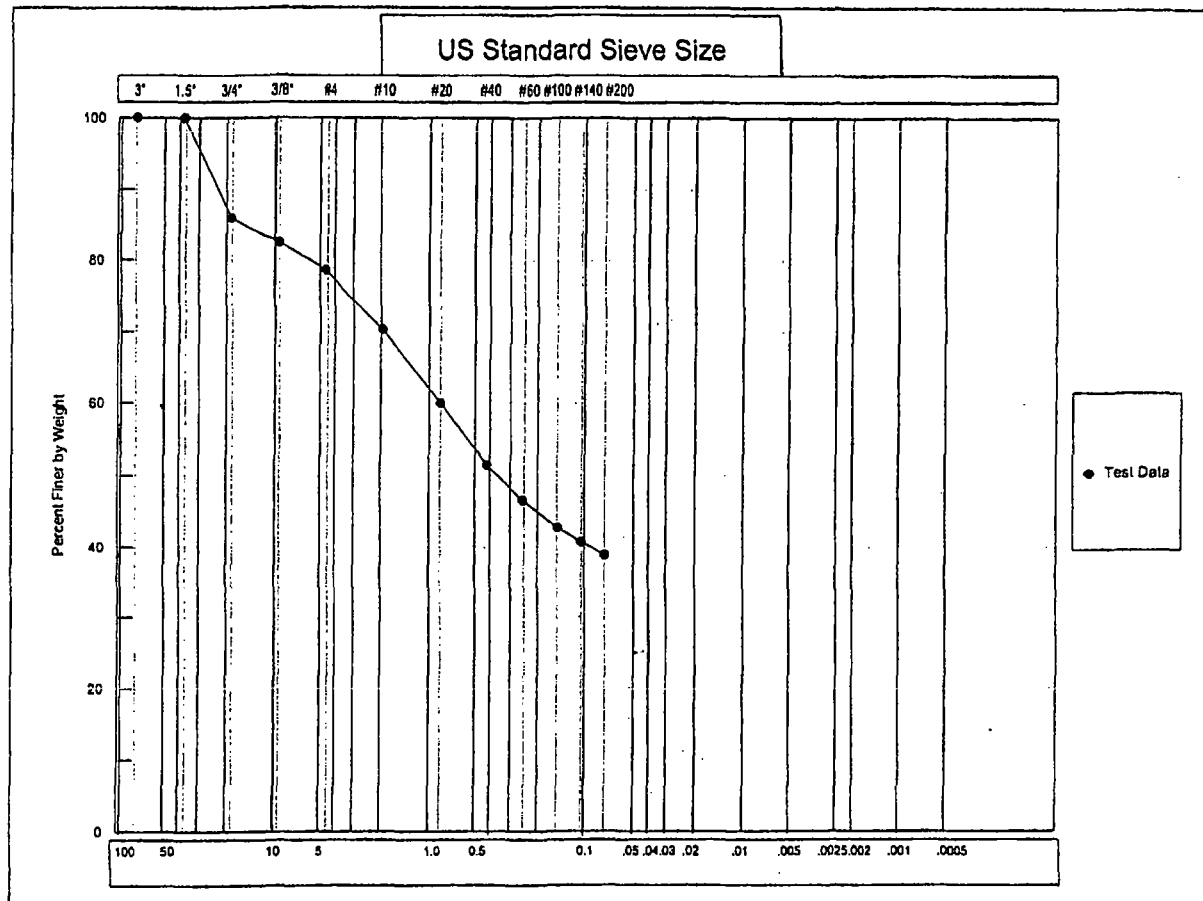
Wt. Partial -#4 Sample Wet (g) 189.64  
Wt. Partial Sample Dry (g) 177.08

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	258.97	258.97	258.97	14.1	85.9
3/8"	0.00	64.04	64.04	323.01	17.6	82.4
#4	0.00	68.01	68.01	391.02	21.3	78.7
#10	3.64	22.37	18.73	18.73	29.6	70.4
#20	3.70	26.89	23.19	41.92	39.9	60.1
#40	3.72	23.14	19.42	61.34	48.5	51.5
#60	3.73	14.85	11.12	72.46	53.5	46.5
#100	3.68	12.28	8.60	81.06	57.3	42.7
#140	3.69	8.14	4.45	85.51	59.3	40.7
#200	3.66	7.91	4.25	89.76	61.2	38.8

Data entered by: SR  
Data checked by: RS  
FileName: USM0415

Date: 10/31/2006  
Date: 11/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-4  
 Job Number: 2562-11 Depth: 1.5'  
 Classification: **Classification Not Performed**

Sample No.: Level 2

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-5  
DEPTH 8.0'  
SAMPLE NO. Level 2  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 10-25-06 RS  
DATE -#4 WASHED 10-27-06 RO  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 146.82  
Wt. Dry Soil & Pan (g) 140.88  
Wt. Lost Moisture (g) 5.94  
Wt. of Pan Only (g) 3.58  
Wt. of Dry Soil (g) 137.30  
Moisture Content % 4.3

Wt. Total Sample  
Wet (g) 2944.90  
Weight of + #4  
Before Washing (g) 1368.90  
Weight of + #4  
After Washing (g) 936.21  
Weight of - #4  
Wet (g) 1576.00  
Weight of - #4  
Dry (g) 1925.39  
Wt. Total Sample  
Dry (g) 2861.60  
Calc. Wt. "W" (g) 295.99  
Calc. Mass + #4 96.84

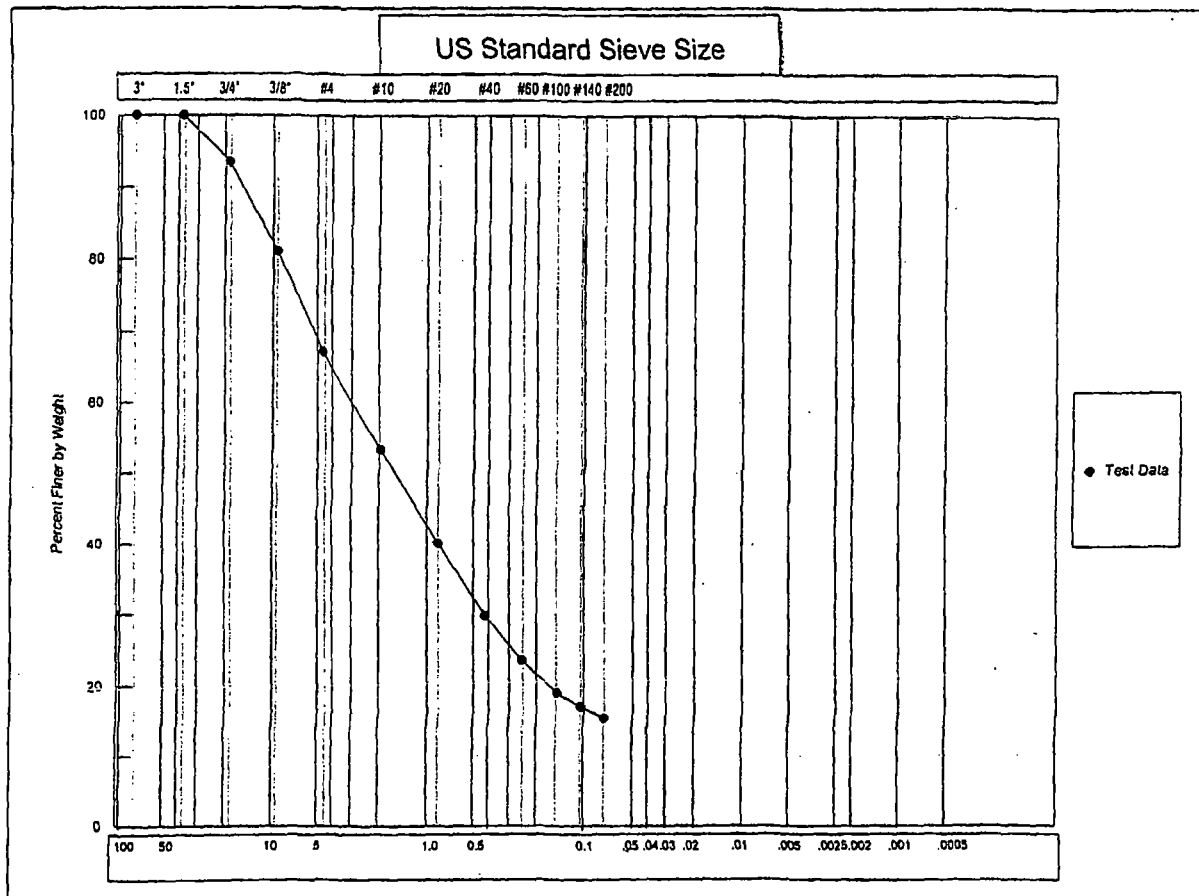
Wt. Partial -#4 Sample Wet (g) 207.77  
Wt. Partial Sample Dry (g) 199.15

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	183.97	183.97	183.97	6.4	93.6
3/8"	0.00	356.62	356.62	540.59	18.9	81.1
#4	0.00	395.62	395.62	936.21	32.7	67.3
#10	3.69	44.84	41.15	41.15	46.6	53.4
#20	3.61	42.84	39.23	80.38	59.9	40.1
#40	3.69	34.21	30.52	110.90	70.2	29.8
#60	3.64	22.25	18.61	129.51	76.5	23.5
#100	3.63	17.20	13.57	143.08	81.1	18.9
#140	3.60	9.41	5.81	148.89	83.0	17.0
#200	3.69	8.47	4.78	153.67	84.6	15.4

Data entered by: SR  
Data checked by: *RS*  
FileName: USM0580

Date: 10/31/2006  
Date: 11/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP-5  
 Job Number: 2562-11    Depth: 8.0'  
 Classification: **Classification Not Performed**

Sample No.: Level 2

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT: URS Operating Services

JOB NO. 2562-11

BORING NO. TP-6  
DEPTH 2.5'  
SAMPLE NO. Level 2  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 10-25-06 RS  
DATE - #4 WASHED 10-27-06 RO  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 90.40  
Wt. Dry Soil & Pan (g) 86.24  
Wt. Lost Moisture (g) 4.16  
Wt. of Pan Only (g) 3.64  
Wt. of Dry Soil (g) 82.60  
Moisture Content % 5.0

Wt. Total Sample  
Wet (g) 3561.29  
Weight of + #4  
Before Washing (g) 1724.37  
Weight of + #4  
After Washing (g) 1633.05  
Weight of - #4  
Wet (g) 1836.92  
Weight of - #4  
Dry (g) 1835.78  
Wt. Total Sample  
Dry (g) 3468.83  
Calc. Wt. "W" (g) 533.52  
Calc. Mass + #4 251.17

Wt. Partial -#4 Sample Wet (g) 296.57  
Wt. Partial Sample Dry (g) 282.35

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	552.28	552.28	552.28	15.9	84.1
3/4"	0.00	495.55	495.55	1047.83	30.2	69.8
3/8"	0.00	327.40	327.40	1375.23	39.6	60.4
#4	0.00	257.82	257.82	1633.05	47.1	52.9
#10	3.65	83.72	80.07	80.07	62.1	37.9
#20	3.62	36.22	32.60	112.67	68.2	31.8
#40	3.58	25.08	21.50	134.17	72.2	27.8
#60	3.69	18.85	15.16	149.33	75.1	24.9
#100	3.61	17.82	14.21	163.54	77.7	22.3
#140	3.66	9.70	6.04	169.58	78.9	21.1
#200	3.71	9.61	5.90	175.48	80.0	20.0

Data entered by: SR

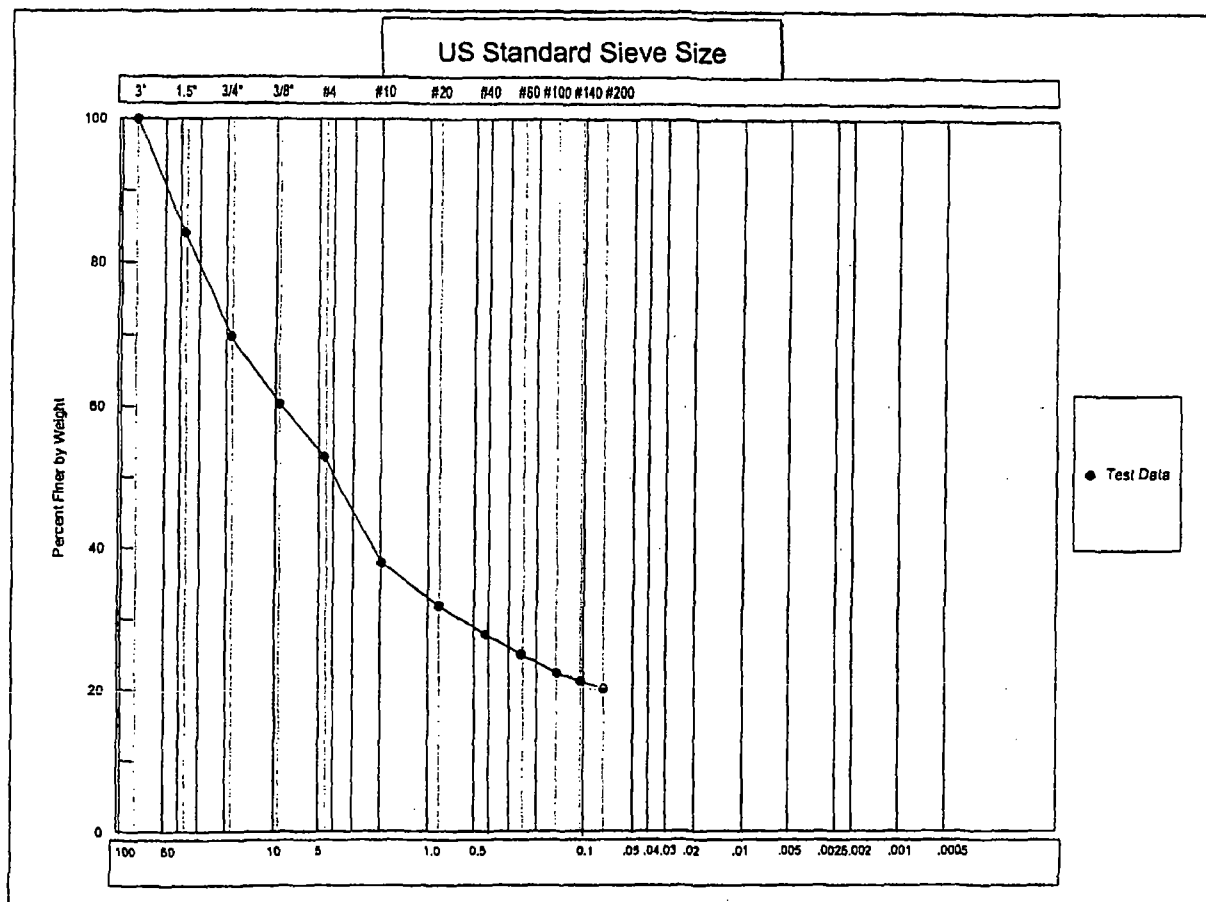
Date: 10/31/2006

Data checked by: RS

Date: 11/01/06

FileName: USM0625

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	CRS	MEDIUM	FINE	

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-6  
 Job Number: 2562-11 Depth: 2.5'  
 Classification: Classification Not Performed

Sample No.: Level 2

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-7  
DEPTH 2.5'  
SAMPLE NO. Level 2  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 10-25-06 RS  
DATE -#4 WASHED 10-27-06 RO  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 109.90  
Wt. Dry Soil & Pan (g) 106.16  
Wt. Lost Moisture (g) 3.74  
Wt. of Pan Only (g) 3.59  
Wt. of Dry Soil (g) 102.57  
Moisture Content % 3.6

Wt. Total Sample  
Wet (g) 3726.30  
Weight of + #4  
Before Washing (g) 1698.70  
Weight of + #4  
After Washing (g) 1602.84  
Weight of - #4  
Wet (g) 2027.60  
Weight of - #4  
Dry (g) 2048.76  
Wt. Total Sample  
Dry (g) 3651.60

Wt. Partial -#4 Sample Wet (g) 202.48  
Wt. Partial Sample Dry (g) 195.36

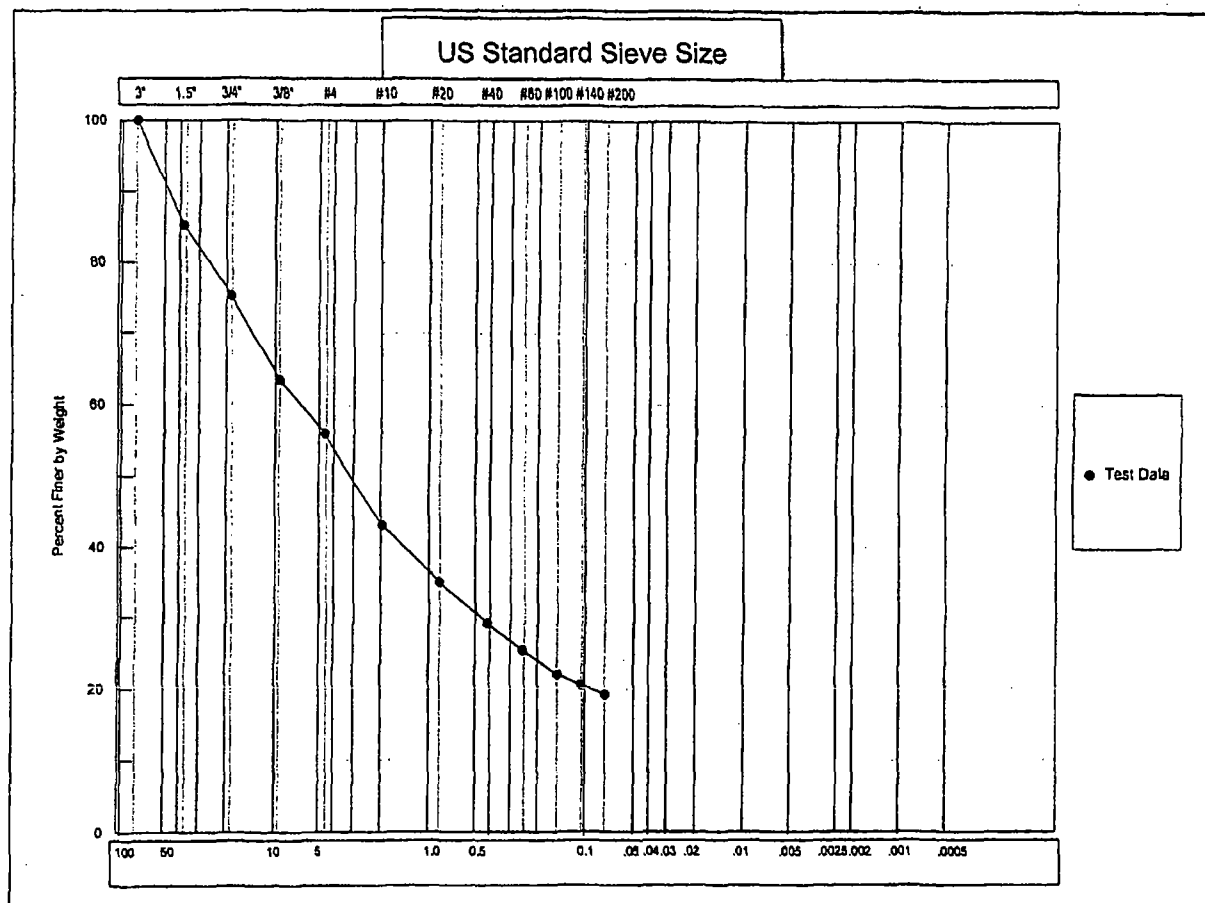
Calc. Wt. "W" (g) 348.19  
Calc. Mass + #4 152.84

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	541.80	541.80	541.80	14.8	85.2
3/4"	0.00	362.92	362.92	904.72	24.8	75.2
3/8"	0.00	432.11	432.11	1336.83	36.6	63.4
#4	0.00	266.01	266.01	1602.84	43.9	56.1
#10	3.63	48.92	45.29	45.29	56.9	43.1
#20	3.63	32.21	28.58	73.87	65.1	34.9
#40	3.65	23.60	19.95	93.82	70.8	29.2
#60	3.66	16.97	13.31	107.13	74.7	25.3
#100	3.80	15.55	11.75	118.88	78.0	22.0
#140	3.68	8.71	5.03	123.91	79.5	20.5
#200	3.70	8.42	4.72	128.63	80.8	19.2

Data entered by: RS SR  
Data checked by: RS  
FileName: USM0725

Date: 10/31/2006  
Date: 11/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-7  
 Job Number: 2562-11 Depth: 2.5'  
 Classification: Classification Not Performed

Sample No.: Level 2

Advanced Terra Testing, Inc.



MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-8  
DEPTH 3.0'  
SAMPLE NO. Level 2  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+ #4 WASHED 10-25-06 RS  
DATE - #4 WASHED 10-27-06 RO  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 84.40  
Wt. Dry Soil & Pan (g) 80.46  
Wt. Lost Moisture (g) 3.94  
Wt. of Pan Only (g) 3.69  
Wt. of Dry Soil (g) 76.77  
Moisture Content % 5.1

Wt. Total Sample  
Wet (g) 3762.80  
Weight of + #4  
Before Washing (g) 709.40  
Weight of + #4  
After Washing (g) 668.64  
Weight of - #4  
Wet (g) 3053.40  
Weight of - #4  
Dry (g) 2943.11  
Wt. Total Sample  
Dry (g) 3611.75  
Calc. Wt. "W" (g) 222.53  
Calc. Mass + #4 41.20

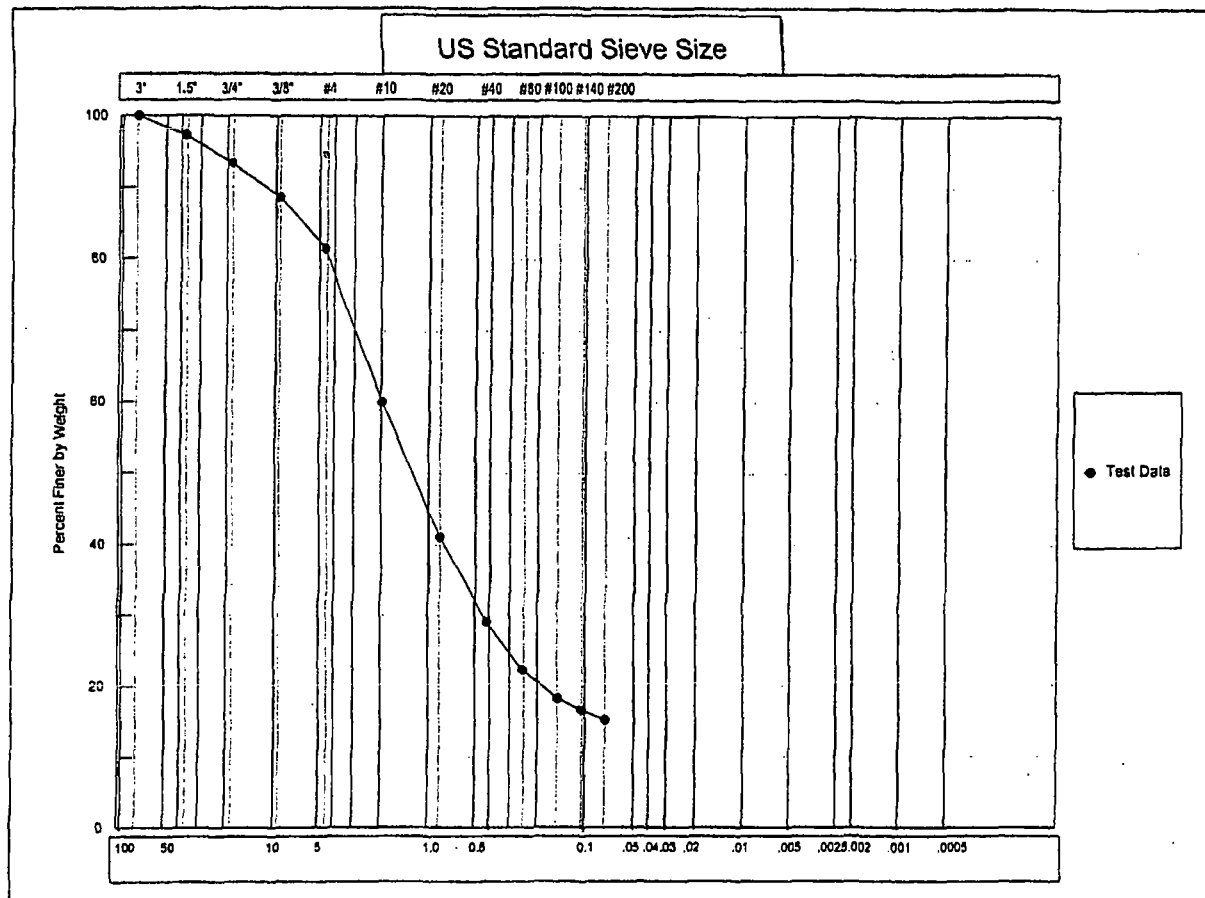
Wt. Partial -#4 Sample Wet (g) 190.64  
Wt. Partial Sample Dry (g) 181.33

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	98.44	98.44	98.44	2.7	97.3
3/4"	0.00	140.28	140.28	238.72	6.6	93.4
3/8"	0.00	168.41	168.41	407.13	11.3	88.7
#4	0.00	261.51	261.51	668.64	18.5	81.5
#10	3.74	51.62	47.88	47.88	40.0	60.0
#20	3.66	45.68	42.02	89.90	58.9	41.1
#40	3.68	30.42	26.74	116.64	70.9	29.1
#60	3.67	18.69	15.02	131.66	77.7	22.3
#100	3.63	12.70	9.07	140.73	81.8	18.2
#140	3.62	7.22	3.60	144.33	83.4	16.6
#200	3.80	6.95	3.15	147.48	84.8	15.2

Data entered by: SR  
Data checked by: RS  
FileName: USM0830

Date: 10/31/2006  
Date: 11/01/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP-8  
 Job Number: 2562-11    Depth: 3.0'  
 Classification: **Classification Not Performed**

Sample No.: Level 2

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
**ASTM D 6913**

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-1  
DEPTH 1-7'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED  
DATE+#4 WASHED 09-11-06 RS  
DATE #4 WASHED 09-25-06 KR  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 78.02  
Wt. Dry Soil & Pan (g) 74.19  
Wt. Lost Moisture (g) 3.82  
Wt. of Pan Only (g) 3.65  
Wt. of Dry Soil (g) 70.54  
Moisture Content % 5.4

Wt. Total Sample  
Wet (g) 2915.30  
Weight of + #4  
Before Washing (g) 776.70  
Weight of + #4  
After Washing (g) 722.30  
Weight of - #4  
Wet (g) 2138.60  
Weight of - #4  
Dry (g) 2080.20  
Wt. Total Sample  
Dry (g) 2802.50

Wt. Partial -#4 Sample Wet (g) 332.57  
Wt. Partial Sample Dry (g) 315.46

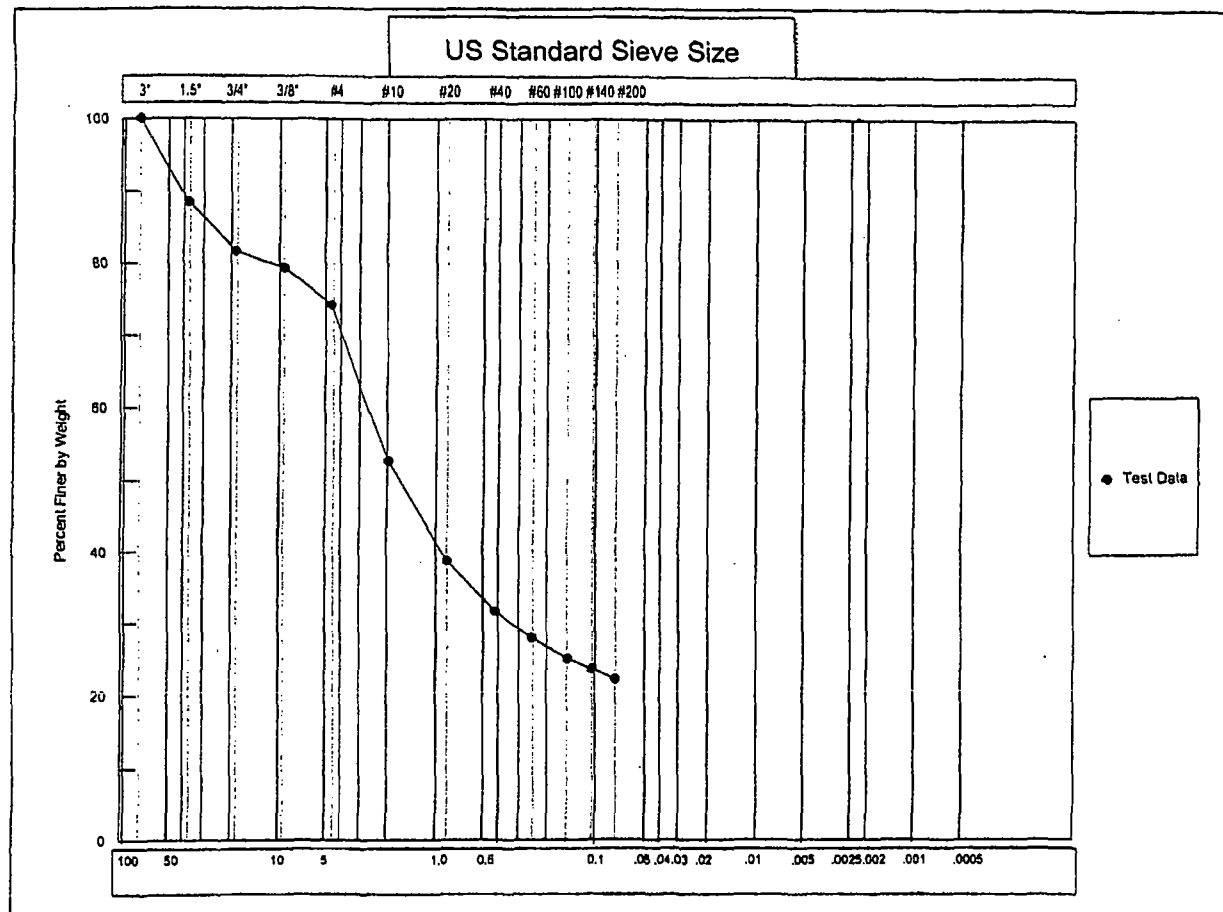
Calc. Wt. "W" (g) 425.00  
Calc. Mass + #4 109.54

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	322.00	322.00	322.00	11.5	88.5
3/4"	0.00	192.70	192.70	514.70	18.4	81.6
3/8"	0.00	63.30	63.30	578.00	20.6	79.4
#4	0.00	144.30	144.30	722.30	25.8	74.2
#10	4.32	95.72	91.40	91.40	47.3	52.7
#20	3.70	62.75	59.05	150.44	61.2	38.8
#40	3.68	33.85	30.17	180.61	68.3	31.7
#60	3.68	19.50	15.83	196.44	72.0	28.0
#100	3.67	16.11	12.44	208.88	74.9	25.1
#140	3.72	9.74	6.02	214.90	76.3	23.7
#200	3.67	9.84	6.17	221.06	77.8	22.2

Data entered by: SR  
Data checked by: RS  
FileName: USM0TP11

Date: 09/26/2006  
Date: 9/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP1-1  
 Job Number: 2582-10    Depth: 1-7'  
 Classification: Classification Not Performed

Sample No.: 1

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-2  
DEPTH 1-10.5'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED  
DATE+#4 WASHED 09-15-06 RS  
DATE -#4 WASHED 09-23-06 RS  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 68.68  
Wt. Dry Soil & Pan (g) 67.55  
Wt. Lost Moisture (g) 1.13  
Wt. of Pan Only (g) 3.64  
Wt. of Dry Soil (g) 63.91  
Moisture Content % 1.8

Wt. Total Sample  
Wet (g) 2245.70  
Weight of + #4  
Before Washing (g) 819.60  
Weight of + #4  
After Washing (g) 769.32  
Weight of - #4  
Wet (g) 1426.10  
Weight of - #4  
Dry (g) 1450.73  
Wt. Total Sample  
Dry (g) 2220.05

Wt. Partial -#4 Sample Wet (g) 290.63  
Wt. Partial Sample Dry (g) 285.58

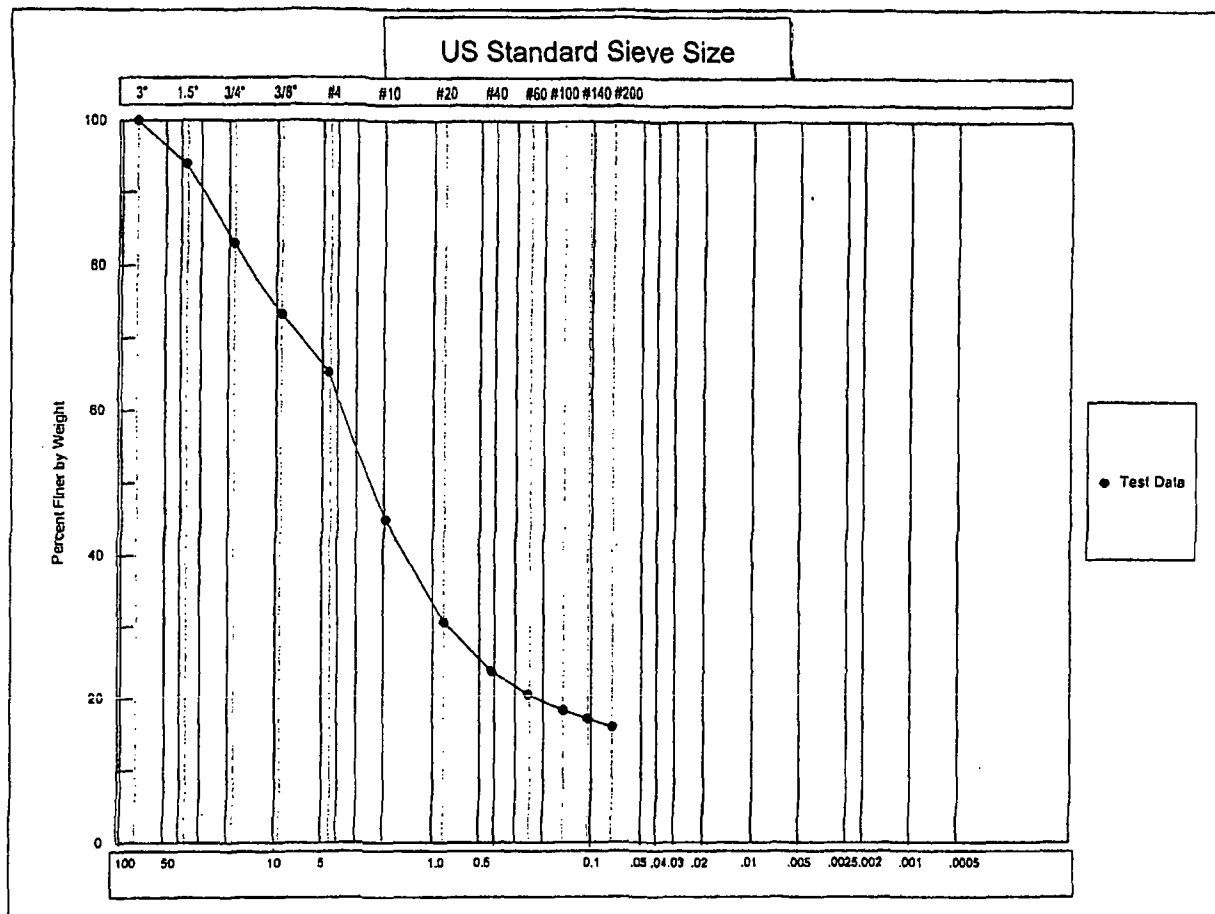
Calc. Wt. "W" (g) 437.02  
Calc. Mass + #4 151.44

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	133.80	133.80	133.80	6.0	94.0
3/4"	0.00	241.33	241.33	375.13	16.9	83.1
3/8"	0.00	215.70	215.70	590.83	26.6	73.4
#4	0.00	178.49	178.49	769.32	34.7	65.3
#10	3.55	92.40	88.85	88.85	55.0	45.0
#20	3.69	66.31	62.62	151.47	69.3	30.7
#40	3.69	34.04	30.35	181.83	76.3	23.7
#60	3.64	17.77	14.13	195.95	79.5	20.5
#100	3.65	13.59	9.95	205.90	81.8	18.2
#140	3.71	8.62	4.91	210.81	82.9	17.1
#200	3.67	8.57	4.90	215.71	84.0	16.0

Data entered by: SR  
Data checked by: AB  
FileName: USM0TP12

Date: 09/25/2006  
Date: 9/25/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP1-2  
 Job Number: 2582-10 Depth: 1-10.5'  
 Classification: **Classification Not Performed**

Sample No.: 1

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
**ASTM D 6913**

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-3  
 DEPTH 1-14'  
 SAMPLE NO. 1  
 SOIL DESCR. Project #22238347  
 LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED  
 DATE + #4 WASHED 09-15-06 RS  
 DATE - #4 WASHED 09-22-06 RS  
 WASH SIEVE Yes  
 DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 95.86  
 Wt. Dry Soil & Pan (g) 93.75  
 Wt. Lost Moisture (g) 2.11  
 Wt. of Pan Only (g) 3.70  
 Wt. of Dry Soil (g) 90.05  
 Moisture Content % 2.3

Wt. Total Sample  
 Wet (g) 2854.00  
 Weight of + #4  
 Before Washing (g) 728.90  
 Weight of + #4  
 After Washing (g) 685.07  
 Weight of - #4  
 Wet (g) 2125.10  
 Weight of - #4  
 Dry (g) 2119.27  
 Wt. Total Sample  
 Dry (g) 2804.34

Wt. Partial - #4 Sample Wet (g) 361.72  
 Wt. Partial Sample Dry (g) 353.44

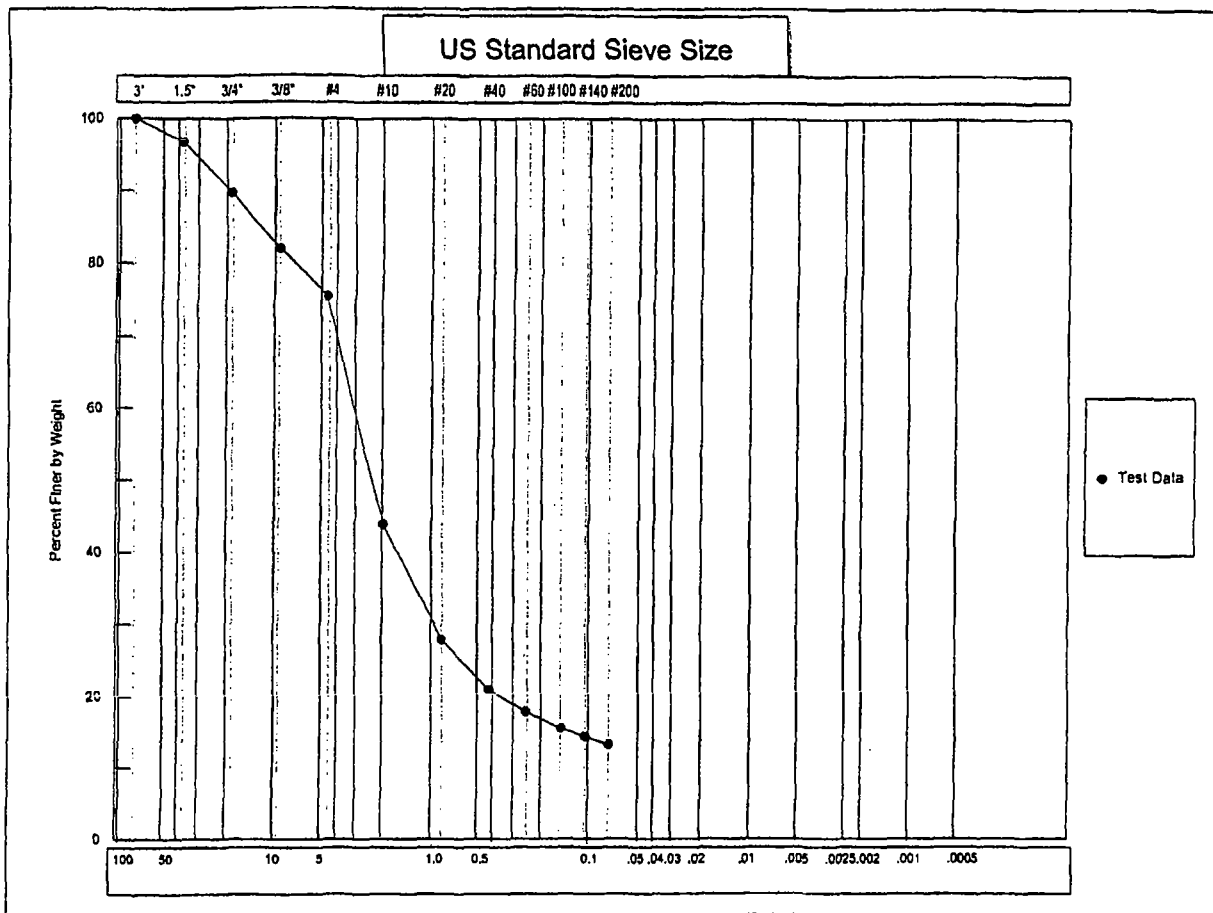
Calc. Wt. "W" (g) 467.69  
 Calc. Mass + #4 114.25

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	91.91	91.91	91.91	3.3	96.7
3/4"	0.00	197.59	197.59	289.50	10.3	89.7
3/8"	0.00	216.57	216.57	506.07	18.0	82.0
#4	0.00	179.00	179.00	685.07	24.4	75.6
#10	3.69	151.93	148.24	148.24	56.1	43.9
#20	3.66	78.55	74.89	223.13	72.1	27.9
#40	3.74	36.43	32.69	255.82	79.1	20.9
#60	3.59	17.98	14.39	270.21	82.2	17.8
#100	3.66	14.68	11.02	281.23	84.6	15.4
#140	3.78	9.24	5.46	286.69	85.7	14.3
#200	3.65	8.95	5.30	291.99	86.9	13.1

Data entered by: SR  
 Data checked by: RS  
 FileName: USM0TP13

Date: 09/25/2006  
 Date: 9/25/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY		
	COARSE	FINE	CRS	MEDIUM	FINE			
COBBLES	PEBBLE GRAVEL		SAND				SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP1-3  
 Job Number: 2562-10 Depth: 1-14'  
 Classification: Classification Not Performed

Sample No.: 1

Advanced Terra Testing, Inc.



**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-4  
DEPTH 1-15'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #05-06-P-9587

SAMPLED  
DATE + #4 WASHED 09-11-06 RS  
DATE - #4 WASHED 09-18-06 RS  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 92.91  
Wt. Dry Soil & Pan (g) 91.64  
Wt. Lost Moisture (g) 1.27  
Wt. of Pan Only (g) 3.69  
Wt. of Dry Soil (g) 87.95  
Moisture Content % 1.4

Wt. Total Sample  
Wet (g) 3329.50  
Weight of + #4  
Before Washing (g) 1013.50  
Weight of + #4  
After Washing (g) 933.00  
Weight of - #4  
Wet (g) 2316.00  
Weight of - #4  
Dry (g) 2362.49  
Wt. Total Sample  
Dry (g) 3295.49

Wt. Partial -#4 Sample Wet (g) 331.71  
Wt. Partial Sample Dry (g) 327.01

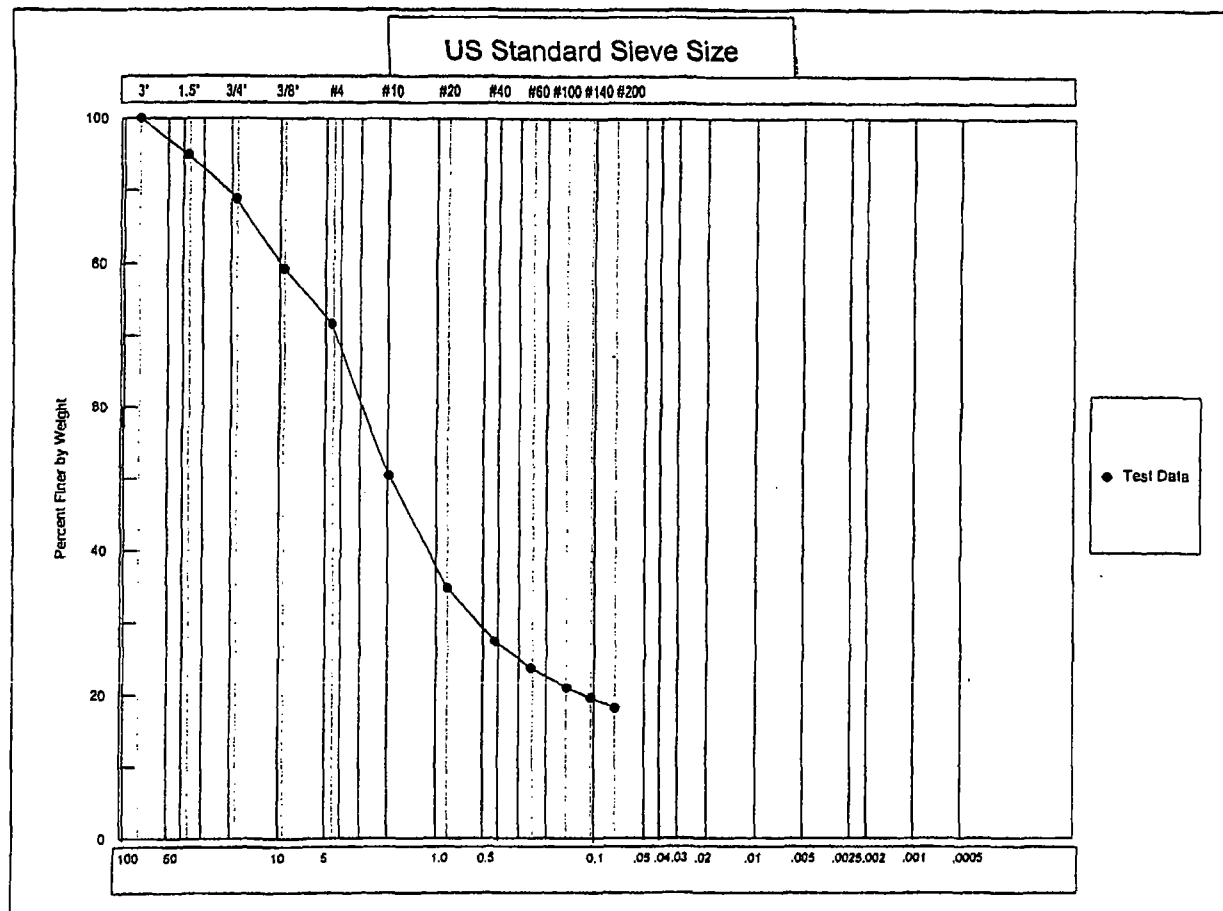
Calc. Wt. "W" (g) 456.15  
Calc. Mass + #4 129.14

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	167.20	167.20	167.20	5.1	94.9
3/4"	0.00	199.30	199.30	366.50	11.1	88.9
3/8"	0.00	314.20	314.20	680.70	20.7	79.3
#4	0.00	252.30	252.30	933.00	28.3	71.7
#10	3.58	100.38	96.80	96.80	49.5	50.5
#20	3.66	74.93	71.27	168.07	65.2	34.8
#40	3.65	37.42	33.77	201.84	72.6	27.4
#60	3.70	20.97	17.27	219.11	76.3	23.7
#100	3.58	15.87	12.29	231.40	79.0	21.0
#140	3.64	10.01	6.37	237.77	80.4	19.6
#200	3.67	10.44	6.77	244.54	81.9	18.1

Data entered by: SR  
Data checked by: RS  
FileName: USM0TP14

Date: 09/20/2006  
Date: 9/20/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services  
 Job Number: 2562-10  
 Classification: Classification Not Performed

Sample No.: 1

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
**ASTM D 6913**

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-5  
DEPTH 1-12'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED  
DATE-#4 WASHED 09-15-06 RS  
DATE -#4 WASHED 09-23-06 RS  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 98.32  
Wt. Dry Soil & Pan (g) 95.78  
Wt. Lost Moisture (g) 2.54  
Wt. of Pan Only (g) 3.79  
Wt. of Dry Soil (g) 91.99  
Moisture Content % 2.8

Wt. Total Sample  
Wet (g) 3568.60  
Weight of + #4  
Before Washing (g) 1163.80  
Weight of + #4  
After Washing (g) 1084.55  
Weight of - #4  
Wet (g) 2404.80  
Weight of - #4  
Dry (g) 2417.30  
Wt. Total Sample  
Dry (g) 3501.85

Wt. Partial -#4 Sample Wet (g) 360.58  
Wt. Partial Sample Dry (g) 350.89

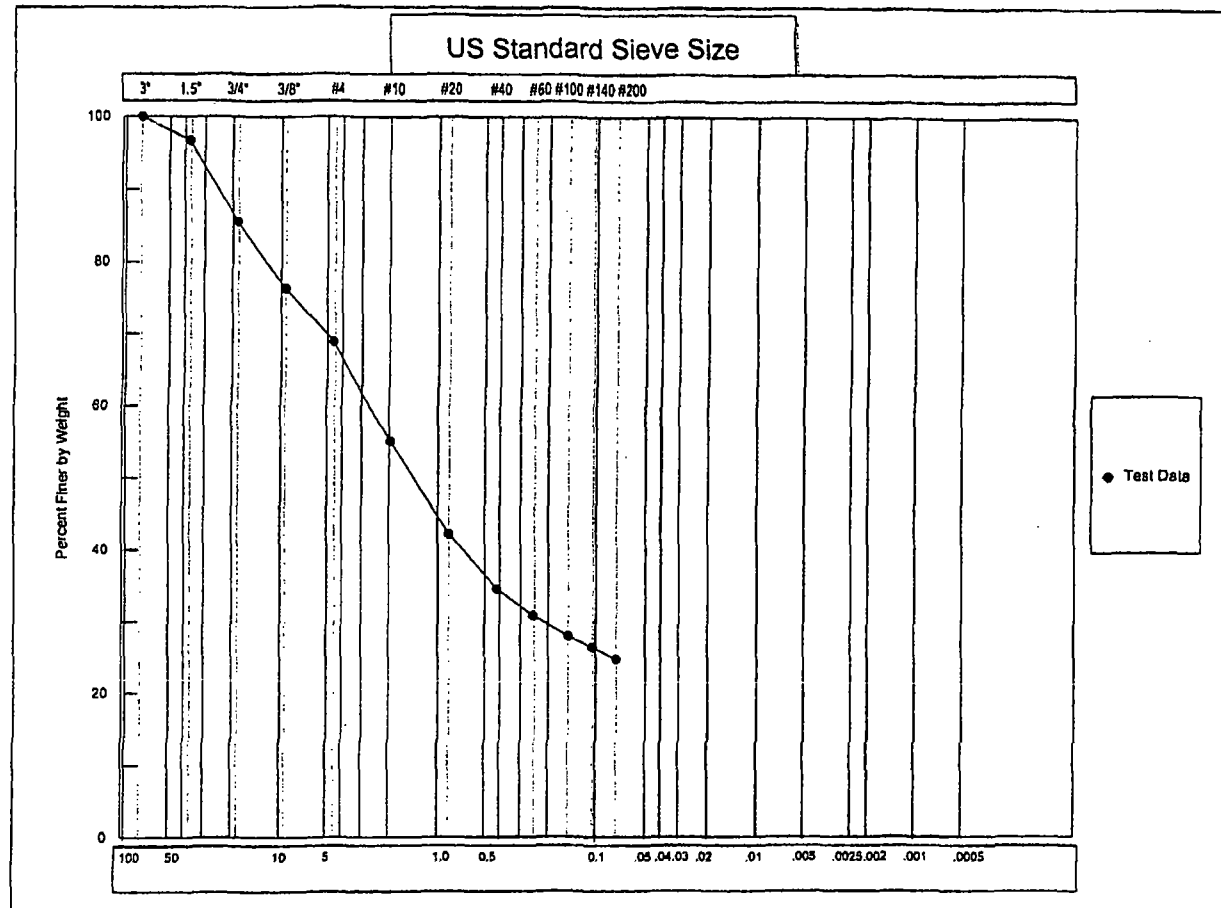
Calc. Wt. "W" (g) 508.32  
Calc. Mass + #4 157.43

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	114.93	114.93	114.93	3.3	96.7
3/4"	0.00	394.37	394.37	509.30	14.5	85.5
3/8"	0.00	318.29	318.29	827.59	23.6	76.4
#4	0.00	256.96	256.96	1084.55	31.0	69.0
#10	3.69	74.17	70.48	70.48	44.8	55.2
#20	3.63	69.35	65.72	136.20	57.8	42.2
#40	3.74	42.59	38.85	175.05	65.4	34.6
#60	3.61	22.77	19.16	194.21	69.2	30.8
#100	3.71	18.38	14.67	208.88	72.1	27.9
#140	3.71	11.32	7.61	216.49	73.6	26.4
#200	3.71	12.05	8.34	224.83	75.2	24.8

Data entered by: SR  
Data checked by: LD  
FileName: USM0TP15

Date: 09/25/2006  
Date: 9/25/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP1-5  
 Job Number: 2562-10 Depth: 1-12'  
 Classification: Classification Not Performed

Sample No.: 1

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP-1-6

DEPTH 1-22'

SAMPLE NO. 1

SOIL DESCR. Project #22238347

LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED

DATE + #4 WASHED 09-20-06 RS

DATE - #4 WASHED 09-25-06 WAR

WASH SIEVE Yes

DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g)	74.30
Wt. Dry Soil & Pan (g)	73.48
Wt. Lost Moisture (g)	0.82
Wt. of Pan Only (g)	3.68
Wt. of Dry Soil (g)	69.80
Moisture Content %	1.2

Wt. Total Sample	
Wet (g)	4012.20
Weight of + #4	
Before Washing (g)	1195.40
Weight of + #4	
After Washing (g)	1152.63
Weight of - #4	
Wet (g)	2816.80
Weight of - #4	
Dry (g)	2826.37
Wt. Total Sample	
Dry (g)	3979.00
Calc. Wt. "W" (g)	316.84
Calc. Mass + #4	91.78

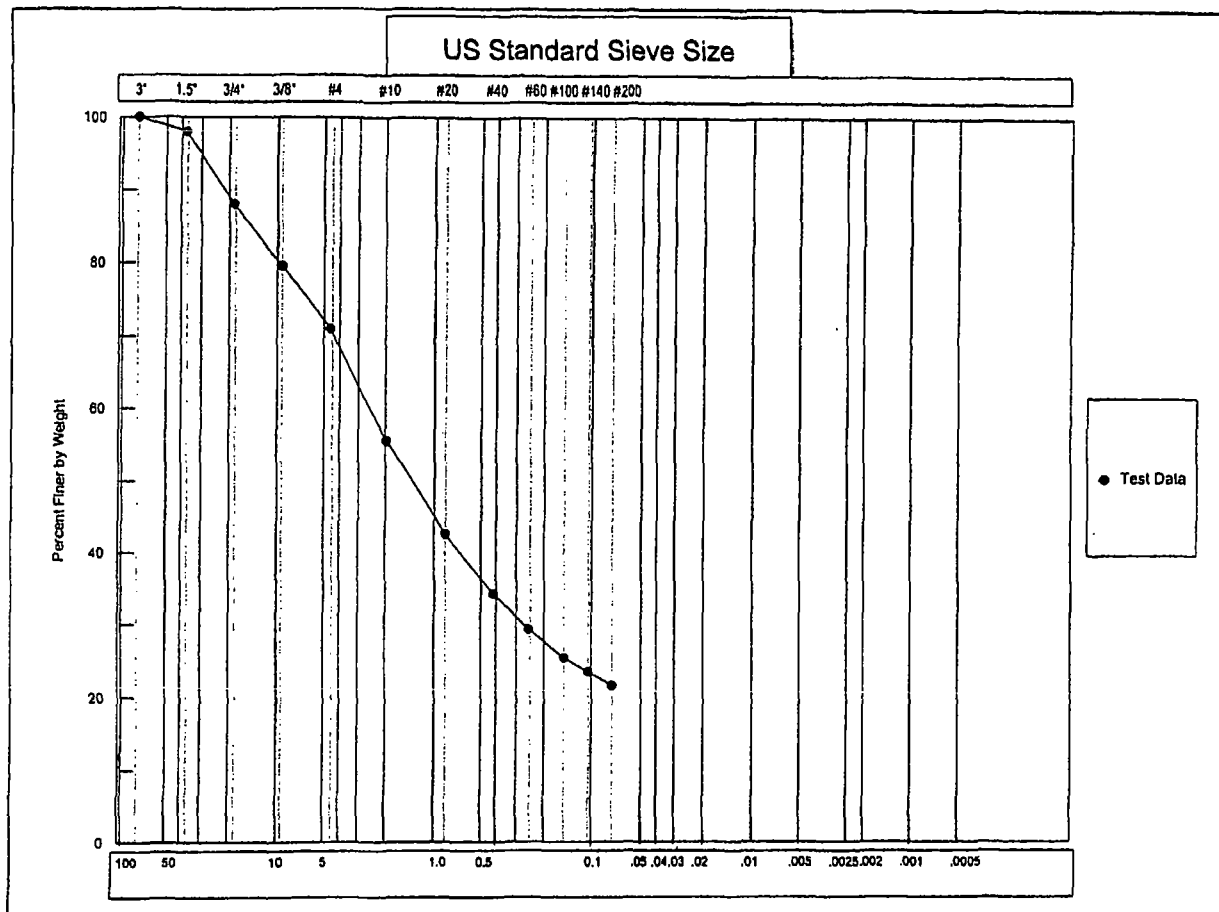
Wt. Partial - #4 Sample Wet (g)	227.70
Wt. Partial Sample Dry (g)	225.06

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	79.44	79.44	79.44	2.0	98.0
3/4"	0.00	396.68	396.68	476.12	12.0	88.0
3/8"	0.00	339.07	339.07	815.19	20.5	79.5
#4	0.00	337.44	337.44	1152.63	29.0	71.0
#10	3.62	52.51	48.89	48.89	44.4	55.6
#20	3.76	44.88	41.12	90.01	57.4	42.6
#40	3.62	30.11	26.49	116.50	65.7	34.3
#60	3.69	19.30	15.61	132.11	70.7	29.3
#100	3.67	16.15	12.48	144.59	74.6	25.4
#140	3.67	9.74	6.07	150.66	76.5	23.5
#200	3.73	9.77	6.04	156.70	78.4	21.6

Data entered by: SR  
Data checked by: RS  
FileName: USM0TP16

Date: 09/26/2006  
Date: 9/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP-1-6  
 Job Number: 2562-10 Depth: 1-22'  
 Classification: **Classification Not Performed**

Sample No.: 1

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
**ASTM D 6913**

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-7

DEPTH 1-12'

SAMPLE NO. 1

SOIL DESCR. Project #22238347

LOCATION Standard Mine P.O. #05-06-P-9587

SAMPLED

DATE+#4 WASHED 09-15-06 RS

DATE -#4 WASHED 09-18-06 RS

WASH SIEVE Yes

DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g)	99.67
Wt. Dry Soil & Pan (g)	98.75
Wt. Lost Moisture (g)	0.92
Wt. of Pan Only (g)	3.67
Wt. of Dry Soil (g)	95.08
Moisture Content %	1.0

Wt. Total Sample	
Wet (g)	3955.70
Weight of + #4	
Before Washing (g)	1890.70
Weight of + #4	
After Washing (g)	1812.86
Weight of - #4	
Wet (g)	2065.00
Weight of - #4	
Dry (g)	2122.30
Wt. Total Sample	
Dry (g)	3935.16

Wt. Partial -#4 Sample Wet (g)	331.80
Wt. Partial Sample Dry (g)	328.62

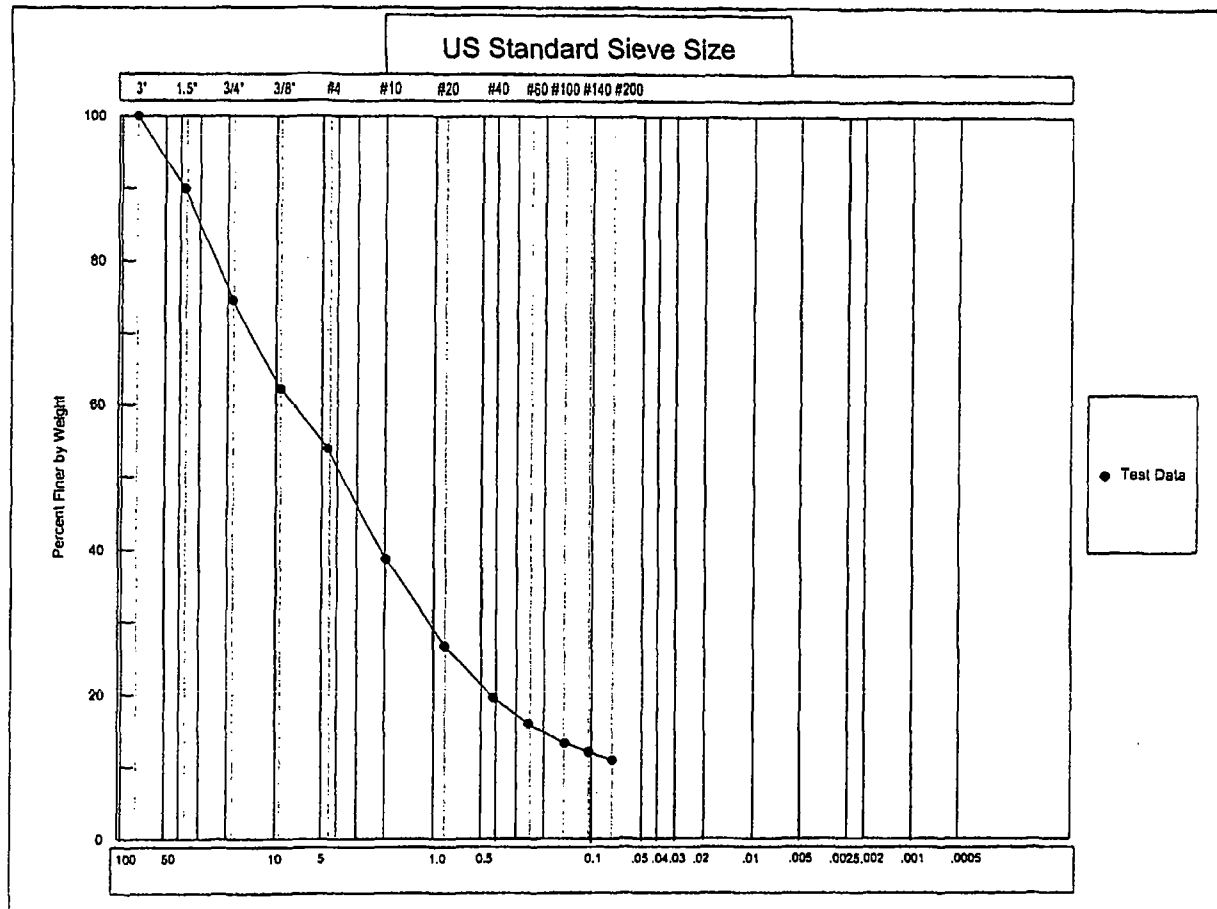
Calc. Wt. "W" (g)	609.33
Calc. Mass + #4	280.71

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	397.53	397.53	397.53	10.1	89.9
3/4"	0.00	600.43	600.43	997.96	25.4	74.6
3/8"	0.00	485.98	485.98	1483.94	37.7	62.3
#4	0.00	328.92	328.92	1812.86	46.1	53.9
#10	3.64	96.48	92.84	92.84	61.3	38.7
#20	3.66	76.94	73.28	166.12	73.3	26.7
#40	3.69	47.45	43.76	209.88	80.5	19.5
#60	3.63	25.50	21.87	231.75	84.1	15.9
#100	3.73	20.16	16.43	248.18	86.8	13.2
#140	3.79	11.18	7.39	255.57	88.0	12.0
#200	3.75	10.79	7.04	262.61	89.2	10.8

Data entered by: SR  
Data checked by: SR  
FileName: USM0TP17

Date: 09/20/2006  
Date: 9/20/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP1-7  
 Job Number: 2582-10 Depth: 1-12'  
 Classification: **Classification Not Performed**

Sample No.: 1

Advanced Terra Testing, Inc.



MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-8  
DEPTH 1-9'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED  
DATE + #4 WASHED 09-15-06 RS  
DATE - #4 WASHED 09-25-06 KR  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 72.63  
Wt. Dry Soil & Pan (g) 71.78  
Wt. Lost Moisture (g) 0.85  
Wt. of Pan Only (g) 3.65  
Wt. of Dry Soil (g) 68.13  
Moisture Content % 1.2

Wt. Total Sample  
Wet (g) 4241.00  
Weight of + #4  
Before Washing (g) 1391.80  
Weight of + #4  
After Washing (g) 1308.64  
Weight of - #4  
Wet (g) 2849.20  
Weight of - #4  
Dry (g) 2896.23  
Wt. Total Sample  
Dry (g) 4204.87  
Calc. Wt. "W" (g) 543.05  
Calc. Mass + #4 169.01

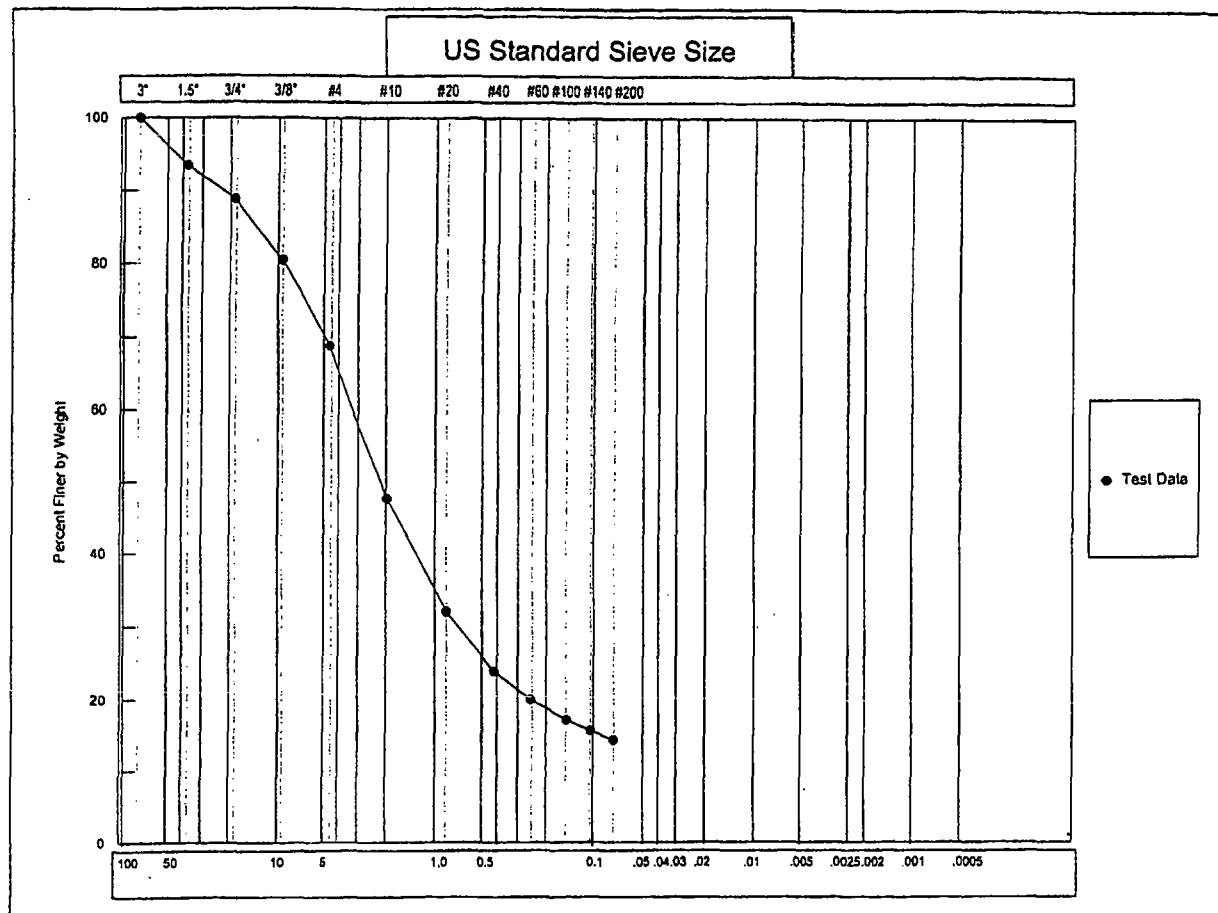
Wt. Partial -#4 Sample Wet (g) 378.71  
Wt. Partial Sample Dry (g) 374.04

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	273.33	273.33	273.33	6.5	93.5
3/4"	0.00	194.05	194.05	467.38	11.1	88.9
3/8"	0.00	350.78	350.78	818.16	19.5	80.5
#4	0.00	490.48	490.48	1308.64	31.1	68.9
#10	4.40	119.18	114.78	114.78	52.3	47.7
#20	3.63	88.51	84.88	199.66	67.9	32.1
#40	3.73	48.60	44.87	244.53	76.2	23.8
#60	3.60	24.90	21.31	265.83	80.1	19.9
#100	3.66	19.19	15.53	281.36	82.9	17.1
#140	3.68	11.37	7.69	289.05	84.3	15.7
#200	3.59	10.99	7.40	296.45	85.7	14.3

Data entered by: SR  
Data checked by: RS  
FileName: USM0TP18

Date: 09/26/2006  
Date: 9/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP1-8  
 Job Number: 2562-10 Depth: 1-9'  
 Classification: **Classification Not Performed**

Sample No.: 1

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-1

DEPTH 1-5'

SAMPLE NO. 1

SOIL DESCR. Project #22238347

LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED

DATE + #4 WASHED 09-18-06 RS

DATE - #4 WASHED 09-25-06 WAR

WASH SIEVE Yes

DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g)	54.91
Wt. Dry Soil & Pan (g)	52.59
Wt. Lost Moisture (g)	2.32
Wt. of Pan Only (g)	3.62
Wt. of Dry Soil (g)	48.97
Moisture Content %	4.7

Wt. Total Sample	
Wet (g)	4864.80
Weight of + #4	
Before Washing (g)	2079.50
Weight of + #4	
After Washing (g)	2035.88
Weight of - #4	
Wet (g)	2785.30
Weight of - #4	
Dry (g)	2700.96
Wt. Total Sample	
Dry (g)	4736.84
Calc. Wt. "W" (g)	352.10
Calc. Mass + #4	151.33

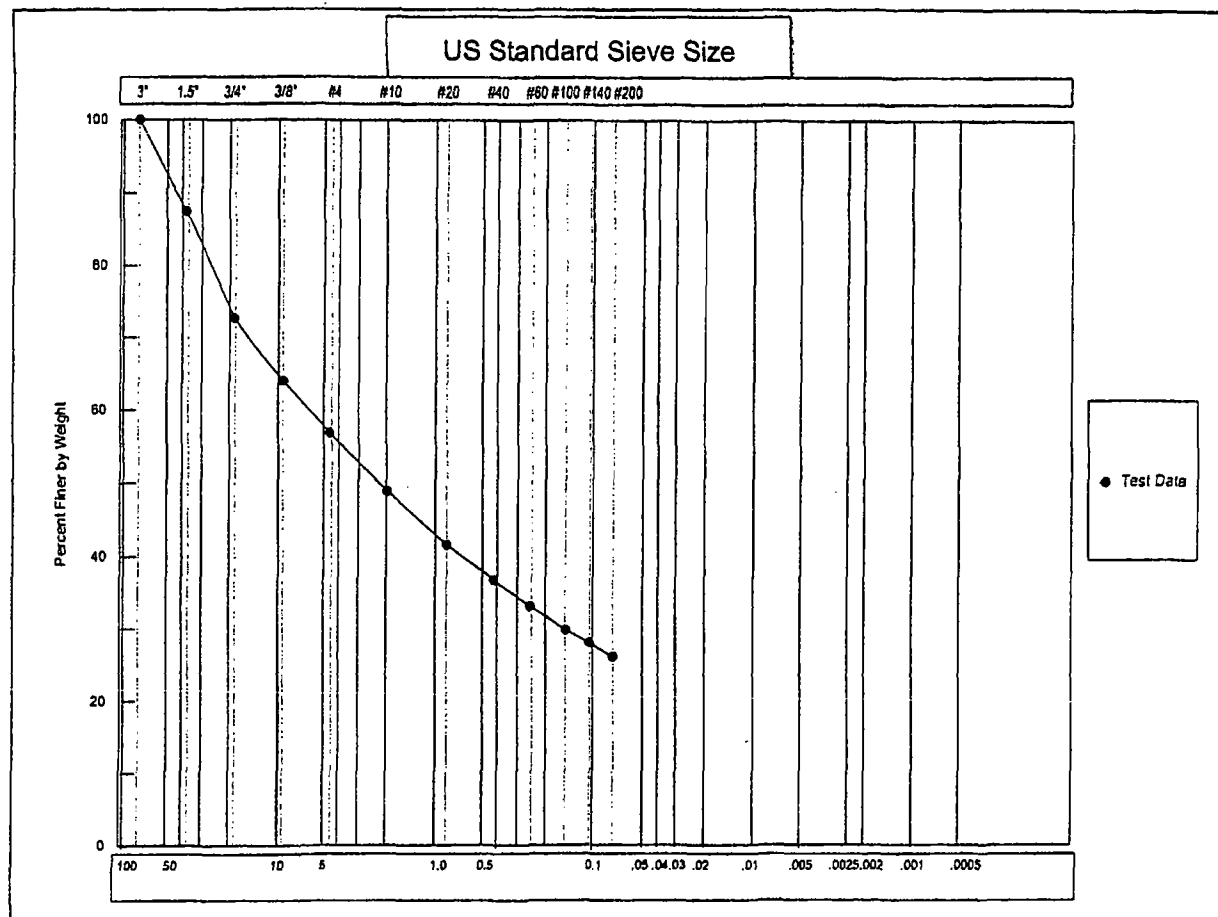
Wt. Partial - #4 Sample Wet (g)	210.28
Wt. Partial Sample Dry (g)	200.77

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	591.55	591.55	591.55	12.5	87.5
3/4"	0.00	703.65	703.65	1295.20	27.3	72.7
3/8"	0.00	411.41	411.41	1706.61	36.0	64.0
#4	0.00	329.27	329.27	2035.88	43.0	57.0
#10	3.72	32.14	28.42	28.42	51.1	48.9
#20	3.61	29.29	25.68	54.10	58.3	41.7
#40	3.72	21.00	17.28	71.38	63.3	36.7
#60	3.72	16.51	12.79	84.17	66.9	33.1
#100	3.68	15.44	11.76	95.93	70.2	29.8
#140	3.64	9.98	6.34	102.27	72.0	28.0
#200	3.65	10.18	6.53	108.80	73.9	26.1

Data entered by: RS SR  
Data checked by: RS  
FileName: USM0TP21

Date: 09/26/2006  
Date: 9/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	CRS	MEDIUM	FINE	

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP2-1  
 Job Number: 2562-10 Depth: 1-5'  
 Classification: **Classification Not Performed**

Sample No.: 1

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-2  
DEPTH 1-4'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED  
DATE + #4 WASHED 09-18-06 RS  
DATE - #4 WASHED 09-25-06 WAR  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 49.57  
Wt. Dry Soil & Pan (g) 48.93  
Wt. Lost Moisture (g) 0.64  
Wt. of Pan Only (g) 3.73  
Wt. of Dry Soil (g) 45.20  
Moisture Content % 1.4

Wt. Total Sample  
Wet (g) 4679.70  
Weight of + #4  
Before Washing (g) 2147.60  
Weight of + #4  
After Washing (g) 2106.98  
Weight of - #4  
Wet (g) 2532.10  
Weight of - #4  
Dry (g) 2536.80  
Wt. Total Sample  
Dry (g) 4643.78  
Calc. Wt. "W" (g) 403.08  
Calc. Mass + #4 182.88

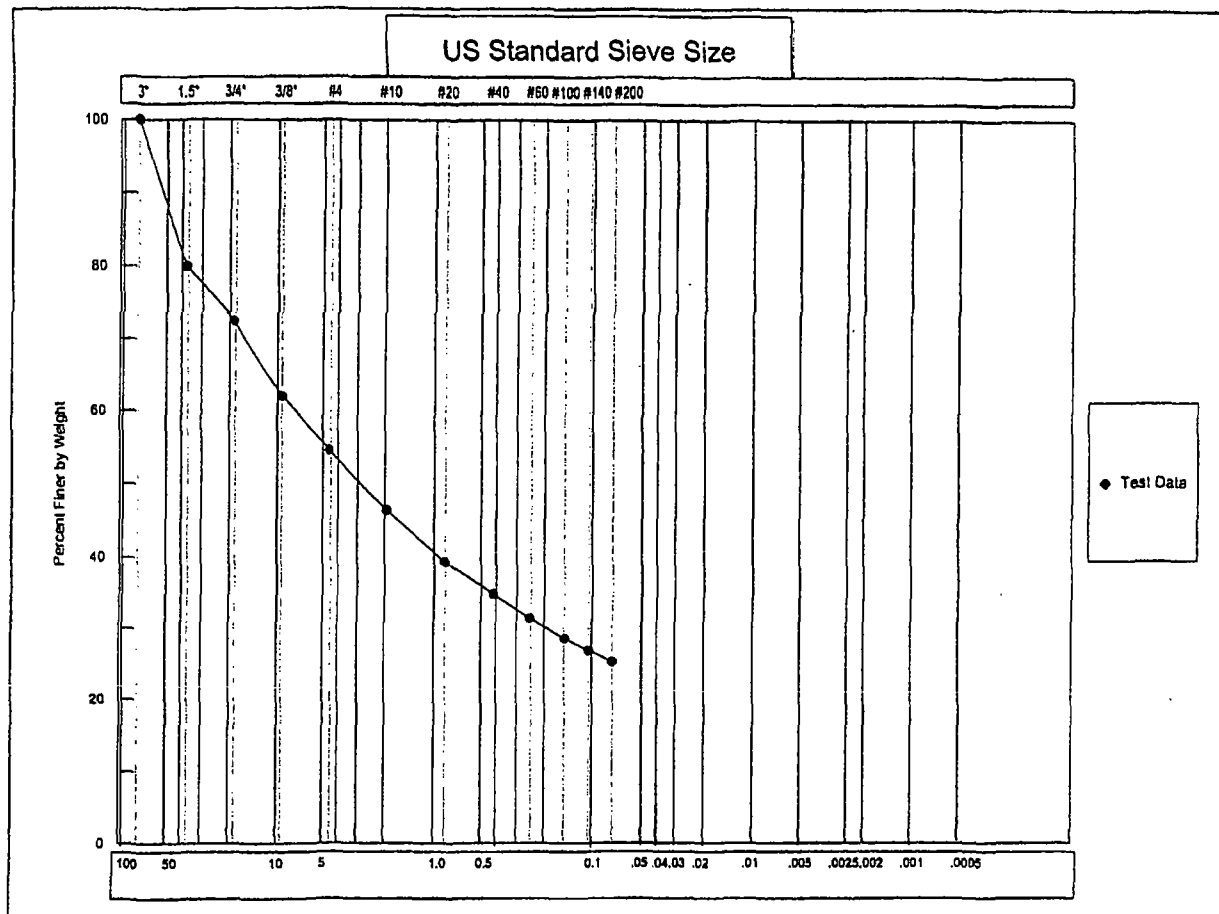
Wt. Partial -#4 Sample Wet (g) 223.31  
Wt. Partial Sample Dry (g) 220.19

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	927.87	927.87	927.87	20.0	80.0
3/4"	0.00	349.44	349.44	1277.31	27.5	72.5
3/8"	0.00	484.77	484.77	1762.08	37.9	62.1
#4	0.00	344.90	344.90	2106.98	45.4	54.6
#10	3.61	36.47	32.86	32.86	53.5	46.5
#20	3.66	32.26	28.60	61.46	60.6	39.4
#40	3.73	21.90	18.17	79.63	65.1	34.9
#60	3.65	17.56	13.91	93.54	68.6	31.4
#100	3.57	15.13	11.56	105.10	71.4	28.6
#140	3.66	10.53	6.87	111.97	73.2	26.8
#200	3.81	10.48	6.67	118.64	74.8	25.2

Data entered by: SR  
Data checked by: ld  
FileName: USM0TP22

Date: 09/26/2006  
Date: 9/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	CRS	MEDIUM	FINE	

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP2-2  
 Job Number: 2562-10 Depth: 1-4'  
 Classification: Classification Not Performed

Sample No.: 1

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-3  
DEPTH 1-8'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED  
DATE+ #4 WASHED 09-19-06 RS  
DATE -#4 WASHED 09-25-06 WAR  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 101.67  
Wt. Dry Soil & Pan (g) 99.26  
Wt. Lost Moisture (g) 2.41  
Wt. of Pan Only (g) 3.72  
Wt. of Dry Soil (g) 95.54  
Moisture Content % 2.5

WL Total Sample  
Wet (g) 3097.20  
Weight of + #4  
Before Washing (g) 669.60  
Weight of + #4  
After Washing (g) 652.14  
Weight of - #4  
Wet (g) 2427.60  
Weight of - #4  
Dry (g) 2384.90  
Wt. Total Sample  
Dry (g) 3037.04

Wt. Partial -#4 Sample Wet (g) 234.61  
Wt. Partial Sample Dry (g) 228.84

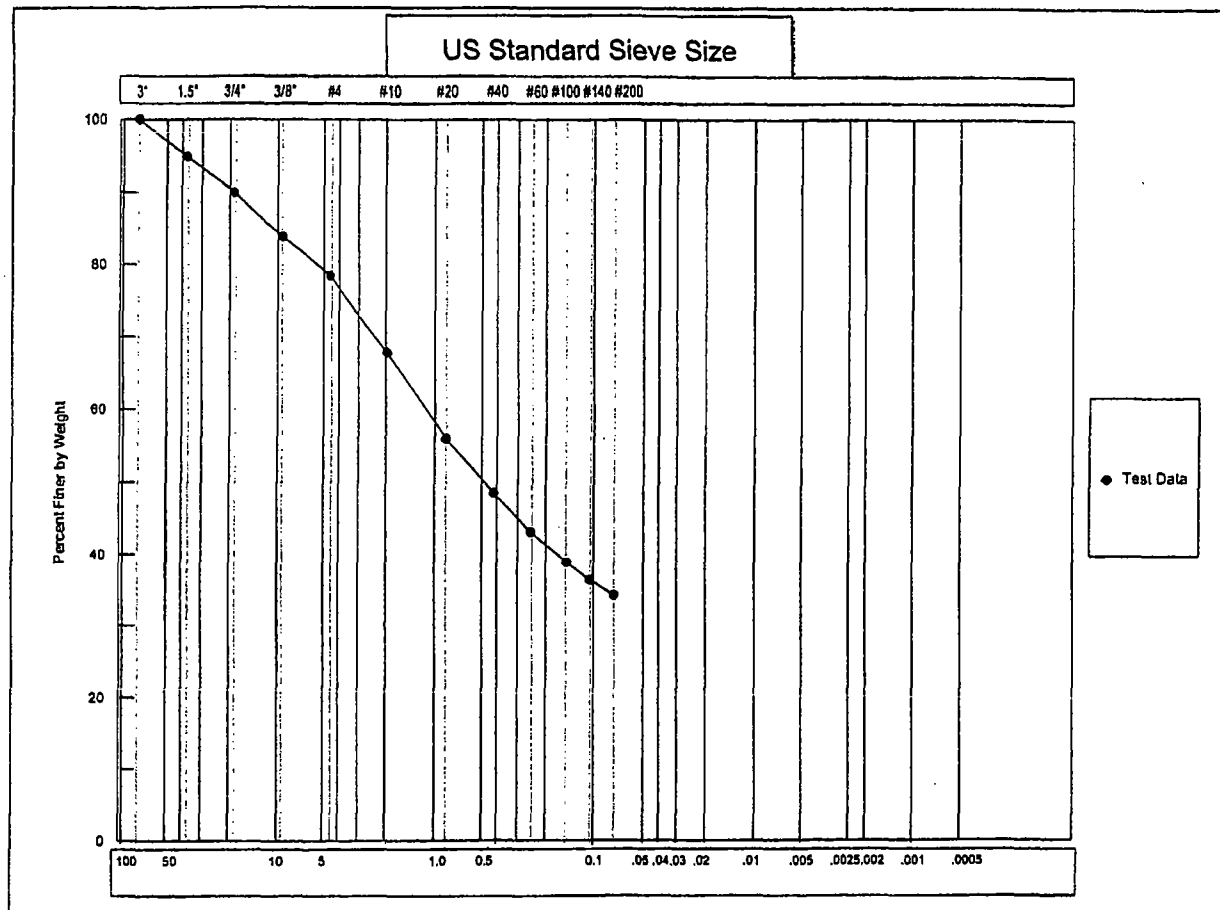
Calc. Wt. "W" (g) 291.41  
Calc. Mass + #4 62.57

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. WL Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	153.52	153.52	153.52	5.1	94.9
3/4"	0.00	151.03	151.03	304.55	10.0	90.0
3/8"	0.00	183.03	183.03	487.58	16.1	83.9
#4	0.00	164.56	164.56	652.14	21.5	78.5
#10	3.64	34.77	31.13	31.13	32.2	67.8
#20	3.66	38.14	34.48	65.61	44.0	56.0
#40	3.62	25.49	21.87	87.48	51.5	48.5
#60	3.70	19.39	15.69	103.17	56.9	43.1
#100	4.04	16.53	12.49	115.66	61.2	38.8
#140	3.70	10.90	7.20	122.86	63.6	36.4
#200	3.71	9.95	6.24	129.10	65.8	34.2

Data entered by: SR  
Data checked by: RS  
FileName: USM0TP23

Date: 09/26/2006  
Date: 9/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP2-3  
 Job Number: 2562-10 Depth: 1-8'  
 Classification: Classification Not Performed

Sample No.: 1

Advanced Terra Testing, Inc.



**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-4  
DEPTH 1-4'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED  
DATE + #4 WASHED 09-18-06 RS  
DATE - #4 WASHED 09-25-06 WAR  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 52.36  
Wt. Dry Soil & Pan (g) 50.81  
Wt. Lost Moisture (g) 1.55  
Wt. of Pan Only (g) 3.64  
Wt. of Dry Soil (g) 47.17  
Moisture Content % 3.3

Wt. Total Sample  
Wet (g) 3869.30  
Weight of + #4  
Before Washing (g) 1495.80  
Weight of + #4  
After Washing (g) 1424.01  
Weight of - #4  
Wet (g) 2373.50  
Weight of - #4  
Dry (g) 2367.49  
Wt. Total Sample  
Dry (g) 3791.50

Wt. Partial -#4 Sample Wet (g) 214.90  
Wt. Partial Sample Dry (g) 208.06

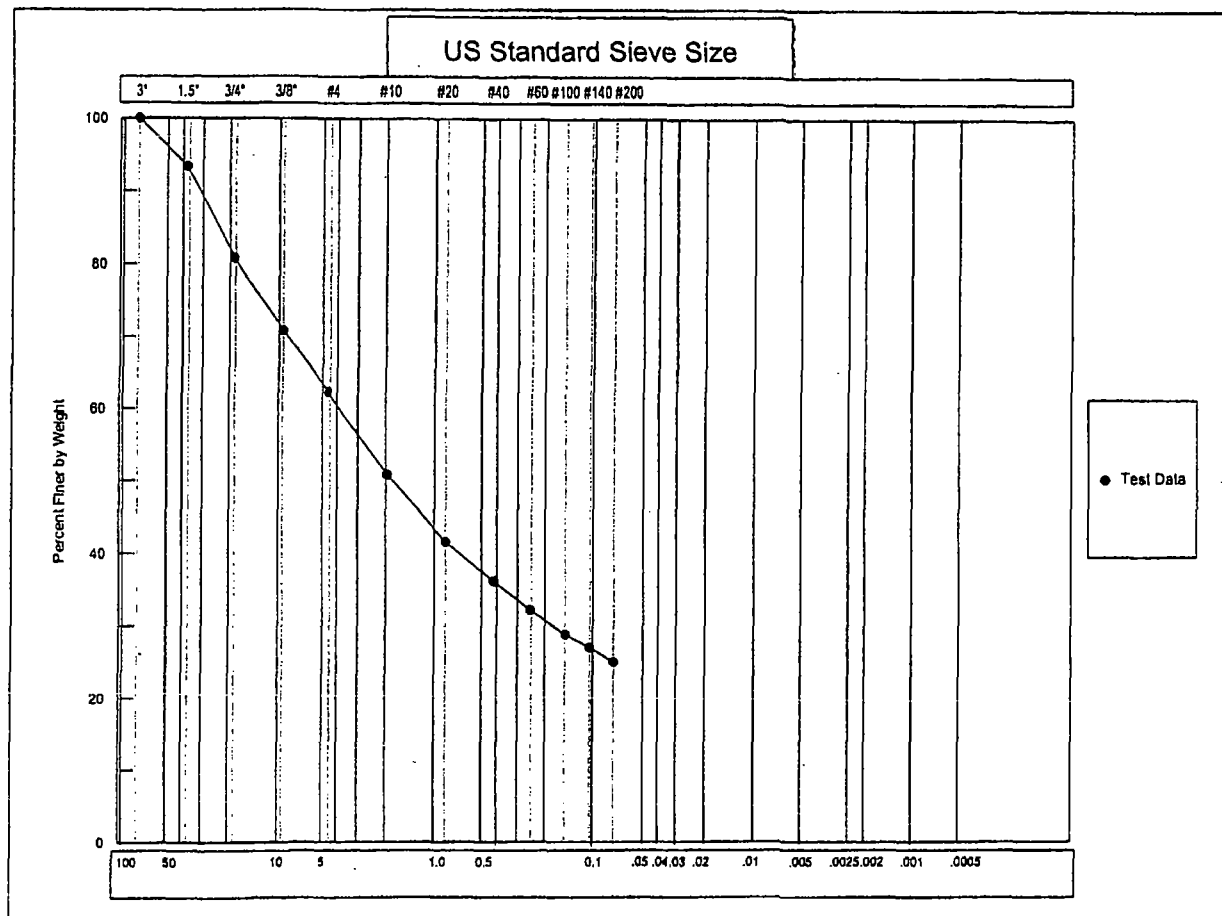
Calc. Wt. "W" (g) 333.21  
Calc. Mass + #4 125.15

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	251.32	251.32	251.32	6.6	93.4
3/4"	0.00	476.36	476.36	727.68	19.2	80.8
3/8"	0.00	374.19	374.19	1101.87	29.1	70.9
#4	0.00	322.14	322.14	1424.01	37.6	62.4
#10	3.64	42.25	38.61	38.61	49.1	50.9
#20	3.70	34.49	30.79	69.40	58.4	41.6
#40	3.63	21.64	18.01	87.41	63.8	36.2
#60	3.62	16.76	13.14	100.55	67.7	32.3
#100	3.70	14.89	11.19	111.74	71.1	28.9
#140	3.68	9.70	6.02	117.76	72.9	27.1
#200	3.69	10.63	6.94	124.70	75.0	25.0

Data entered by: SR  
Data checked by: RS  
FileName: USM0TP24

Date: 09/26/2006  
Date: 9/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP2-4  
 Job Number: 2562-10 Depth: 1-4'  
 Classification: **Classification Not Performed**

Sample No.: 1

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-5  
DEPTH 1-4'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED  
DATE + #4 WASHED 09-15-06 RS  
DATE - #4 WASHED 09-25-06 KR  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 88.15  
Wt. Dry Soil & Pan (g) 85.27  
Wt. Lost Moisture (g) 2.88  
Wt. of Pan Only (g) 3.82  
Wt. of Dry Soil (g) 81.45  
Moisture Content % 3.5

Wt. Total Sample  
Wet (g) 3968.80  
Weight of + #4  
Before Washing (g) 1557.50  
Weight of + #4  
After Washing (g) 1502.77  
Weight of - #4  
Wet (g) 2411.30  
Weight of - #4  
Dry (g) 2381.81  
Wt. Total Sample  
Dry (g) 3884.58

Wt. Partial - #4 Sample Wet (g) 350.13  
Wt. Partial Sample Dry (g) 338.17

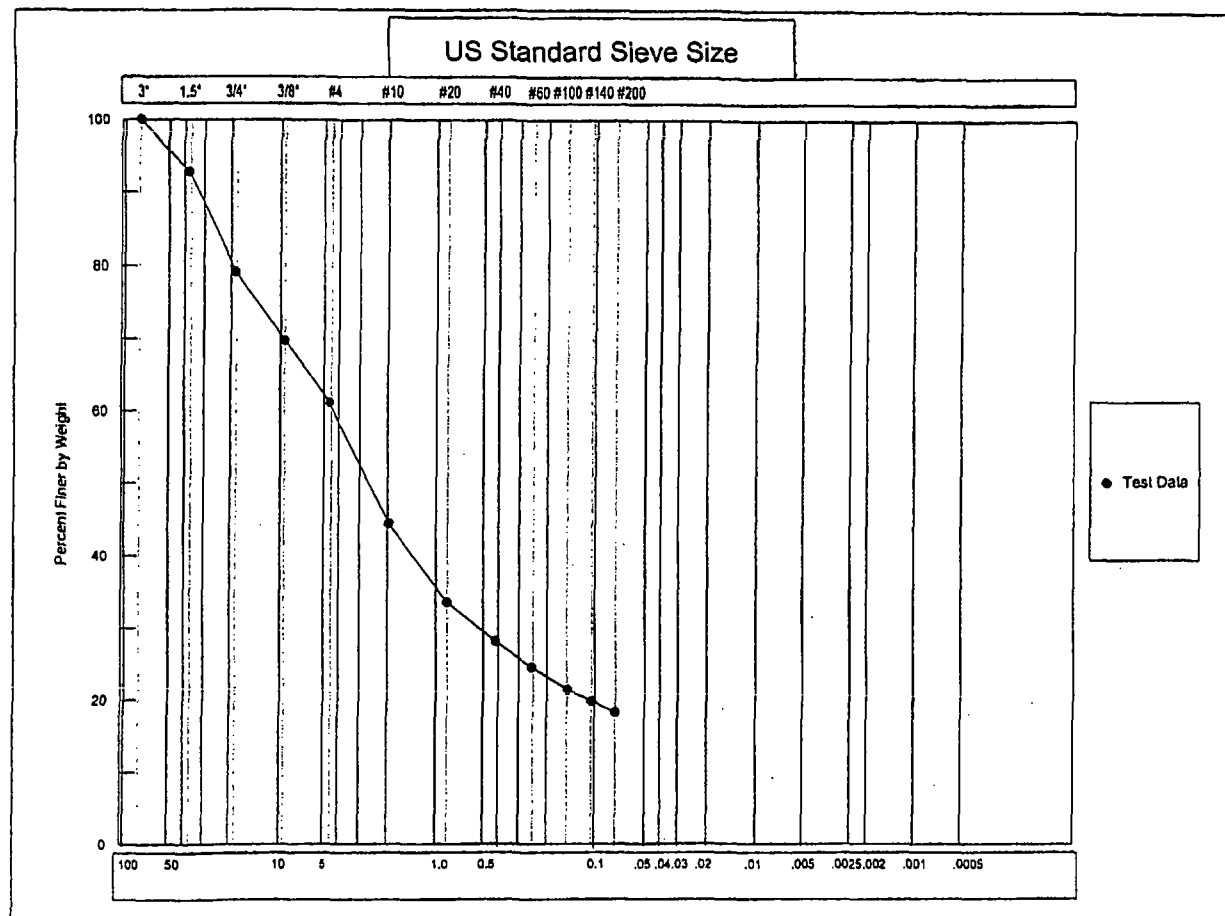
Calc. Wt. "W" (g) 551.54  
Calc. Mass + #4 213.37

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	279.22	279.22	279.22	7.2	92.8
3/4"	0.00	527.70	527.70	806.92	20.8	79.2
3/8"	0.00	363.50	363.50	1170.42	30.1	69.9
#4	0.00	332.35	332.35	1502.77	38.7	61.3
#10	4.32	96.98	92.66	92.66	55.5	44.5
#20	3.68	63.77	60.09	152.75	66.4	33.6
#40	3.67	33.53	29.86	182.61	71.8	28.2
#60	3.63	23.54	19.91	202.52	75.4	24.6
#100	3.66	20.96	17.30	219.83	78.5	21.5
#140	3.62	12.58	8.96	228.78	80.2	19.8
#200	3.68	12.52	8.84	237.62	81.8	18.2

Data entered by: SR  
Data checked by: RS  
FileName: USM0TP25

Date: 09/26/2006  
Date: 9/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP2-5  
 Job Number: 2562-10 Depth: 1-4'  
 Classification: Classification Not Performed

Sample No.: 1

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-6  
DEPTH 1-5'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED  
DATE + #4 WASHED 09-20-06 RS  
DATE - #4 WASHED 09-25-06 WAR  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 68.36  
Wt. Dry Soil & Pan (g) 67.22  
Wt. Lost Moisture (g) 1.14  
Wt. of Pan Only (g) 3.72  
Wt. of Dry Soil (g) 63.50  
Moisture Content % 1.8

Wt. Total Sample  
Wet (g) 3857.30  
Weight of + #4  
Before Washing (g) 1653.60  
Weight of + #4  
After Washing (g) 1599.30  
Weight of - #4  
Wet (g) 2203.70  
Weight of - #4  
Dry (g) 2218.18  
Wt. Total Sample  
Dry (g) 3817.48

Wt. Partial - #4 Sample Wet (g) 203.90  
Wt. Partial Sample Dry (g) 200.30

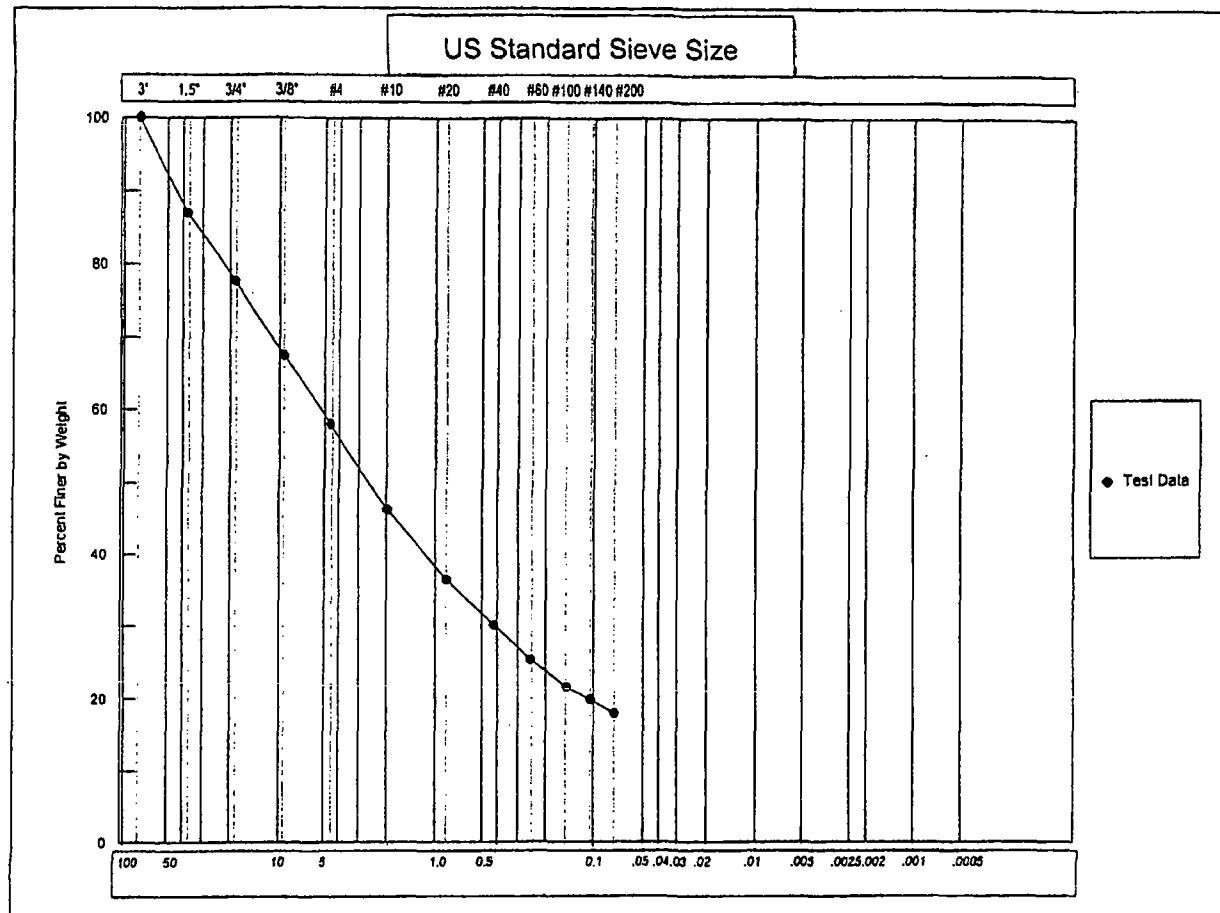
Calc. Wt. "W" (g) 344.72  
Calc. Mass + #4 144.42

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	497.46	497.46	497.46	13.0	87.0
3/4"	0.00	351.05	351.05	848.51	22.2	77.8
3/8"	0.00	392.27	392.27	1240.78	32.5	67.5
#4	0.00	358.52	358.52	1599.30	41.9	58.1
#10	3.65	44.47	40.82	40.82	53.7	46.3
#20	3.61	37.32	33.71	74.53	63.5	36.5
#40	3.68	25.46	21.78	96.31	69.8	30.2
#60	3.69	20.23	16.54	112.85	74.6	25.4
#100	3.76	16.77	13.01	125.86	78.4	21.6
#140	3.68	9.85	6.17	132.03	80.2	19.8
#200	3.60	10.24	6.64	138.67	82.1	17.9

Data entered by: SR  
Data checked by: 128  
FileName: USM0TP26

Date: 09/26/2006  
Date: 9/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	CRS	MEDIUM	FINE	

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP2-6  
 Job Number: 2562-10    Depth: 1-5'  
 Classification: Classification Not Performed

Sample No.: 1

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-7  
DEPTH 1-5'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED  
DATE + #4 WASHED 09-19-06 RS  
DATE - #4 WASHED 09-25-06 WAR  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes  
NATURAL No

Wt. Wet Soil & Pan (g) 52.01  
Wt. Dry Soil & Pan (g) 50.59  
Wt. Lost Moisture (g) 1.42  
Wt. of Pan Only (g) 3.70  
Wt. of Dry Soil (g) 46.89  
Moisture Content % 3.0

Wt. Total Sample Wet (g) 4167.40  
Weight of + #4 Before Washing (g) 1579.60  
Weight of + #4 After Washing (g) 1541.23  
Weight of - #4 Wet (g) 2587.80  
Weight of - #4 Dry (g) 2548.98  
Wt. Total Sample Dry (g) 4090.21

Wt. Partial - #4 Sample Wet (g) 233.12  
Wt. Partial Sample Dry (g) 226.27

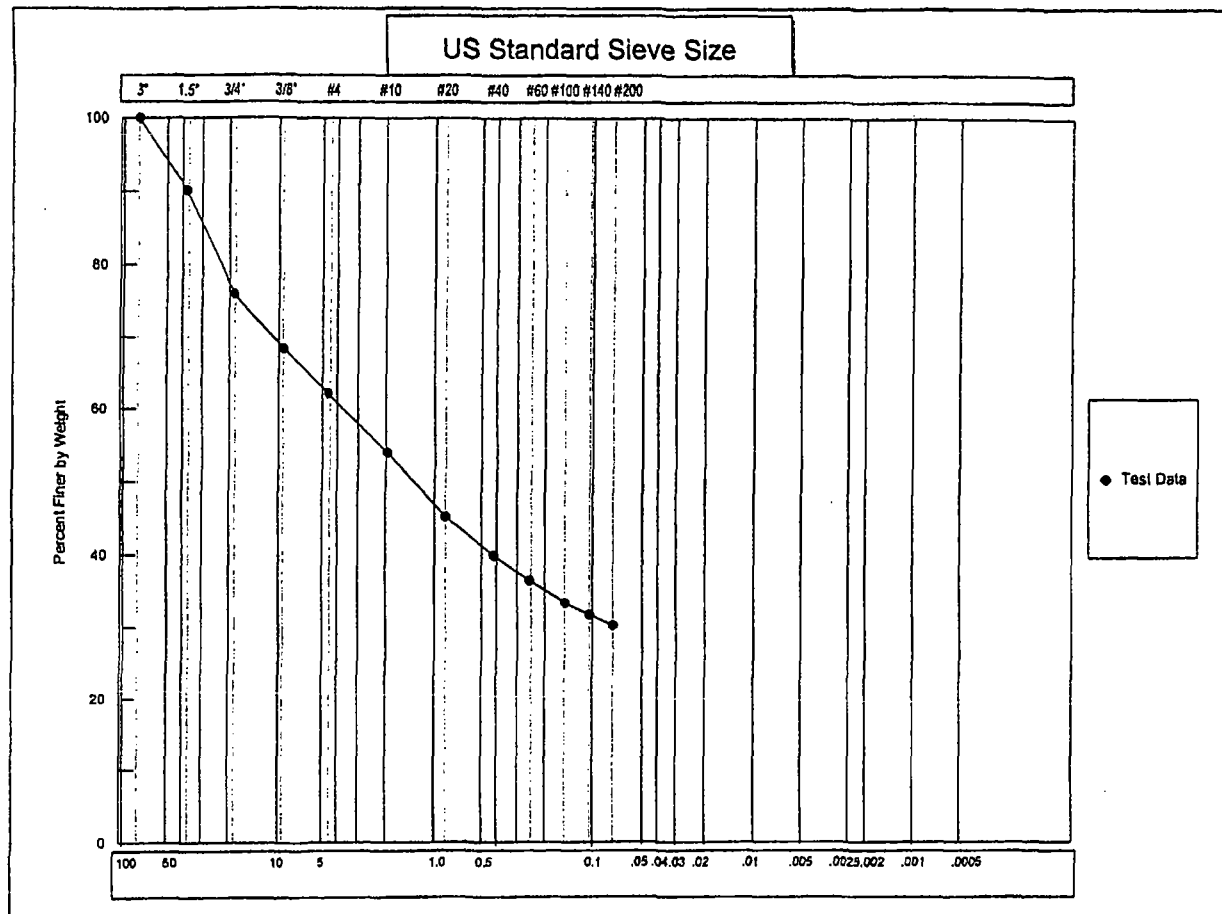
Calc. Wt. "W" (g) 363.08  
Calc. Mass + #4 136.81

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	404.00	404.00	404.00	9.9	90.1
3/4"	0.00	575.17	575.17	979.17	23.9	76.1
3/8"	0.00	311.33	311.33	1290.50	31.6	68.4
#4	0.00	250.73	250.73	1541.23	37.7	62.3
#10	3.58	33.74	30.16	30.16	46.0	54.0
#20	3.58	35.38	31.80	61.96	54.7	45.3
#40	3.70	23.01	19.31	81.27	60.1	39.9
#60	3.68	16.01	12.33	93.60	63.5	36.5
#100	3.72	15.01	11.29	104.89	66.6	33.4
#140	3.67	9.57	5.90	110.79	68.2	31.8
#200	3.69	9.12	5.43	116.22	69.7	30.3

Data entered by: SR  
Data checked by: RS  
FileName: USM0TP27

Date: 09/26/2006  
Date: 9/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP2-7  
 Job Number: 2562-10 Depth: 1-5'  
 Classification: **Classification Not Performed**

Sample No.: 1

Advanced Terra Testing, Inc.



**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
**ASTM D 6913**

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-8  
DEPTH 1-7'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

SAMPLED  
DATE+#4 WASHED 09-15-06 RS  
DATE -#4 WASHED 09-25-06 KR  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 72.41  
Wt. Dry Soil & Pan (g) 70.82  
Wt. Lost Moisture (g) 1.59  
Wt. of Pan Only (g) 3.64  
Wt. of Dry Soil (g) 67.18  
Moisture Content % 2.4

Wt. Total Sample  
Wet (g) 3095.90  
Weight of + #4  
Before Washing (g) 1234.60  
Weight of + #4  
After Washing (g) 1172.74  
Weight of - #4  
Wet (g) 1861.30  
Weight of - #4  
Dry (g) 1878.70  
Wt. Total Sample  
Dry (g) 3051.44

Wt. Partial -#4 Sample Wet (g) 311.67  
Wt. Partial Sample Dry (g) 304.46

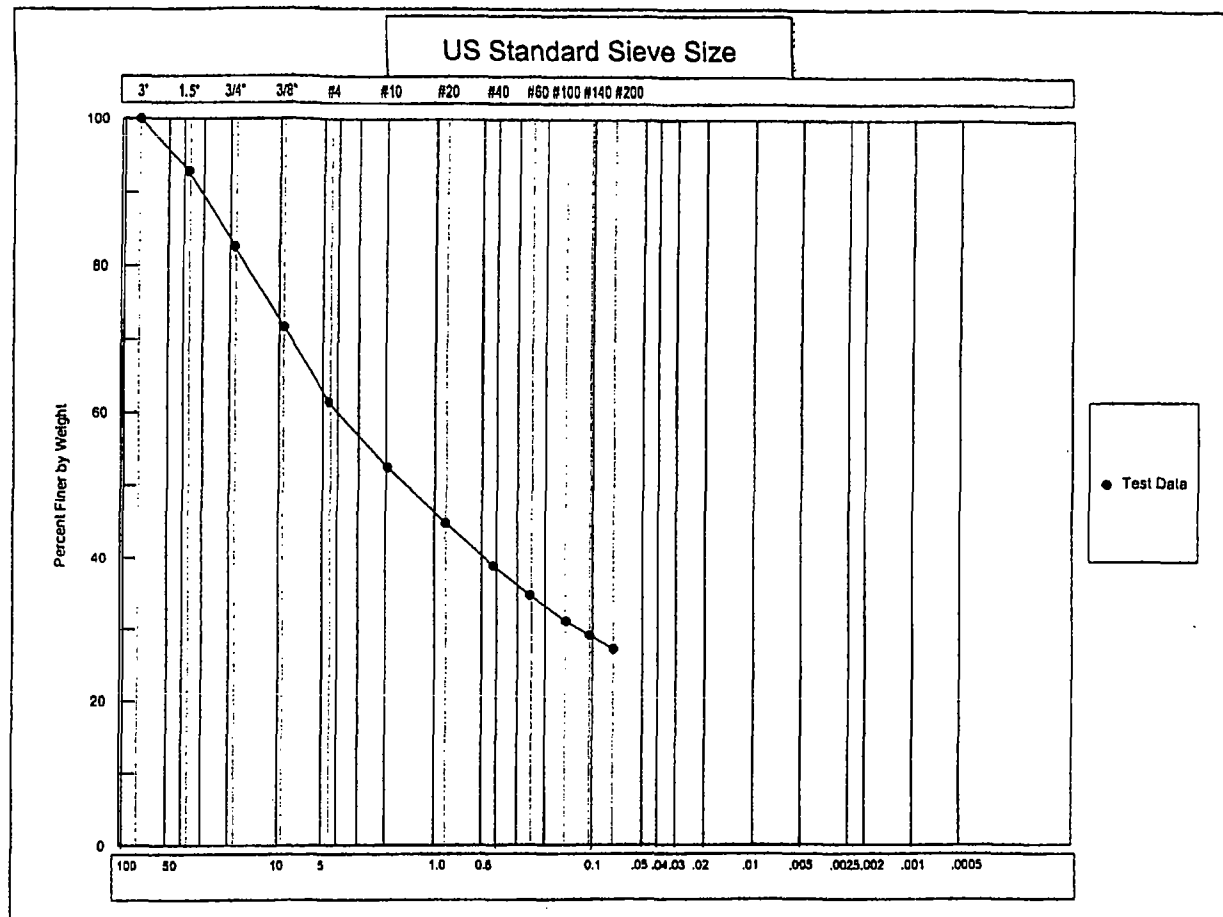
Calc. Wt. "W" (g) 494.52  
Calc. Mass + #4 190.06

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	217.64	217.64	217.64	7.1	92.9
3/4"	0.00	312.82	312.82	530.46	17.4	82.6
3/8"	0.00	331.90	331.90	862.36	28.3	71.7
#4	0.00	310.38	310.38	1172.74	38.4	61.6
#10	3.70	48.28	44.58	44.58	47.4	52.6
#20	3.74	41.95	38.21	82.78	55.2	44.8
#40	3.65	32.88	29.23	112.02	61.1	38.9
#60	3.77	24.17	20.40	132.41	65.2	34.8
#100	3.68	21.84	18.16	150.57	68.9	31.1
#140	3.68	13.41	9.73	160.30	70.8	29.2
#200	3.68	13.45	9.77	170.08	72.8	27.2

Data entered by: SR  
Data checked by: 128  
FileName: USM0TP28

Date: 09/26/2006  
Date: 9/27/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP2-8  
 Job Number: 2582-10 Depth: 1-7'  
 Classification: Classification Not Performed

Sample No.: 1

Advanced Terra Testing, Inc.

**ATTERBERG LIMITS TEST**  
**ASTM D 4318**

<b>CLIENT</b>	URS Operating Services	<b>JOB NO.</b>	2562-11
<b>BORING NO.</b>	TP-1	<b>DATE SAMPLED</b>	
<b>DEPTH</b>	2.5'	<b>DATE TESTED</b>	10-27-06 WAR
<b>SAMPLE NO.</b>	Level 225	<b>LOCATION</b>	Standard Mine
<b>SOIL DESCR.</b>	Project #22238347		
<b>TEST TYPE</b>	One-Point Atterberg Test		

**Plastic Limit  
Determination**

	1	2	AVERAGE
Wt Dish & Wet Soil	8.24	8.77	
Wt Dish & Dry Soil	6.87	7.27	
Wt of Moisture	1.37	1.50	
Wt of Dish	0.81	0.82	
Wt of Dry Soil	6.06	6.45	
Moisture Content	22.61	23.26	22.93

**Liquid Limit**      Device Number      0966  
**Determination**

	1	2	AVERAGE
Number of Blows	22	20	
Wt Dish & Wet Soil	10.38	9.67	
Wt Dish & Dry Soil	7.90	7.34	
Wt of Moisture	2.48	2.33	
Wt of Dish	0.83	0.82	
Wt of Dry Soil	7.07	6.52	
Moisture Content	35.08	35.74	
Corrected Moisture Content	34.54	34.78	34.66

<b>Liquid Limit</b>	35
<b>Plastic Limit</b>	23
<b>Plasticity Index</b>	12

**Atterberg Classification**      CL

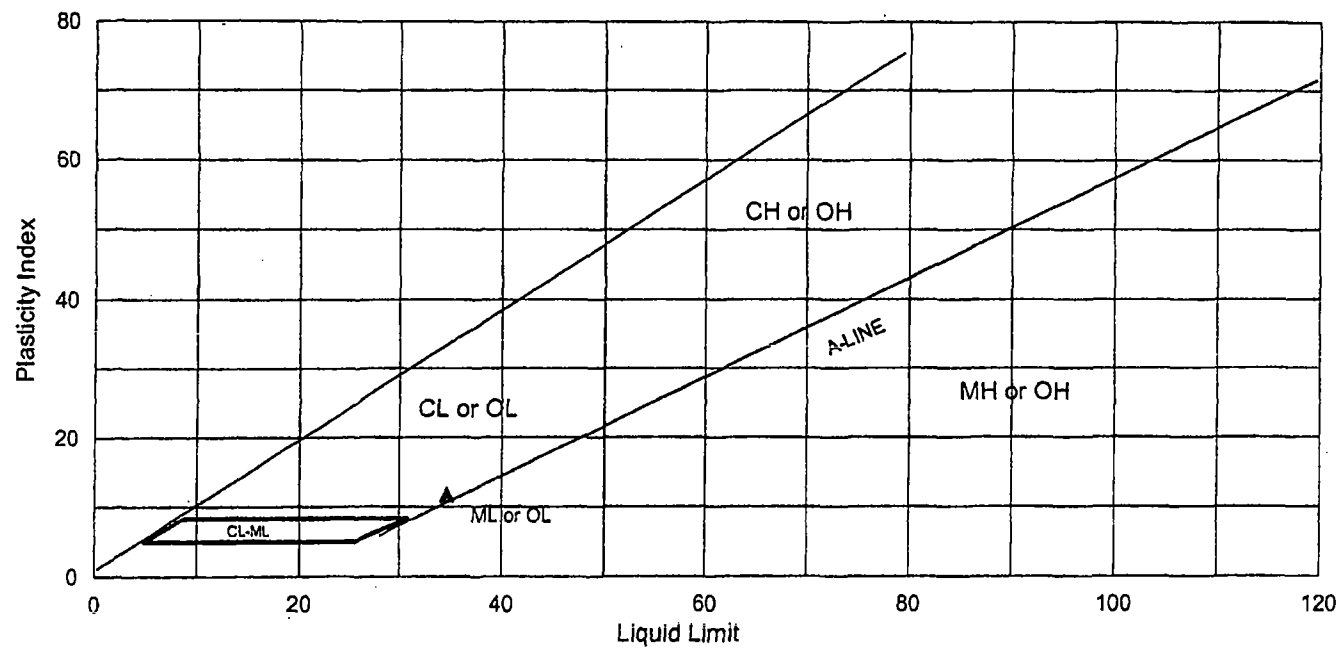
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Checked by: \_\_\_\_\_  
FileName: \_\_\_\_\_

SR      Date: 10/31/2006  
Date: 11/01/06  
USG0251

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-1, 2.5', Level 225



▲ Classification

**ATTERBERG LIMITS TEST  
ASTM D 4318**

<b>CLIENT</b>	URS Operating Services	<b>JOB NO.</b>	2562-11
<b>BORING NO.</b>	TP-2	<b>DATE SAMPLED</b>	
<b>DEPTH</b>	2.5-3.0	<b>DATE TESTED</b>	10-26-06 RO
<b>SAMPLE NO.</b>	Level 225	<b>LOCATION</b>	Standard Mine
<b>SOIL DESCR.</b>	Project #22238347		
<b>TEST TYPE</b>	One-Point Atterberg Test		

**Plastic Limit  
Determination**

	1	2	AVERAGE
Wt Dish & Wet Soil	6.93	6.75	
Wt Dish & Dry Soil	5.58	5.46	
Wt of Moisture	1.35	1.29	
Wt of Dish	0.77	0.76	
Wt of Dry Soil	4.81	4.70	
Moisture Content	28.07	27.45	27.76

**Liquid Limit      Device Number      0966  
Determination**

	1	2	AVERAGE
Number of Blows	23	22	
Wt Dish & Wet Soil	11.55	11.18	
Wt Dish & Dry Soil	8.87	8.62	
Wt of Moisture	2.68	2.56	
Wt of Dish	0.77	0.76	
Wt of Dry Soil	8.10	7.86	
Moisture Content	33.09	32.57	
Corrected Moisture Content	32.75	32.07	32.41

Liquid Limit	32
Plastic Limit	28
Plasticity Index	5

**Atterberg Classification**      ML

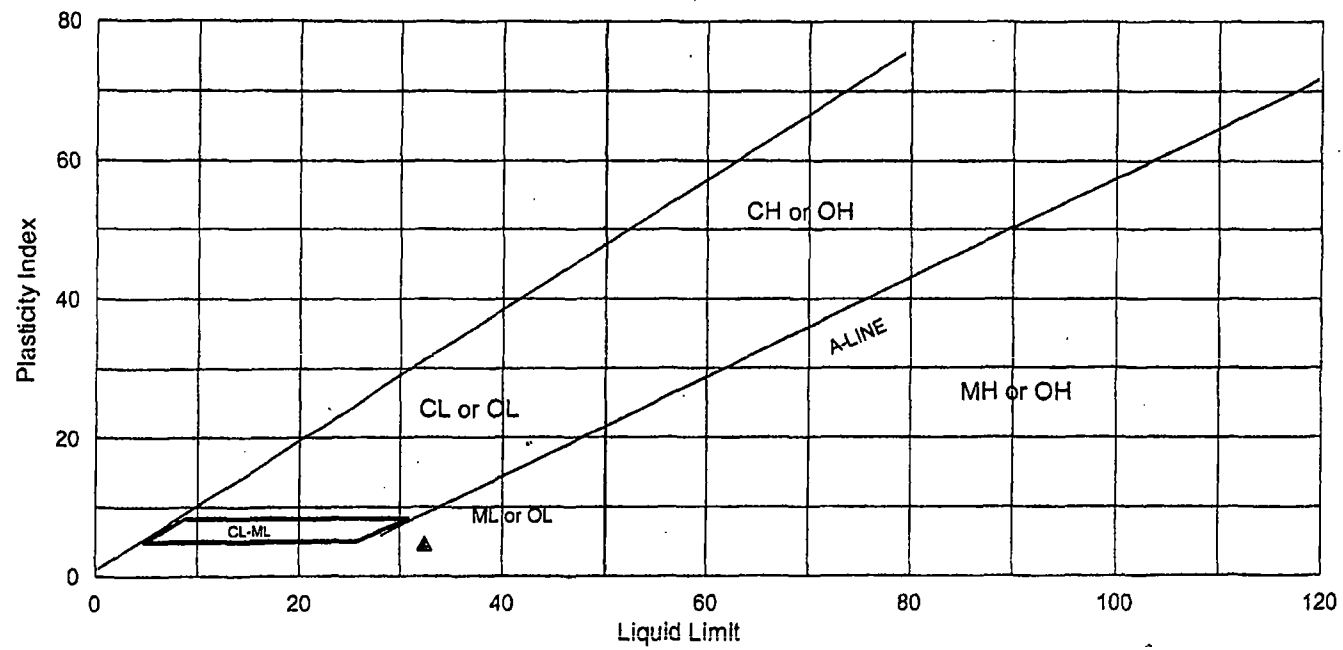
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SR      Date: 10/27/2006  
 Date: 10/27/06  
 USG02530

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-2, 2.5-3.0, Level 225



▲ Classification

**ATTERBERG LIMITS TEST**  
**ASTM D 4318**

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-3  
DEPTH 3.5  
SAMPLE NO. Level 225  
SOIL DESCR. Project #22238347  
TEST TYPE One-Point Atterberg Test

DATE SAMPLED  
DATE TESTED 10-26-06 RO  
LOCATION Standard Mine

Plastic Limit  
Determination

	1	2	AVERAGE
Wt Dish & Wet Soil	7.07	7.27	
Wt Dish & Dry Soil	5.69	5.84	
Wt of Moisture	1.38	1.43	
Wt of Dish	1.11	1.12	
Wt of Dry Soil	4.58	4.72	
Moisture Content	30.13	30.30	30.21

Liquid Limit Device Number 0966  
Determination

	1	2	AVERAGE
Number of Blows	26	24	
Wt Dish & Wet Soil	11.88	11.21	
Wt Dish & Dry Soil	9.02	8.51	
Wt of Moisture	2.86	2.70	
Wt of Dish	1.04	1.07	
Wt of Dry Soil	7.98	7.44	
Moisture Content	35.84	36.29	
Corrected Moisture Content	36.01	36.11	36.06

Liquid Limit 36  
Plastic Limit 30  
Plasticity Index 6

Atterberg Classification ML

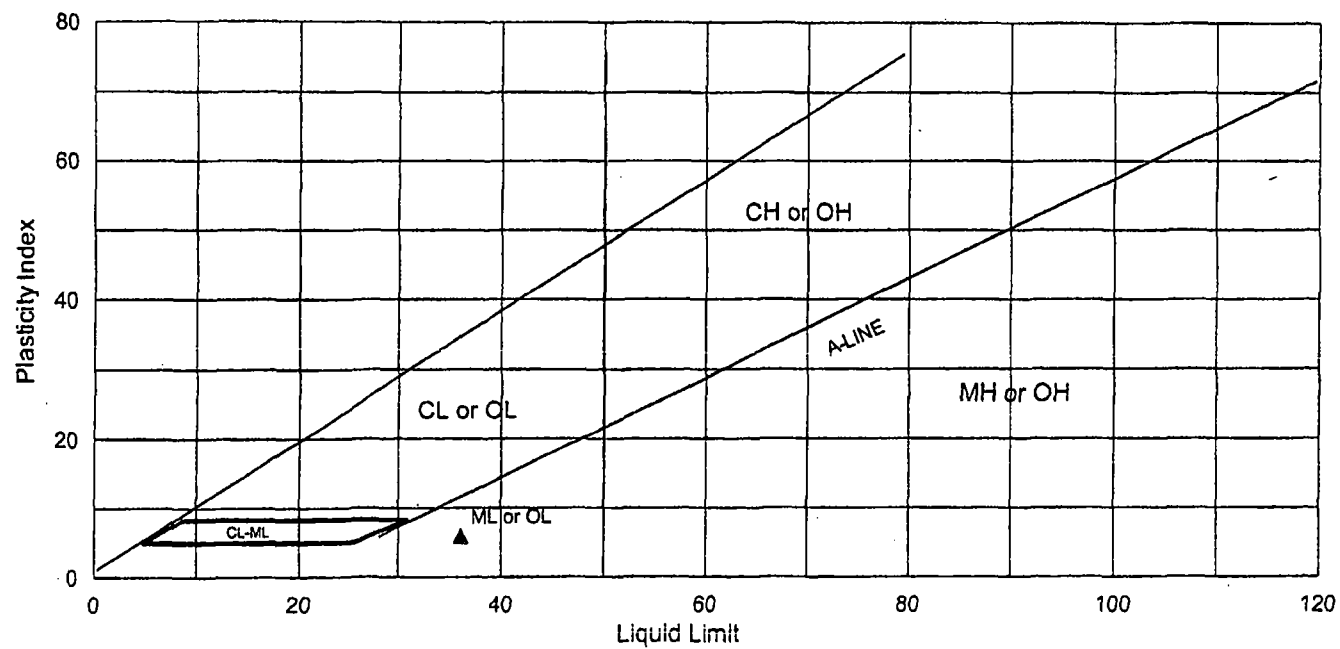
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SR Date: 10/27/2006  
Date: 10/27/06  
USG0P335

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-3, 3.5, Level 225



▲ Classification



**ATTERBERG LIMITS TEST**  
ASTM D 4318

CLIENT	URS Operating Services	JOB NO.	2562-11
BORING NO.	TP-4	DATE SAMPLED	
DEPTH	3.0'	DATE TESTED	10-23-06 RO
SAMPLE NO.	Level 225	LOCATION	Standard Mine
SOIL DESCR.	Project #22238347		
TEST TYPE	One-Point Atterberg Test		

Plastic Limit  
Determination

	1	2	AVERAGE
Wt Dish & Wet Soil	6.50	6.51	
Wt Dish & Dry Soil	5.39	5.39	
Wt of Moisture	1.11	1.12	
Wt of Dish	0.82	0.82	
Wt of Dry Soil	4.57	4.57	
Moisture Content	24.29	24.51	24.40

Liquid Limit      Device Number      0966  
Determination

	1	2	AVERAGE
Number of Blows	24	23	
Wt Dish & Wet Soil	10.45	9.27	
Wt Dish & Dry Soil	7.67	6.81	
Wt of Moisture	2.78	2.46	
Wt of Dish	0.81	0.77	
Wt of Dry Soil	6.86	6.04	
Moisture Content	40.52	40.73	
Corrected Moisture Content	40.33	40.32	40.32

Liquid Limit      40  
Plastic Limit      24  
Plasticity Index      16

Atterberg Classification      CL

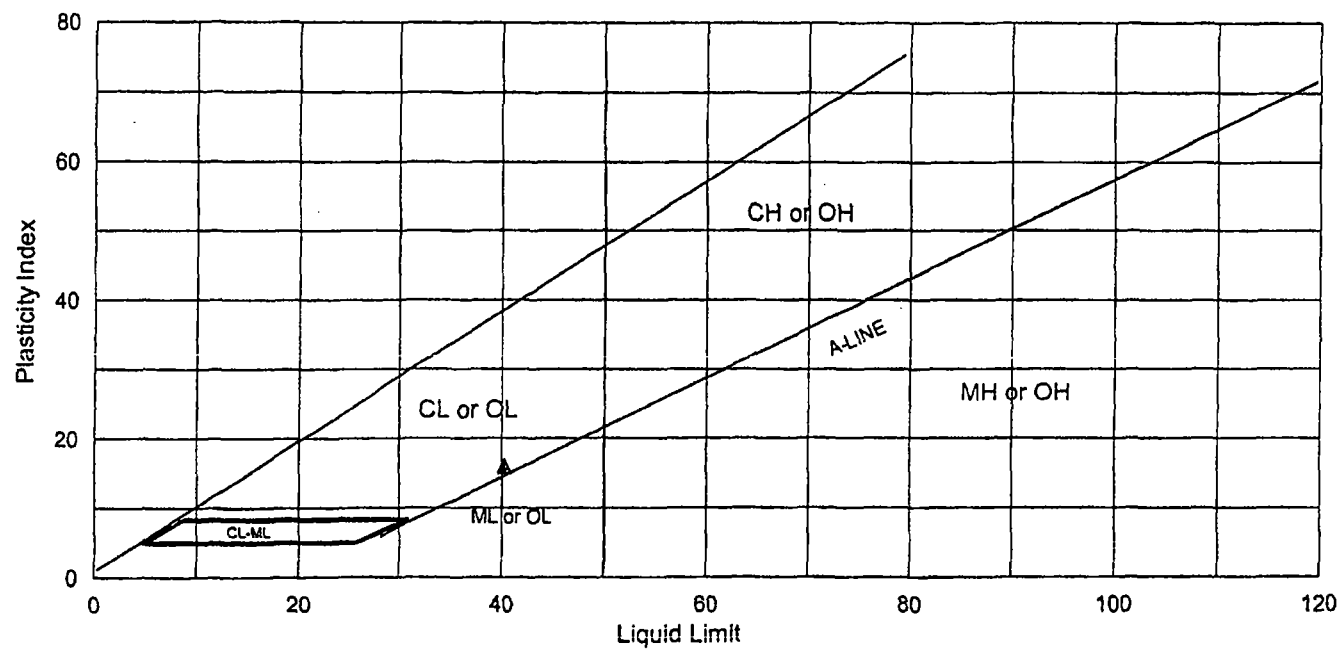
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SR      Date: 10/24/2006  
Date: 10/25/06  
USG0TP4

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-4, 3.0', Level 225



▲ Classification

**ATTERBERG LIMITS TEST**  
**ASTM D 4318**

CLIENT	URS Operating Services	JOB NO.	2562-11
BORING NO.	TP-5	DATE SAMPLED	
DEPTH	3.0'	DATE TESTED	10-27-06 WAR
SAMPLE NO.	Level 225	LOCATION	Standard Mine
SOIL DESCR.	Project #22238347		
TEST TYPE	One-Point Atterberg Test		

Plastic Limit  
Determination

	1	2	AVERAGE
Wt Dish & Wet Soil	7.61	7.73	
Wt Dish & Dry Soil	6.54	6.61	
Wt of Moisture	1.07	1.12	
Wt of Dish	0.82	0.82	
Wt of Dry Soil	5.72	5.79	
Moisture Content	18.71	19.34	19.02

Liquid Limit      Device Number      0966  
Determination

	1	2	AVERAGE
Number of Blows	28	26	
Wt Dish & Wet Soil	9.25	11.52	
Wt Dish & Dry Soil	7.26	8.97	
Wt of Moisture	1.99	2.55	
Wt of Dish	0.83	0.81	
Wt of Dry Soil	6.43	8.16	
Moisture Content	30.95	31.25	
Corrected Moisture Content	31.38	31.40	31.39

Liquid Limit      31  
Plastic Limit      19  
Plasticity Index      12

Atterberg Classification      CL

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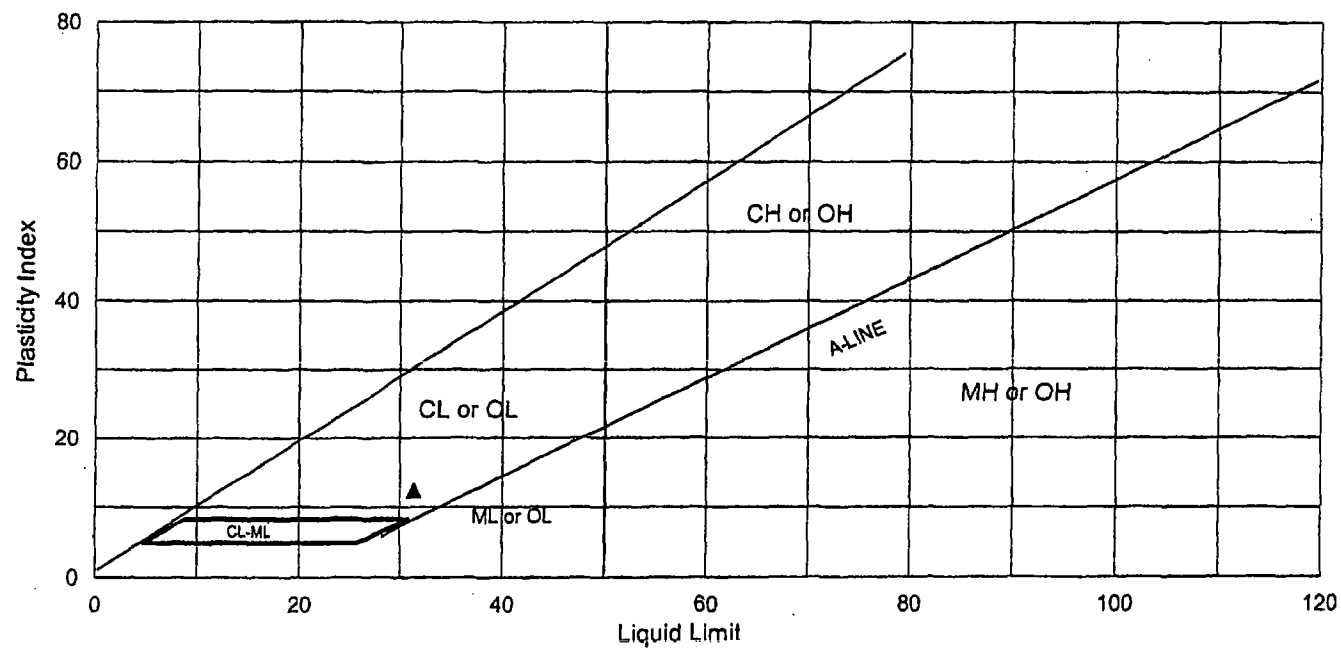
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USG0530

Date: 10/31/2006  
Date: 11/01/06

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-5, 3.0', Level 225



▲ Classification

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services JOB NO. 2562-11  
BORING NO. TP-1 DATE SAMPLED  
DEPTH 4' DATE TESTED 10-25-06 RS  
SAMPLE NO. Level 245 LOCATION Standard Mine  
SOIL DESCR. Project #22238347  
TEST TYPE One-Point Atterberg Test

Plastic Limit  
Determination

	1	2	AVERAGE
Wt Dish & Wet Soil	7.61	6.70	
Wt Dish & Dry Soil	6.13	5.47	
Wt of Moisture	1.48	1.23	
Wt of Dish	0.82	0.81	
Wt of Dry Soil	5.31	4.66	
Moisture Content	27.87	26.39	27.13

Liquid Limit Device Number 0258  
Determination

	1	2	AVERAGE
Number of Blows	24	26	
Wt Dish & Wet Soil	11.17	10.63	
Wt Dish & Dry Soil	8.67	8.25	
Wt of Moisture	2.50	2.38	
Wt of Dish	0.82	0.79	
Wt of Dry Soil	7.85	7.46	
Moisture Content	31.85	31.90	
Corrected Moisture Content	31.69	32.06	31.87

Liquid Limit 32  
Plastic Limit 27  
Plasticity Index 5

Atterberg Classification ML

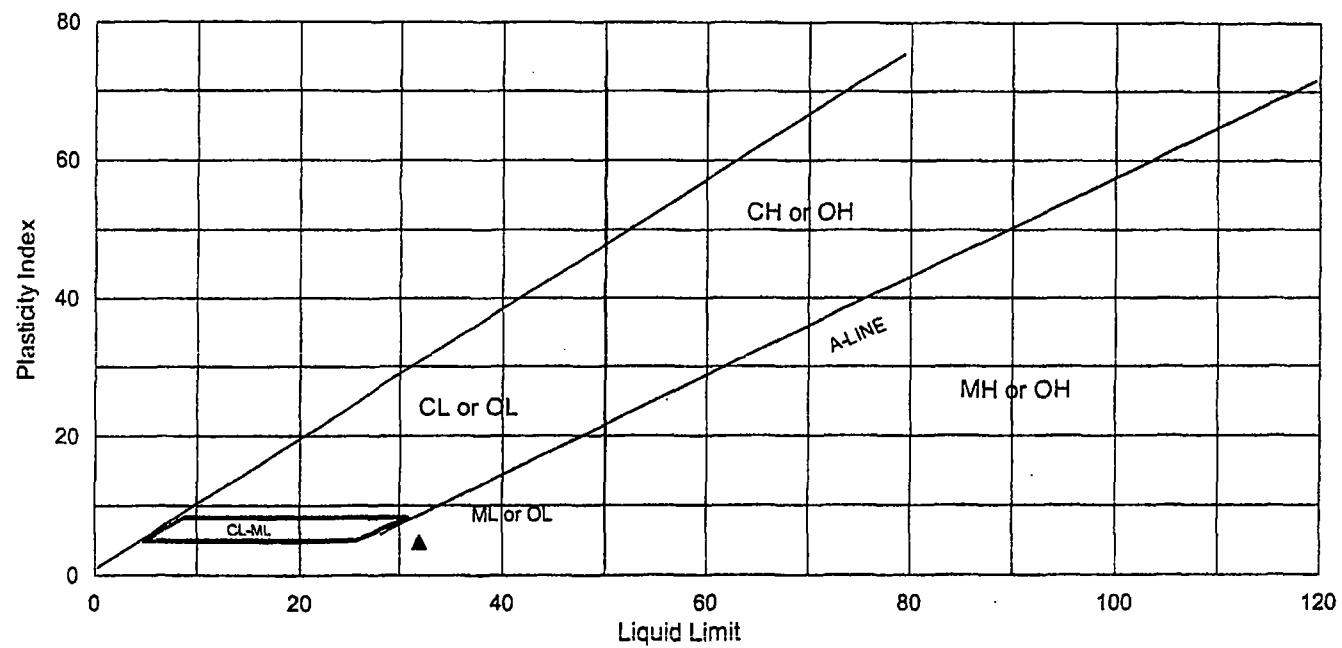
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SR Date: 10/26/2006  
Date: 10/27/06  
USG0TP1

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-1, 4', Level 245



▲ Classification

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

BORING NO. TP-2  
DEPTH 4.5  
SAMPLE NO. Level 245  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

JOB NO. 2562-11

DATE SAMPLED  
DATE TESTED 10-23-06 RO

Plastic Limit  
Determination

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish  
Wt of Dry Soil  
Moisture Content

NON-PLASTIC

Liquid Limit Device Number 0966  
Determination

Number of Blows

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish  
Wt of Dry Soil  
Moisture Content

NON-PLASTIC

Liquid Limit NP  
Plastic Limit NP  
Plasticity Index NP

Atterberg Classification NP

Data entry by:  
Checked by: RS  
FileName:

SR Date: 10/24/2006  
Date: 10/25/06  
USG0TP2

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services  
BORING NO. TP-3  
DEPTH 4'  
SAMPLE NO. Level 245  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

JOB NO. 2562-11  
DATE SAMPLED  
DATE TESTED 10-25-06 RS

Plastic Limit  
Determination

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish NON-PLASTIC  
Wt of Dry Soil  
Moisture Content

Liquid Limit Device Number 0258  
Determination

Number of Blows

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish NON-PLASTIC  
Wt of Dry Soil  
Moisture Content

Liquid Limit NP  
Plastic Limit NP  
Plasticity Index NP

Atterberg Classification NP

Data entry by:  
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FileName:

SR Date: 10/26/2006  
Date: 10/27/06  
USG0TP3

ADVANCED TERRA TESTING, INC.



ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT	URS Operating Services	JOB NO.	2562-11
BORING NO.	TP-4	DATE SAMPLED	
DEPTH	7.0	DATE TESTED	10-23-06 RS
SAMPLE NO.	Level 245		
SOIL DESCR.	Project #22238347		
LOCATION	Standard Mine		
Plastic Limit Determination			
Wt Dish & Wet Soil			
Wt Dish & Dry Soil			
Wt of Moisture			
Wt of Dish			
Wt of Dry Soil			
Moisture Content			
NON-PLASTIC			
Liquid Limit Determination	Device Number	0258	
Number of Blows			
Wt Dish & Wet Soil			
Wt Dish & Dry Soil			
Wt of Moisture			
Wt of Dish			
Wt of Dry Soil			
Moisture Content			
NON-PLASTIC			
Liquid Limit	NP		
Plastic Limit	NP		
Plasticity Index	NP		
Atterberg Classification	NP		

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SR Date: 10/24/2006  
Date: 10/25/06  
USG0P470

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services JOB NO. 2562-11  
BORING NO. TP-5 DATE SAMPLED  
DEPTH 5.0 DATE TESTED 10-26-06 RS  
SAMPLE NO. Level 245 LOCATION Standard Mine  
SOIL DESCR. Project #22238347  
TEST TYPE One-Point Atterberg Test

Plastic Limit  
Determination

	1	2	AVERAGE
Wt Dish & Wet Soil	7.25	7.23	
Wt Dish & Dry Soil	6.02	5.99	
Wt of Moisture	1.23	1.24	
Wt of Dish	0.82	0.74	
Wt of Dry Soil	5.20	5.25	
Moisture Content	23.65	23.62	23.64

Liquid Limit Device Number 0258  
Determination

	1	2	AVERAGE
Number of Blows	21	22	
Wt Dish & Wet Soil	9.38	10.54	
Wt Dish & Dry Soil	7.48	8.42	
Wt of Moisture	1.90	2.12	
Wt of Dish	0.74	0.81	
Wt of Dry Soil	6.74	7.61	
Moisture Content	28.19	27.86	
Corrected Moisture Content	27.60	27.43	27.52

Liquid Limit 28  
Plastic Limit 24  
Plasticity Index 4

Atterberg Classification ML

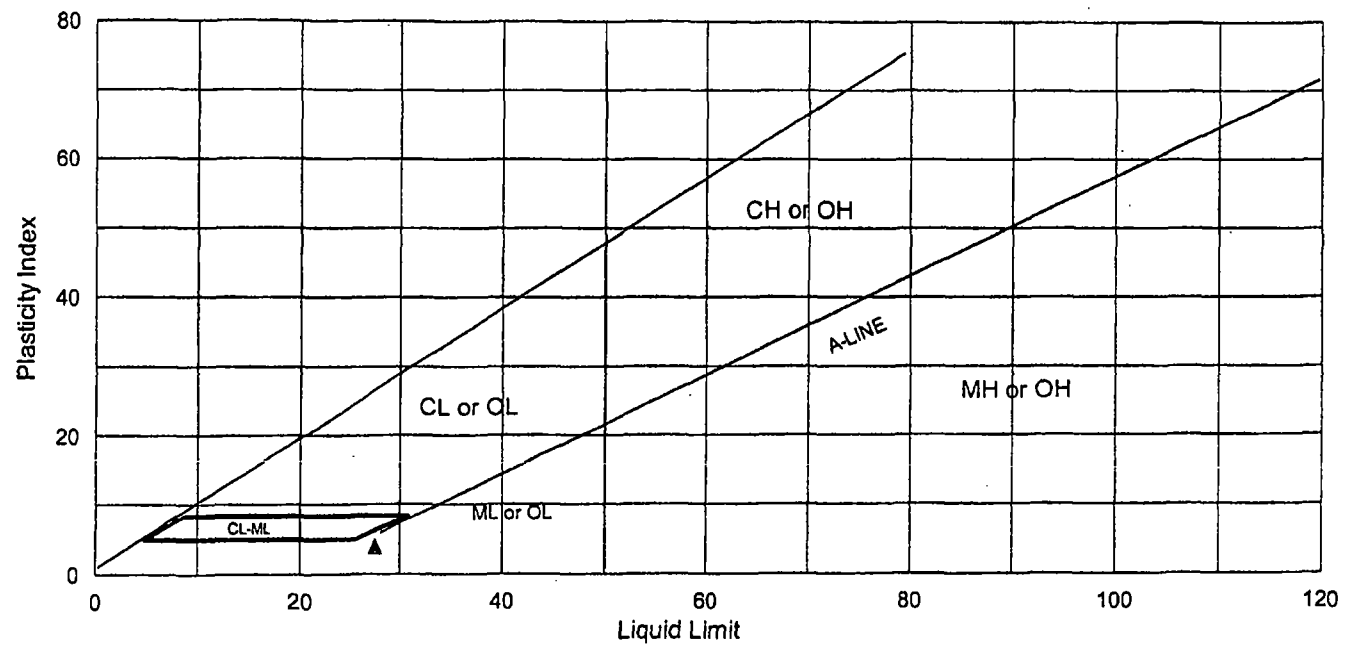
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SR Date: 10/27/2006  
Date: 10/27/06  
USG0P550

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-5, 5.0, Level 245



▲ Classification

**ATTERBERG LIMITS TEST**  
**ASTM D 4318**

<b>CLIENT</b>	URS Operating Services	<b>JOB NO.</b>	2562-11
<b>BORING NO.</b>	TP-6	<b>DATE SAMPLED</b>	
<b>DEPTH</b>	4.0'	<b>DATE TESTED</b>	10-27-06 WAR/JJL
<b>SAMPLE NO.</b>	Level 245	<b>LOCATION</b>	Standard Mine
<b>SOIL DESCR.</b>	Project #22238347		
<b>TEST TYPE</b>	One-Point Atterberg Test		

**Plastic Limit  
Determination**

	1	2	AVERAGE
Wt Dish & Wet Soil	7.60	8.07	
Wt Dish & Dry Soil	6.36	6.75	
Wt of Moisture	1.24	1.32	
Wt of Dish	0.82	0.74	
Wt of Dry Soil	5.54	6.01	
Moisture Content	22.38	21.96	22.17

**Liquid Limit      Device Number      0966  
Determination**

	1	2	AVERAGE
Number of Blows	21	23	
Wt Dish & Wet Soil	15.93	15.01	
Wt Dish & Dry Soil	12.69	12.09	
Wt of Moisture	3.24	2.92	
Wt of Dish	0.81	0.82	
Wt of Dry Soil	11.88	11.27	
Moisture Content	27.27	25.91	
Corrected Moisture Content	26.70	25.65	26.18

Liquid Limit	26
Plastic Limit	22
Plasticity Index	4

**Atterberg Classification**      ML

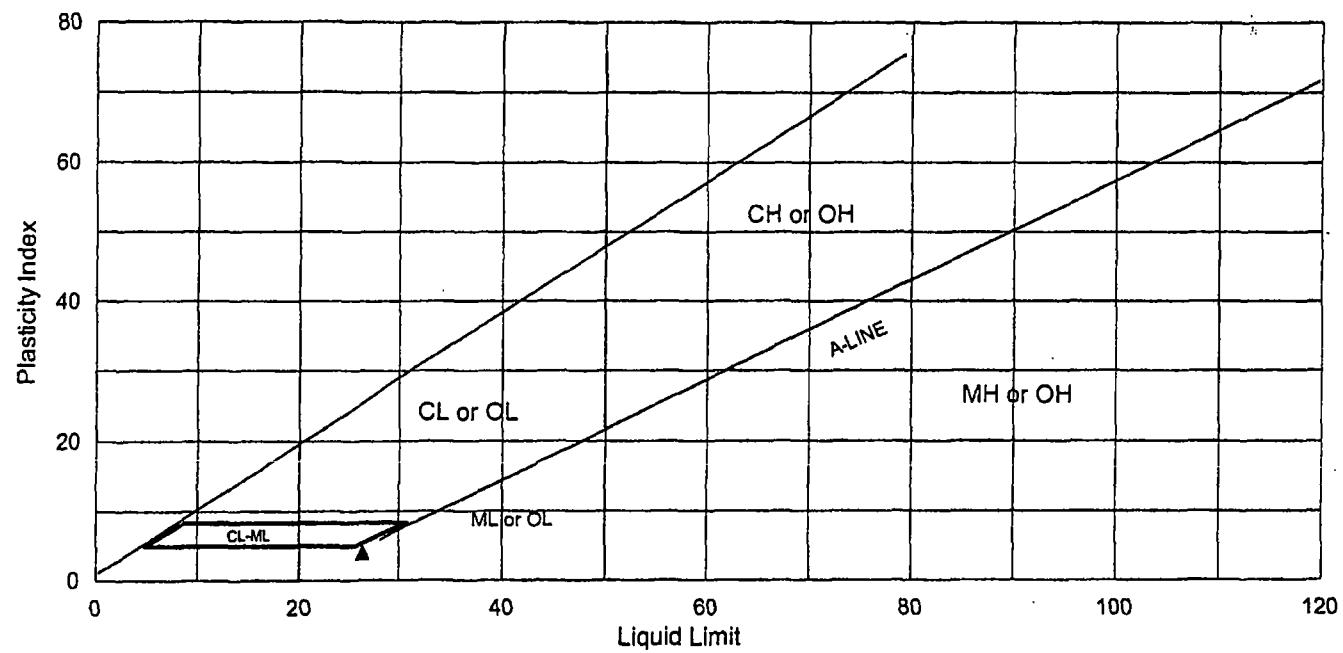
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Date: 11/01/06  
USG0640

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-6, 4.0', Level 245



▲ Classification

**ATTERBERG LIMITS TEST**  
**ASTM D 4318**

CLIENT            URS Operating Services

JOB NO.    2562-11

BORING NO.            TP-7  
DEPTH                3.5'  
SAMPLE NO.            Level 245  
SOIL DESCR.            Project #22238347  
TEST TYPE              One-Point Atterberg Test

DATE SAMPLED  
DATE TESTED            10-27-06 WAR  
LOCATION                Standard Mine

**Plastic Limit  
Determination**

	1	2	AVERAGE
Wt Dish & Wet Soil	7.31	7.22	
Wt Dish & Dry Soil	6.27	6.13	
Wt of Moisture	1.04	1.09	
Wt of Dish	0.82	0.82	
Wt of Dry Soil	5.45	5.31	
Moisture Content	19.08	20.53	19.80

Liquid Limit    Device Number            0966  
Determination

	1	2	AVERAGE
Number of Blows	29	27	
Wt Dish & Wet Soil	12.44	20.53	
Wt Dish & Dry Soil	9.93	16.17	
Wt of Moisture	2.51	4.36	
Wt of Dish	0.83	0.82	
Wt of Dry Soil	9.10	15.35	
Moisture Content	27.58	28.40	
Corrected Moisture Content	28.08	28.67	28.38

Liquid Limit                    28  
Plastic Limit                    20  
Plasticity Index                9

Atterberg Classification    CL

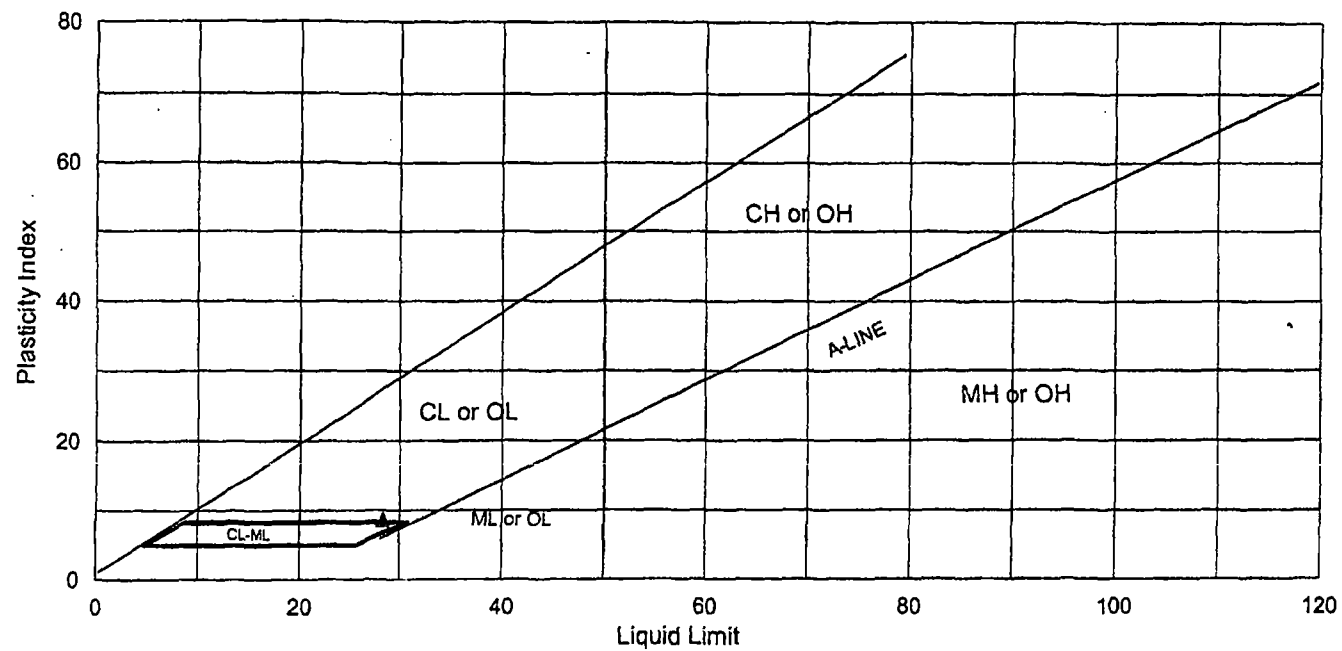
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USG0735

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-7, 3.5', Level 245



▲ Classification

**ATTERBERG LIMITS TEST  
ASTM D 4318**

<b>CLIENT</b>	URS Operating Services	<b>JOB NO.</b>	2562-11
<b>BORING NO.</b>	TP-8	<b>DATE SAMPLED</b>	
<b>DEPTH</b>	4.5'	<b>DATE TESTED</b>	10-27-06 WAR/JJL
<b>SAMPLE NO.</b>	Level 245	<b>LOCATION</b>	Standard Mine
<b>SOIL DESCR.</b>	Project #22238347		
<b>TEST TYPE</b>	One-Point Atterberg Test		

**Plastic Limit  
Determination**

	1	2	AVERAGE
Wt Dish & Wet Soil	6.13	6.42	
Wt Dish & Dry Soil	5.17	5.47	
Wt of Moisture	0.96	0.95	
Wt of Dish	0.81	0.84	
Wt of Dry Soil	4.36	4.63	
Moisture Content	22.02	20.52	21.27

**Liquid Limit      Device Number      0966  
Determination**

	1	2	AVERAGE
Number of Blows	30	28	
Wt Dish & Wet Soil	10.01	13.54	
Wt Dish & Dry Soil	8.20	11.00	
Wt of Moisture	1.81	2.54	
Wt of Dish	0.76	0.81	
Wt of Dry Soil	7.44	10.19	
Moisture Content	24.33	24.93	
Corrected Moisture Content	24.87	25.27	25.07

Liquid Limit	25
Plastic Limit	21
Plasticity Index	4

**Atterberg Classification**      ML

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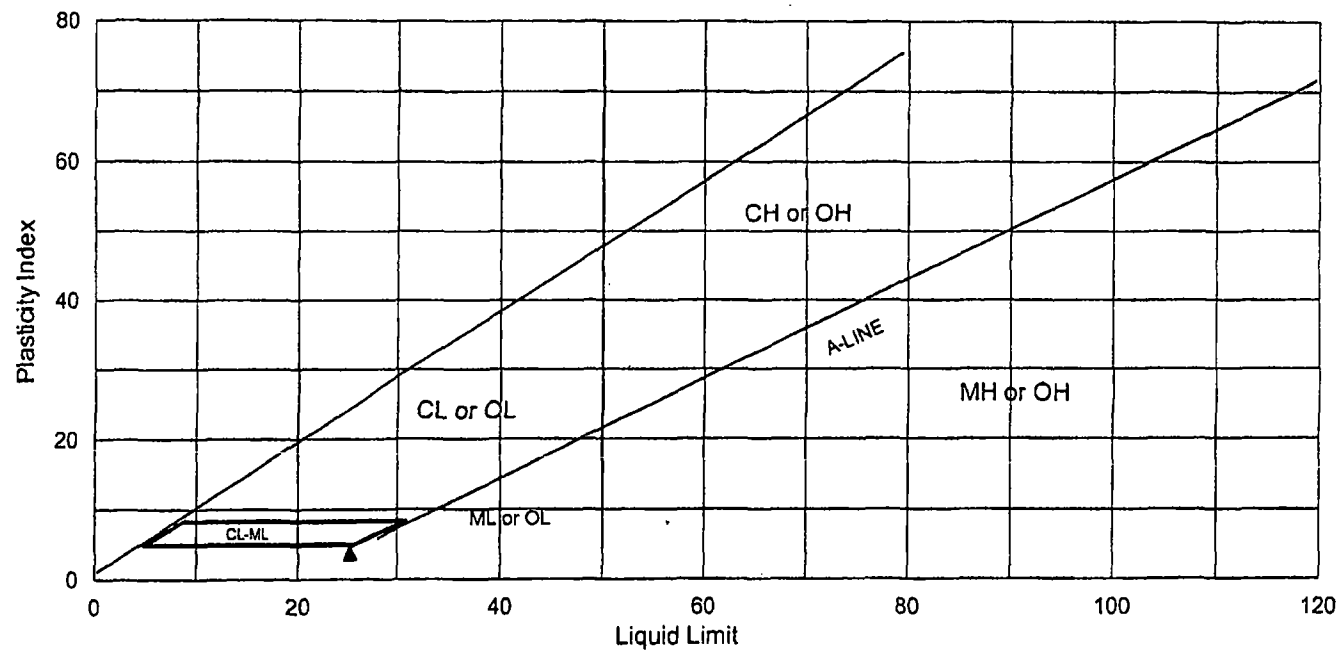
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 USG0845

ADVANCED TERRA TESTING, INC.



# PLASTICITY CHART

TP-8, 4.5', Level 245



▲ Classification

**ATTERBERG LIMITS TEST  
ASTM D 4318**

CLIENT            URS Operating Services

JOB NO.    2562-11

BORING NO.        TP-1  
DEPTH              2.5'  
SAMPLE NO.        Level 2  
SOIL DESCR.        Project #22238347  
TEST TYPE          One-Point Atterberg Test

DATE SAMPLED  
DATE TESTED        10-26-06 WAR  
LOCATION              Standard Mine

Plastic Limit  
Determination

	1	2	AVERAGE
Wt Dish & Wet Soil	7.06	6.94	
Wt Dish & Dry Soil	5.72	5.61	
Wt of Moisture	1.34	1.33	
Wt of Dish	0.78	0.82	
Wt of Dry Soil	4.94	4.79	
Moisture Content	27.13	27.77	27.45

Liquid Limit        Device Number        0966  
Determination

	1	2	AVERAGE
Number of Blows	26	24	
Wt Dish & Wet Soil	9.05	9.73	
Wt Dish & Dry Soil	6.58	7.05	
Wt of Moisture	2.47	2.68	
Wt of Dish	0.83	0.82	
Wt of Dry Soil	5.75	6.23	
Moisture Content	42.96	43.02	
Corrected Moisture Content	43.16	42.81	42.98
Liquid Limit	43		
Plastic Limit	27		
Plasticity Index	16		

Atterberg Classification    ML

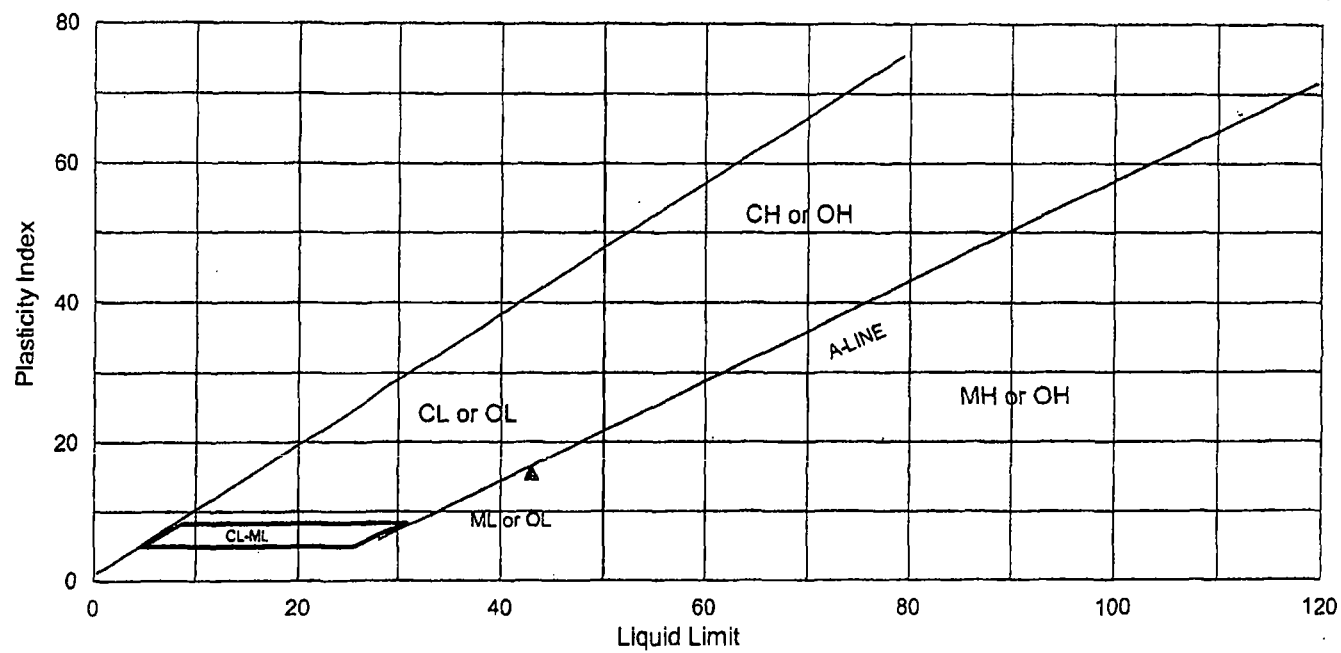
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Date: 10/27/06  
USG0P125

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-1, 2.5', Level 2



▲ Classification

**ATTERBERG LIMITS TEST  
ASTM D 4318**

<b>CLIENT</b>	URS Operating Services	<b>JOB NO.</b>	2562-11
<b>BORING NO.</b>	TP-2	<b>DATE SAMPLED</b>	
<b>DEPTH</b>	2.5-3.0	<b>DATE TESTED</b>	10-27-06 WAR/JJL
<b>SAMPLE NO.</b>	Level 2	<b>LOCATION</b>	Standard Mine
<b>SOIL DESCR.</b>	Project #22238347		
<b>TEST TYPE</b>	One-Point Atterberg Test		

**Plastic Limit  
Determination**

	1	2	AVERAGE
Wt Dish & Wet Soil	5.57	6.67	
Wt Dish & Dry Soil	4.74	5.60	
Wt of Moisture	0.83	1.07	
Wt of Dish	0.82	0.83	
Wt of Dry Soil	3.92	4.77	
Moisture Content	21.17	22.43	21.80

**Liquid Limit**      Device Number      0966  
**Determination**

	1	2	AVERAGE
Number of Blows	27	25	
Wt Dish & Wet Soil	9.90	9.51	
Wt Dish & Dry Soil	7.39	7.10	
Wt of Moisture	2.51	2.41	
Wt of Dish	0.81	0.82	
Wt of Dry Soil	6.58	6.28	
Moisture Content	38.15	38.38	
Corrected Moisture Content	38.50	38.38	38.44

Liquid Limit	38
Plastic Limit	22
Plasticity Index	17

**Atterberg Classification**      CL

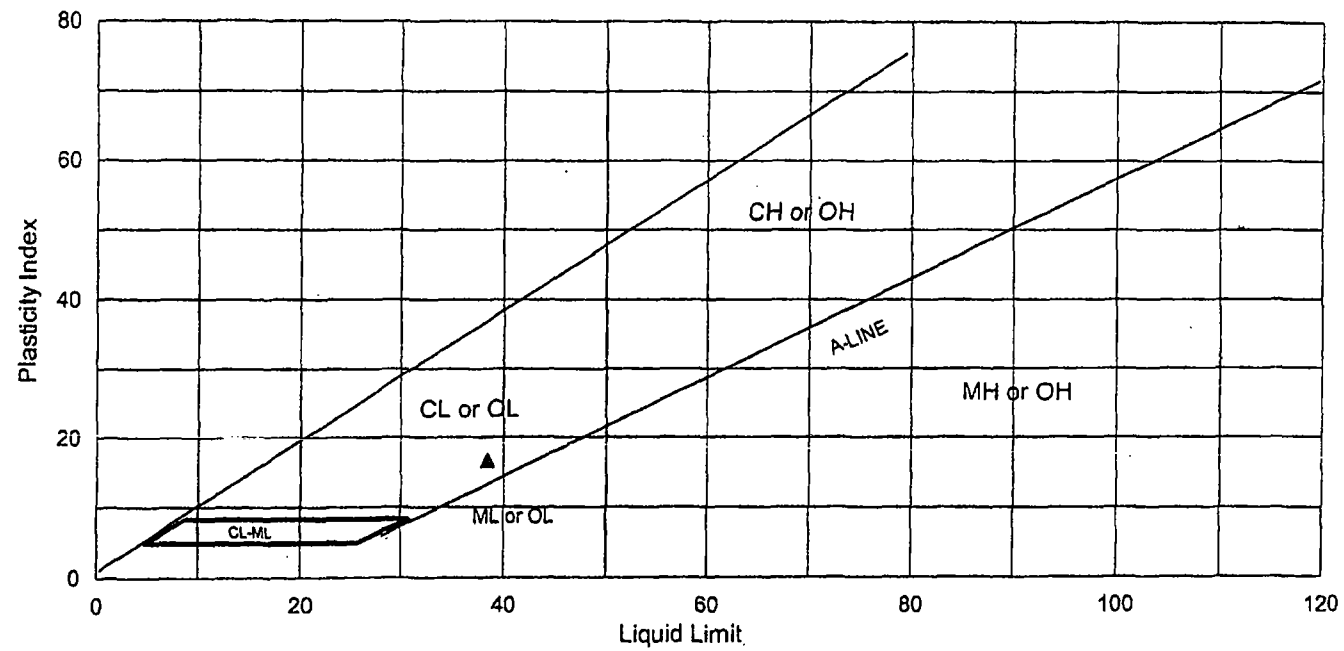
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Date: 11/01/06  
USG0225

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-2, 2.5-3.0, Level 2



▲ Classification

**ATTERBERG LIMITS TEST**  
ASTM D 4318

CLIENT	URS Operating Services	JOB NO.	2562-11
BORING NO.	TP-3	DATE SAMPLED	
DEPTH	1.5	DATE TESTED	10-26-06 RO
SAMPLE NO.	Level 2	LOCATION	Standard Mine
SOIL DESCR.	Project #22238347		
TEST TYPE	One-Point Atterberg Test		

Plastic Limit  
Determination

	1	2	AVERAGE
Wt Dish & Wet Soil	7.17	7.14	
Wt Dish & Dry Soil	5.92	5.89	
Wt of Moisture	1.25	1.25	
Wt of Dish	0.77	0.83	
Wt of Dry Soil	5.15	5.06	
Moisture Content	24.27	24.70	24.49

Liquid Limit  
Determination

	1	2	AVERAGE
Device Number	0966		
Number of Blows	28	27	
Wt Dish & Wet Soil	11.55	11.65	
Wt Dish & Dry Soil	8.86	8.92	
Wt of Moisture	2.69	2.73	
Wt of Dish	0.82	0.82	
Wt of Dry Soil	8.04	8.10	
Moisture Content	33.46	33.70	
Corrected Moisture Content	33.92	34.02	33.97
Liquid Limit	34		
Plastic Limit	24		
Plasticity Index	9		

Atterberg Classification      ML

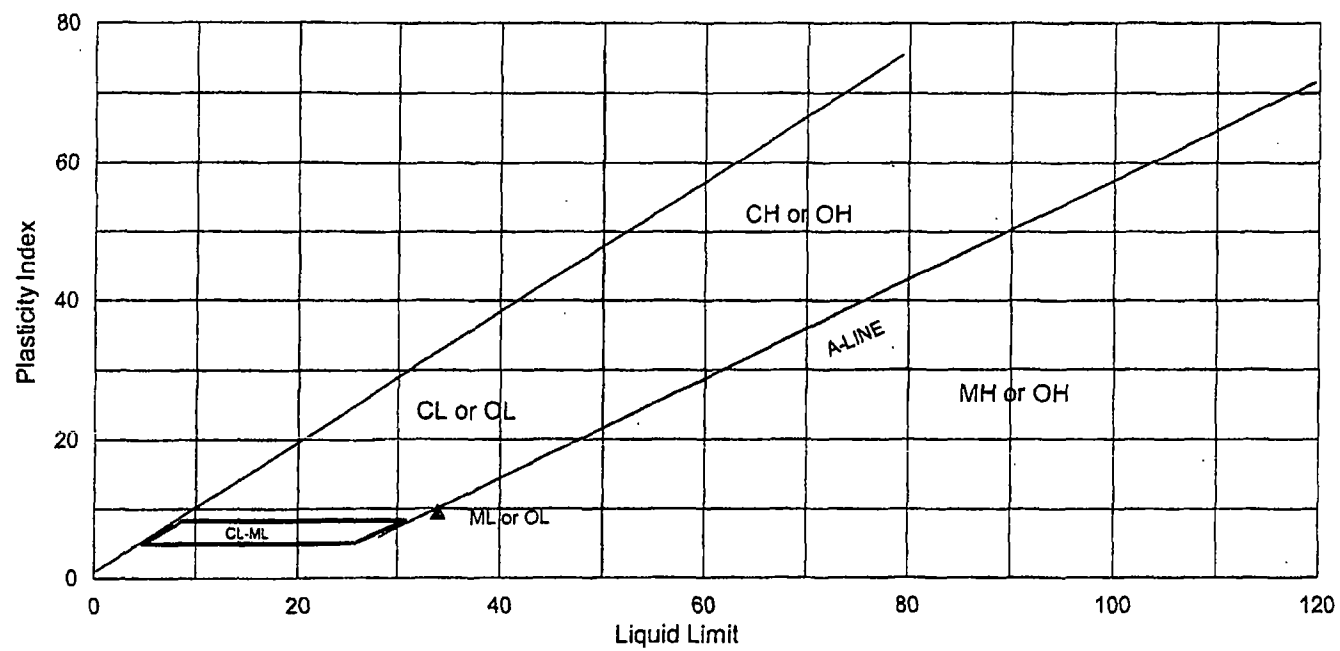
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SR      Date: 10/27/2006  
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USG0P315

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-3, 1.5, Level 2



▲ Classification

**ATTERBERG LIMITS TEST  
ASTM D 4318**

<b>CLIENT</b>	URS Operating Services	<b>JOB NO.</b>	2562-11
<b>BORING NO.</b>	TP-4	<b>DATE SAMPLED</b>	
<b>DEPTH</b>	1.5'	<b>DATE TESTED</b>	10-27-06 WAR/JJL
<b>SAMPLE NO.</b>	Level 2	<b>LOCATION</b>	Standard Mine
<b>SOIL DESCR.</b>	Project #22238347		
<b>TEST TYPE</b>	One-Point Atterberg Test		

**Plastic Limit  
Determination**

	1	2	AVERAGE
Wt Dish & Wet Soil	7.87	7.59	
Wt Dish & Dry Soil	6.31	6.10	
Wt of Moisture	1.56	1.49	
Wt of Dish	0.82	0.80	
Wt of Dry Soil	5.49	5.30	
Moisture Content	28.42	28.11	28.26

**Liquid Limit  
Determination**

	1	2	AVERAGE
Device Number	0966		
Number of Blows	21	23	
Wt Dish & Wet Soil	8.64	10.30	
Wt Dish & Dry Soil	6.08	7.18	
Wt of Moisture	2.56	3.12	
Wt of Dish	0.83	0.82	
Wt of Dry Soil	5.25	6.36	
Moisture Content	48.76	49.06	
Corrected Moisture Content	47.74	48.56	48.15

Liquid Limit	48
Plastic Limit	28
Plasticity Index	20

Atterberg Classification      ML

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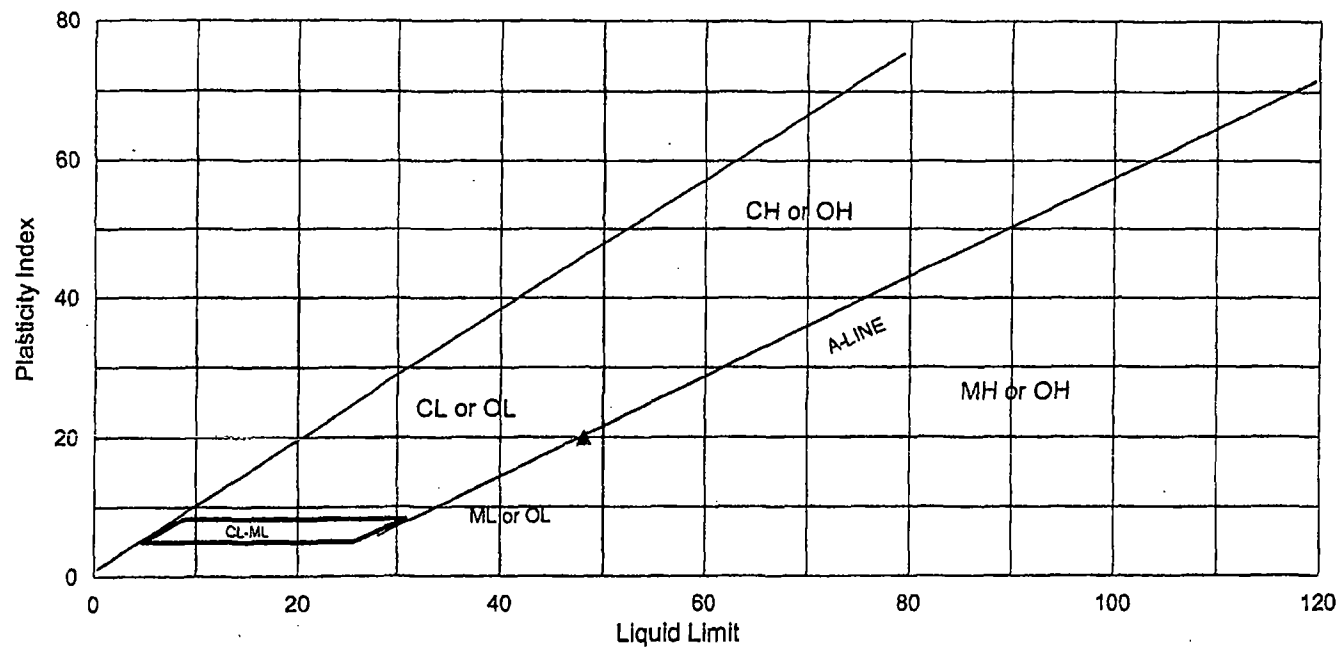
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 Date: 11/1/06  
 USG0415

ADVANCED TERRA TESTING, INC.



# PLASTICITY CHART

TP-4, 1.5', Level 2



▲ Classification

**ATTERBERG LIMITS TEST**  
ASTM D 4318

CLIENT            URS Operating Services

JOB NO.    2562-11

BORING NO.            TP-5  
DEPTH                8.0'  
SAMPLE NO.            Level 2  
SOIL DESCR.            Project #22238347  
TEST TYPE              One-Point Atterberg Test

DATE SAMPLED  
DATE TESTED            10-25-06 RS  
LOCATION                Standard Mine

Plastic Limit  
Determination

	1	2	AVERAGE
Wt Dish & Wet Soil	5.72	6.93	
Wt Dish & Dry Soil	4.92	5.94	
Wt of Moisture	0.80	0.99	
Wt of Dish	0.81	0.83	
Wt of Dry Soil	4.11	5.11	
Moisture Content	19.46	19.37	19.42

Liquid Limit    Device Number    0258  
Determination

	1	2	AVERAGE
Number of Blows	21	22	
Wt Dish & Wet Soil	10.69	9.55	
Wt Dish & Dry Soil	8.48	7.56	
Wt of Moisture	2.21	1.99	
Wt of Dish	0.82	0.81	
Wt of Dry Soil	7.66	6.75	
Moisture Content	28.85	29.48	
Corrected Moisture Content	28.25	29.03	28.64

Liquid Limit            29  
Plastic Limit            19  
Plasticity Index        9

Atterberg Classification    CL

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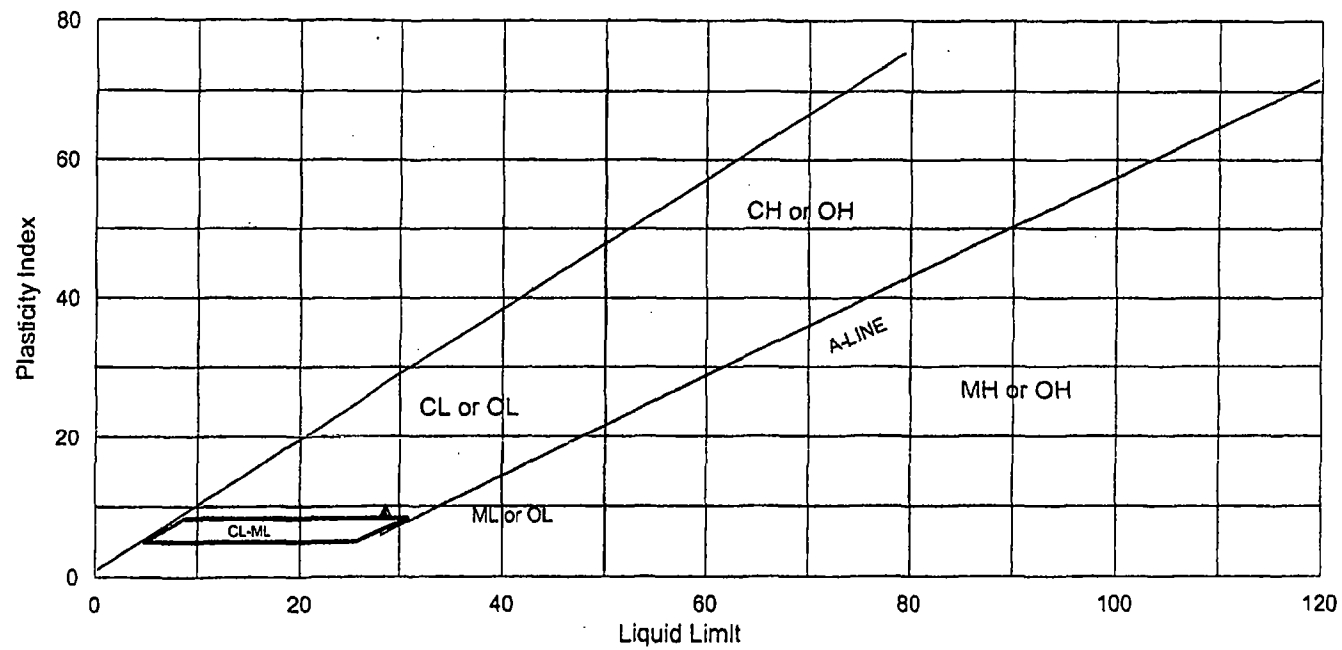
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USG0TP5

Date: 10/26/2006  
Date: 10/27/06

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-5, 8.0', Level 2



▲ Classification

**ATTERBERG LIMITS TEST  
ASTM D 4318**

CLIENT	URS Operating Services	JOB NO.	2562-11
BORING NO.	TP-6	DATE SAMPLED	
DEPTH	2.5	DATE TESTED	10-25-06 RS
SAMPLE NO.	Level 2	LOCATION	Standard Mine
SOIL DESCR.	Project #22238347		
TEST TYPE	One-Point Atterberg Test		

Plastic Limit  
Determination

	1	2	AVERAGE
Wt Dish & Wet Soil	5.36	5.25	
Wt Dish & Dry Soil	4.43	4.32	
Wt of Moisture	0.93	0.93	
Wt of Dish	0.78	0.74	
Wt of Dry Soil	3.65	3.58	
Moisture Content	25.48	25.98	25.73

Liquid Limit      Device Number      0258  
Determination

	1	2	AVERAGE
Number of Blows	21	22	
Wt Dish & Wet Soil	9.13	10.19	
Wt Dish & Dry Soil	6.83	7.59	
Wt of Moisture	2.30	2.60	
Wt of Dish	0.81	0.74	
Wt of Dry Soil	6.02	6.85	
Moisture Content	38.23	37.96	
Corrected Moisture Content	37.43	37.37	37.40

Liquid Limit	37
Plastic Limit	26
Plasticity Index	12

Atterberg Classification      ML

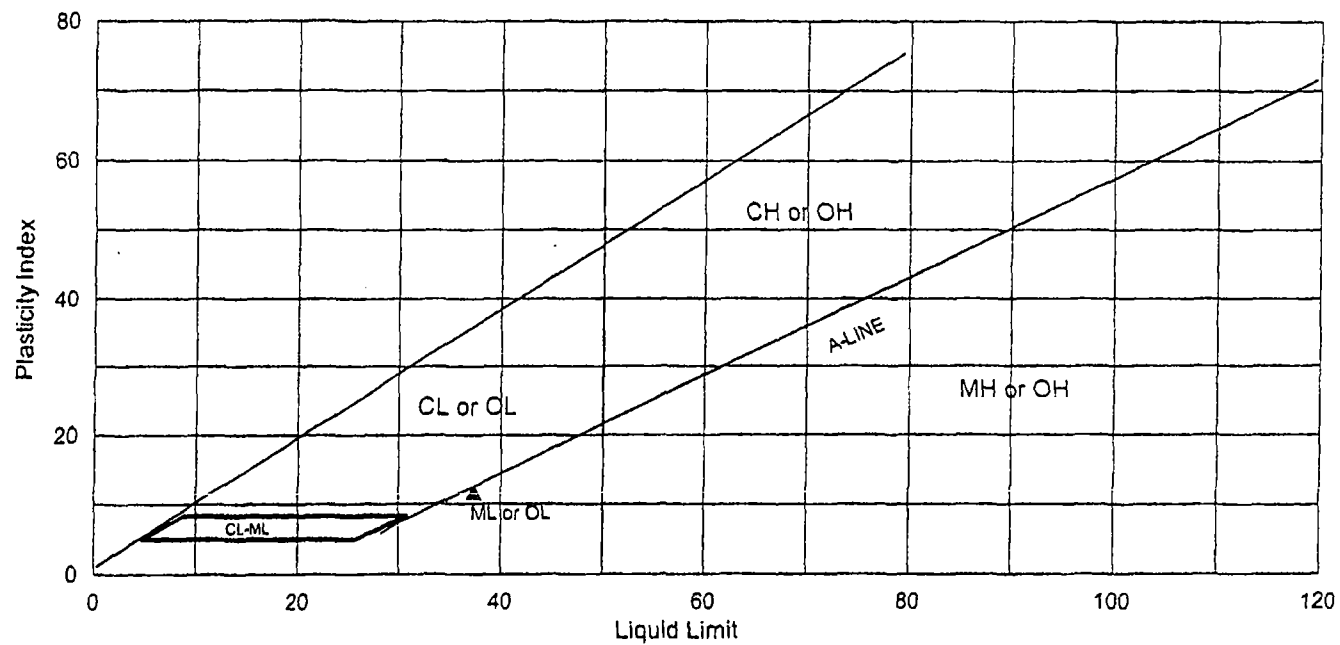
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Date: 10/27/06  
USG0TP6

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-6, 2.5, Level 2



▲ Classification

**ATTERBERG LIMITS TEST**  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-7  
DEPTH 2.5'  
SAMPLE NO. Level 2  
SOIL DESCR. Project #22238347  
TEST TYPE One-Point Atterberg Test

DATE SAMPLED  
DATE TESTED 10-27-06 WAR/JJL  
LOCATION Standard Mine

Plastic Limit  
Determination

	1	2	AVERAGE
Wt Dish & Wet Soil	7.76	7.60	
Wt Dish & Dry Soil	6.39	6.33	
Wt of Moisture	1.37	1.27	
Wt of Dish	0.81	0.83	
Wt of Dry Soil	5.58	5.50	
Moisture Content	24.55	23.09	23.82

Liquid Limit Device Number 0966  
Determination

	1	2	AVERAGE
Number of Blows	27	25	
Wt Dish & Wet Soil	9.76	10.24	
Wt Dish & Dry Soil	7.23	7.57	
Wt of Moisture	2.53	2.67	
Wt of Dish	0.81	0.82	
Wt of Dry Soil	6.42	6.75	
Moisture Content	39.41	39.56	
Corrected Moisture Content	39.78	39.56	39.67

Liquid Limit 40  
Plastic Limit 24  
Plasticity Index 16

Atterberg Classification CL

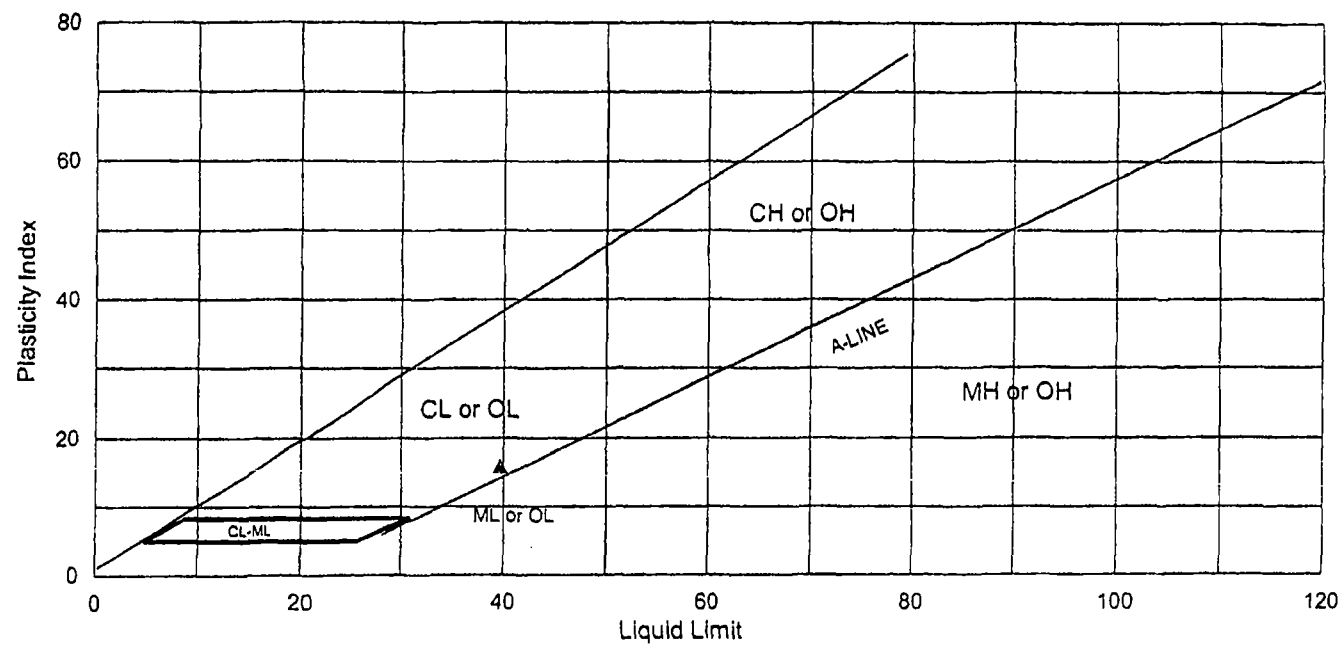
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SR Date: 10/31/2006  
Date: 11/01/06  
USG0725

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP-7, 2.5', Level 2



▲ Classification

**ATTERBERG LIMITS TEST**  
**ASTM D 4318**

CLIENT            URS Operating Services

JOB NO.    2562-11

BORING NO.            TP-8  
DEPTH                3.0'  
SAMPLE NO.            Level 2  
SOIL DESCR.            Project #22238347  
TEST TYPE              One-Point Atterberg Test

DATE SAMPLED  
DATE TESTED            10-27-06 WAR  
LOCATION                Standard Mine

Plastic Limit  
Determination

	1	2	AVERAGE
Wt Dish & Wet Soil	6.50	6.19	
Wt Dish & Dry Soil	5.42	5.16	
Wt of Moisture	1.08	1.03	
Wt of Dish	0.82	0.76	
Wt of Dry Soil	4.60	4.40	
Moisture Content	23.48	23.41	23.44

Liquid Limit    Device Number            0966  
Determination

	1	2	AVERAGE
Number of Blows	23	25	
Wt Dish & Wet Soil	8.79	10.55	
Wt Dish & Dry Soil	6.70	8.01	
Wt of Moisture	2.09	2.54	
Wt of Dish	0.82	0.83	
Wt of Dry Soil	5.88	7.18	
Moisture Content	35.54	35.38	
Corrected Moisture Content	35.19	35.38	35.28

Liquid Limit                    35  
Plastic Limit                    23  
Plasticity Index                12

Atterberg Classification    CL

Data entry by: RS  
Checked by: RS  
FileName:

SR  
USG0TP8

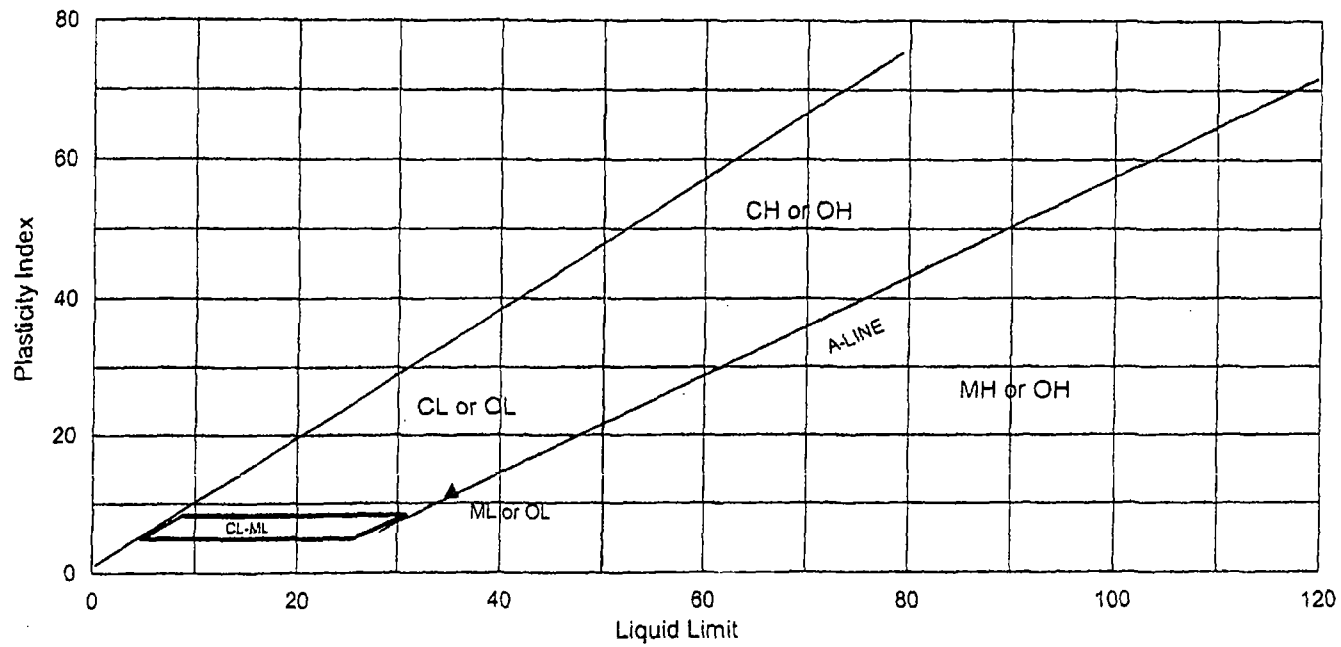
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ADVANCED TERRA TESTING, INC.



# PLASTICITY CHART

TP-8, 3.0', Level 2



▲ Classification

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-1  
DEPTH 1-7'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

DATE SAMPLED  
DATE TESTED 10-02-06 RS

Plastic Limit  
Determination

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish NON-PLASTIC  
Wt of Dry Soil  
Moisture Content

Liquid Limit Device Number 0966  
Determination

Number of Blows

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish NON-PLASTIC  
Wt of Dry Soil  
Moisture Content

Liquid Limit NP  
Plastic Limit NP  
Plasticity Index NP

Atterberg Classification NP

Data entry by:

Checked by: *DLM*

FileName:

SR

Date: 10/02/2006

Date: *10/02/06*

USG0S501

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-2  
DEPTH 1-10.5'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

DATE SAMPLED  
DATE TESTED 09-30-06 RS

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	7.16	7.88	8.06
Wt Dish & Dry Soil	6.00	6.59	6.75
Wt of Moisture	1.16	1.29	1.31
Wt of Dish	0.74	0.81	0.76
Wt of Dry Soil	5.26	5.78	5.99
Moisture Content	22.05	22.32	21.87

Liquid Limit  
Determination

Device Number 0258

	1	2	3	4	5
Number of Blows	35	34	21	17	23
Wt Dish & Wet Soil	9.99	10.85	8.69	11.75	9.37
Wt Dish & Dry Soil	7.91	8.53	6.79	9.08	7.34
Wt of Moisture	2.08	2.32	1.90	2.67	2.03
Wt of Dish	0.75	0.82	0.76	0.76	0.77
Wt of Dry Soil	7.16	7.71	6.03	8.32	6.57
Moisture Content	29.05	30.09	31.51	32.09	30.90

Liquid Limit 30.7  
Plastic Limit 22.1  
Plasticity Index 8.6

Atterberg Classification CL

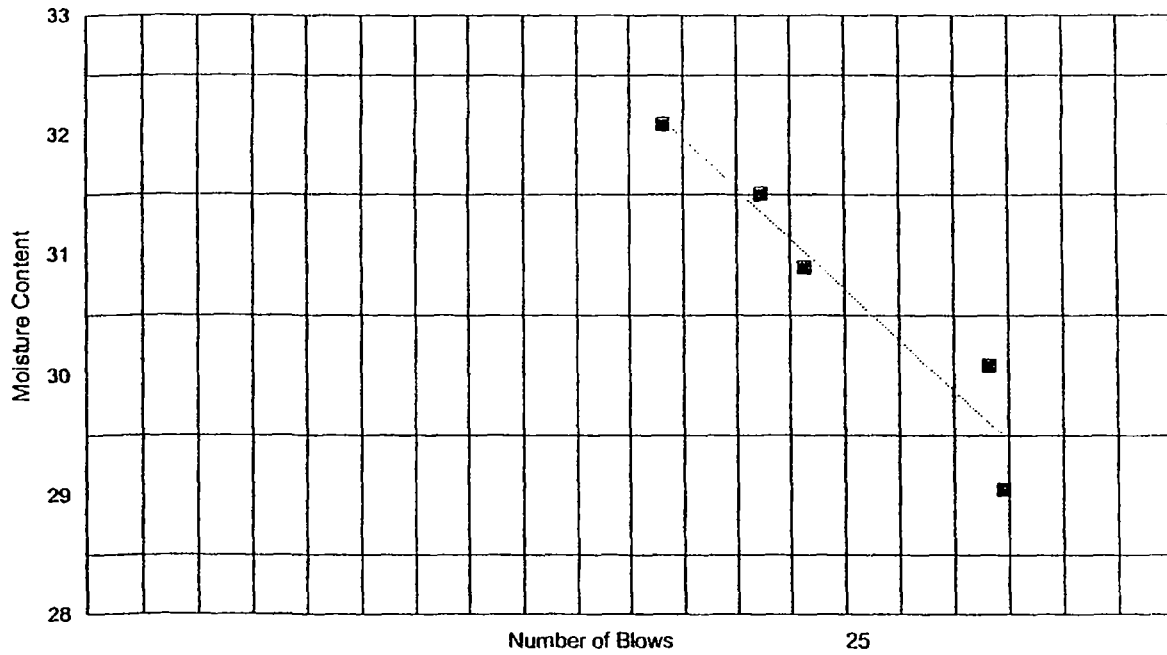
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USG0TP12

ADVANCED TERRA TESTING, INC.

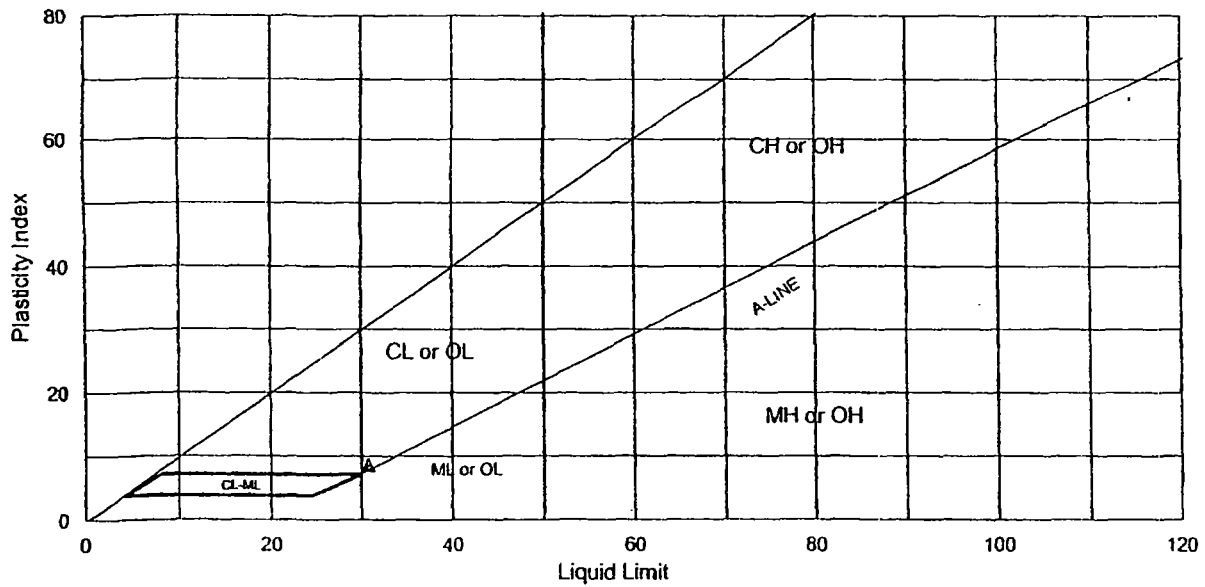
# Atterberg Limits, Flow Curve

TP1-2, 1-10.5', 1



# PLASTICITY CHART

TP1-2, 1-10.5', 1



▲ Classification

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-3  
DEPTH 1-14'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

DATE SAMPLED  
DATE TESTED 09-30-06 BKL

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	7.56	7.60	7.89
Wt Dish & Dry Soil	6.49	6.50	6.73
Wt of Moisture	1.07	1.10	1.16
Wt of Dish	0.78	0.82	0.74
Wt of Dry Soil	5.71	5.68	5.99
Moisture Content	18.74	19.37	19.37

Liquid Limit  
Determination

Device Number 0966

	1	2	3	4	5
Number of Blows	36	31	27	21	19
Wt Dish & Wet Soil	14.32	13.57	11.34	10.84	9.78
Wt Dish & Dry Soil	11.69	11.01	9.17	8.71	7.83
Wt of Moisture	2.63	2.56	2.17	2.13	1.95
Wt of Dish	0.75	0.75	0.72	0.75	0.77
Wt of Dry Soil	10.94	10.26	8.45	7.96	7.06
Moisture Content	24.04	24.95	25.68	26.76	27.62

Liquid Limit 26.0  
Plastic Limit 19.2  
Plasticity Index 6.9

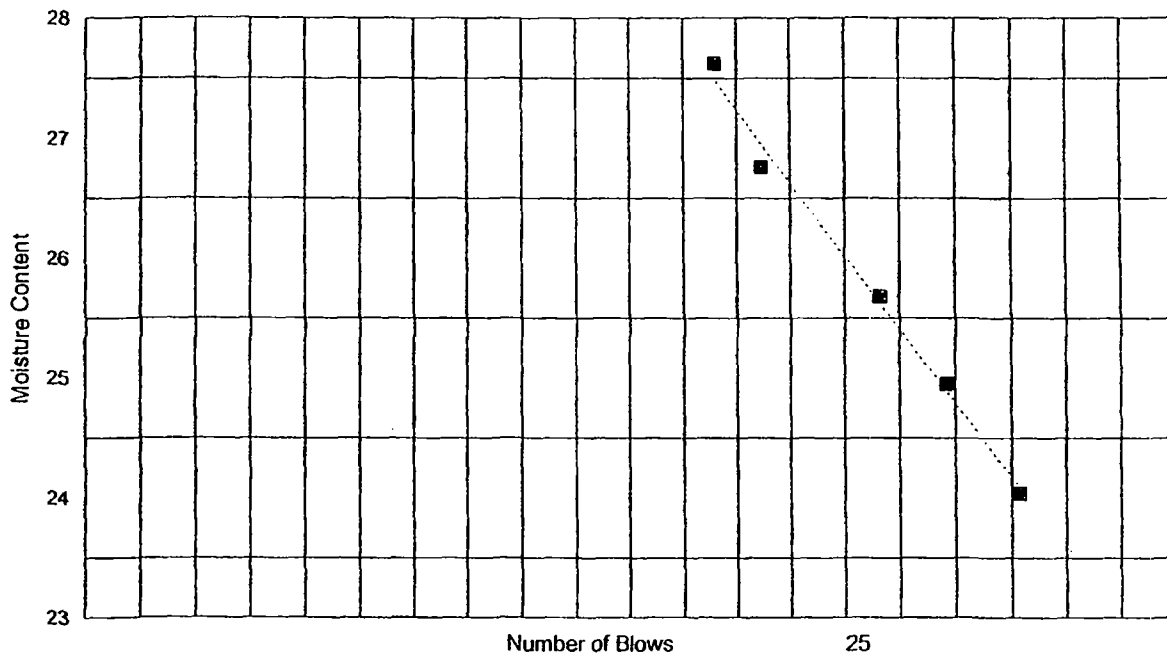
Atterberg Classification CL-ML

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ADVANCED TERRA TESTING, INC.

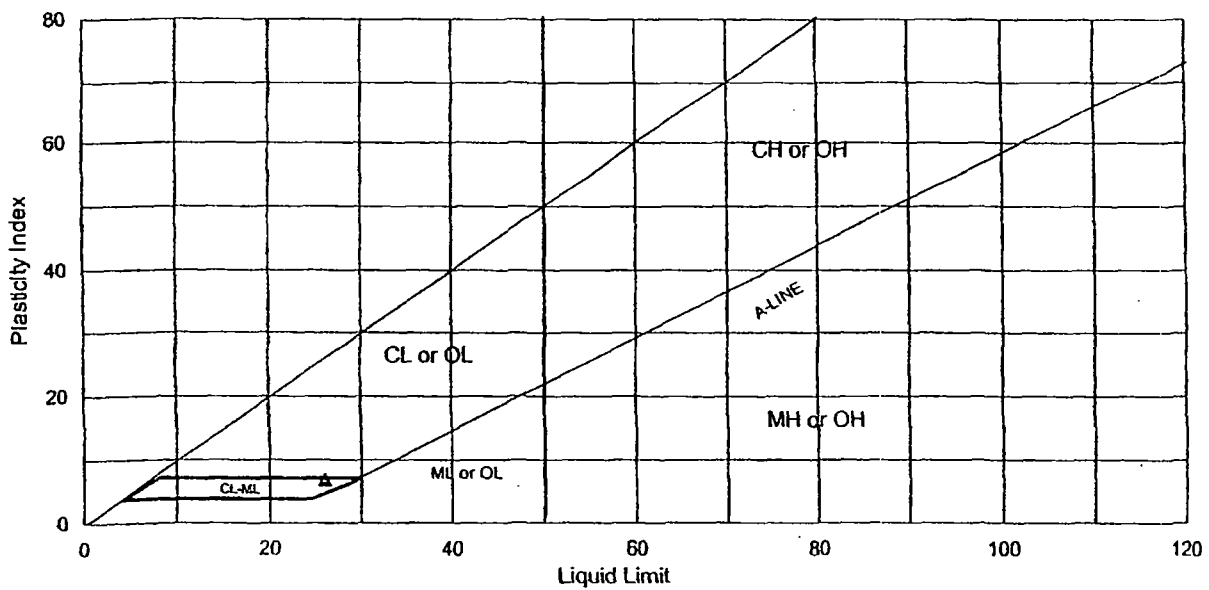
# Atterberg Limits, Flow Curve

TP1-3, 1-14', 1



# PLASTICITY CHART

TP1-3, 1-14', 1



ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-4

DATE SAMPLED

DEPTH 1-15'

DATE TESTED

09-30-06 BKL

SAMPLE NO. 1

SOIL DESCR. Project #22238347

LOCATION Standard Mine P.O. #OS-06-P-9587

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	8.07	7.85	8.84
Wt Dish & Dry Soil	6.96	6.75	7.59
Wt of Moisture	1.11	1.10	1.25
Wt of Dish	0.81	0.82	0.82
Wt of Dry Soil	6.15	5.93	6.77
Moisture Content	18.05	18.55	18.46

Liquid Limit  
Determination

Device Number

0966

	1	2	3	4
Number of Blows	38	32	22	18
Wt Dish & Wet Soil	12.48	13.72	14.13	16.13
Wt Dish & Dry Soil	10.44	11.45	11.76	13.40
Wt of Moisture	2.04	2.27	2.37	2.73
Wt of Dish	0.81	0.82	0.82	0.82
Wt of Dry Soil	9.63	10.63	10.94	12.58
Moisture Content	21.18	21.35	21.66	21.70

Liquid Limit 21.5  
Plastic Limit 18.4  
Plasticity Index 3.2

Atterberg Classification ML

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SR Date: 10/02/2006

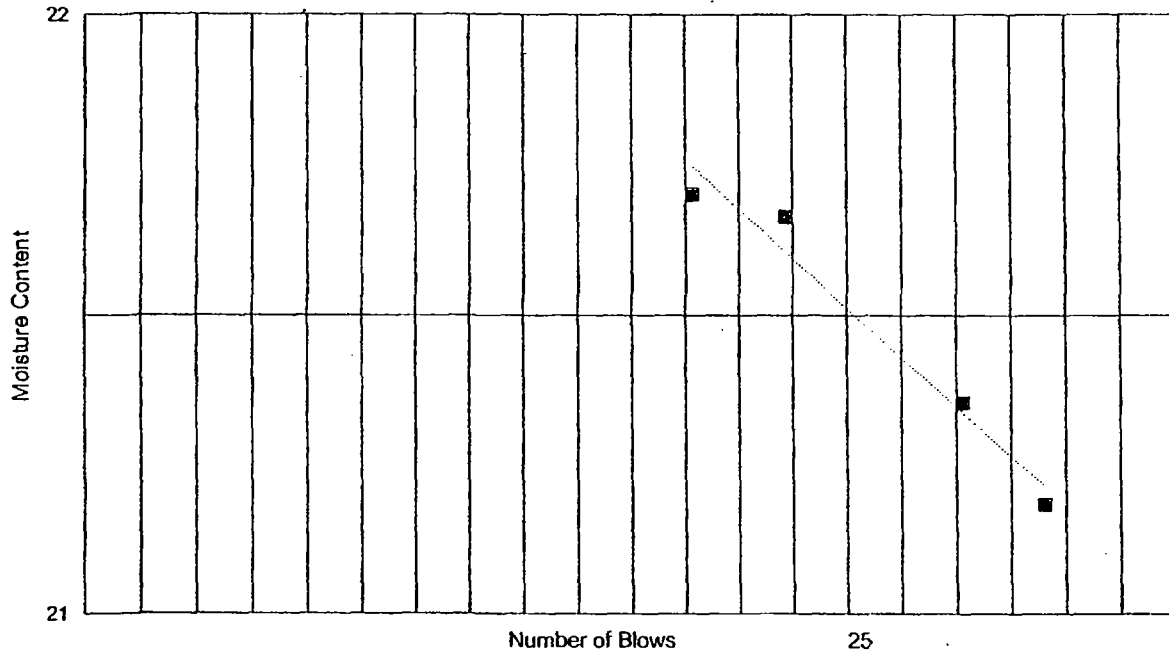
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USG0TP14

ADVANCED TERRA TESTING, INC.

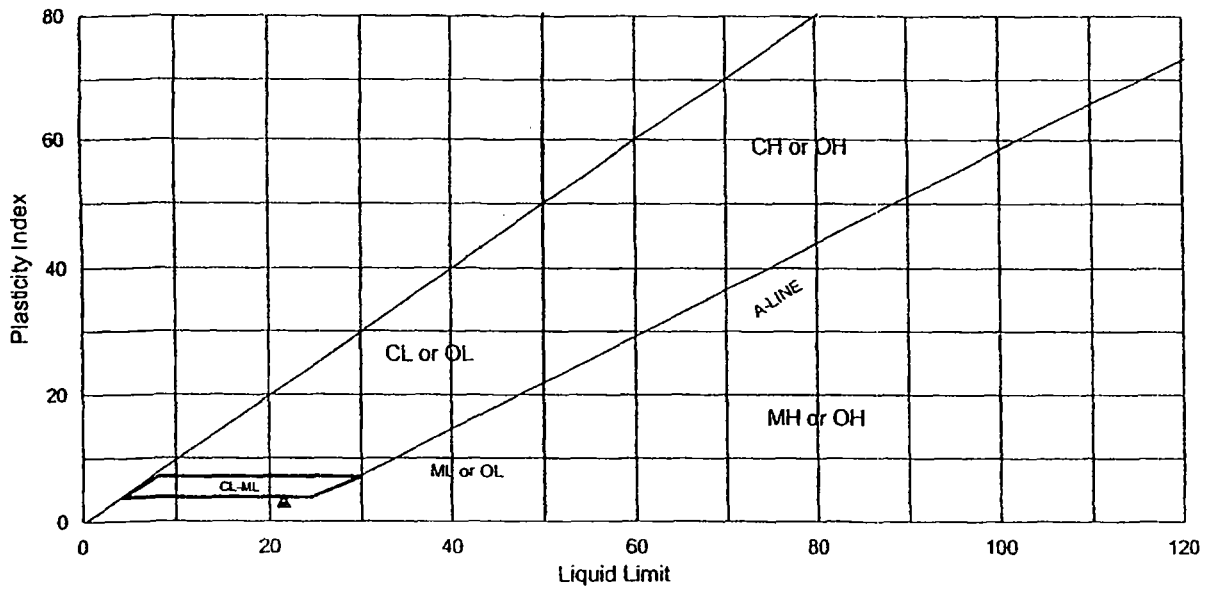
# Atterberg Limits, Flow Curve

TP1-4, 1-15', 1



# PLASTICITY CHART

TP1-4, 1-15', 1



▲ Classification



ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-5  
DEPTH 1-12'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587  
DATE SAMPLED  
DATE TESTED 09-20-06 RS

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	7.12	7.89	6.99
Wt Dish & Dry Soil	6.05	6.66	5.90
Wt of Moisture	1.07	1.23	1.09
Wt of Dish	0.81	0.82	0.82
Wt of Dry Soil	5.24	5.84	5.08
Moisture Content	20.42	21.06	21.46

Liquid Limit  
Determination

Device Number

0860

	1	2	3	4	5
Number of Blows	15	19	21	33	30
Wt Dish & Wet Soil	8.41	8.07	9.04	11.25	11.99
Wt Dish & Dry Soil	6.77	6.51	7.29	9.08	9.67
Wt of Moisture	1.64	1.56	1.75	2.17	2.32
Wt of Dish	0.83	0.81	0.82	0.81	0.83
Wt of Dry Soil	5.94	5.70	6.47	8.27	8.84
Moisture Content	27.61	27.37	27.05	26.24	26.24

Liquid Limit 26.7  
Plastic Limit 21.0  
Plasticity Index 5.7

Atterberg Classification CL-ML

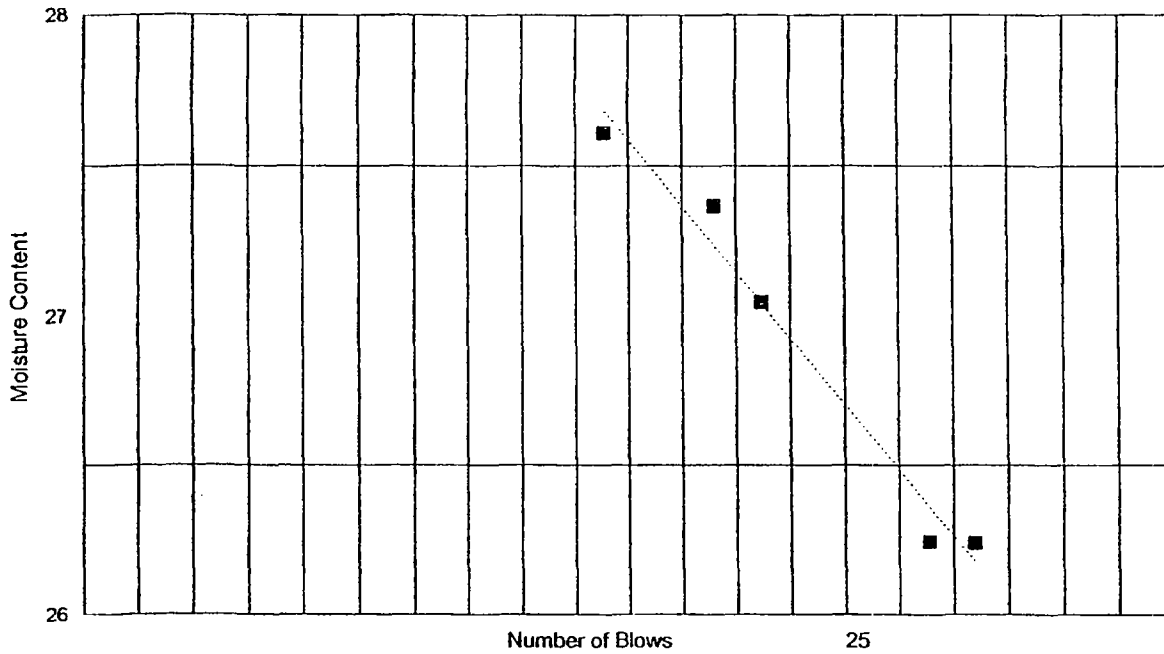
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SR Date: 09/21/2006  
Date: 09/21/06  
USG0TP15

ADVANCED TERRA TESTING, INC.

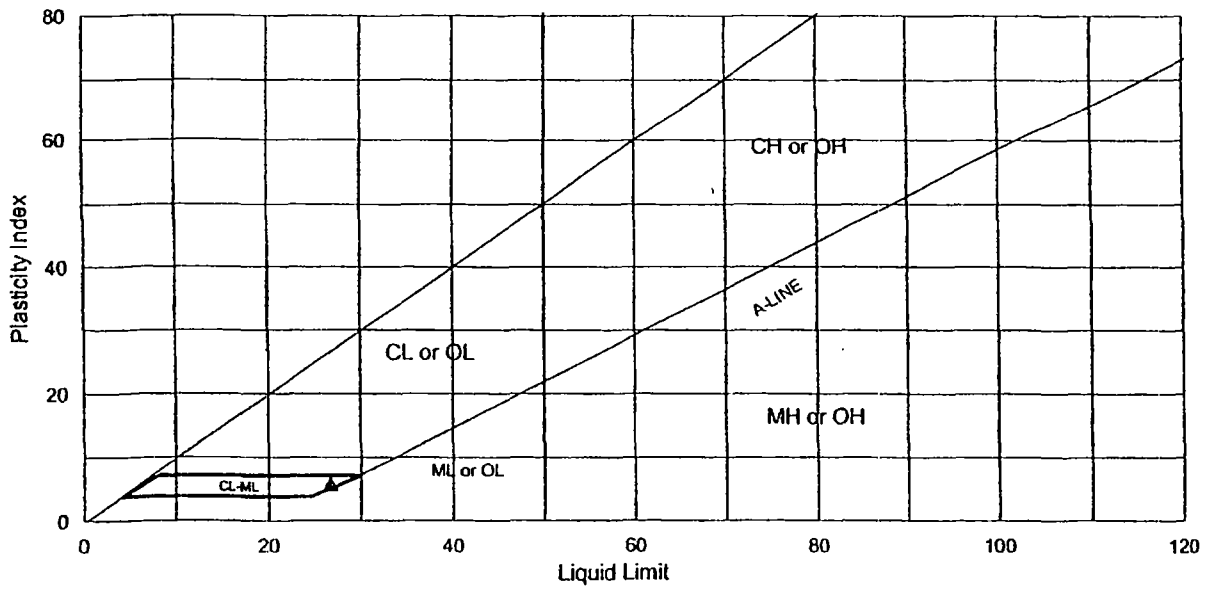
# Atterberg Limits, Flow Curve

TP1-5, 1-12', 1



# PLASTICITY CHART

TP1-5, 1-12', 1



ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-6  
DEPTH 1-22  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

DATE SAMPLED  
DATE TESTED 09-28-06 WAR

Plastic Limit  
Determination

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish  
Wt of Dry Soil  
Moisture Content

NON-PLASTIC

Liquid Limit Device Number 0966  
Determination

Number of Blows

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish  
Wt of Dry Soil  
Moisture Content

NON-PLASTIC

Liquid Limit NP  
Plastic Limit NP  
Plasticity Index NP

Atterberg Classification NP

Data entry by:  
Checked by: RS  
FileName:

SR Date: 09/28/2006  
Date: 9/30/06  
USG0TP16

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-7

DEPTH 1-12

DATE SAMPLED

SAMPLE NO. 1

DATE TESTED

09-28-06 WAR

SOIL DESCR. Project #22238347

LOCATION

Standard Mine P.O. #OS-06-P-9587

Plastic Limit  
Determination

Wt Dish & Wet Soil

Wt Dish & Dry Soil

Wt of Moisture

Wt of Dish

NON-PLASTIC

Wt of Dry Soil

Moisture Content

Liquid Limit  
Determination

Device Number

0966

Number of Blows

Wt Dish & Wet Soil

Wt Dish & Dry Soil

Wt of Moisture

Wt of Dish

NON-PLASTIC

Wt of Dry Soil

Moisture Content

Liquid Limit NP

Plastic Limit NP

Plasticity Index NP

Atterberg Classification

NP

Data entry by:

Checked by: 128

FileName:

SR

Date: 09/28/2006

Date: 9/30/06

USG0TP17

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-8

DEPTH 1-9'

DATE SAMPLED

DATE TESTED 09-30-06 BKL

SAMPLE NO. 1

SOIL DESCR. Project #22238347

LOCATION Standard Mine P.O. #OS-06-P-9587

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	8.75	8.74	8.72
Wt Dish & Dry Soil	7.49	7.50	7.46
Wt of Moisture	1.26	1.24	1.26
Wt of Dish	0.82	0.82	0.81
Wt of Dry Soil	6.67	6.68	6.65
Moisture Content	18.89	18.56	18.95

Liquid Limit  
Determination

Device Number

0966

	1	2	3	4
Number of Blows	32	28	21	15
Wt Dish & Wet Soil	12.50	11.11	13.16	13.17
Wt Dish & Dry Soil	10.61	9.42	11.12	11.06
Wt of Moisture	1.89	1.69	2.04	2.11
Wt of Dish	0.81	0.81	0.82	0.76
Wt of Dry Soil	9.80	8.61	10.30	10.30
Moisture Content	19.29	19.63	19.81	20.49

Liquid Limit 19.7  
Plastic Limit 18.8  
Plasticity Index 0.9

Atterberg Classification ML

Data entry by:

Checked by: *DPH*

FileName:

SR

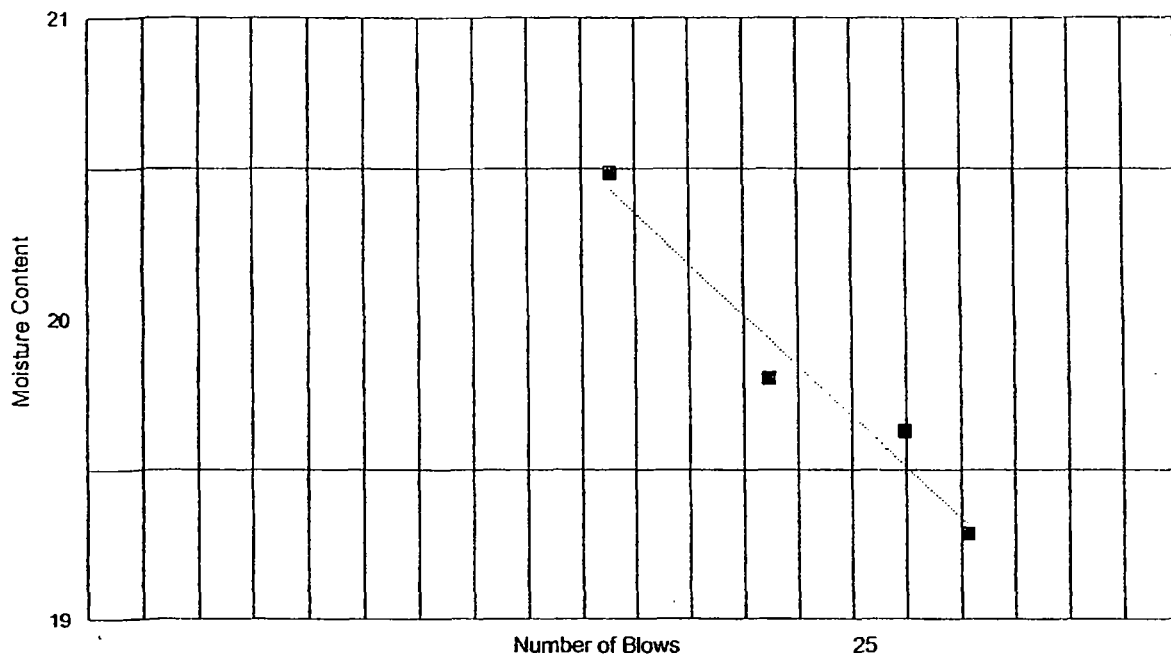
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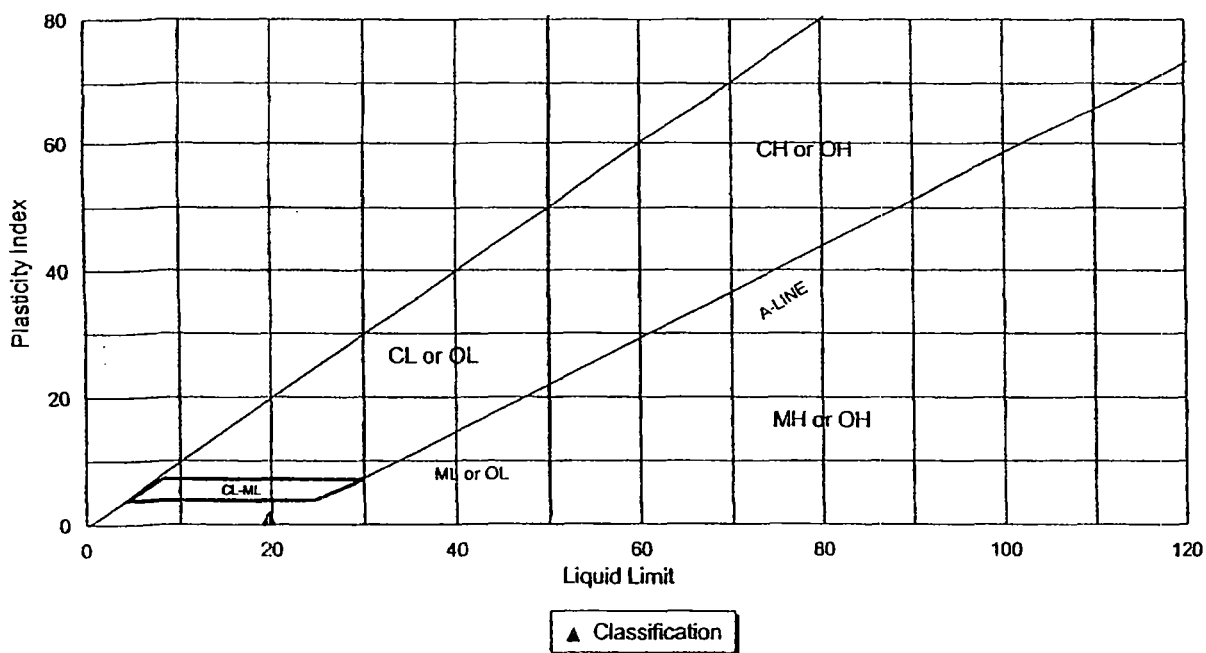
USG0TP18

ADVANCED TERRA TESTING, INC.

# Atterberg Limits, Flow Curve TP1-8, 1-9', 1



# PLASTICITY CHART TP1-8, 1-9', 1



ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-1

DATE SAMPLED

DEPTH 1-5'

DATE TESTED

09-30-06 RS

SAMPLE NO. 1

SOIL DESCR. Project #22238347

LOCATION Standard Mine P.O. #OS-06-P-9587

Plastic Limit  
Determination

Wt Dish & Wet Soil

Wt Dish & Dry Soil

Wt of Moisture

Wt of Dish

NON-PLASTIC

Wt of Dry Soil

Moisture Content

Liquid Limit  
Determination

Device Number

0258

Number of Blows

Wt Dish & Wet Soil

Wt Dish & Dry Soil

Wt of Moisture

Wt of Dish

NON-PLASTIC

Wt of Dry Soil

Moisture Content

Liquid Limit NP  
Plastic Limit NP  
Plasticity Index NP

Atterberg Classification

NP

Data entry by:

SR

Date: 10/02/2006

Checked by: *dlm*

Date: *10/02/06*

FileName:

USG0TP21

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-2

DATE SAMPLED

DEPTH 1-4'

DATE TESTED 09-30-06 BKL

SAMPLE NO. 1

SOIL DESCR. Project #22238347

LOCATION Standard Mine P.O. #OS-06-P-9587

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	7.66	7.52	7.60
Wt Dish & Dry Soil	6.29	6.23	6.28
Wt of Moisture	1.37	1.29	1.32
Wt of Dish	0.82	0.82	0.82
Wt of Dry Soil	5.47	5.41	5.46
Moisture Content	25.05	23.84	24.18

Liquid Limit  
Determination

Device Number

0966

	1	2	3	4
Number of Blows	33	37	20	15
Wt Dish & Wet Soil	10.52	12.18	10.47	13.29
Wt Dish & Dry Soil	8.25	9.53	8.17	10.30
Wt of Moisture	2.27	2.65	2.30	2.99
Wt of Dish	0.76	0.75	0.78	0.75
Wt of Dry Soil	7.49	8.78	7.39	9.55
Moisture Content	30.31	30.18	31.12	31.31

Liquid Limit 30.7  
Plastic Limit 24.4  
Plasticity Index 6.4

Atterberg Classification ML

Data entry by:  
Checked by: DPM  
FileName:

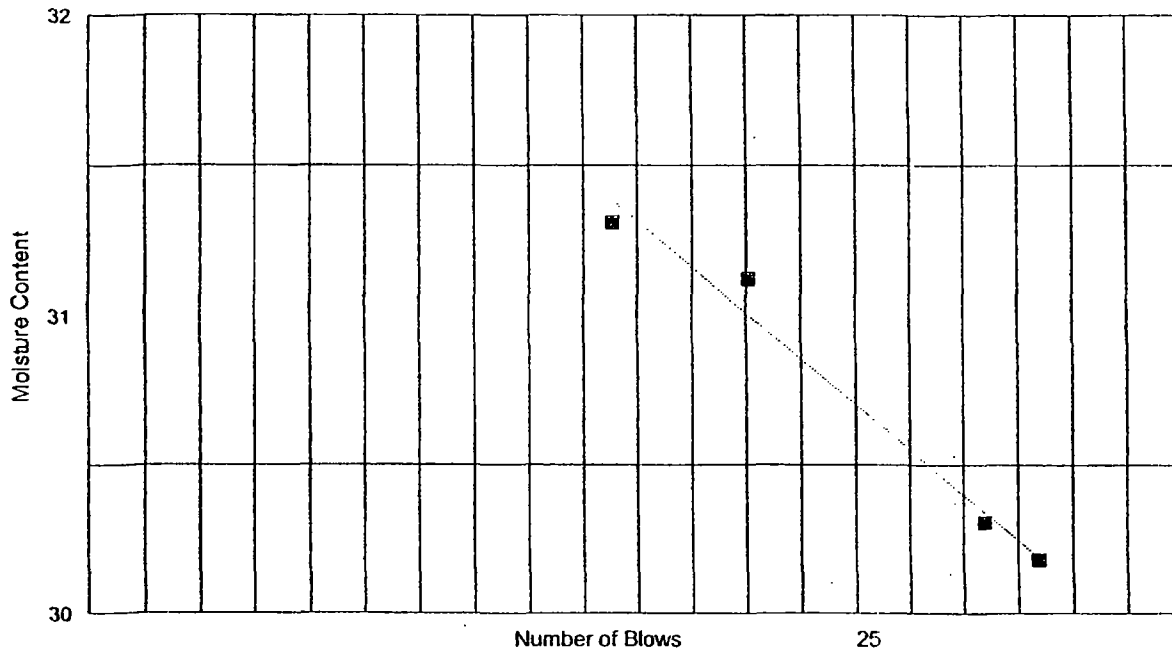
SR Date: 10/02/2006  
Date: 10/02/06  
USG0TP22

ADVANCED TERRA TESTING, INC.



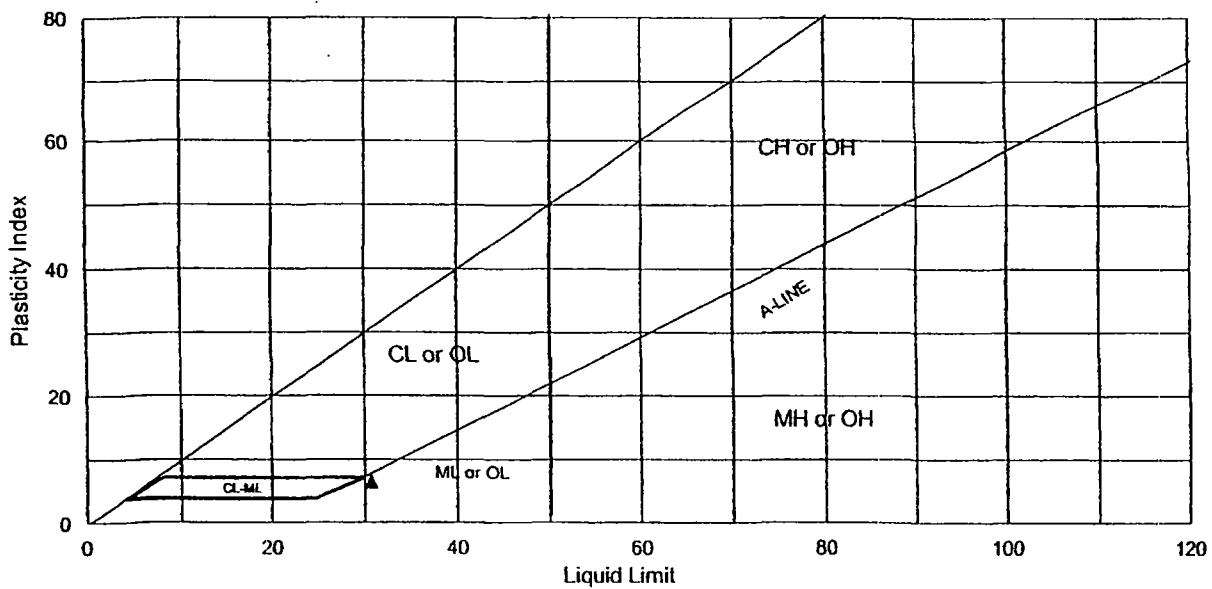
# Atterberg Limits, Flow Curve

TP2-2, 1-4', 1



## PLASTICITY CHART

TP2-2, 1-4', 1



▲ Classification

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-3  
DEPTH 1-8'  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

DATE SAMPLED  
DATE TESTED 09-28,30-06 RS

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	7.85	8.50	9.13
Wt Dish & Dry Soil	6.56	7.07	7.61
Wt of Moisture	1.29	1.43	1.52
Wt of Dish	0.76	0.74	0.76
Wt of Dry Soil	5.80	6.33	6.85
Moisture Content	22.24	22.59	22.19

Liquid Limit  
Determination

Device Number

0258

	1	2	3
Number of Blows	15	22	32
Wt Dish & Wet Soil	8.57	9.69	10.25
Wt Dish & Dry Soil	6.83	7.71	8.16
Wt of Moisture	1.74	1.98	2.09
Wt of Dish	0.76	0.74	0.75
Wt of Dry Soil	6.07	6.97	7.41
Moisture Content	28.67	28.41	28.14

Liquid Limit 28.3  
Plastic Limit 22.3  
Plasticity Index 6.0

Atterberg Classification ML

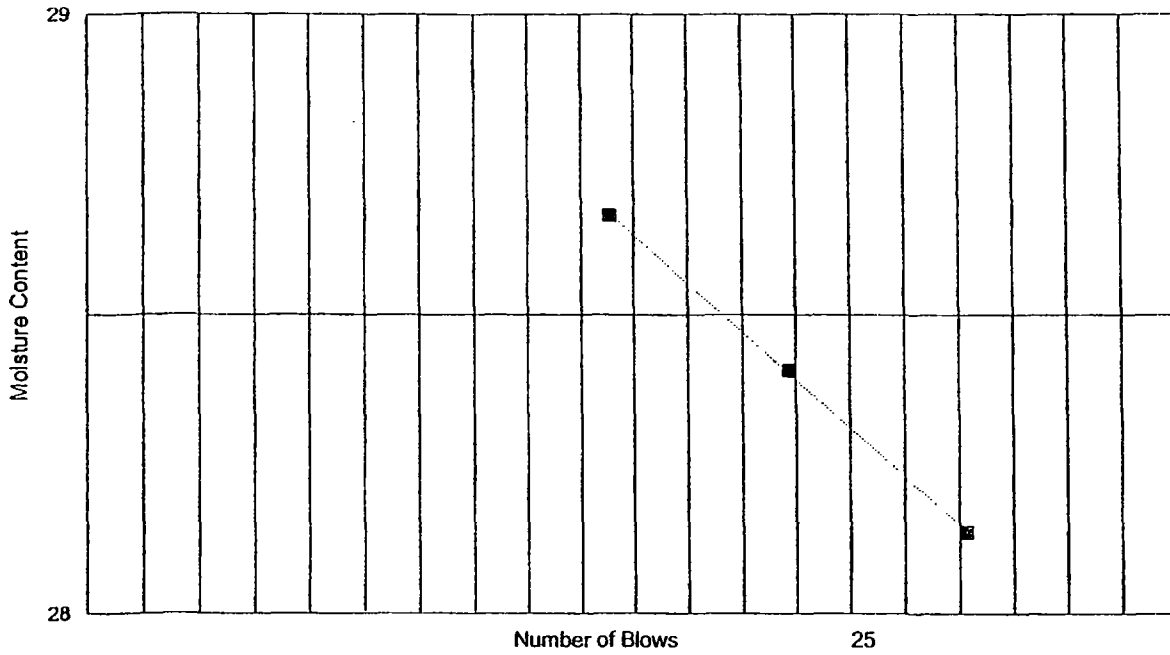
Data entry by:  
Checked by: *DPM*  
FileName:

SR Date: 10/02/2006  
Date: 10/02/06  
USG0TP23

ADVANCED TERRA TESTING, INC.

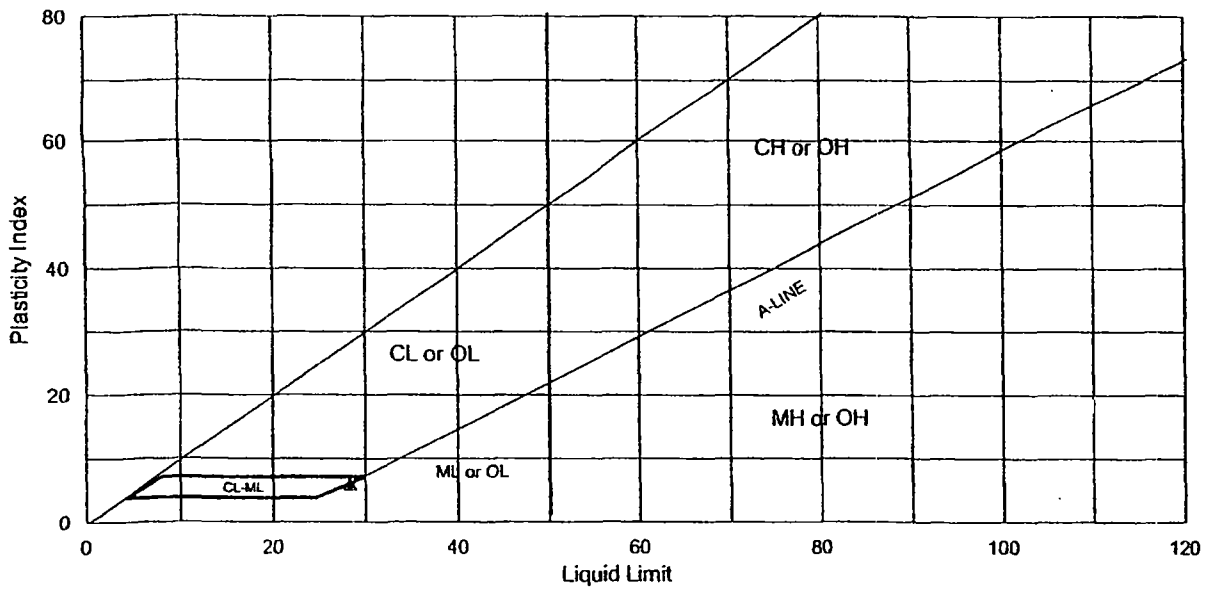
# Atterberg Limits, Flow Curve

TP2-3, 1-8', 1



## PLASTICITY CHART

TP2-3, 1-8', 1



ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-4  
DEPTH 1-4'  
SAMPLE NO. 1  
SOIL DESCR. Project #2238347  
LOCATION Standard Mine P.O. #05-06-P-9587

DATE SAMPLED  
DATE TESTED 09-20-06 RS

Plastic Limit  
Determination

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish  
Wt of Dry Soil  
Moisture Content

NON-PLASTIC

Liquid Limit Device Number 0860  
Determination

Number of Blows

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish  
Wt of Dry Soil  
Moisture Content

NON-PLASTIC

Liquid Limit NP  
Plastic Limit NP  
Plasticity Index NP

Atterberg Classification NP

Data entry by:  
Checked by: RS  
FileName:

SR Date: 09/20/2006  
Date: 9/20/06  
USG0TP24

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-5  
DEPTH 1-4  
SAMPLE NO. 1  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine P.O. #OS-06-P-9587

DATE SAMPLED  
DATE TESTED 09-28-06 WAR

Plastic Limit  
Determination

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish  
Wt of Dry Soil  
Moisture Content

NON-PLASTIC

Liquid Limit Device Number 0966  
Determination

Number of Blows

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish  
Wt of Dry Soil  
Moisture Content

NON-PLASTIC

Liquid Limit NP  
Plastic Limit NP  
Plasticity Index NP

Atterberg Classification NP

Data entry by:  
Checked by: RS  
FileName:

SR Date: 09/28/2006  
Date: 9/30/06  
USG0TP25

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-6

DATE SAMPLED

DEPTH 1-5'

DATE TESTED

09-30-06 BKL

SAMPLE NO. 1

SOIL DESCR. Project #22238347

LOCATION Standard Mine P.O. #OS-06-P-9587

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	7.56	7.59	7.60
Wt Dish & Dry Soil	6.44	6.49	6.50
Wt of Moisture	1.12	1.10	1.10
Wt of Dish	0.82	0.77	0.76
Wt of Dry Soil	5.62	5.72	5.74
Moisture Content	19.93	19.23	19.16

Liquid Limit  
Determination

Device Number

0966

	1	2	3
Number of Blows	25	27	19
Wt Dish & Wet Soil	11.19	11.20	12.66
Wt Dish & Dry Soil	9.08	9.10	10.26
Wt of Moisture	2.11	2.10	2.40
Wt of Dish	0.74	0.76	0.83
Wt of Dry Soil	8.34	8.34	9.43
Moisture Content	25.30	25.18	25.45

Liquid Limit 25.3  
Plastic Limit 19.4  
Plasticity Index 5.8

Atterberg Classification CL-ML

Data entry by:

Checked by: *ppm*

FileName:

SR

Date: 10/02/2006

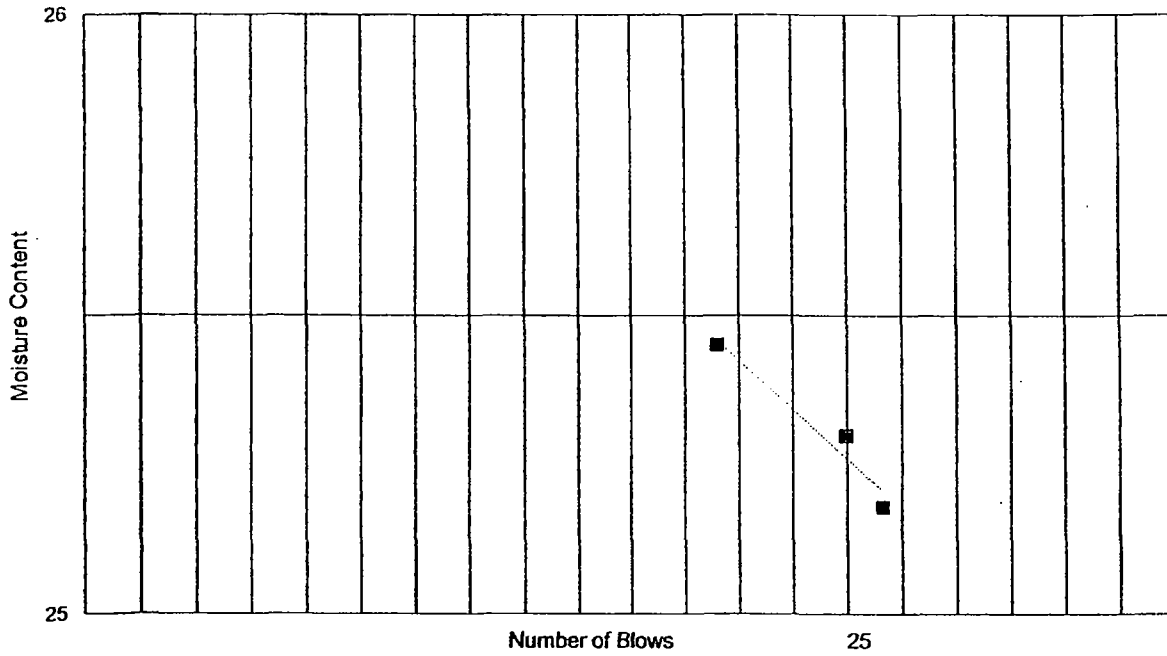
Date: *10/02/06*

USG0TP26

ADVANCED TERRA TESTING, INC.

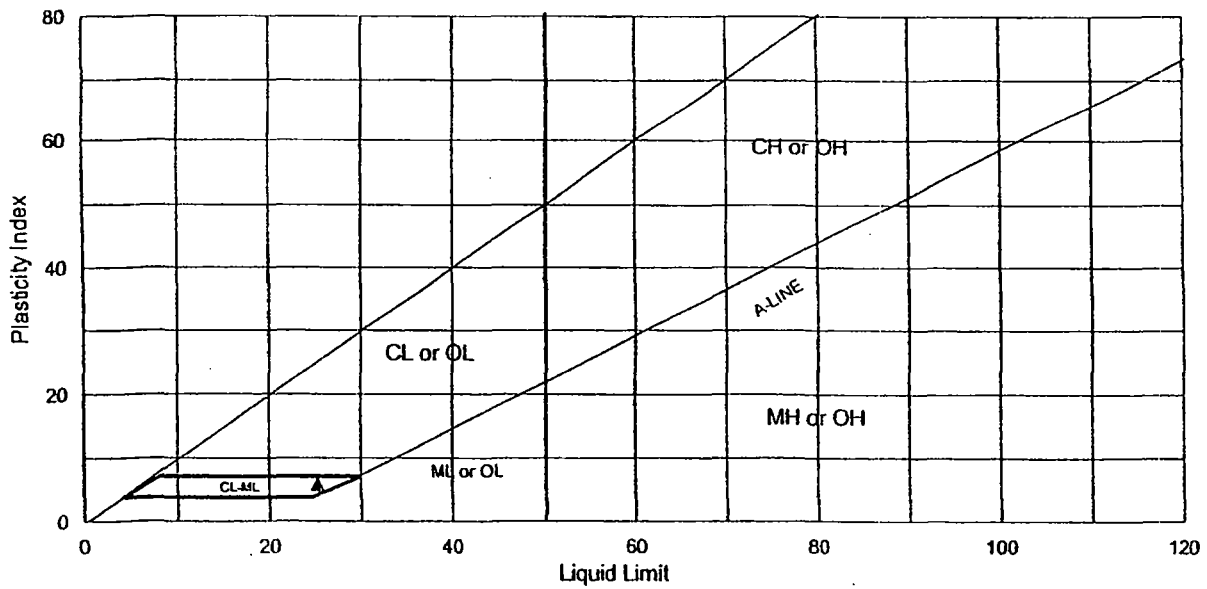
# Atterberg Limits, Flow Curve

TP2-6, 1-5', 1



# PLASTICITY CHART

TP2-6, 1-5', 1



▲ Classification

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-7

DEPTH 1-5'

DATE SAMPLED

DATE TESTED 09-30-06 BKL

SAMPLE NO. 1

SOIL DESCR. Project #22238347

LOCATION Standard Mine P.O. #OS-06-P-9587

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	6.63	7.20	6.52
Wt Dish & Dry Soil	5.50	5.98	5.43
Wt of Moisture	1.13	1.22	1.09
Wt of Dish	0.77	0.81	0.75
Wt of Dry Soil	4.73	5.17	4.68
Moisture Content	23.89	23.60	23.29

Liquid Limit  
Determination

Device Number

0966

	1	2	3	4	5
Number of Blows	35	28	25	21	18
Wt Dish & Wet Soil	8.73	8.93	8.59	7.98	9.21
Wt Dish & Dry Soil	6.79	6.92	6.64	6.17	7.10
Wt of Moisture	1.94	2.01	1.95	1.81	2.11
Wt of Dish	0.82	0.82	0.76	0.76	0.81
Wt of Dry Soil	5.97	6.10	5.88	5.41	6.29
Moisture Content	32.50	32.95	33.16	33.46	33.55

Liquid Limit 33.1  
Plastic Limit 23.6  
Plasticity Index 9.5

Atterberg Classification ML

Data entry by:  
Checked by: *DPM*  
FileName:

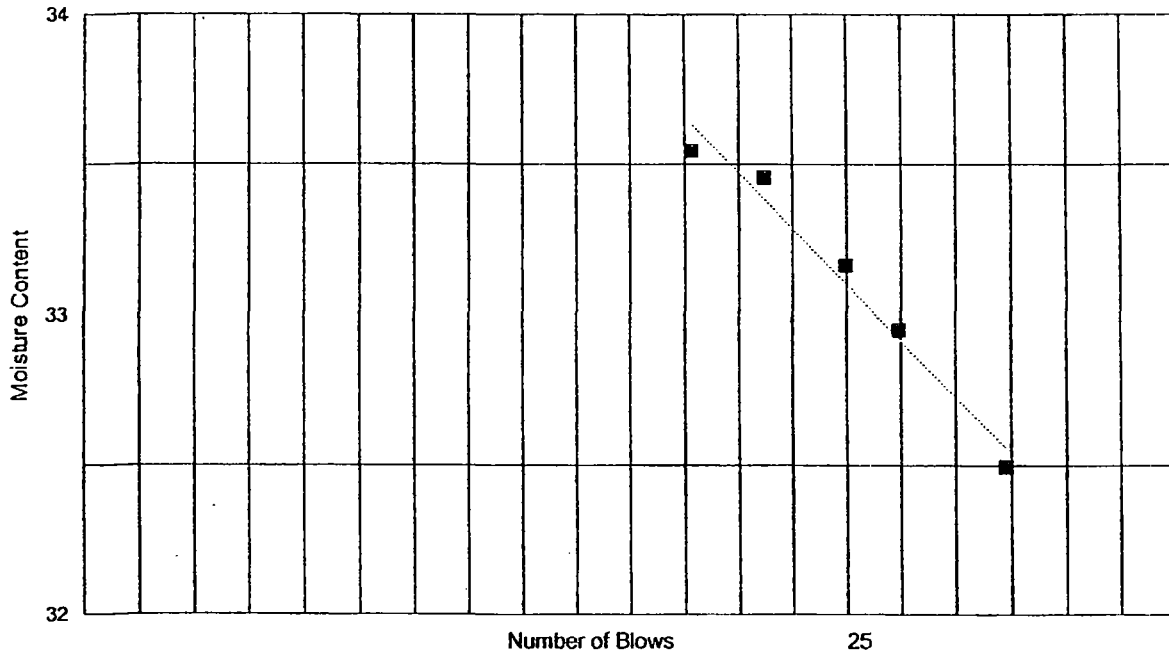
SR Date: 10/02/2006  
Date: *10/02/06*  
USG0TP27

ADVANCED TERRA TESTING, INC.



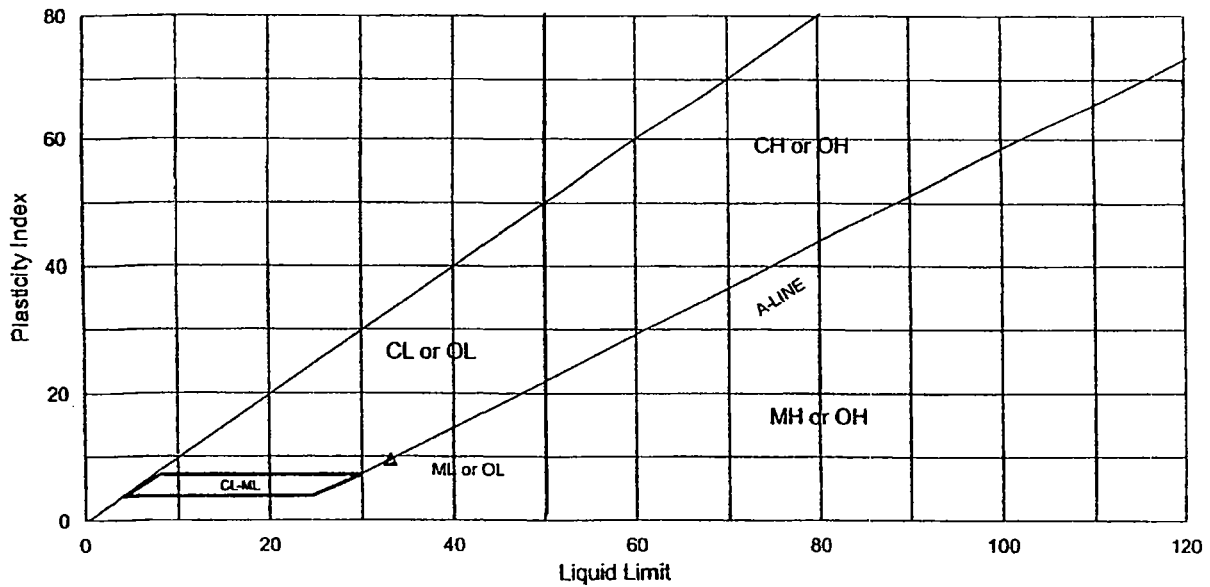
# Atterberg Limits, Flow Curve

TP2-7, 1-5', 1



# PLASTICITY CHART

TP2-7, 1-5', 1



ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-8

DATE SAMPLED

DEPTH 1-7'

DATE TESTED

10-02-06 RS

SAMPLE NO. 1

SOIL DESCR. Project #22238347

LOCATION Standard Mine P.O. #OS-06-P-9587

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	6.64	8.75	8.24
Wt Dish & Dry Soil	5.53	7.24	6.80
Wt of Moisture	1.11	1.51	1.44
Wt of Dish	0.82	0.81	0.82
Wt of Dry Soil	4.71	6.43	5.98
Moisture Content	23.57	23.48	24.08

Liquid Limit  
Determination

Device Number

0258

	1	2	3	4	5
Number of Blows	33	24	26	16	27
Wt Dish & Wet Soil	12.03	11.12	11.03	12.38	11.28
Wt Dish & Dry Soil	9.54	8.79	8.73	9.72	8.92
Wt of Moisture	2.49	2.33	2.30	2.66	2.36
Wt of Dish	0.83	0.82	0.81	0.84	0.83
Wt of Dry Soil	8.71	7.97	7.92	8.88	8.09
Moisture Content	28.59	29.23	29.04	29.95	29.22

Liquid Limit 29.2  
Plastic Limit 23.7  
Plasticity Index 5.5

Atterberg Classification ML

Data entry by:  
Checked by: *RD*  
FileName:

SR Date: 10/03/2006  
Date: *10/4/06*  
USG0TP28

ADVANCED TERRA TESTING, INC.

## COMPOSITE TEST PIT SAMPLES

*Grain Size Distribution*

*Atterberg Limits*

*Standard Proctor Compaction*

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-1,TP-4,TP-5  
DEPTH Composite  
SAMPLE NO. Level 225-1  
SOIL DESCR. #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 01-11-07 RS  
DATE -#4 WASHED 01-11-07 RS  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 101.86  
Wt. Dry Soil & Pan (g) 98.68  
Wt. Lost Moisture (g) 3.18  
Wt. of Pan Only (g) 3.06  
Wt. of Dry Soil (g) 95.62  
Moisture Content % 3.3

Wt. Total Sample  
Wet (g) 2941.90  
Weight of + #4  
Before Washing (g) 843.56  
Weight of + #4  
After Washing (g) 796.53  
Weight of - #4  
Wet (g) 2098.34  
Weight of - #4  
Dry (g) 2076.32  
Wt. Total Sample  
Dry (g) 2872.85

Wt. Partial -#4 Sample Wet (g) 234.83  
Wt. Partial Sample Dry (g) 227.27

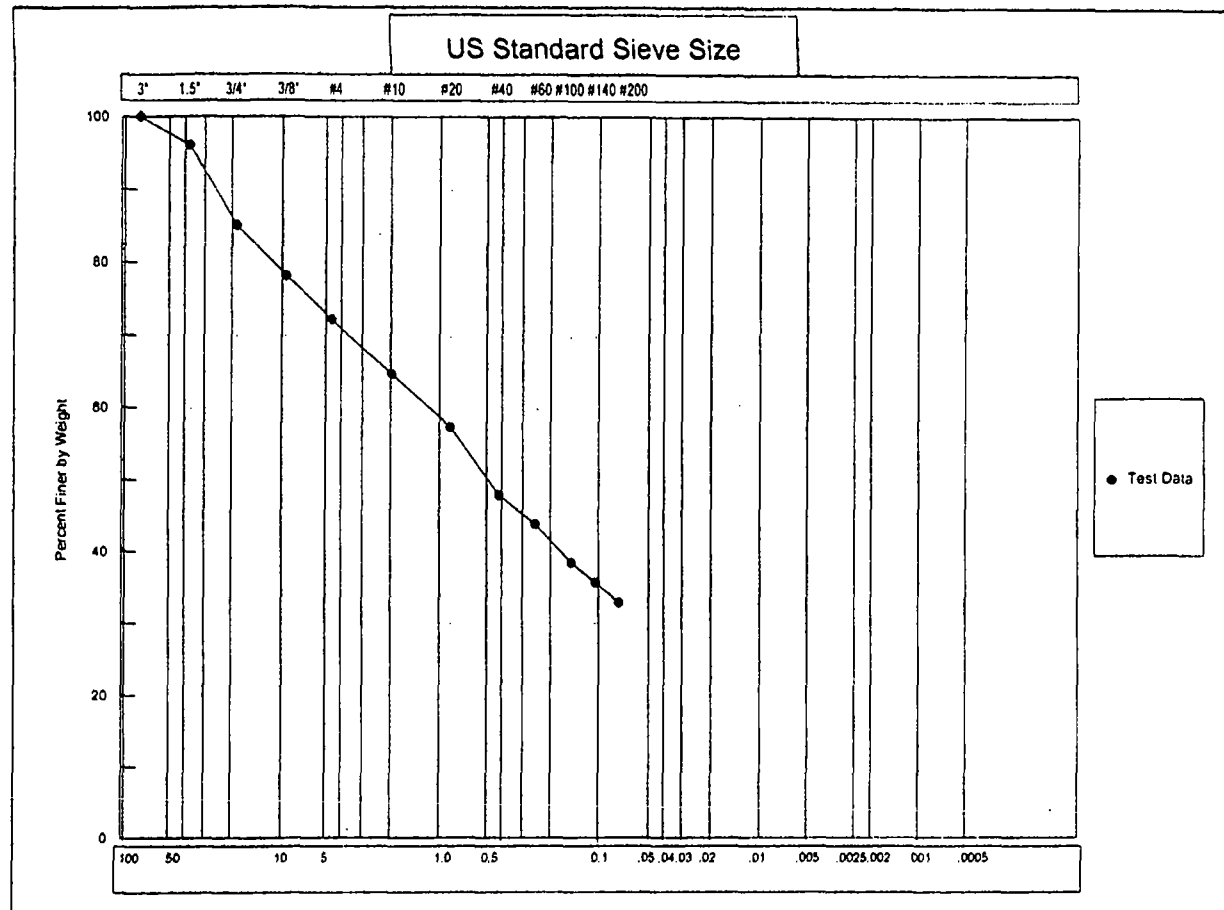
Calc. Wt. "W" (g) 314.46  
Calc. Mass + #4 87.19

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	114.13	114.13	114.13	4.0	96.0
3/4"	0.00	315.02	315.02	429.15	14.9	85.1
3/8"	0.00	197.68	197.68	626.83	21.8	78.2
#4	0.00	169.70	169.70	796.53	27.7	72.3
#10	2.38	26.02	23.64	23.64	35.2	64.8
#20	2.36	25.51	23.15	46.79	42.6	57.4
#40	2.36	31.96	29.60	76.39	52.0	48.0
#60	2.38	15.10	12.72	89.11	56.1	43.9
#100	2.36	19.59	17.23	106.34	61.5	38.5
#140	2.31	11.02	8.71	115.05	64.3	35.7
#200	2.30	11.14	8.84	123.89	67.1	32.9

Data entered by: SR  
Data checked by: cue  
FileName: USM0P145

Date: 01/12/2007  
Date: 1/16/07

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP-1, TP-4, TP-5  
 Job Number: 2562-11    Depth: Composite  
 Classification: **Classification Not Performed**

Sample No.: Level 225-1

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP1, TP5, TP6  
DEPTH Composite  
SAMPLE NO. Level 245-1  
SOIL DESCR. #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 01-17-07 WAR  
DATE -#4 WASHED 01-17-07 WAR  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 109.54  
Wt. Dry Soil & Pan (g) 107.96  
Wt. Lost Moisture (g) 1.58  
Wt. of Pan Only (g) 3.09  
Wt. of Dry Soil (g) 104.87  
Moisture Content % 1.5

Wt. Total Sample  
Wet (g) 3991.12  
Weight of + #4  
Before Washing (g) 1846.70  
Weight of + #4  
After Washing (g) 1729.25  
Weight of - #4  
Wet (g) 2144.42  
Weight of - #4  
Dry (g) 2228.30  
Wt. Total Sample  
Dry (g) 3957.55

Wt. Partial -#4 Sample Wet (g) 335.13  
Wt. Partial Sample Dry (g) 330.16

Calc. Wt. "W" (g) 586.37  
Calc. Mass + #4 256.21

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	598.51	598.51	598.51	15.1	84.9
3/4"	0.00	544.91	544.91	1143.42	28.9	71.1
3/8"	0.00	299.86	299.86	1443.28	36.5	63.5
#4	0.00	285.97	285.97	1729.25	43.7	56.3
#10	3.09	44.92	41.83	41.83	50.8	49.2
#20	3.69	74.78	71.09	112.92	63.0	37.0
#40	3.19	46.84	43.65	156.57	70.4	29.6
#60	3.17	23.08	19.91	176.48	73.8	26.2
#100	3.68	19.89	16.21	192.69	76.6	23.4
#140	3.66	13.57	9.91	202.60	78.2	21.8
#200	3.21	14.06	10.85	213.45	80.1	19.9

Data entered by: SR  
Data checked by: ce  
FileName: USM0P156

Date: 01/19/2007  
Date: 1/19/07

ADVANCED TERRA TESTING, INC.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP1, TP6, TP7  
DEPTH Composite  
SAMPLE NO. Level 2-1  
SOIL DESCR. #22238347  
LOCATION Standard Mine

SAMPLED  
DATE+#4 WASHED 01-17-07 WAR  
DATE -#4 WASHED 01-17-07 WAR  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 125.61  
Wt. Dry Soil & Pan (g) 121.93  
Wt. Lost Moisture (g) 3.68  
Wt. of Pan Only (g) 3.19  
Wt. of Dry Soil (g) 118.74  
Moisture Content % 3.1

Wt. Total Sample  
Wet (g) 5007.37  
Weight of + #4  
Before Washing (g) 2800.08  
Weight of + #4  
After Washing (g) 2447.24  
Weight of - #4  
Wet (g) 2207.29  
Weight of - #4  
Dry (g) 2483.17  
Wt. Total Sample  
Dry (g) 4930.41

Wt. Partial -#4 Sample Wet (g) 226.67  
Wt. Partial Sample Dry (g) 219.86

Calc. Wt. "W" (g) 436.53  
Calc. Mass + #4 216.67

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	706.07	706.07	706.07	14.3	85.7
3/4"	0.00	681.92	681.92	1387.99	28.2	71.8
3/8"	0.00	675.23	675.23	2063.22	41.8	58.2
#4	0.00	384.02	384.02	2447.24	49.6	50.4
#10	3.70	33.22	29.52	29.52	56.4	43.6
#20	3.10	23.34	20.24	49.76	61.0	39.0
#40	3.12	16.51	13.39	63.15	64.1	35.9
#60	3.10	15.29	12.19	75.34	66.9	33.1
#100	3.10	13.58	10.48	85.82	69.3	30.7
#140	3.10	10.17	7.07	92.89	70.9	29.1
#200	3.20	10.93	7.73	100.62	72.7	27.3

Data entered by: SR

Date: 01/23/2007

Data checked by: cu

Date: 1/23/07

FileName: USM0P167

ADVANCED TERRA TESTING, INC.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP-3, TP-5  
DEPTH Composite  
SAMPLE NO. Level 2-2  
SOIL DESCR. #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 01-16-07 WAR  
DATE - #4 WASHED 01-16-07 RS  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 88.20  
Wt. Dry Soil & Pan (g) 86.75  
Wt. Lost Moisture (g) 1.45  
Wt. of Pan Only (g) 3.68  
Wt. of Dry Soil (g) 83.07  
Moisture Content % 1.7

Wt. Total Sample  
Wet (g) 2374.51  
Weight of + #4  
Before Washing (g) 637.61  
Weight of + #4  
After Washing (g) 589.39  
Weight of - #4  
Wet (g) 1736.90  
Weight of - #4  
Dry (g) 1754.50  
Wt. Total Sample  
Dry (g) 2343.89

Wt. Partial -#4 Sample Wet (g) 212.91  
Wt. Partial Sample Dry (g) 209.26

Calc. Wt. "W" (g) 279.55  
Calc. Mass + #4 70.30

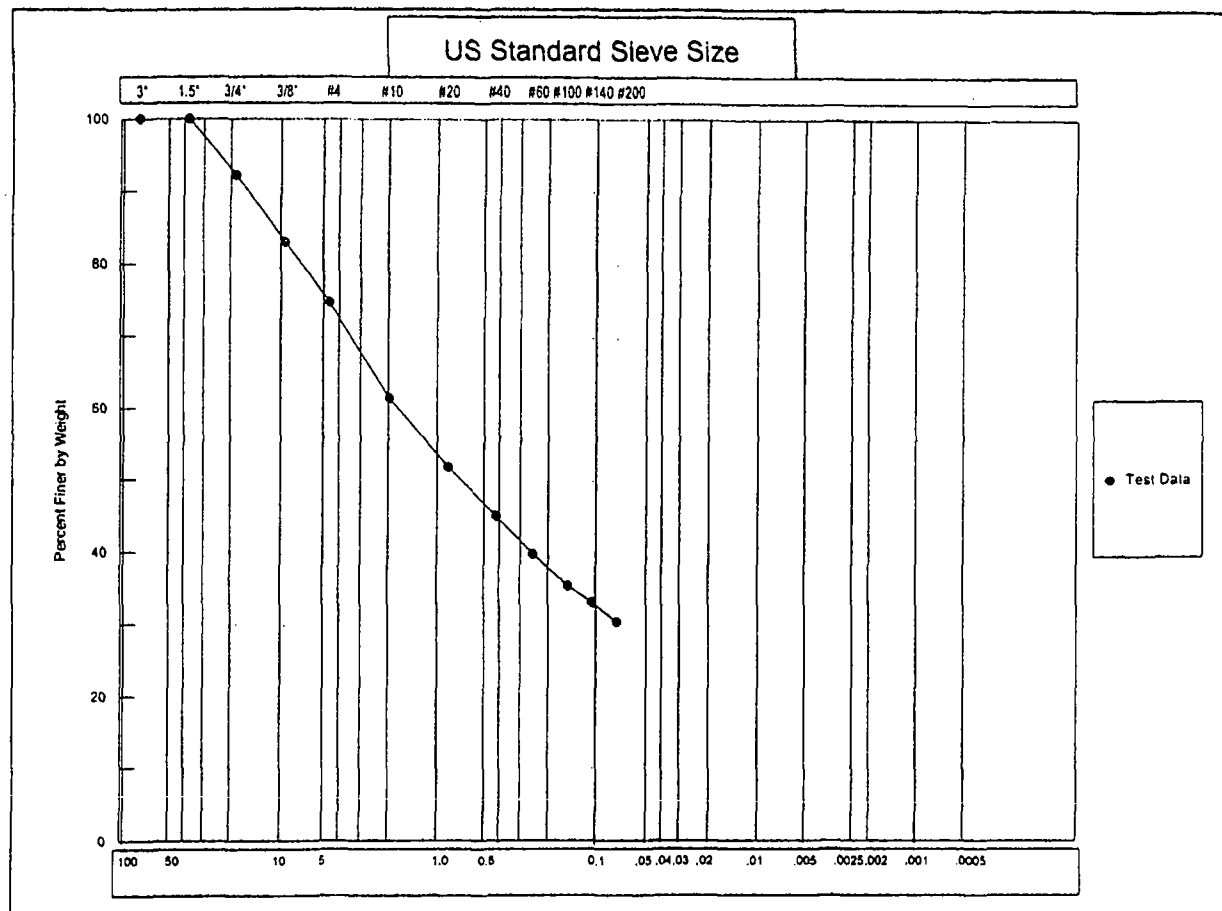
Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	180.60	180.60	180.60	7.7	92.3
3/8"	0.00	215.98	215.98	396.58	16.9	83.1
#4	0.00	192.81	192.81	589.39	25.1	74.9
#10	3.59	40.71	37.12	37.12	38.4	61.6
#20	3.07	29.96	26.89	64.01	48.0	52.0
#40	3.07	22.02	18.95	82.96	54.8	45.2
#60	3.68	18.63	14.95	97.91	60.2	39.8
#100	3.10	15.54	12.44	110.35	64.6	35.4
#140	3.77	10.13	6.36	116.71	66.9	33.1
#200	3.17	10.74	7.57	124.28	69.6	30.4

Data entered by: SR  
Data checked by: CA  
FileName: USM0TP35

Date: 01/17/2007  
Date: 1/18/07

ADVANCED TERRA TESTING, INC.





COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	CRS	MEDIUM	FINE	

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP-3, TP-5  
 Job Number: 2562-11    Depth: Composite  
 Classification: **Classification Not Performed**

Sample No.: Level 2-2

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-6, TP1-7, TP1-8  
DEPTH (1-22), (1-12), (1-9)  
SAMPLE NO. Composite  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 10-13-06 RS  
DATE - #4 WASHED 10-20-06 RS  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 105.41  
Wt. Dry Soil & Pan (g) 102.86  
Wt. Lost Moisture (g) 2.55  
Wt. of Pan Only (g) 3.61  
Wt. of Dry Soil (g) 99.25  
Moisture Content % 2.6

Wt. Total Sample Wet (g) 3089.44  
Weight of + #4 Before Washing (g) 1011.60  
Weight of + #4 After Washing (g) 966.04  
Weight of - #4 Wet (g) 2077.84  
Weight of - #4 Dry (g) 2070.21  
Wt. Total Sample Dry (g) 3036.25

Wt. Partial -#4 Sample Wet (g) 181.93  
Wt. Partial Sample Dry (g) 177.37

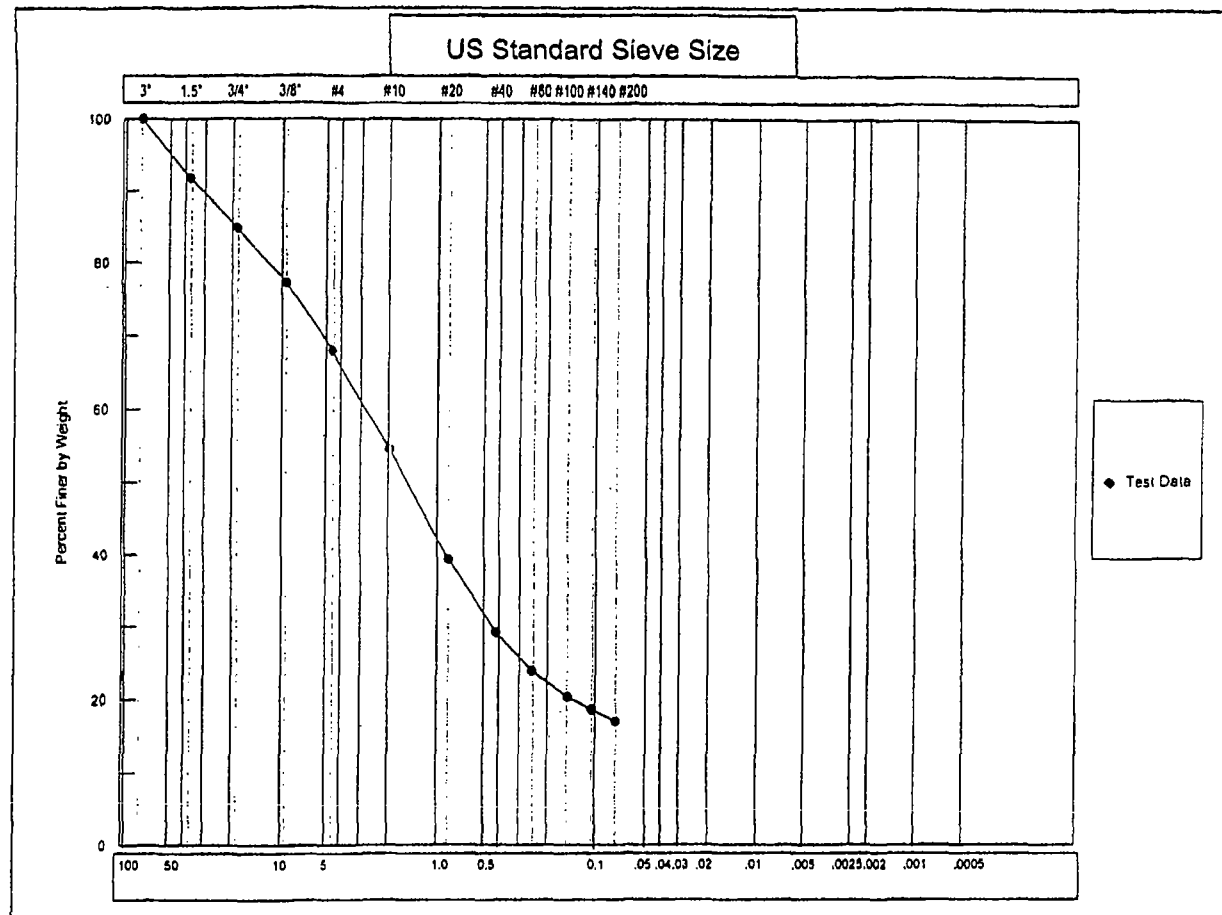
Calc. Wt. "W" (g) 260.14  
Calc. Mass + #4 82.77

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	248.23	248.23	248.23	8.2	91.8
3/4"	0.00	212.66	212.66	460.89	15.2	84.8
3/8"	0.00	226.84	226.84	687.73	22.7	77.3
#4	0.00	278.31	278.31	966.04	31.8	68.2
#10	2.35	37.33	34.98	34.98	45.3	54.7
#20	2.38	42.21	39.83	74.81	60.6	39.4
#40	2.36	28.78	26.42	101.23	70.7	29.3
#60	2.31	16.49	14.18	115.41	76.2	23.8
#100	2.31	11.42	9.11	124.52	79.7	20.3
#140	2.38	6.74	4.36	128.88	81.4	18.6
#200	2.36	6.70	4.34	133.22	83.0	17.0

Data entered by: SR  
Data checked by: RS  
FileName: USM01678

Date: 10/23/2006  
Date: 10/23/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP1-6, TP1-7, TP1-8  
 Job Number: 2562-10    Depth: (1-22), (1-12), (1-9)  
 Classification: Classification Not Performed

Sample No.: Composite

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP1-2, TP1-3, TP1-5  
DEPTH (1-10.5), (1-14), (1-12)  
SAMPLE NO. Composite  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 10-13-06 RS  
DATE - #4 WASHED 10-20-06 RS  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 93.09  
Wt. Dry Soil & Pan (g) 87.66  
Wt. Lost Moisture (g) 5.43  
Wt. of Pan Only (g) 3.66  
Wt. of Dry Soil (g) 84.00  
Moisture Content % 6.5

Wt. Total Sample  
Wet (g) 2900.19  
Weight of + #4  
Before Washing (g) 743.19  
Weight of + #4  
After Washing (g) 695.80  
Weight of - #4  
Wet (g) 2157.00  
Weight of - #4  
Dry (g) 2070.54  
Wt. Total Sample  
Dry (g) 2766.34

Wt. Partial -#4 Sample Wet (g) 178.66  
Wt. Partial Sample Dry (g) 167.81

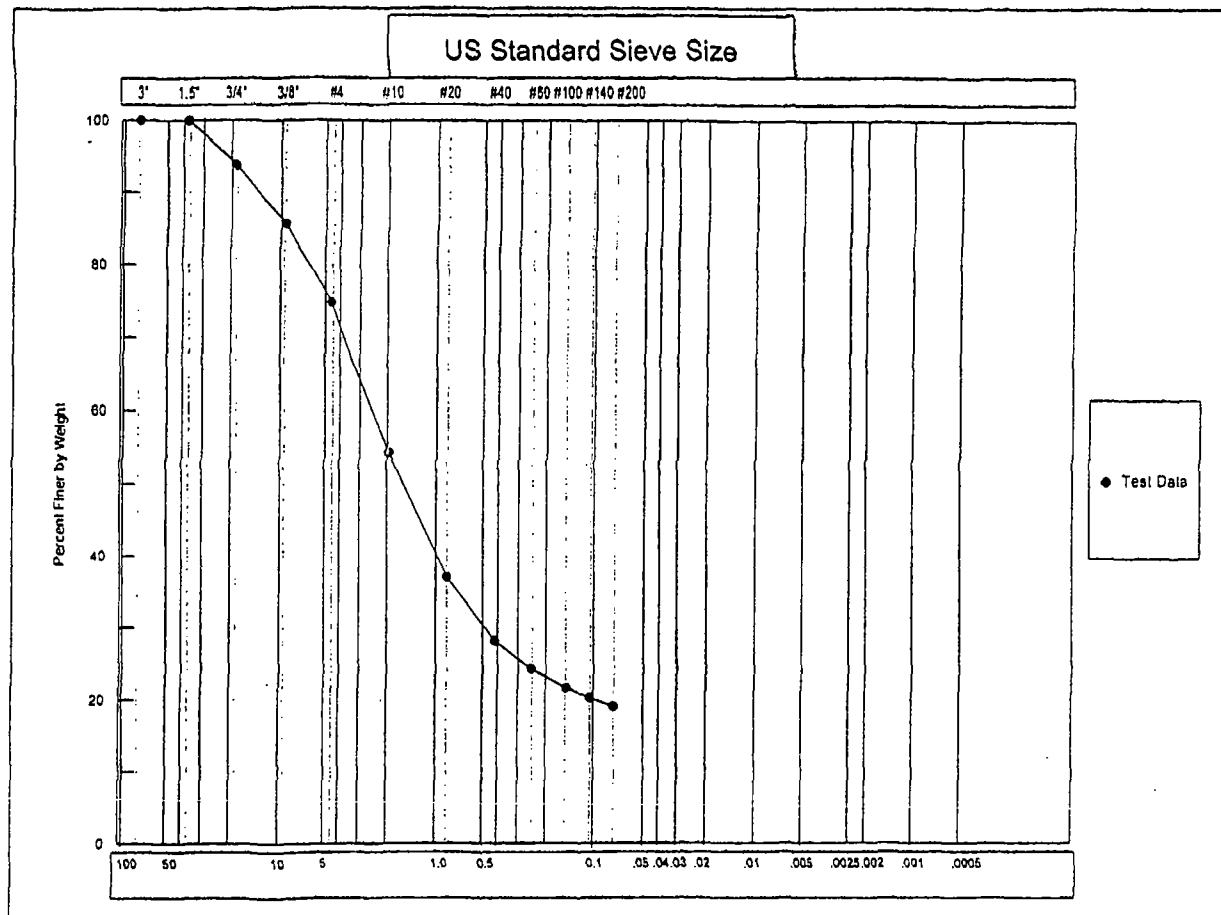
Calc. Wt. "W" (g) 224.20  
Calc. Mass + #4 56.39

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	173.26	173.26	173.26	6.3	93.7
3/8"	0.00	221.45	221.45	394.71	14.3	85.7
#4	0.00	301.09	301.09	695.80	25.2	74.8
#10	2.30	48.16	45.86	45.86	45.6	54.4
#20	2.37	41.26	38.89	84.75	63.0	37.0
#40	2.37	22.07	19.70	104.45	71.7	28.3
#60	2.36	11.17	8.81	113.26	75.7	24.3
#100	2.36	8.44	6.08	119.34	78.4	21.6
#140	2.38	5.49	3.11	122.45	79.8	20.2
#200	2.37	5.09	2.72	125.17	81.0	19.0

Data entered by: RS SR  
Data checked by: RS  
FileName: USM01235

Date: 10/23/2006  
Date: 10/23/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services    Boring No.: TP1-2, TP1-3, TP1-5  
 Job Number: 2562-10    Depth: (1-10.5), (1-14), (1-12)  
 Classification: Classification Not Performed

Sample No.: Composite

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-1, TP2-4, TP2-5  
DEPTH (1-5), (1-4), (1-4)  
SAMPLE NO. Composite  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 10-13-06 RS  
DATE - #4 WASHED 10-20-06 RS  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 98.77  
Wt. Dry Soil & Pan (g) 89.34  
Wt. Lost Moisture (g) 9.43  
Wt. of Pan Only (g) 3.68  
Wt. of Dry Soil (g) 85.66  
Moisture Content % 11.0

Wt. Total Sample Wet (g) 3613.05  
Weight of + #4 Before Washing (g) 1298.32  
Weight of + #4 After Washing (g) 1239.27  
Weight of - #4 Wet (g) 2314.73  
Weight of - #4 Dry (g) 2138.37  
Wt. Total Sample Dry (g) 3377.64

Wt. Partial - #4 Sample Wet (g) 206.63  
Wt. Partial Sample Dry (g) 186.14

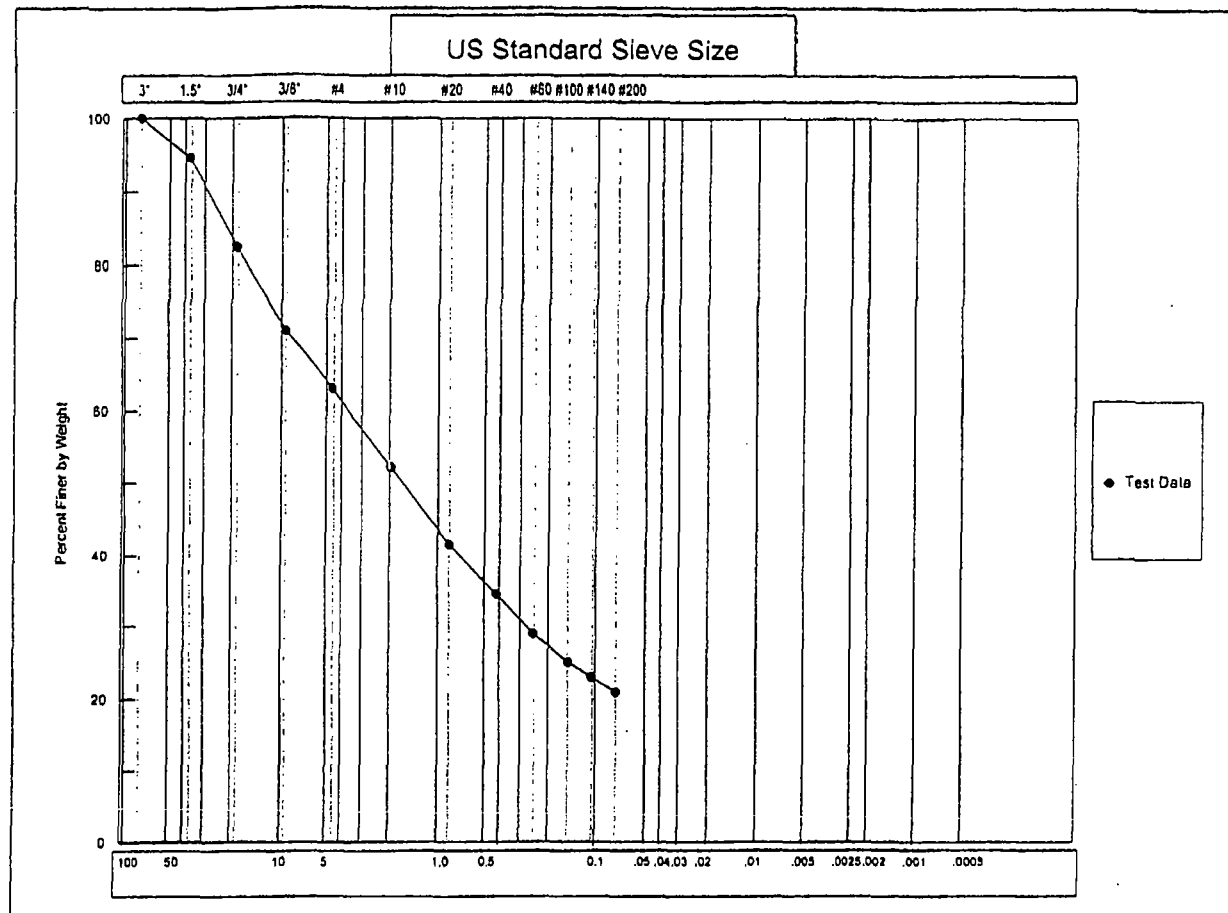
Calc. Wt. "W" (g) 294.01  
Calc. Mass + #4 107.87

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	178.84	178.84	178.84	5.3	94.7
3/4"	0.00	411.16	411.16	590.00	17.5	82.5
3/8"	0.00	385.66	385.66	975.66	28.9	71.1
#4	0.00	263.61	263.61	1239.27	36.7	63.3
#10	2.37	34.38	32.01	32.01	47.6	52.4
#20	2.37	34.00	31.63	63.64	58.3	41.7
#40	2.37	23.16	20.79	84.43	65.4	34.6
#60	2.35	18.72	16.37	100.80	71.0	29.0
#100	2.38	14.04	11.66	112.46	74.9	25.1
#140	2.35	8.39	6.04	118.50	77.0	23.0
#200	2.38	8.37	5.99	124.49	79.0	21.0

Data entered by: SR  
Data checked by: RS  
FileName: USM02145

Date: 10/23/2006  
Date: 10/23/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		

COBBLES TO BOULDERS	PEBBLE GRAVEL				SAND			SILT	CLAY
	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP2-1, TP2-4, TP2-5  
 Job Number: 2562-10 Depth: (1-5), (1-4), (1-4)  
 Classification: **Classification Not Performed**

Sample No.: Composite

Advanced Terra Testing, Inc.

**MECHANICAL ANALYSIS - SIEVE TEST DATA**  
ASTM D 6913

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-6, TP2-7, TP2-8  
DEPTH (1-5), (1-5), (1-8)  
SAMPLE NO. Composite  
SOIL DESCR. Project #22238347  
LOCATION Standard Mine

SAMPLED  
DATE + #4 WASHED 10-13-06 RS  
DATE - #4 WASHED 10-20-06 RS  
WASH SIEVE Yes  
DRY SIEVE No

**MOISTURE DATA**

**WASH SIEVE ANALYSIS**

HYGROSCOPIC Yes

NATURAL No

Wt. Wet Soil & Pan (g) 95.21  
Wt. Dry Soil & Pan (g) 87.44  
Wt. Lost Moisture (g) 7.77  
Wt. of Pan Only (g) 3.68  
Wt. of Dry Soil (g) 83.76  
Moisture Content % 9.3

Wt. Total Sample  
Wet (g) 3142.76  
Weight of + #4  
Before Washing (g) 1233.22  
Weight of + #4  
After Washing (g) 1149.39  
Weight of - #4  
Wet (g) 1909.54  
Weight of - #4  
Dry (g) 1824.15  
Wt. Total Sample  
Dry (g) 2973.54

Wt. Partial - #4 Sample Wet (g) 178.01  
Wt. Partial Sample Dry (g) 162.90

Calc. Wt. "W" (g) 265.54  
Calc. Mass + #4 102.64

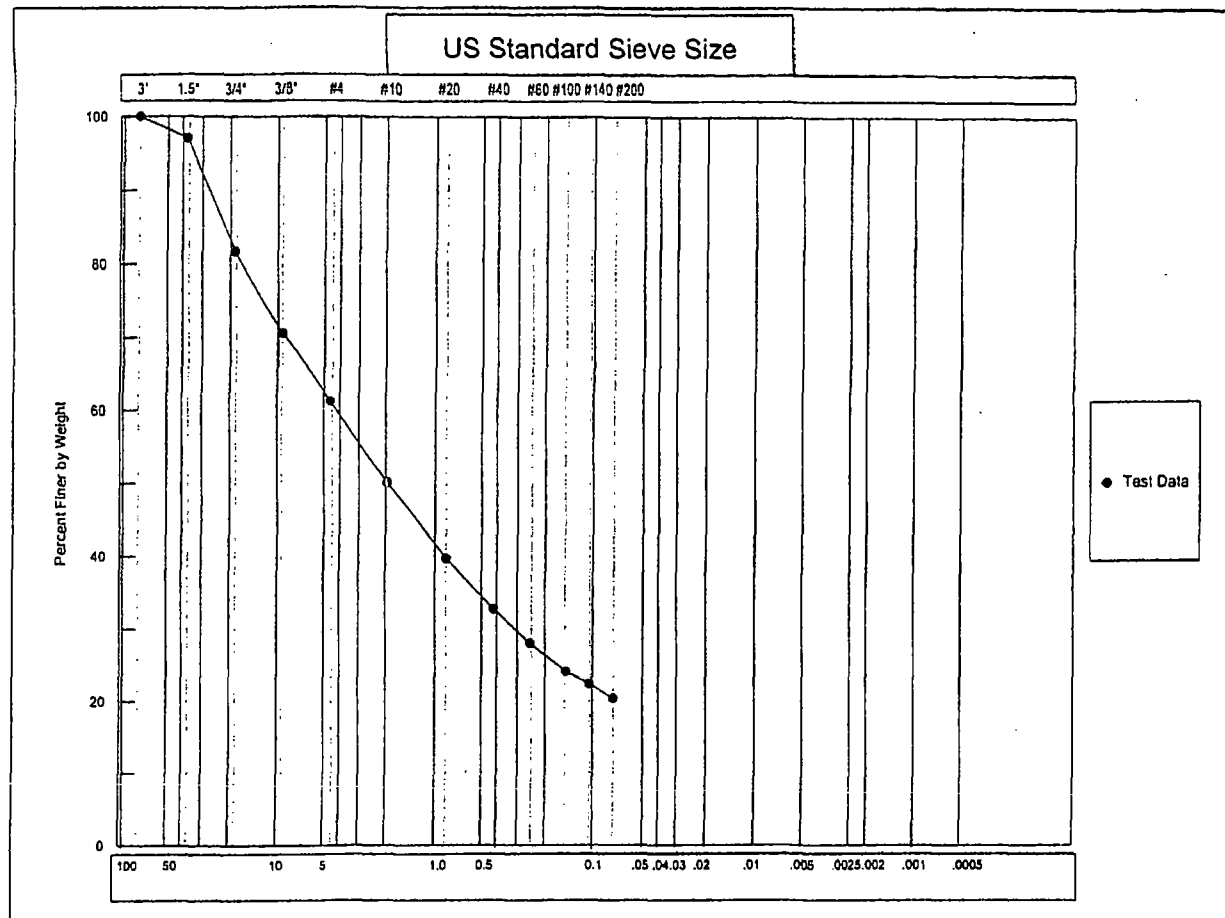
Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	89.01	89.01	89.01	3.0	97.0
3/4"	0.00	455.18	455.18	544.19	18.3	81.7
3/8"	0.00	327.23	327.23	871.42	29.3	70.7
#4	0.00	277.97	277.97	1149.39	38.7	61.3
#10	2.39	31.94	29.55	29.55	49.8	50.2
#20	2.36	30.02	27.66	57.21	60.2	39.8
#40	2.30	20.76	18.46	75.67	67.2	32.8
#60	2.30	14.84	12.54	88.21	71.9	28.1
#100	2.40	12.93	10.53	98.74	75.8	24.2
#140	2.36	6.97	4.61	103.35	77.6	22.4
#200	2.37	7.78	5.41	108.76	79.6	20.4

Data entered by: SR  
Data checked by: RS  
FileName: USM02678

Date: 10/23/2006  
Date: 10/23/06

ADVANCED TERRA TESTING, INC.





COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		
COBBLES	PEBBLE GRAVEL		SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE

USCS

WENTWORTH

Client: URS Operating Services Boring No.: TP2-6, TP2-7, TP2-8  
 Job Number: 2562-10 Depth: (1-5), (1-5), (1-8)  
 Classification: **Classification Not Performed**

Sample No.: Composite

Advanced Terra Testing, Inc.

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP1, TP4, TP5  
DEPTH Composite  
SAMPLE NO. Level 225-1  
SOIL DESCR.  
LOCATION Standard Mine

DATE SAMPLED  
DATE TESTED 01-16-07 JJJ

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	9.20	11.21	9.70
Wt Dish & Dry Soil	7.56	9.17	7.94
Wt of Moisture	1.64	2.04	1.76
Wt of Dish	0.81	0.81	0.74
Wt of Dry Soil	6.75	8.36	7.20
Moisture Content	24.30	24.40	24.44

Liquid Limit  
Determination

Device Number

0966

	1	2	3	4
Number of Blows	17	22	33	20
Wt Dish & Wet Soil	10.31	10.14	10.74	9.84
Wt Dish & Dry Soil	7.85	7.74	8.24	7.53
Wt of Moisture	2.46	2.40	2.50	2.31
Wt of Dish	0.82	0.74	0.81	0.82
Wt of Dry Soil	7.03	7.00	7.43	6.71
Moisture Content	34.99	34.29	33.65	34.43

Liquid Limit 34.1  
Plastic Limit 24.4  
Plasticity Index 9.7

Atterberg Classification ML

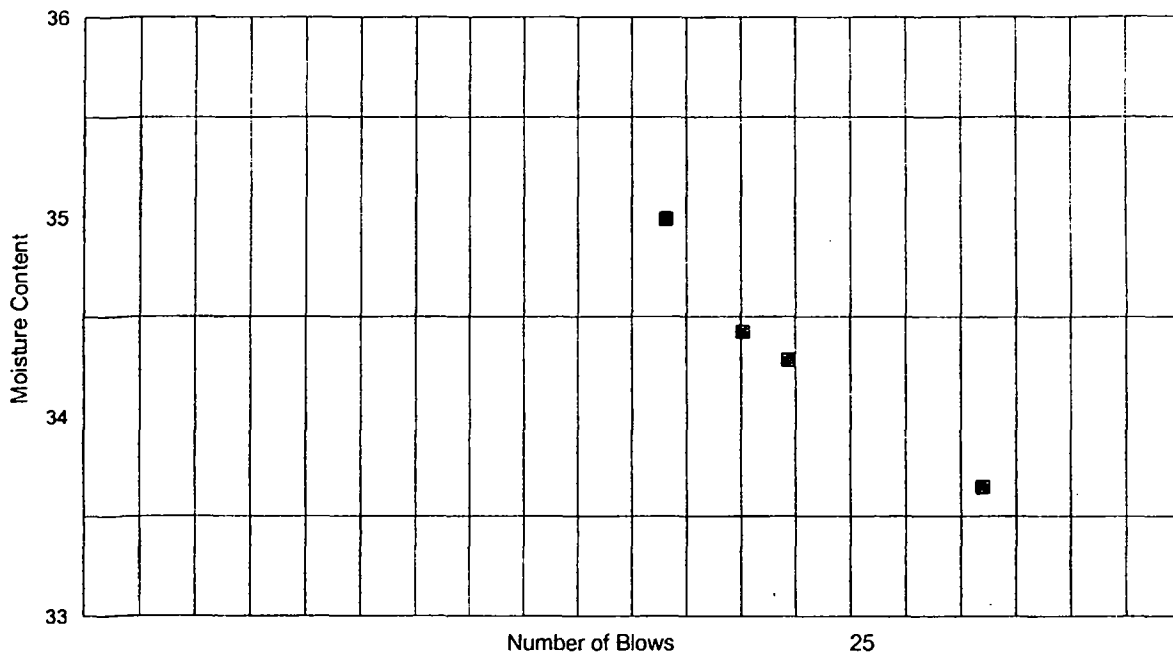
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SR Date: 01/18/2007  
Date: 1/18/07  
USG0P145

ADVANCED TERRA TESTING, INC.

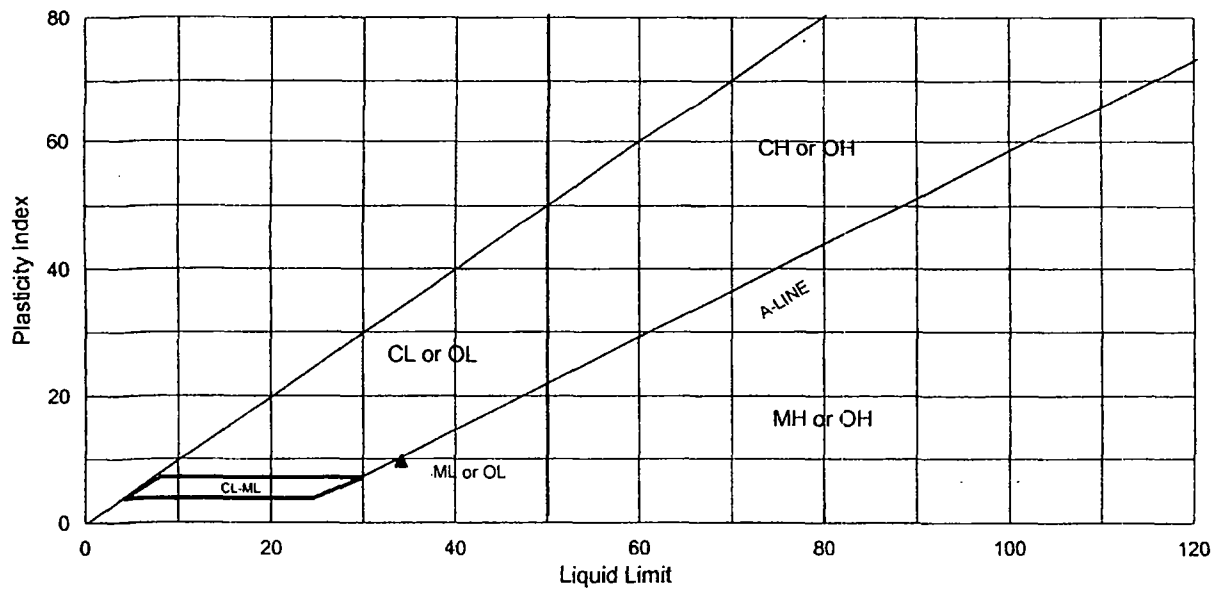
# Atterberg Limits, Flow Curve

TP1, TP4, TP5, Composite, Level 225-1



# PLASTICITY CHART

TP1, TP4, TP5, Composite, Level 225-1



▲ Classification

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP1, TP5, TP6  
DEPTH Composite  
SAMPLE NO. Level 245-1  
SOIL DESCR. #22238347  
LOCATION Standard Mine

DATE SAMPLED  
DATE TESTED 01-18-07 RO

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	10.34	11.38	11.68
Wt Dish & Dry Soil	8.38	9.22	9.41
Wt of Moisture	1.96	2.16	2.27
Wt of Dish	0.82	0.82	0.82
Wt of Dry Soil	7.56	8.40	8.59
Moisture Content	25.93	25.71	26.43


Liquid Limit  
Determination

Device Number 0258

	1	2	3	4	5
Number of Blows	17	22	30	31	26
Wt Dish & Wet Soil	21.88	14.00	13.83	12.47	14.25
Wt Dish & Dry Soil	17.09	11.05	10.96	9.92	11.25
Wt of Moisture	4.79	2.95	2.87	2.55	3.00
Wt of Dish	0.82	0.82	0.82	0.82	0.82
Wt of Dry Soil	16.27	10.23	10.14	9.10	10.43
Moisture Content	29.44	28.84	28.30	28.02	28.76

Liquid Limit 28.6  
Plastic Limit 26.0  
Plasticity Index 2.6

Atterberg Classification ML

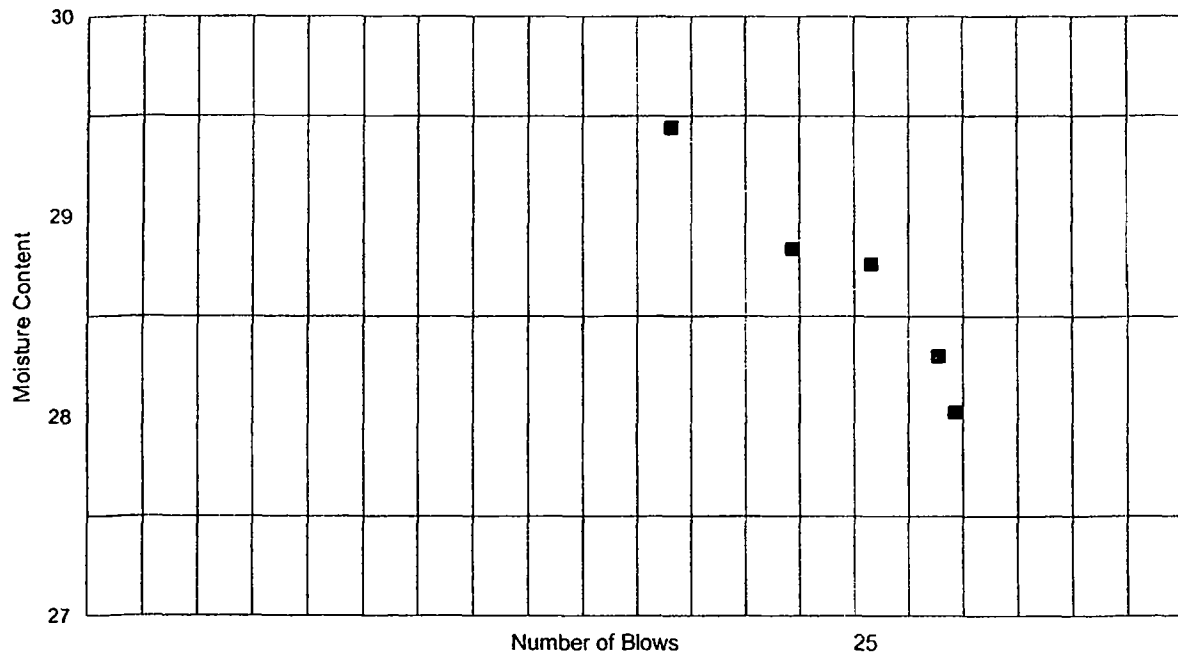
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SR Date: 01/24/2007  
Date: 1/25/07  
USG0P156

ADVANCED TERRA TESTING, INC.

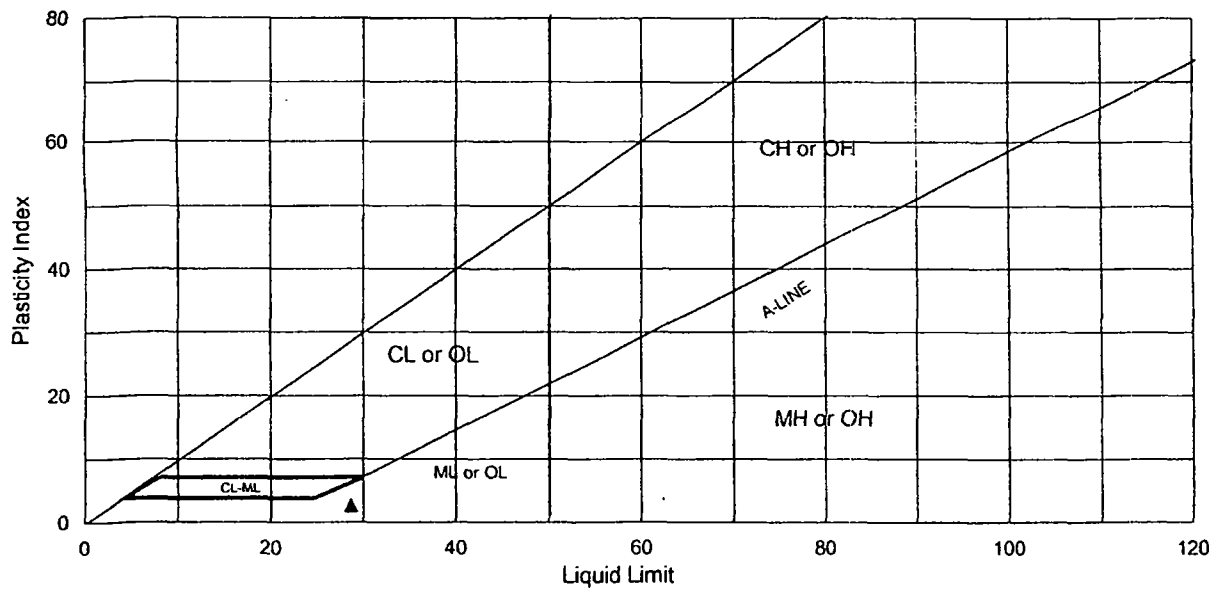
# Atterberg Limits, Flow Curve

TP1, TP5, TP6, Composite, Level 245-1



# PLASTICITY CHART

TP1, TP5, TP6, Composite, Level 245-1



▲ Classification

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP2, TP3, TP4  
DEPTH Composite  
SAMPLE NO. Level 245-2  
SOIL DESCR.  
LOCATION Standard Mine

DATE SAMPLED  
DATE TESTED 01-18-07 JJL

Plastic Limit  
Determination

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish  
Wt of Dry Soil  
Moisture Content

NON-PLASTIC

Liquid Limit Device Number 0966  
Determination

Number of Blows

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish  
Wt of Dry Soil  
Moisture Content

NON-PLASTIC

Liquid Limit NP  
Plastic Limit NP  
Plasticity Index NP

Atterberg Classification NP

Data entry by:  
Checked by: \_\_\_\_\_  
FileName:

SR Date: 01/18/2007  
Date: \_\_\_\_\_  
USG0P234

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services JOB NO. 2562-11  
BORING NO. TP1, TP6, TP7 DATE SAMPLED  
DEPTH Composite DATE TESTED 01-18-07 JJL  
SAMPLE NO. Level 2-1  
SOIL DESCR.  
LOCATION Standard Mine

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	8.30	7.86	9.02
Wt Dish & Dry Soil	6.81	6.55	7.44
Wt of Moisture	1.49	1.31	1.58
Wt of Dish	0.82	0.83	0.82
Wt of Dry Soil	5.99	5.72	6.62
Moisture Content	24.87	22.90	23.87

Liquid Limit  
Determination Device Number 0966

	1	2	3	4	5
Number of Blows	15	19	25	31	35
Wt Dish & Wet Soil	9.68	9.65	10.21	12.26	11.35
Wt Dish & Dry Soil	7.31	7.33	7.79	9.36	8.68
Wt of Moisture	2.37	2.32	2.42	2.90	2.67
Wt of Dish	0.82	0.82	0.82	0.84	0.82
Wt of Dry Soil	6.49	6.51	6.97	8.52	7.86
Moisture Content	36.52	35.64	34.72	34.04	33.97

Liquid Limit 34.8  
Plastic Limit 23.9  
Plasticity Index 10.9

Atterberg Classification CL

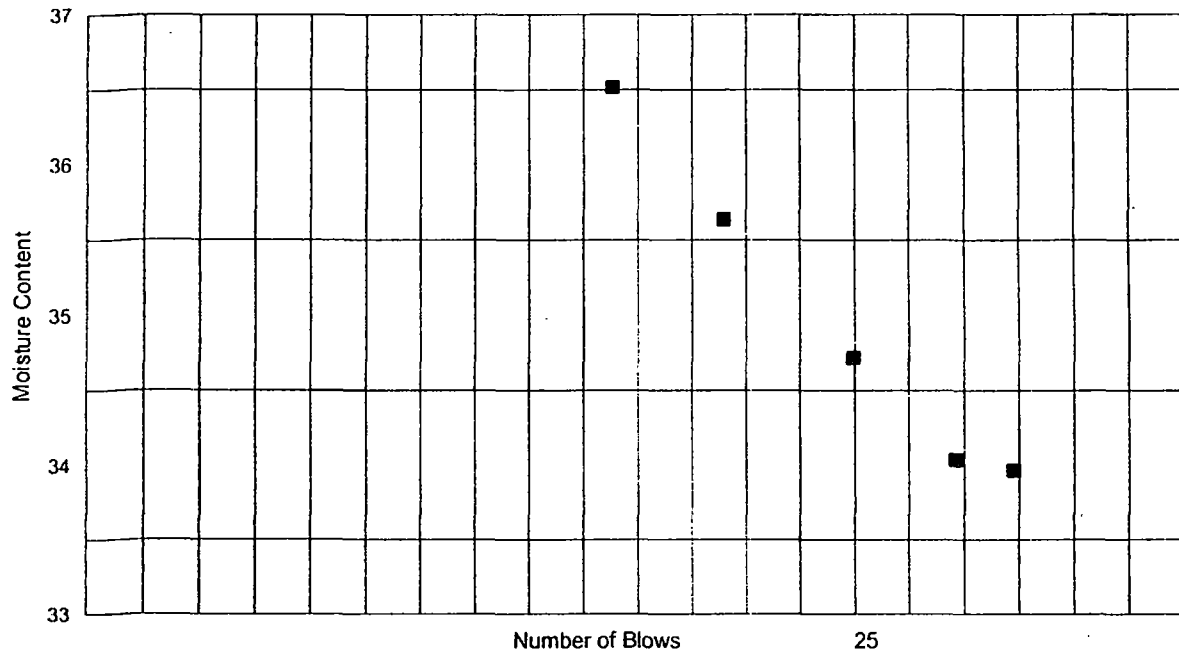
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SR Date: 01/25/2007  
Date: 1/25/07  
USG0P167

ADVANCED TERRA TESTING, INC.

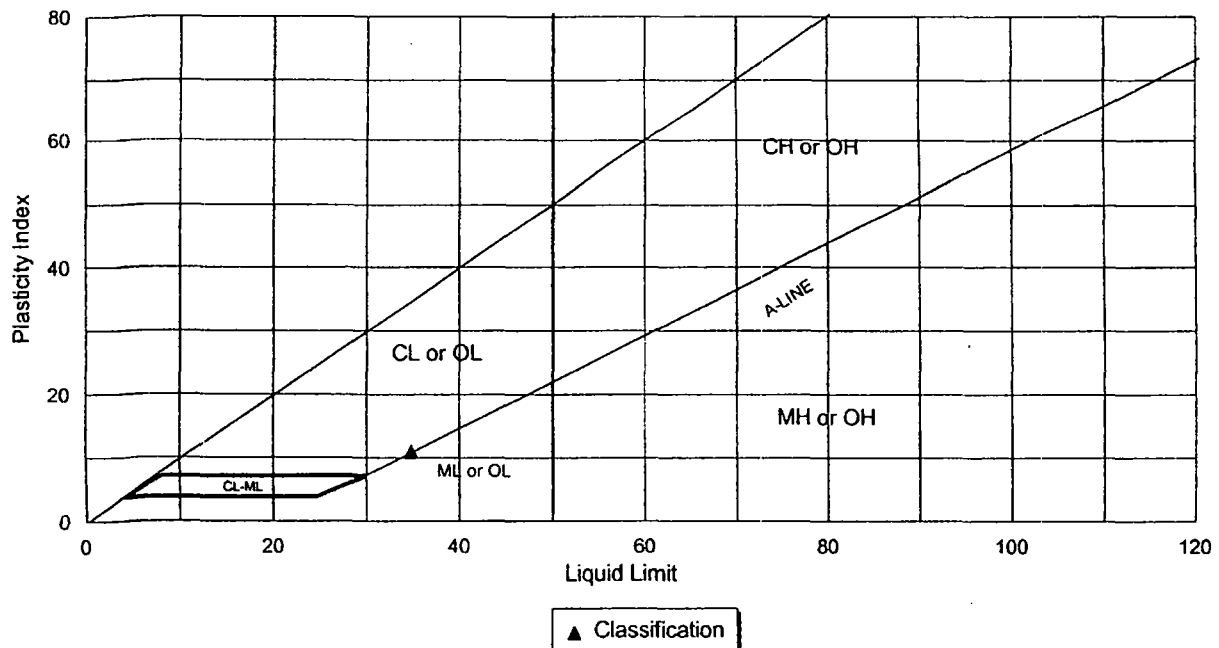
# Atterberg Limits, Flow Curve

TP1, TP6, TP7, Composite, Level 2-1



# PLASTICITY CHART

TP1, TP6, TP7, Composite, Level 2-1





ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-11

BORING NO. TP3, TP5  
DEPTH Composite  
SAMPLE NO. Level 2-2  
SOIL DESCR. #22238347  
LOCATION Standard Mine

DATE SAMPLED  
DATE TESTED 01-17-07 JJJ

Plastic Limit  
Determination

	1	2	3
Wt Dish & Wet Soil	7.77	6.92	7.53
Wt Dish & Dry Soil	6.52	5.85	6.35
Wt of Moisture	1.25	1.07	1.18
Wt of Dish	0.82	0.76	0.76
Wt of Dry Soil	5.70	5.09	5.59
Moisture Content	21.93	21.02	21.11

Liquid Limit Device Number 0966  
Determination

	1	2	3
Number of Blows	28	25	20
Wt Dish & Wet Soil	9.84	8.56	9.10
Wt Dish & Dry Soil	7.60	6.62	6.97
Wt of Moisture	2.24	1.94	2.13
Wt of Dish	0.77	0.77	0.77
Wt of Dry Soil	6.83	5.85	6.20
Moisture Content	32.80	33.16	34.35

Liquid Limit 33.3  
Plastic Limit 21.4  
Plasticity Index 11.9

Atterberg Classification CL

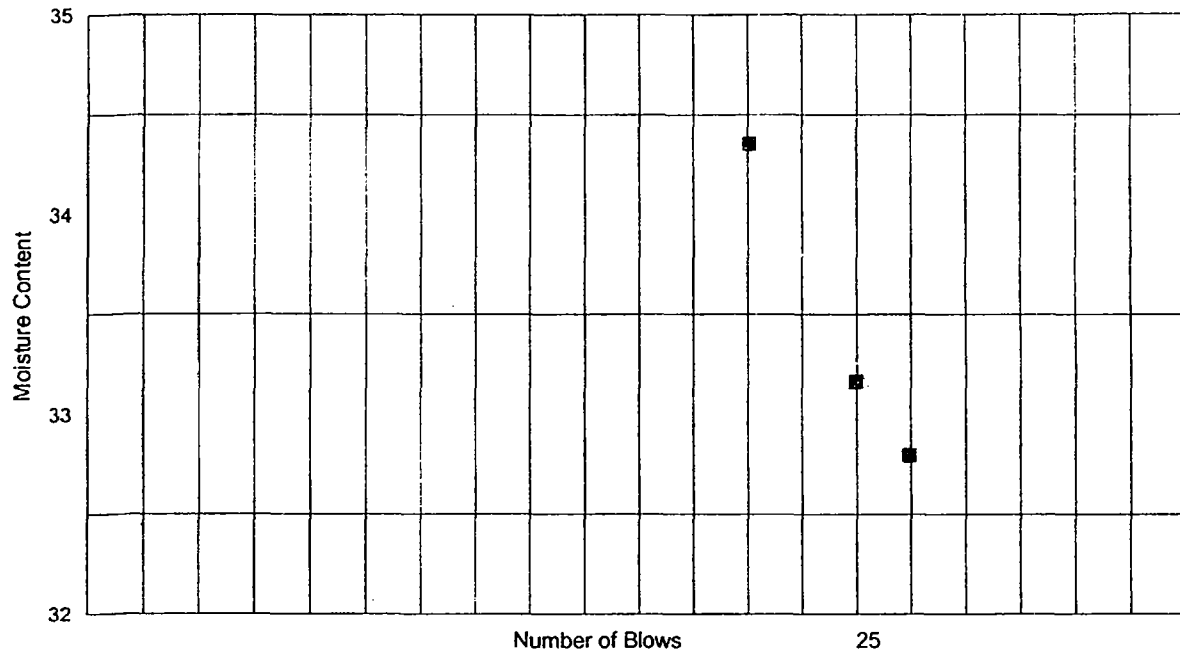
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ADVANCED TERRA TESTING, INC.

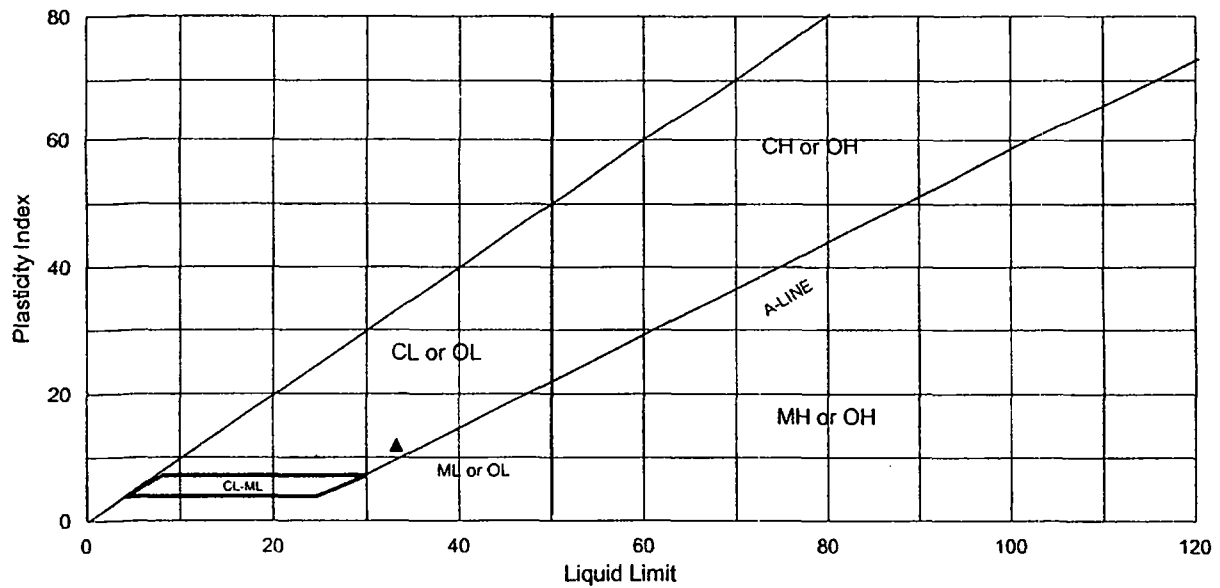
# Atterberg Limits, Flow Curve

TP3, TP5, Composite, Level 2-2



# PLASTICITY CHART

TP3, TP5, Composite, Level 2-2



▲ Classification

**ATTERBERG LIMITS TEST  
ASTM D 4318**

CLIENT	URS Operating Services	JOB NO.	2562-10
BORING NO.	TP1-6, TP1-7, TP1-8	DATE SAMPLED	
DEPTH	(1-22), (1-12), (1-9)	DATE TESTED	10-17-06 RO
SAMPLE NO.	Composite	LOCATION	Standard Mine
SOIL DESCR.	Project #22238347		
TEST TYPE	One-Point Atterberg Test		

**Plastic Limit  
Determination**

	1	2	AVERAGE
Wt Dish & Wet Soil	6.59	6.66	
Wt Dish & Dry Soil	5.76	5.82	
Wt of Moisture	0.83	0.84	
Wt of Dish	0.81	0.82	
Wt of Dry Soil	4.95	5.00	
Moisture Content	16.77	16.80	16.78

**Liquid Limit      Device Number      0966  
Determination**

	1	2	AVERAGE
Number of Blows	25	27	
Wt Dish & Wet Soil	13.71	10.89	
Wt Dish & Dry Soil	11.19	8.92	
Wt of Moisture	2.52	1.97	
Wt of Dish	0.81	0.81	
Wt of Dry Soil	10.38	8.11	
Moisture Content	24.28	24.29	
Corrected Moisture Content	24.28	24.52	24.40

Liquid Limit	24
Plastic Limit	17
Plasticity Index	8

Atterberg Classification      CL

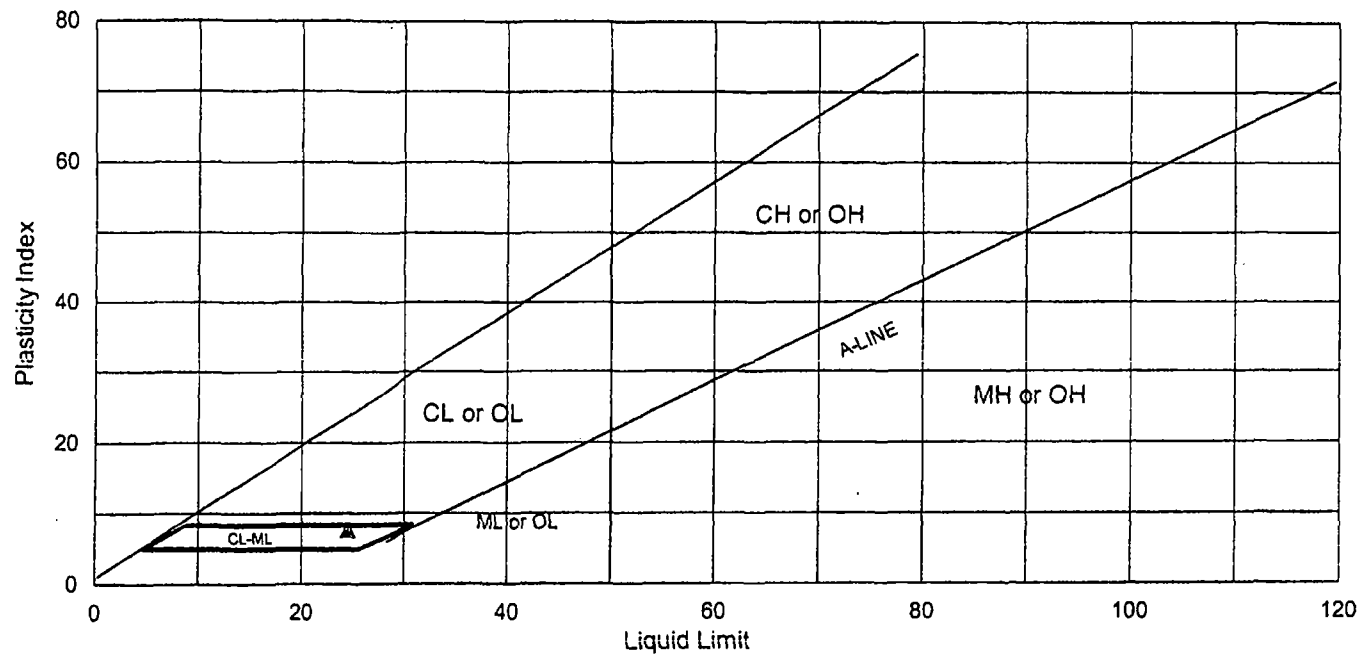
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SR      Date: 10/18/2006  
Date: 10/18/06  
USG01678

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP1-6, TP1-7, TP1-8, (1-22), (1-12), (1-9), Composite



▲ Classification

**ATTERBERG LIMITS TEST**  
ASTM D 4318

CLIENT	URS Operating Services	JOB NO.	2562-10
BORING NO.	TP1-2, TP1-3, TP1-5	DATE SAMPLED	
DEPTH	(1-10.5), (1-14), (1-12)	DATE TESTED	10-16-06 RO
SAMPLE NO.	Composite	LOCATION	Standard Mine
SOIL DESCR.	Project #22238347		
TEST TYPE	One-Point Atterberg Test		

Plastic Limit  
Determination

	1	2	AVERAGE
Wt Dish & Wet Soil	6.55	6.79	
Wt Dish & Dry Soil	5.61	5.79	
Wt of Moisture	0.94	1.00	
Wt of Dish	0.82	0.81	
Wt of Dry Soil	4.79	4.98	
Moisture Content	19.62	20.08	19.85

Liquid Limit      Device Number      0966  
Determination

	1	2	AVERAGE
Number of Blows	21	20	
Wt Dish & Wet Soil	12.37	10.93	
Wt Dish & Dry Soil	9.67	8.56	
Wt of Moisture	2.70	2.37	
Wt of Dish	0.79	0.82	
Wt of Dry Soil	8.88	7.74	
Moisture Content	30.41	30.62	
Corrected Moisture Content	29.77	29.80	29.79
Liquid Limit	30		
Plastic Limit	20		
Plasticity Index	10		

Atterberg Classification      CL

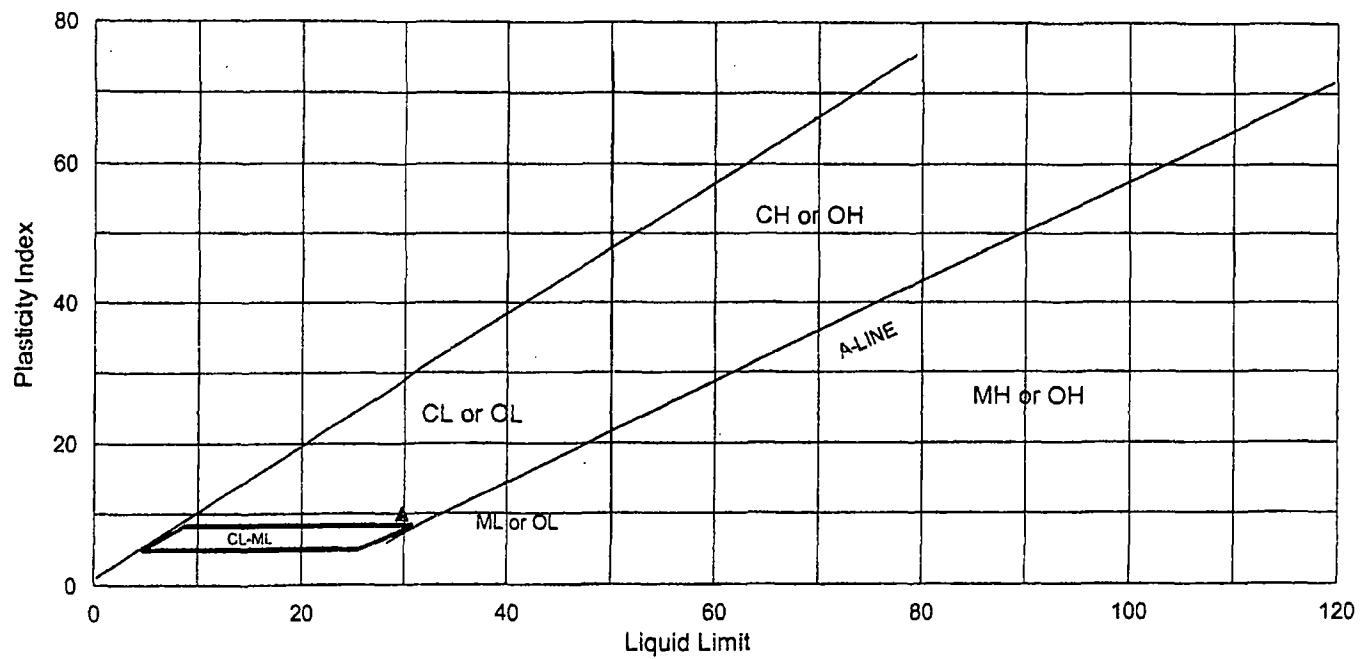
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SR      Date: 10/17/2006  
Date: 10/18/06  
USG01213

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP1-2, TP1-3, TP1-5, (1-10.5), (1-14), (1-12), Composite



▲ Classification

**ATTERBERG LIMITS TEST  
ASTM D 4318**

CLIENT	URS Operating Services	JOB NO.	2562-10
BORING NO.	TP2-1, TP2-4, TP2-5	DATE SAMPLED	
DEPTH	(1-5), (1-4), (1-4)	DATE TESTED	10-16-06 RO
SAMPLE NO.	Composite	LOCATION	Standard Mine
SOIL DESCR.	Project #22238347		
TEST TYPE	One-Point Atterberg Test		

**Plastic Limit  
Determination**

	1	2	AVERAGE
Wt Dish & Wet Soil	6.30	6.79	
Wt Dish & Dry Soil	5.18	5.58	
Wt of Moisture	1.12	1.21	
Wt of Dish	0.82	0.74	
Wt of Dry Soil	4.36	4.84	
Moisture Content	25.69	25.00	25.34

**Liquid Limit      Device Number      0966  
Determination**

	1	2	AVERAGE
Number of Blows	29	28	
Wt Dish & Wet Soil	12.14	12.01	
Wt Dish & Dry Soil	9.07	8.96	
Wt of Moisture	3.07	3.05	
Wt of Dish	0.81	0.77	
Wt of Dry Soil	8.26	8.19	
Moisture Content	37.17	37.24	
Corrected Moisture Content	37.84	37.75	37.80
Liquid Limit	38		
Plastic Limit	25		
Plasticity Index	12		

Atterberg Classification      ML

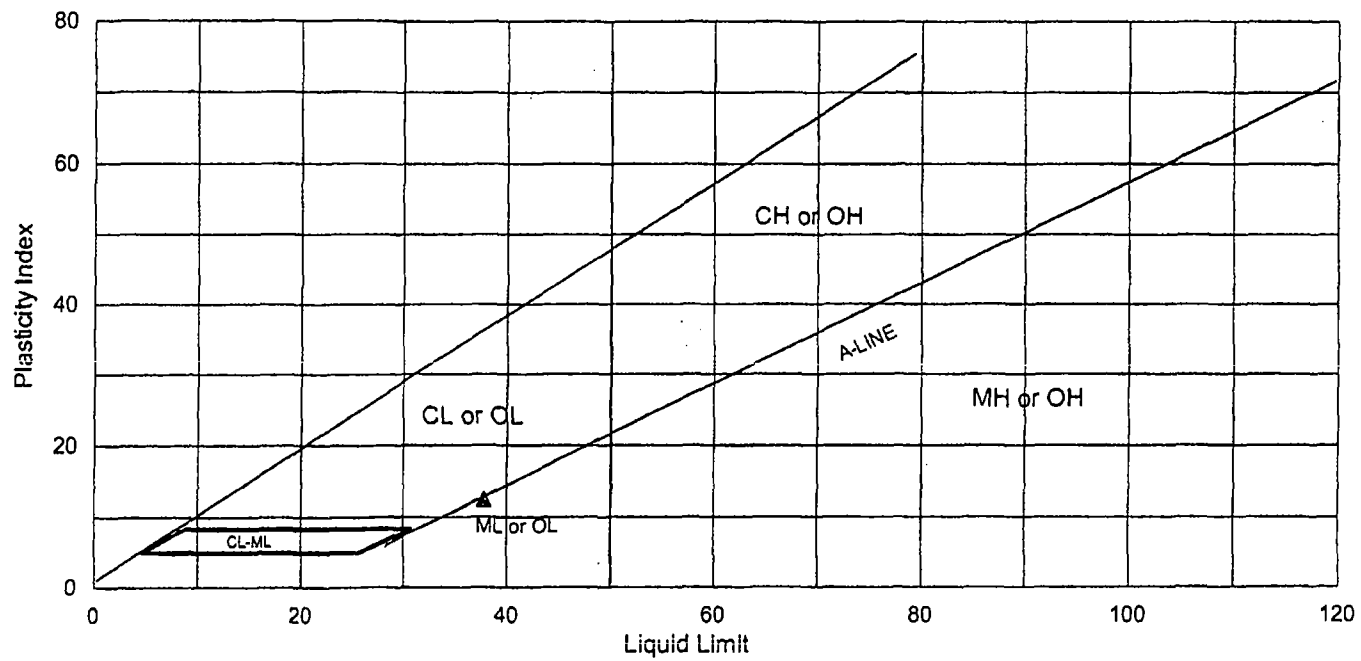
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SR      Date: 10/17/2006  
Date: 10/18/06  
USG02124

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP2-1, TP2-4, TP2-5, (1-5), (1-4), (1-4), Composite



▲ Classification



**ATTERBERG LIMITS TEST**  
**ASTM D 4318**

CLIENT	URS Operating Services	JOB NO.	2562-10
BORING NO.	TP2-6, TP2-7, TP2-8	DATE SAMPLED	
DEPTH	(1-5), (1-5), (1-8)	DATE TESTED	10-13-06 RO
SAMPLE NO.	Composite	LOCATION	Standard Mine
SOIL DESCR.	Project #22238347		
TEST TYPE	One-Point Atterberg Test		

**Plastic Limit  
Determination**

	1	2	AVERAGE
Wt Dish & Wet Soil	7.05	7.19	
Wt Dish & Dry Soil	5.86	5.93	
Wt of Moisture	1.19	1.26	
Wt of Dish	0.81	0.81	
Wt of Dry Soil	5.05	5.12	
Moisture Content	23.56	24.61	24.09

**Liquid Limit      Device Number      0966  
Determination**

	1	2	AVERAGE
Number of Blows	20	22	
Wt Dish & Wet Soil	11.69	8.93	
Wt Dish & Dry Soil	8.73	6.68	
Wt of Moisture	2.96	2.25	
Wt of Dish	0.81	0.83	
Wt of Dry Soil	7.92	5.85	
Moisture Content	37.37	38.46	
Corrected Moisture Content	36.38	37.87	37.12
Liquid Limit	37		
Plastic Limit	24		
Plasticity Index	13		

Atterberg Classification      CL

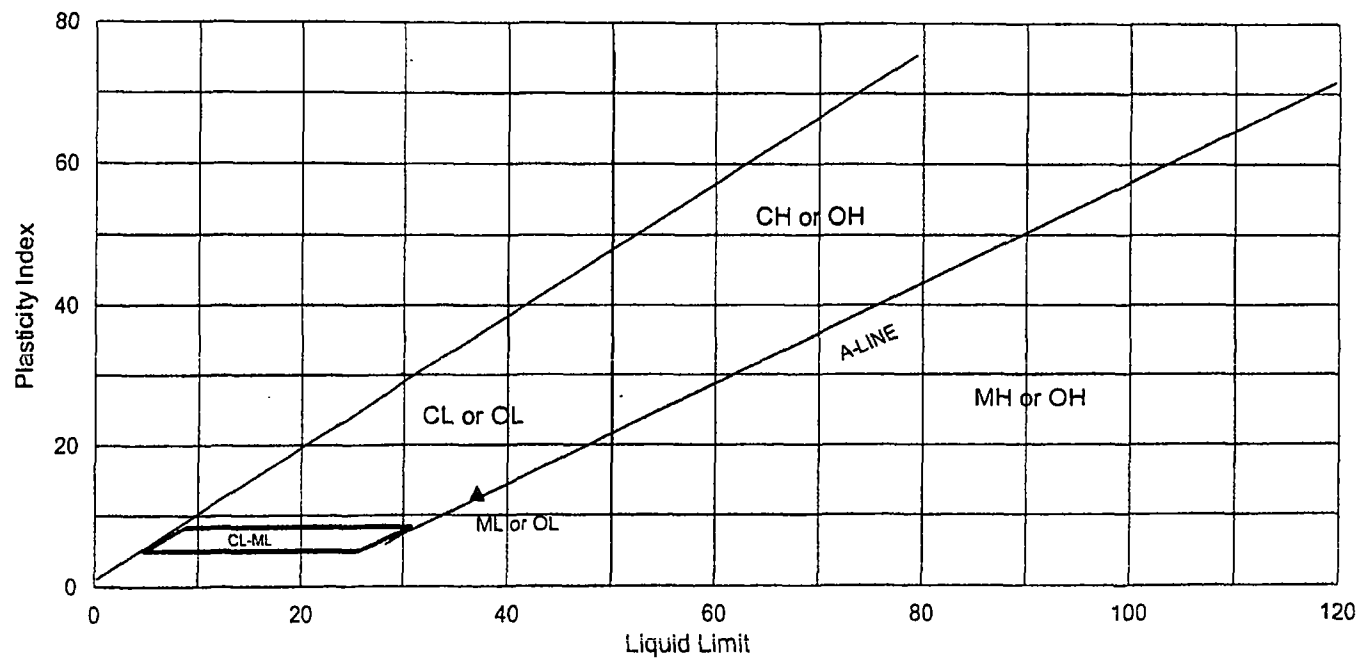
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USG02678

ADVANCED TERRA TESTING, INC.

# PLASTICITY CHART

TP2-6, TP2-7, TP2-8, (1-5), (1-5), (1-8), Composite



▲ Classification

COMPACTION TEST  
ASTM D 698 B

CLIENT: URS Operating Services

JOB NO. 2562-11

BORING NO. TP-1, TP-4, TP-5  
DEPTH Composite  
SAMPLE NO. Level 225-1  
SOIL DESCR. Project #22238347

DATE SAMPLED  
DATE TESTED 1/10/07 WAR  
LOCATION Standard Mine

Moisture Determination

	1	2	3	4	5
Wt of Moisture added (ml)	360.00	320.00	280.00	240.00	200.00
Wt. of soil & dish (g)	304.51	413.98	490.42	521.62	451.05
Dry wt. soil & dish (g)	252.31	346.03	416.79	449.63	393.07
Net loss of moisture (g)	52.20	67.95	73.63	71.99	57.98
Wt. of dish (g)	8.36	8.36	8.33	8.40	8.34
Net wt. of dry soil (g)	243.95	337.67	408.46	441.23	384.73
Moisture Content (%)	21.40	20.12	18.03	16.32	15.07
Corrected Moisture Content	17.17	16.15	14.47	13.10	12.10

Density determination

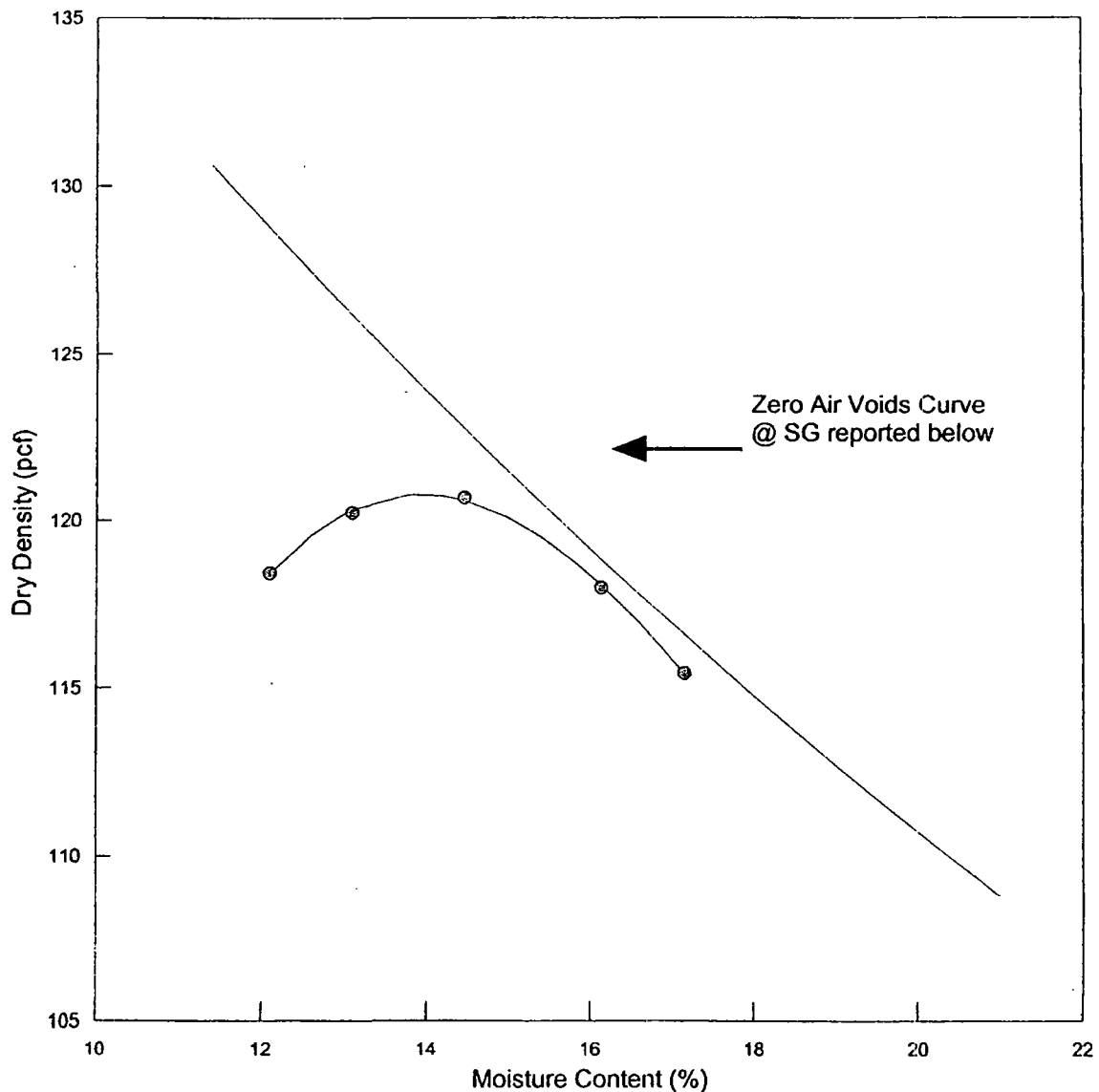
Wt of soil & mold (lb)	14.47	14.54	14.59	14.52	14.41
Wt. of mold (lb)	10.30	10.30	10.30	10.30	10.30
Net wt. of wet soil (lb)	4.17	4.24	4.29	4.22	4.11
Net wt of dry soil (lb)	3.56	3.65	3.75	3.73	3.67
Dry Density, (pcf)	106.77	109.51	112.43	111.94	109.99
Corrected Dry Density (pcf)	115.42	117.98	120.69	120.23	118.43
Volume Factor	30	30	30	30	30

Data entered by: RS Date: 01/11/2007  
Data checked by: WAR Date: 1/11/07  
FileName: USPR2251

ADVANCED TERRA TESTING, INC.

# Proctor Compaction Test

TP-1, TP-4, TP-5, Composite, Level 225-1



- Best Fit Curve

• Actual Data

- Zero Air Voids Curve @ SG = 2.75

OPTIMUM MOISTURE CONTENT = 13.9 MAXIMUM DRY DENSITY = 120.8  
ASTM D 698 B, Rock correction applied? Y

ADVANCED TERRA TESTING, INC.

COMPACTION TEST  
ASTM D 698 C

CLIENT: URS Operating Services JOB NO. 2562-11

BORING NO. TP-1, TP-5, TP-6 DATE SAMPLED  
DEPTH Composite DATE TESTED 1/16/07 RS  
SAMPLE NO. Level 245-1 LOCATION Standard Mine  
SOIL DESCR. Project #22238347

Moisture Determination

	1	2	3	4	5
Wt of Moisture added (ml)	400.00	300.00	500.00	~600.00	~700.00
Wt. of soil & dish (g)	423.22	385.88	290.39	458.07	326.08
Dry wt. soil & dish (g)	387.63	359.14	262.41	403.83	283.10
Net loss of moisture (g)	35.59	26.74	27.98	54.24	42.98
Wt. of dish (g)	8.21	8.25	8.00	8.37	8.49
Net wt. of dry soil (g)	379.42	350.89	254.41	395.46	274.61
Moisture Content (%)	9.38	7.62	11.00	13.72	15.65
Corrected Moisture Content	6.61	5.38	7.75	9.65	11.01

Density determination

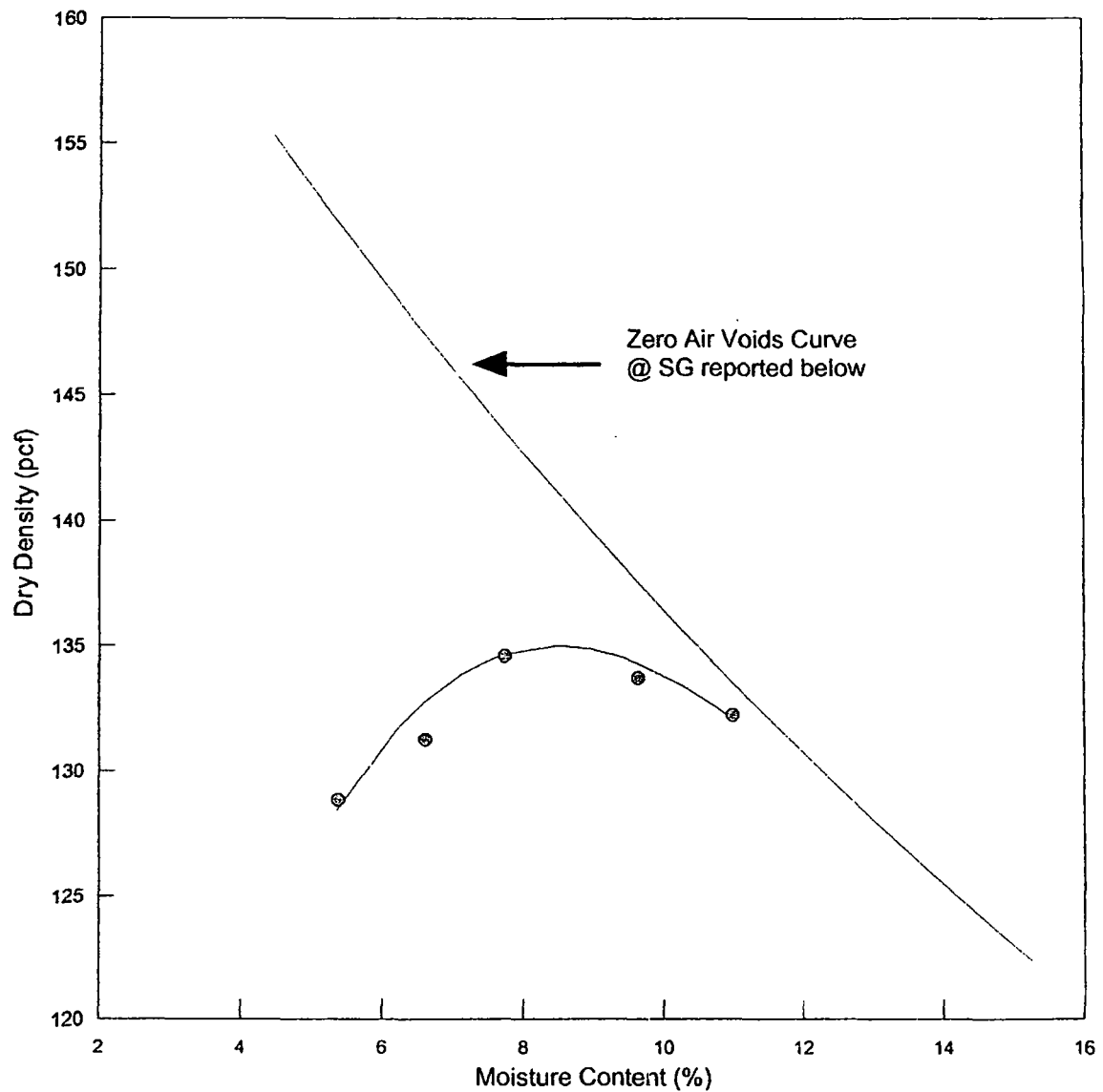
Wt of soil & mold (lb)	21.98	21.65	22.40	22.49	22.47
Wt. of mold (lb)	12.49	12.49	12.49	12.49	12.49
Net wt. of wet soil (lb)	9.49	9.16	9.91	10.00	9.98
Net wt of dry soil (lb)	8.90	8.69	9.20	9.12	8.99
Dry Density, (pcf)	118.69	115.90	122.63	121.60	119.87
Corrected Dry Density (pcf)	131.25	128.85	134.61	133.73	132.26
Volume Factor	13.33333	13.3333333	13.33333	13.33333	13.33333

Data entered by: RS Date: 01/17/2007  
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FileName: USPR2451

ADVANCED TERRA TESTING, INC.

# Proctor Compaction Test

TP-1, TP-5, TP-6, Compsite, Level 245-1



- Best Fit Curve

● Actual Data

- Zero Air Voids Curve @ SG = 2.80

OPTIMUM MOISTURE CONTENT = 8.5 MAXIMUM DRY DENSITY = 135.0  
ASTM D 698 C, Rock correction applied? Y

ADVANCED TERRA TESTING, INC.

COMPACTION TEST  
ASTM D 698 C

CLIENT: URS Operating Services JOB NO. 2562-11

BORING NO. TP-2, TP-3, TP-4 DATE SAMPLED  
DEPTH Composite DATE TESTED 1/16/07 RO/RS  
SAMPLE NO. Level 245-2 LOCATION Standard Mine  
SOIL DESCR. Project #22238347

Moisture Determination

	1	2	3	4
Wt of Moisture added (ml)	500.00	400.00	300.00	600.00
Wt. of soil & dish (g)	718.07	832.14	907.55	899.11
Dry wt. soil & dish (g)	636.02	749.73	832.71	787.54
Net loss of moisture (g)	82.05	82.41	74.84	111.57
Wt. of dish (g)	16.04	14.90	15.62	15.69
Net wt. of dry soil (g)	619.98	734.83	817.09	771.85
Moisture Content (%)	13.23	11.21	9.16	14.45
Corrected Moisture Content	10.97	9.30	7.60	11.98

Density determination

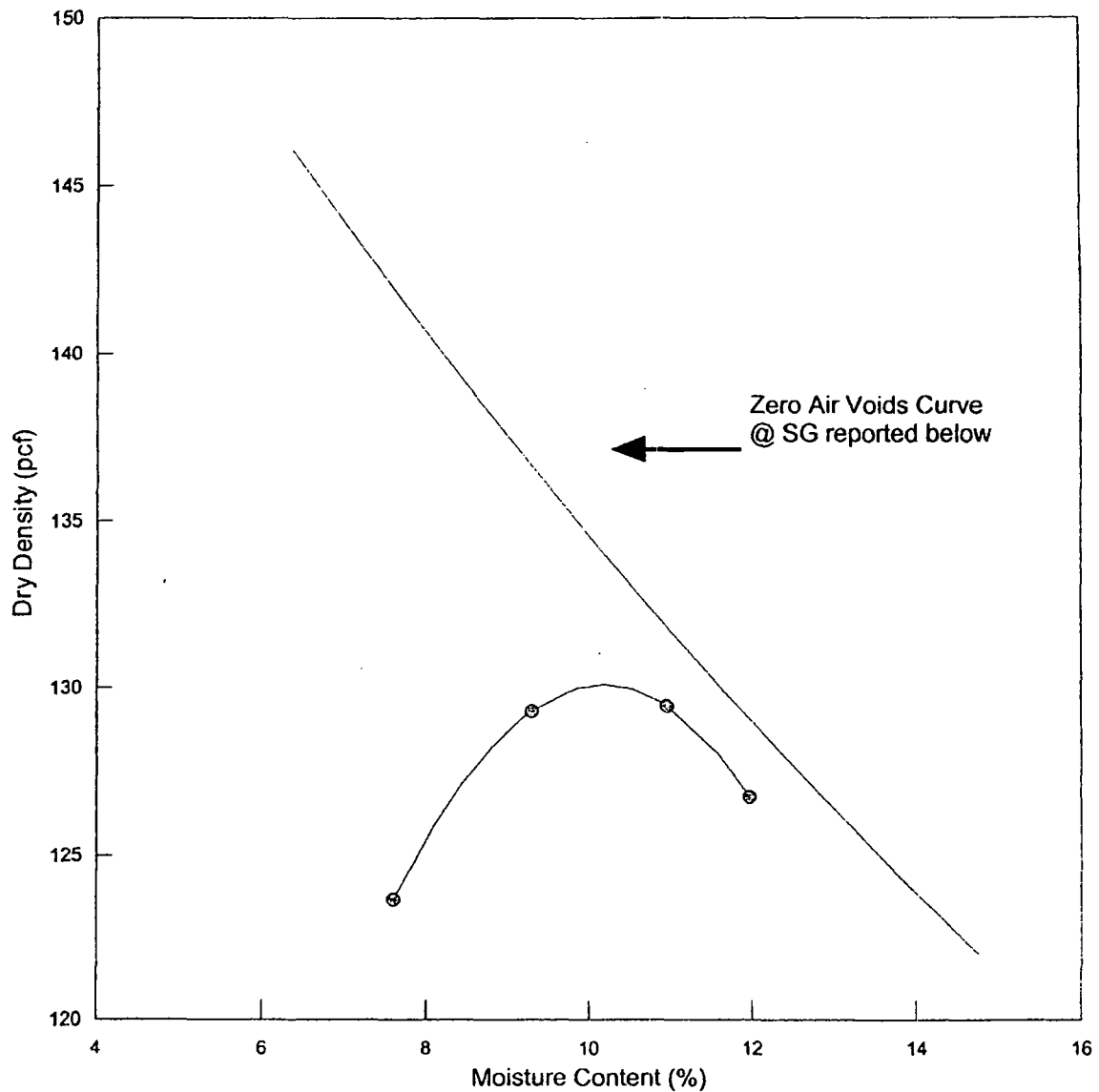
	1	2	3	4
Wt of soil & mold (lb)	22.83	22.66	22.00	22.67
Wt. of mold (lb)	12.49	12.49	12.49	12.49
Net wt. of wet soil (lb)	10.34	10.17	9.51	10.18
Net wt of dry soil (lb)	9.32	9.30	8.84	9.09
Dry Density, (pcf)	124.24	124.06	117.85	121.21
Corrected Dry Density (pcf)	130.44	130.28	124.57	127.67
Volume Factor	13.33333	13.3333333	13.33333	13.33333

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FileName: USPR2452

ADVANCED TERRA TESTING, INC.

# Proctor Compaction Test

TP-2, TP-3, TP-4, Compote, Level 245-2



- Best Fit Curve

● Actual Data

- Zero Air Voids Curve @ SG = 2.75

OPTIMUM MOISTURE CONTENT = 10.2 MAXIMUM DRY DENSITY = 130.1  
ASTM D 698 C, Rock correction applied? Y

ADVANCED TERRA TESTING, INC.



COMPACTION TEST  
ASTM D 698 C

CLIENT: URS Operating Services JOB NO. 2562-11

BORING NO. TP-1, TP-6, TP-7 DATE SAMPLED  
DEPTH Composite DATE TESTED 1/16 & 18/07 JJL/RS  
SAMPLE NO. Level 2-1 LOCATION Standard Mine  
SOIL DESCR. Project #22238347

Moisture Determination

	1	2	3	4
Wt of Moisture added (ml)	600.00	400.00	700.00	500.00
Wt. of soil & dish (g)	895.84	740.43	1169.13	776.56
Dry wt. soil & dish (g)	786.44	672.14	1006.98	695.91
Net loss of moisture (g)	109.40	68.29	162.15	80.65
Wt. of dish (g)	15.73	15.88	15.76	15.75
Net wt. of dry soil (g)	770.71	656.26	991.22	680.16
Moisture Content (%)	14.19	10.41	16.36	11.86
Corrected Moisture Content	9.99	7.33	11.51	8.35

Density determination

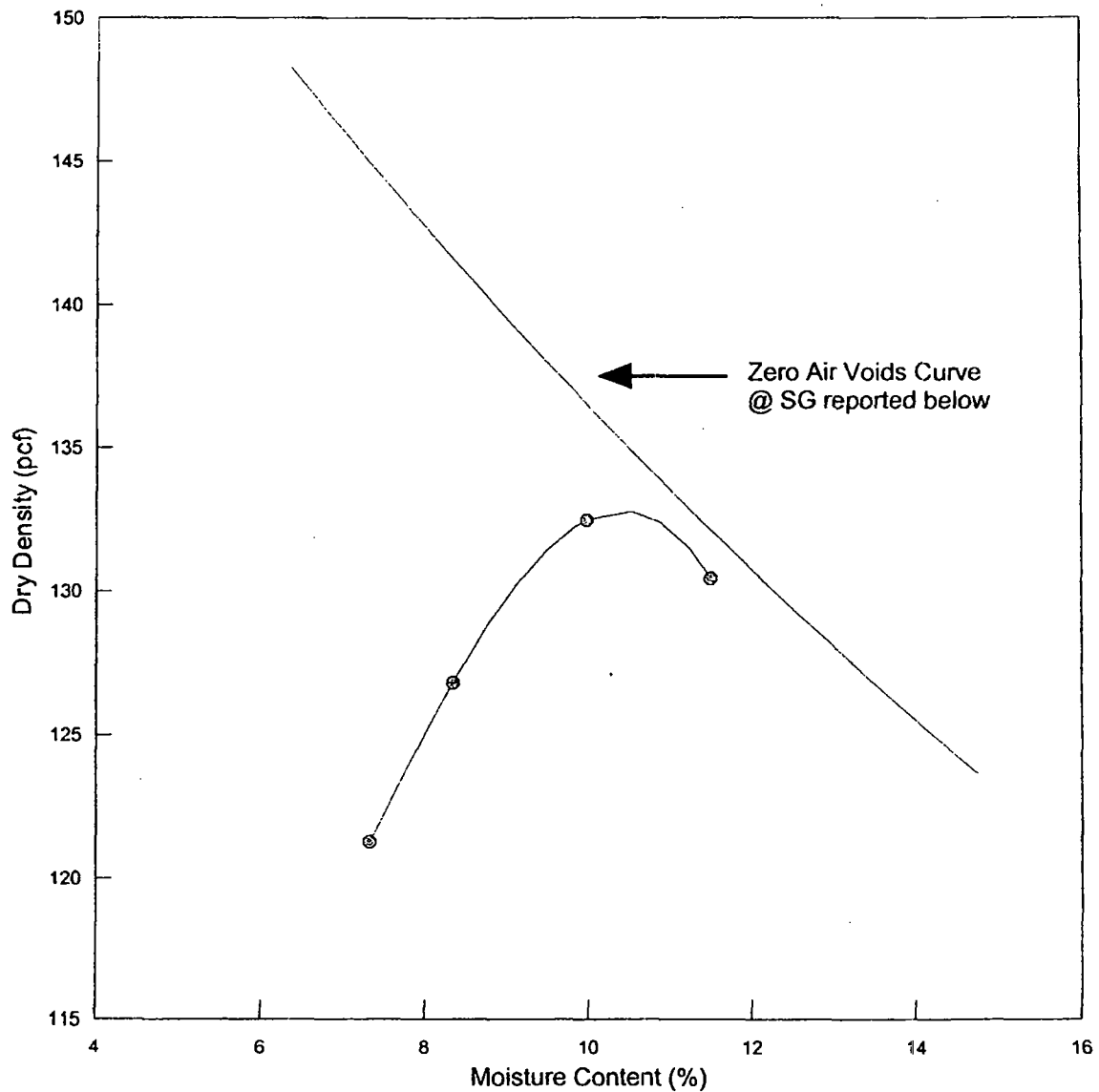
	1	2	3	4
Wt of soil & mold (lb)	22.40	21.13	22.34	21.72
Wt. of mold (lb)	12.49	12.49	12.49	12.49
Net wt. of wet soil (lb)	9.91	8.64	9.85	9.23
Net wt of dry soil (lb)	9.01	8.05	8.83	8.52
Dry Density, (pcf)	120.13	107.33	117.78	113.58
Corrected Dry Density (pcf)	132.47	121.28	130.45	126.81
Volume Factor	13.33333	13.333333	13.33333	13.33333

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ADVANCED TERRA TESTING, INC.

# Proctor Compaction Test

TP-1, TP-6, TP-7, Composite, Level 2-1



- Best Fit Curve

● Actual Data

- Zero Air Voids Curve @ SG = 2.80

OPTIMUM MOISTURE CONTENT = 10.4 MAXIMUM DRY DENSITY = 132.8  
ASTM D 698 C, Rock correction applied? Y

ADVANCED TERRA TESTING, INC.

COMPACTION TEST  
ASTM D 698 B

CLIENT: URS Operating Services

JOB NO. 2562-11

BORING NO. TP-3, TP-5  
DEPTH Composite  
SAMPLE NO. Level 2-2  
SOIL DESCR. Project #22238347

DATE SAMPLED  
DATE TESTED 1/16/07 RS  
LOCATION Standard Mine

Moisture Determination

	1	2	3	4	5
Wt of Moisture added (ml)	320.00	280.00	240.00	200.00	360.00
Wt. of soil & dish (g)	439.50	417.33	341.40	411.62	376.33
Dry wt. soil & dish (g)	378.43	366.19	302.94	372.18	320.96
Net loss of moisture (g)	61.07	51.14	38.46	39.44	55.37
Wt. of dish (g)	8.23	8.32	8.18	7.99	8.28
Net wt. of dry soil (g)	370.20	357.87	294.76	364.19	312.68
Moisture Content (%)	16.50	14.29	13.05	10.83	17.71
Corrected Moisture Content	14.07	12.19	11.13	9.24	15.10

Density determination

Wt of soil & mold (lb)	14.75	14.82	14.74	14.54	14.66
Wt. of mold (lb)	10.30	10.30	10.30	10.30	10.30
Net wt. of wet soil (lb)	4.45	4.52	4.44	4.24	4.36
Net wt of dry soil (lb)	3.90	4.03	4.00	3.88	3.79
Dry Density, (pcf)	117.03	120.89	119.86	116.44	113.64
Corrected Dry Density (pcf)	122.82	126.43	125.46	122.26	119.62
Volume Factor	30	30	30	30	30

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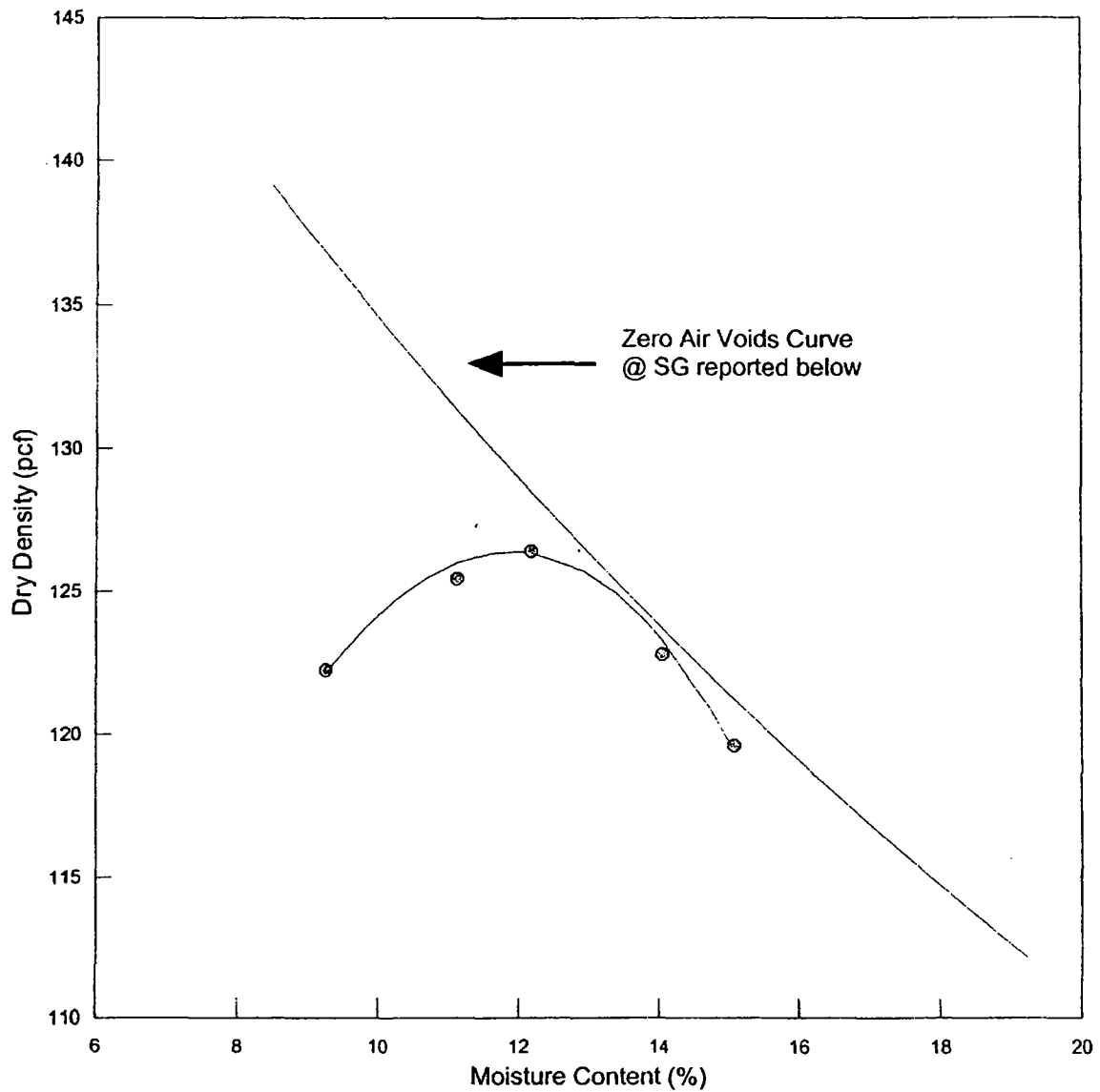
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FileName: USPRLV22

ADVANCED TERRA TESTING, INC.

# Proctor Compaction Test

TP-3, TP-5, Composite, Level 2-2



- Best Fit Curve

● Actual Data

- Zero Air Voids Curve @ SG = 2.75

OPTIMUM MOISTURE CONTENT = 11.9 MAXIMUM DRY DENSITY = 126.4  
ASTM D 698 B, Rock correction applied? Y

ADVANCED TERRA TESTING, INC.

COMPACTION TEST  
ASTM D 698 C

CLIENT:	URS Operating Services	JOB NO.	2562-10
BORING NO.	TP1-6, TP1-7, TP1-8	DATE SAMPLED	
DEPTH	(1-22), (1-12), (1-9)	DATE TESTED	10/18/06 WAR
SAMPLE NO.	Composite	LOCATION	Standard Mine
SOIL DESCR.	Project #22238347		

Moisture Determination

	1	2	3	4
Wt of Moisture added (ml)	500.00	400.00	300.00	450.00
Wt. of soil & dish (g)	511.49	602.23	511.52	584.07
Dry wt. soil & dish (g)	455.22	546.83	468.33	522.37
Net loss of moisture (g)	56.27	55.40	43.19	61.70
Wt. of dish (g)	8.18	8.11	8.33	7.86
Net wt. of dry soil (g)	447.04	538.72	460.00	514.51
Moisture Content (%)	12.59	10.28	9.39	11.99
Corrected Moisture Content	10.70	8.75	7.99	10.20

Density determination

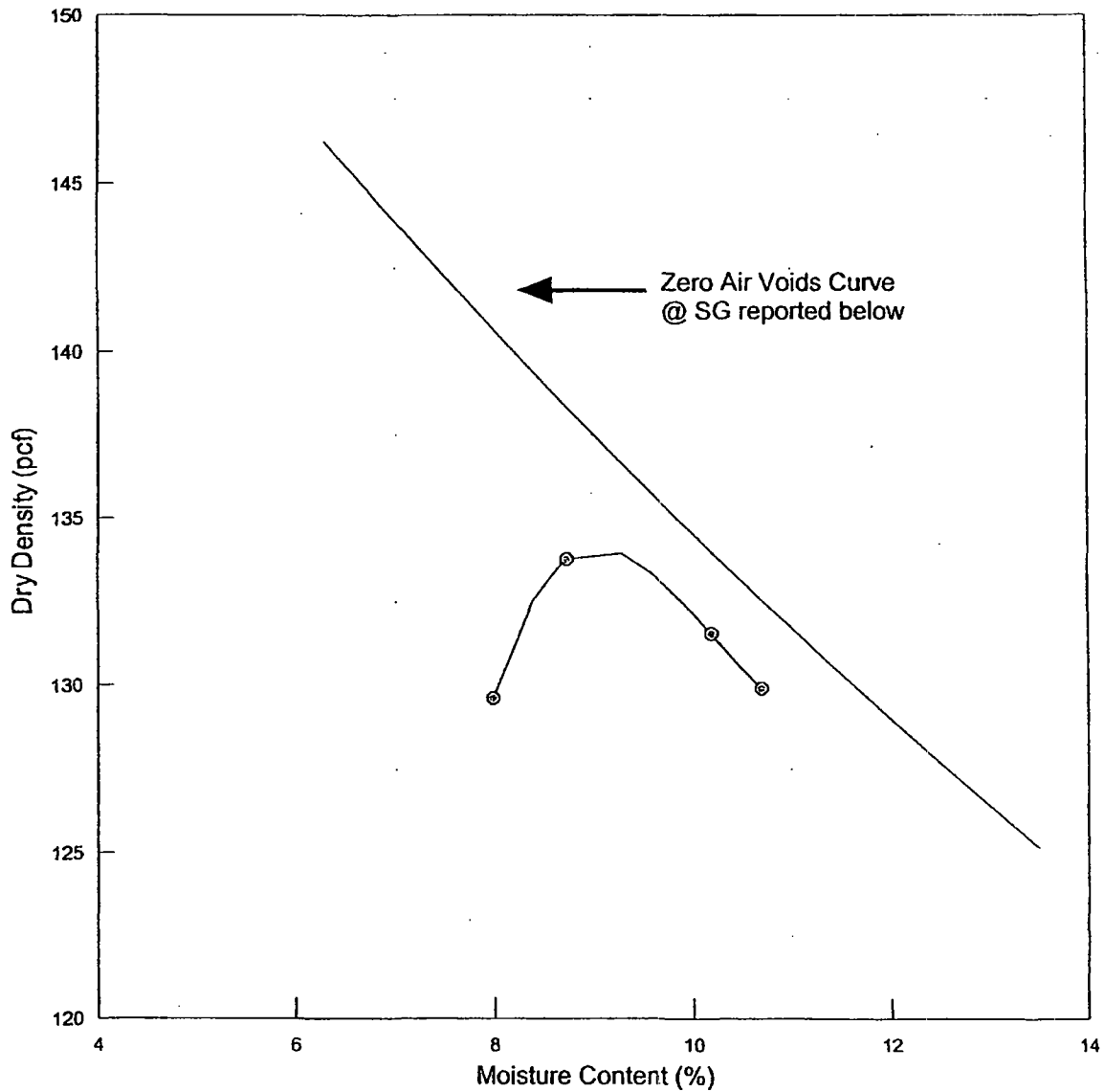
Wt of soil & mold (lb)	22.83	22.99	22.55	22.93
Wt. of mold (lb)	12.49	12.49	12.49	12.49
Net wt. of wet soil (lb)	10.34	10.50	10.06	10.44
Net wt of dry soil (lb)	9.34	9.66	9.32	9.47
Dry Density, (pcf)	124.54	128.74	124.21	126.32
Corrected Dry Density (pcf)	129.91	133.78	129.61	131.55
Volume Factor	13.33333	13.333333	13.33333	13.33333

Data entered by: RS      Date: 10/23/2006  
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ADVANCED TERRA TESTING, INC.

# Proctor Compaction Test

TP1-6, TP1-7, TP1-8, (1-22), (1-12), (1-9), Composite



- Best Fit Curve

⊙ Actual Data

- Zero Air Voids Curve @ SG = 2.75

OPTIMUM MOISTURE CONTENT = 9.1 MAXIMUM DRY DENSITY = 134.1  
ASTM D 698 C, Rock correction applied? Y

ADVANCED TERRA TESTING, INC.

COMPACTION TEST  
ASTM D 698 C

CLIENT: URS Operating Services JOB NO. 2562-10

BORING NO. TP1-2, TP1-3, TP1-5 DATE SAMPLED  
DEPTH (1-10.5), (1-14), (1-12) DATE TESTED 10/18/06 WAR  
SAMPLE NO. Composite LOCATION Standard Mine  
SOIL DESCR. Project #22238347

Moisture Determination

	1	2	3	4
Wt of Moisture added (ml)	500.00	450.00	300.00	600.00
Wt. of soil & dish (g)	593.37	614.86	526.26	562.83
Dry wt. soil & dish (g)	524.59	549.27	480.52	489.96
Net loss of moisture (g)	68.78	65.59	45.74	72.87
Wt. of dish (g)	8.05	8.30	8.29	8.34
Net wt. of dry soil (g)	516.54	540.97	472.23	481.62
Moisture Content (%)	13.32	12.12	9.69	15.13
Corrected Moisture Content	11.80	10.74	8.58	13.40

Density determination

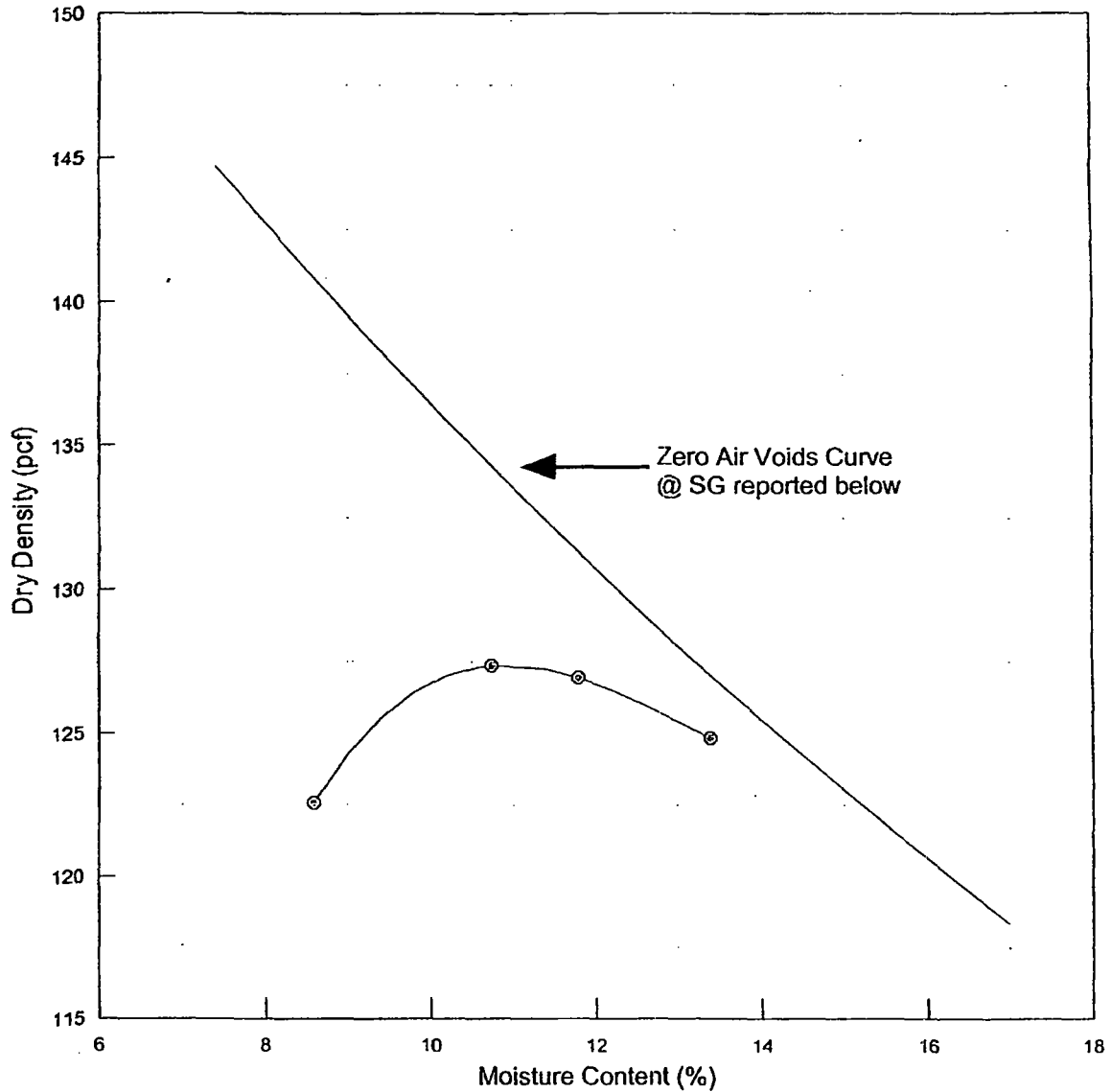
Wt of soil & mold (lb)	22.77	22.71	22.10	22.73
Wt. of mold (lb)	12.49	12.49	12.49	12.49
Net wt. of wet soil (lb)	10.28	10.22	9.61	10.24
Net wt of dry soil (lb)	9.20	9.23	8.85	9.03
Dry Density, (pcf)	122.60	123.05	118.00	120.40
Corrected Dry Density (pcf)	126.95	127.38	122.58	124.86
Volume Factor	13.33333	13.333333	13.33333	13.33333

Data entered by: RS Date: 10/25/2006  
Data checked by: WAV Date: 10/25/06  
FileName: USPRT235

ADVANCED TERRA TESTING, INC.

# Proctor Compaction Test

TP1-2, TP1-3, TP1-5, (1-10.5), (1-14), (1-12), Composite



- Best Fit Curve      © Actual Data      - Zero Air Voids Curve @ SG = 2.80

OPTIMUM MOISTURE CONTENT = 10.9 MAXIMUM DRY DENSITY = 127.4  
ASTM D 698 C, Rock correction applied? Y

ADVANCED TERRA TESTING, INC.



COMPACTION TEST  
ASTM D 698 C

CLIENT:	URS Operating Services	JOB NO.	2562-10
BORING NO.	TP2-1, TP2-4, TP2-5	DATE SAMPLED	
DEPTH	(1-5), (1-4), (1-4)	DATE TESTED	10/18/06 WAR
SAMPLE NO.	Composite	LOCATION	Standard Mine
SOIL DESCR.	Project #22238347		

Moisture Determination

	1	2	3	4
Wt of Moisture added (ml)	600.00	500.00	~17.7 %	300.00
Wt. of soil & dish (g)	433.07	540.32	589.40	493.86
Dry wt. soil & dish (g)	367.16	467.23	502.14	435.54
Net loss of moisture (g)	65.91	73.09	87.26	58.32
Wt. of dish (g)	8.25	8.02	8.24	8.26
Net wt. of dry soil (g)	358.91	459.21	493.90	427.28
Moisture Content (%)	18.36	15.92	17.67	13.65
Corrected Moisture Content	15.45	13.39	14.86	11.49

Density determination

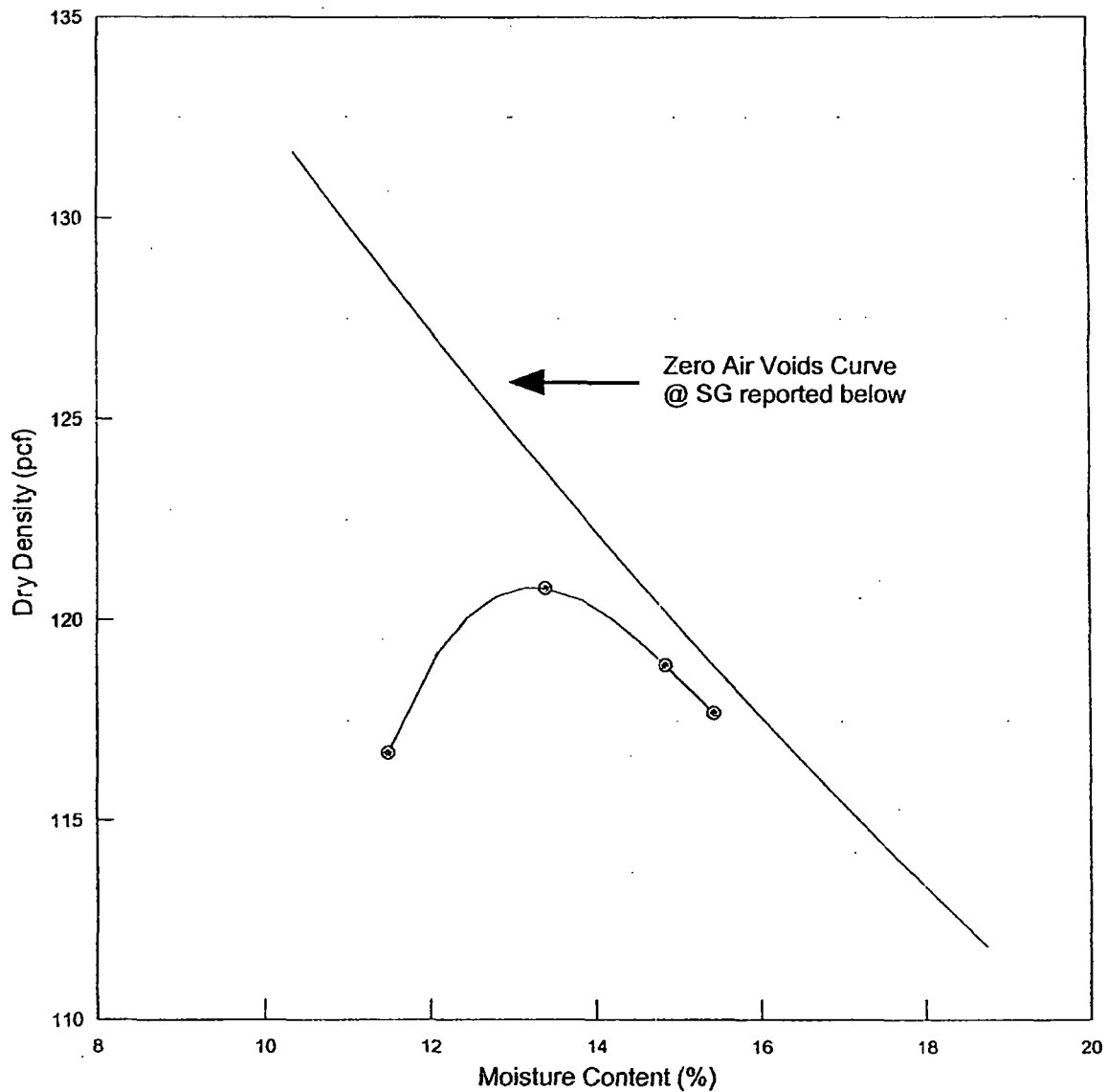
Wt of soil & mold (lb)	22.13	22.24	22.19	21.71
Wt. of mold (lb)	12.49	12.49	12.49	12.49
Net wt. of wet soil (lb)	9.64	9.75	9.70	9.22
Net wt of dry soil (lb)	8.35	8.60	8.44	8.27
Dry Density, (pcf)	111.33	114.65	112.60	110.27
Corrected Dry Density (pcf)	117.70	120.80	118.89	116.70
Volume Factor	13.33333	13.333333	13.33333	13.33333

Data entered by: RS      Date: 10/25/2006  
 Data checked by: WHE      Date: 10/25/06  
 FileName: USPRT145

ADVANCED TERRA TESTING, INC.

# Proctor Compaction Test

TP2-1, TP2-4, TP2-5, (1-5), (1-4), (1-4), Composite



- Best Fit Curve      ⊙ Actual Data      - Zero Air Voids Curve @ SG = 2.70

OPTIMUM MOISTURE CONTENT = 13.3 MAXIMUM DRY DENSITY = 120.3  
ASTM D 698 C, Rock correction applied? Y

ADVANCED TERRA TESTING, INC.

COMPACTION TEST  
ASTM D 698 C

CLIENT: URS Operating Services

JOB NO. 2562-10

BORING NO. TP2-6, TP2-7, TP2-8  
DEPTH (1-5),(1-5),(1-8)  
SAMPLE NO. Composite  
SOIL DESCR. Project #22238347

DATE SAMPLED  
DATE TESTED 10/18/06 WAR  
LOCATION Stadar Mine

Moisture Determination

	1	2	3	4	5
Wt of Moisture added (ml)	500.00	400.00	300.00	200.00	100.00
Wt. of soil & dish (g)	489.98	444.07	480.32	425.52	414.70
Dry wt. soil & dish (g)	412.44	379.98	422.24	382.05	374.75
Net loss of moisture (g)	77.54	64.09	58.08	43.47	39.95
Wt. of dish (g)	8.35	8.21	8.29	8.20	7.90
Net wt. of dry soil (g)	404.09	371.77	413.95	373.85	366.85
Moisture Content (%)	19.19	17.24	14.03	11.63	10.89
Corrected Moisture Content	14.95	13.43	10.94	9.07	8.49

Density determination

Wt of soil & mold (lb)	22.20	22.34	22.49	22.05	21.75
Wt. of mold (lb)	12.49	12.49	12.49	12.49	12.49
Net wt. of wet soil (lb)	9.71	9.85	10.00	9.56	9.26
Net wt of dry soil (lb)	8.45	8.68	9.01	8.77	8.54
Dry Density, (pcf)	112.63	115.78	120.19	116.87	113.80
Corrected Dry Density (pcf)	122.28	125.15	129.14	126.14	123.35
Volume Factor	13.33333	13.333333	13.33333	13.33333	13.33333

Data entered by: RS

Date: 10/19/2006

Data checked by: WAR

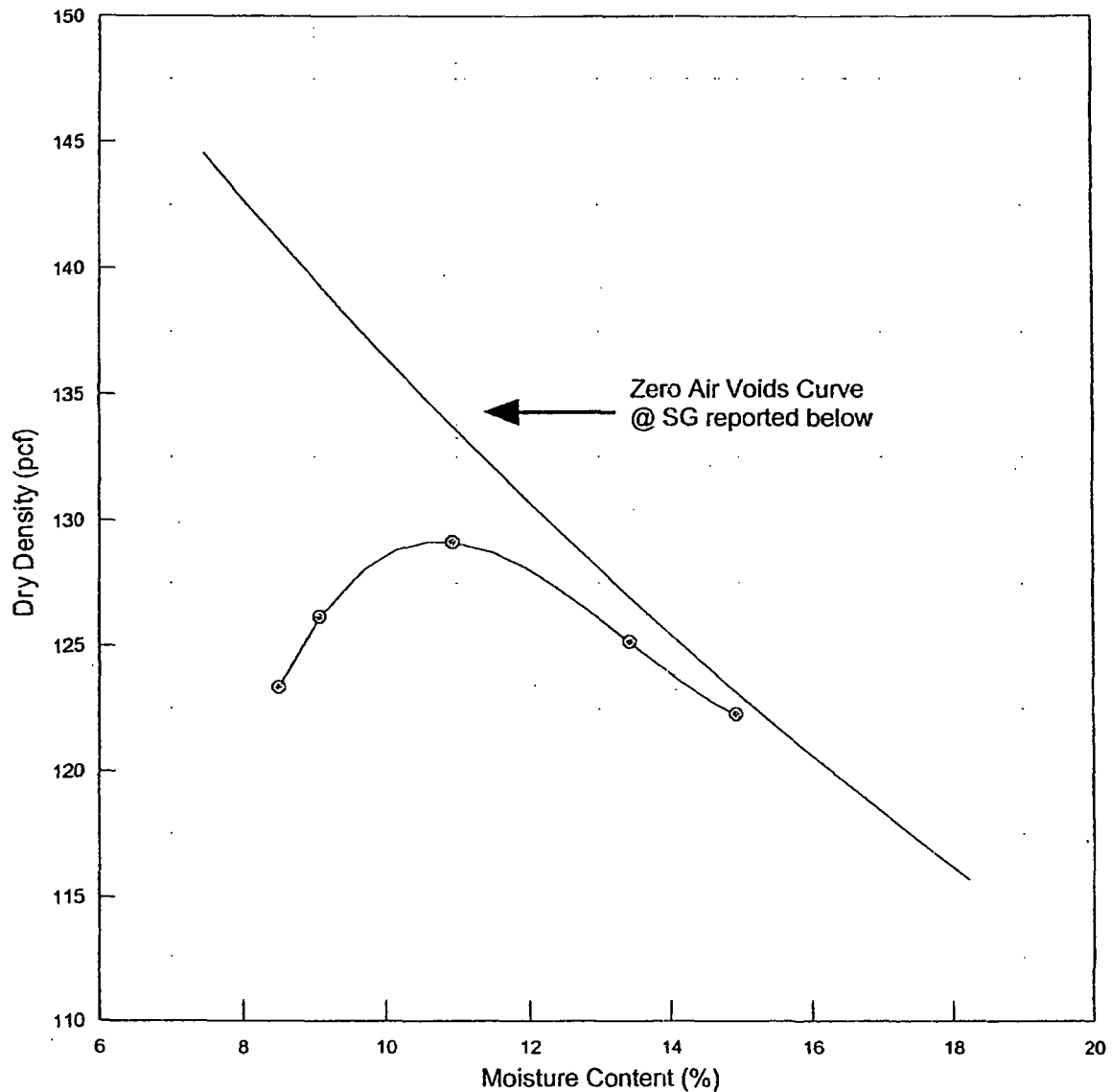
Date: 10/19/06

FileName: USPRT678

ADVANCED TERRA TESTING, INC.

# Proctor Compaction Test

TP2-6, TP2-7, TP2-8, (1-5),(1-5),(1-8), Composite



- Best Fit Curve

⊗ Actual Data

- Zero Air Voids Curve @ SG = 2.80

OPTIMUM MOISTURE CONTENT = 10.8 MAXIMUM DRY DENSITY = 129.2  
ASTM D 698 C, Rock correction applied? Y

ADVANCED TERRA TESTING, INC.

**AREA 99 RIPRAP SAMPLES**

SPECIFIC GRAVITY & ABSORPTION OF ROCK  
ASTM C 127

CLIENT URS Operating Services  
LOCATION Standard Mine, Project #22238347

JOB NO. 2562-10

BORING NO.	RR1-1	RR1-2	RR1-3	RR1-4
DEPTH				
SAMPLE NO.				
DATE SAMPLED				
DATE TESTED	9/13/06 RS	9/13/06 RS	9/13/06 RS	9/13/06 RS
SOIL DESCR.				

TEST DATA

Temperature Water & Agg. (C)	23.4	23.4	23.3	23.3
Wt. Saturated Surface-Dry Agg. (gms)	1053.1	1285.1	727.2	1816.9
Wt. Saturated Agg. in Water (gms)	647.7	787.2	448.0	1099.8
Wt. Dry Agg. & Pan (gms)	1077.7	1301.3	753.0	1823.9
Wt. of Pan (gms)	34.6	34.7	34.5	34.8
Wt. of Dry Aggregate (gms)	1043.1	1266.6	718.5	1789.1
Correction Factor (to 23 degrees C)	0.99924	0.99924	0.99926	0.99926

SPECIFIC GRAVITY & ABSORPTION DETERMINATIONS

Apparent Specific Gravity	2.636	2.640	2.654	2.594
Bulk Specific Gravity	2.571	2.542	2.571	2.493
Bulk Specific Gravity (Sat. Surface-Dry Agg.)	2.596	2.579	2.603	2.532
Percent Absorption (%)	0.96	1.46	1.21	1.55

Data entry by: APM RS  
Data checked by: USSASMRR  
FileName: USSASMRR

Date: 9/15/06  
Date: 9/15/06

09/14/2006

ADVANCED TERRA TESTING, INC.

SPECIFIC GRAVITY & ABSORPTION OF ROCK  
ASTM C 127

CLIENT URS Operating Services  
LOCATION Standard Mine, Project #22238347

JOB NO. 2562-10

BORING NO.	RR1-5	RR1-6	RR1-7	RR1-8
DEPTH				
SAMPLE NO.				
DATE SAMPLED				
DATE TESTED	9/13/06 RS	9/13/06 RS	9/13/06 RS	9/13/06 RS
SOIL DESCR.				

TEST DATA

Temperature Water & Agg. (C)	23.2	23.2	23.1	23.1
Wt. Saturated Surface-Dry Agg. (gms)	1115.9	780.5	780.3	1884.0
Wt. Saturated Agg. in Water (gms)	669.2	467.4	468.6	1156.1
Wt. Dry Agg. & Pan (gms)	1120.9	796.6	794.5	1902.0
Wt. of Pan (gms)	34.7	34.6	34.5	34.6
Wt. of Dry Aggregate (gms)	1086.2	762.0	760.0	1867.4
Correction Factor (to 23 degrees C)	0.99929	0.99929	0.99931	0.99931

SPECIFIC GRAVITY & ABSORPTION DETERMINATIONS

Apparent Specific Gravity	2.603	2.585	2.606	2.624
Bulk Specific Gravity	2.430	2.432	2.437	2.564
Bulk Specific Gravity (Sat. Surface-Dry Agg.)	2.496	2.491	2.502	2.586
Percent Absorption (%)	2.73	2.42	2.66	0.89

Data entry by: RS  
Data checked by: DDM  
FileName: USSASMR2

Date: 9/15/06

09/14/2006

ADVANCED TERRA TESTING, INC.

IRREGULAR LUMP POINT LOAD TEST  
ASTM D 5731

CLIENT: URS Operating System

JOB NO.: 2562-10

LOCATION: Project # 22238347 Standard Mine Site

DATE TESTED: 9/14/06 HN

Specimen ID	Width (in.)	Diameter (in.)	De <sup>2</sup> (in <sup>2</sup> )	Gauge Failure Load (pslg)	P (lb)	Is	F	Is(50)	C	Compressive Strength (psi)	Loading with respect to Fracture/Bedding	Failure Mode
RR1-1	3.300	1.700	7.143	1695	3508.7	491.2	1.1	559.7	21.7	12,120	N/A	S
RR1-2	3.400	2.010	8.701	2890	5982.3	687.5	1.2	818.9	23.1	18,930	N/A	S
RR1-3	3.120	1.096	4.354	535	1107.5	254.4	1.0	259.3	18.8	4,880	N/A	S
RR1-4	3.325	1.690	7.155	1875	3881.3	542.5	1.1	618.3	21.6	13,360	N/A	S
RR1-5	3.300	1.155	4.853	883	1827.8	376.6	1.0	393.4	19.1	7,510	N/A	S
RR1-6	2.560	1.500	4.889	480	993.6	203.2	1.0	212.6	20.7	4,410	N/A	S
RR1-7	3.220	1.448	5.937	1013	2096.9	353.2	1.1	386.0	20.5	7,900	N/A	S
RR1-8	3.098	1.550	6.114	1775	3674.3	601.0	1.1	661.2	21.0	13,850	N/A	S

Notes:

W: Shortest distance perpendicular to loading direction  
D: Sample Thickness between platens  
De<sup>2</sup>: Equivalent Diameter =  $4 \cdot L \cdot D / \pi$   
Piston Area (in<sup>2</sup>): 2.07  
P: Gauge Failure Load \* Piston area (in<sup>2</sup>)  
Is: Point Load Index Strength =  $P / De^2$   
F: Size Correction Factor to 2.0 in =  $(De / 2.0)^{0.45}$   
Is(50): Size Corrected Index Strength =  $F \cdot Is$   
C: Factor to Estimate Compressive Strength related to Core Diameter  
Compressive Strength in psi =  $C \cdot Is(50)$

Failure Modes:

F: Fracture/Bedding Controlled  
S: Substance Controlled  
C: Combination Substance & Fracture

Data Entered By: HN Date: 09/14/2006  
Data Checked By: WJ Date: 09/15/06  
Filename: USPTLOAD

ADVANCED TERRA TESTING, inc.



**CTC-GEOTEK, INC.**155 South Navajo Street  
Denver, Colorado 80223Date: 120-13-2006  
Technician: JWProject Name: Advanced Terra Testing  
Quarry Source: Standard Mine  
Project Number: 263009ASTM C 535, "Standard Test Method for Resistance to Degradation  
of Large-Size Coarse Aggregate by Abrasion and Impact in the  
Los Angeles Machine"

Grading Used: Grading "1"

Sieve Size		Required Grading (gm)	Actual Grading Weights			
Passing	Retained		Sample 1	Sample 2	Sample 3	
3.0 in. (75.0 mm)	2 1/2 in. (63.0 mm)	2500 ± 50	2539.0	2497.9	2474.6	
2 1/2 in. (63.0 mm)	2.0 in. (50.0 mm)	2500 ± 50	2519.4	2519.8	2537.1	
2.0 in. (50.0 mm)	1 1/2 in. (37.5 mm)	5000 ± 50	5002.1	4988.6	5001.7	
1 1/2 in. (37.5 mm)	1.0 in. (25.0 mm)	—	---	---	---	
Total Aggregate Accumulated		10000 ± 100	10060.5	10006.3	10013.4	

Initial Weight (gm)	10060.5	10006.3	10013.4	
Unwashed Weight at 200 Rev. (gm)	9572.2	9399.6	9497.8	
Washed Weight at 1000 Rev. (gm)	8488.5	8053.7	8463.7	

Percent Loss at 200 Revolutions	4.9	6.1	5.1	
Percent Loss at 1000 Revolutions	15.6	19.5	15.5	
Uniform Hardness Ratio	0.311	0.311	0.333	

\*No. 12 (1.70 mm) Sieve was used to determine "Percent Loss"

**TAILING SAMPLES**

*Grain Size Distribution*

*Atterberg Limits*

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 422

CLIENT URS Operating Services  
BORING NO. SMT P S001  
DEPTH  
SAMPLE NO.  
SOIL DESCR.  
LOCATION P.O. #05-06-P-9587

JOB NO. 2562-10  
SAMPLED 08-24-06  
DATE TESTED 09-30-06 DPM  
WASH SIEVE Yes  
DRY SIEVE No

MOISTURE DATA

HYGROSCOPIC Yes  
NATURAL No  
  
Wt. Wet Soil & Pan (g) 93.61  
Wt. Dry Soil & Pan (g) 93.13  
Wt. Lost Moisture (g) 0.48  
Wt. of Pan Only (g) 3.61  
Wt. of Dry Soil (g) 89.52  
Moisture Content % 0.5  
  
Wt. Hydrom. Sample Wet (g) 46.52  
Wt. Hydrom. Sample Dry (g) 46.27

WASH SIEVE ANALYSIS

Wt. Total Sample Wet (g) 46.52  
Weight of + #10 Before Washing (g) 0.00  
Weight of + #10 After Washing (g) 0.00  
Weight of - #10 Wet (g) 46.52  
Weight of - #10 Dry (g) 46.27  
Wt. Total Sample Dry (g) 46.27  
  
Calc. Wt. "W" (g) 46.27  
Calc. Mass + #10 0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	2.79	2.81	0.02	0.02	0.0	100.0
#40	1.92	1.94	0.02	0.04	0.1	99.9
#60	1.77	2.59	0.82	0.86	1.9	98.1
#100	1.96	10.07	8.11	8.97	19.4	80.6
#200	2.33	16.97	14.64	23.61	51.0	49.0

Data entered by: SR  
Data checked by:     
FileName: USH0S001

Date: 10/04/2006  
Date: 10/4/06

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA  
ASTM D 422

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. SMT P S001

SAMPLED 08-24-06

DEPTH

DATE TESTED 09-30-06 DPM

SAMPLE NO.

WASH SIEVE Yes

SOIL DESCR.

DRY SIEVE No

LOCATION P.O. #05-06-P-9587

Hydrometer # ASTM 152 H

Temp., Deg. C 25.1

Sp. Gr. of Soil 2.65

Temp. Coef. K 0.01285

Value of "alpha" 1.00

Wt. Dry Sample "W" 46.272

Deflocculant Sodium Hexametaphosphate

% of Total Sample 100.0

Defloc. Corr'n 5.0

Meniscus Corr'n -1.0

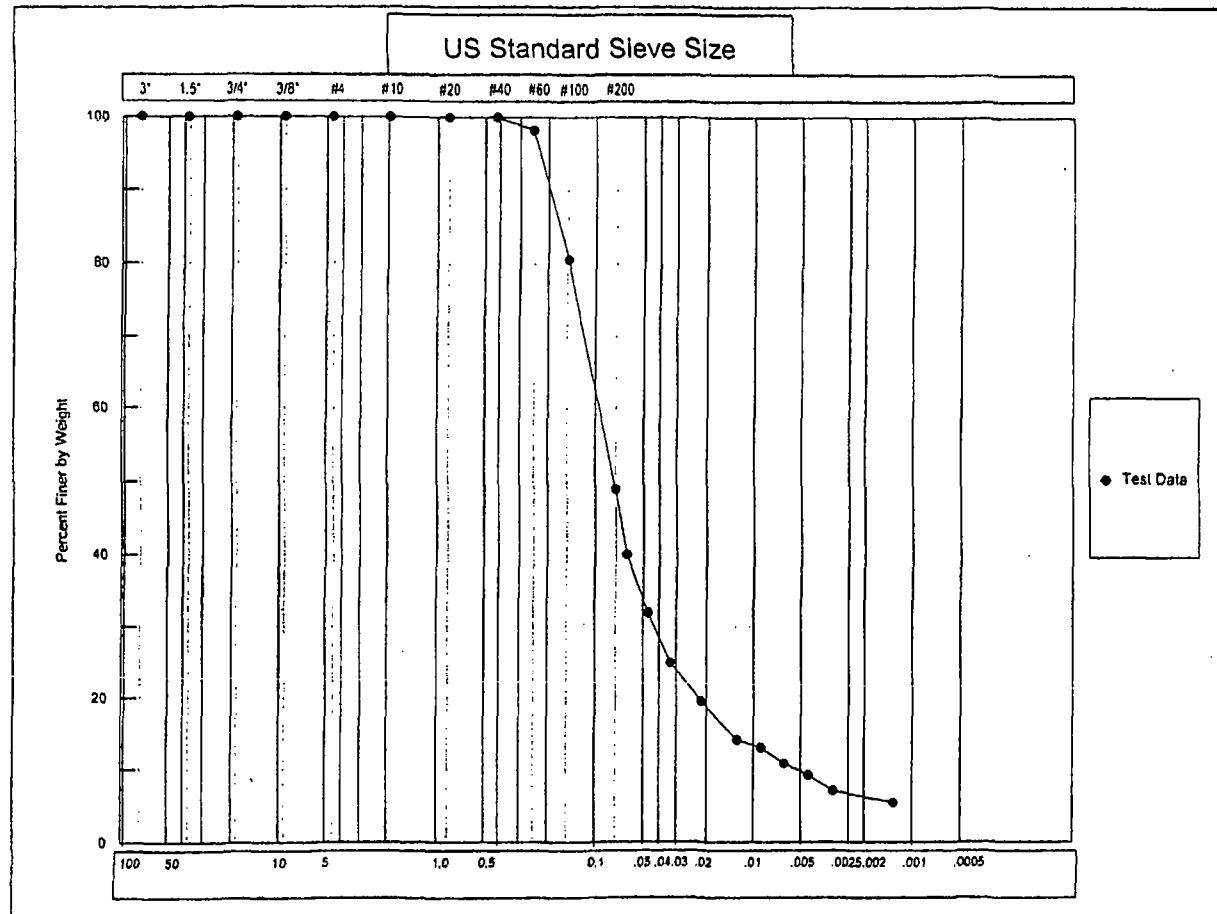
T Elapsed Time (min)	Hydrometer Original	Reading Corrected "R"	100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)
0.0	—	—	—	—	—	—
0.5	24.50	18.50	40.0	40.0	12.27	0.0636
1.0	20.75	14.75	31.9	31.9	12.89	0.0461
2.0	17.50	11.50	24.9	24.9	13.42	0.0333
5.0	15.00	9.00	19.5	19.5	13.83	0.0214
15.0	12.50	6.50	14.0	14.0	14.24	0.0125
30.0	12.00	6.00	13.0	13.0	14.32	0.0089
60.0	11.00	5.00	10.8	10.8	14.49	0.0063
120.0	10.25	4.25	9.2	9.2	14.61	0.0045
250.0	9.25	3.25	7.0	7.0	14.77	0.0031
1440.0	8.50	2.50	5.4	5.4	14.90	0.0013

$$\text{Grain Diameter} = K \cdot (\text{SQRT}(L/T))$$

Data entered by: AS SR  
Data checked by: AS  
FileName: USH0S001

Date: 10/04/2006  
Date: 10/4/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY			
	COARSE	FINE	CRS	MEDIUM	FINE				
COBBLES	PEBBLE GRAVEL				SAND			SILT	CLAY
TO BOULDERS	COARSE	MED	FINE	GRAN	COARSE	MED	FINE		

USCS

WENTWORTH

Client: URS Operating Services  
 Job Number: 2562-10  
 Classification: Classification Not Performed

Sample No.:

Advanced Terra Testing, Inc.

MECHANICAL ANALYSIS - SIEVE TEST DATA  
ASTM D 422

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. SMT P SS01

SAMPLED

DEPTH

DATE TESTED

09-30-06 DPM

SAMPLE NO.

WASH SIEVE

Yes

SOIL DESCR.

DRY SIEVE

No

LOCATION P.O. #05-06-P-9587

MOISTURE DATA

WASH SIEVE ANALYSIS

HYGROSCOPIC Yes

Wt. Total Sample

Wet (g)

690.51

NATURAL No

Weight of + #10

Before Washing (g)

0.00

Weight of + #10

After Washing (g)

0.00

Wt. Wet Soil & Pan (g)

62.67

Wt. Dry Soil & Pan (g)

62.24

Wt. Lost Moisture (g)

0.43

Wt. of Pan Only (g)

3.64

Wt. of Dry Soil (g)

58.60

Moisture Content %

0.7

Weight of - #10

Wet (g)

690.51

Weight of - #10

Dry (g)

685.48

Wt. Total Sample

Dry (g)

685.48

Wt. Hydrom. Sample Wet (g)

54.96

Calc. Wt. "W" (g)

54.56

Wt. Hydrom. Sample Dry (g)

54.56

Calc. Mass + #10

0.00

Sieve Number (Size)	Pan Weight (g)	Indiv. Wt. + Pan (g)	Indiv. Wt. Retain.	Cum. Wt. Retain.	Cum. % Retain.	% Finer By Wt.
3"	0.00	0.00	0.00	0.00	0.0	100.0
1 1/2"	0.00	0.00	0.00	0.00	0.0	100.0
3/4"	0.00	0.00	0.00	0.00	0.0	100.0
3/8"	0.00	0.00	0.00	0.00	0.0	100.0
#4	0.00	0.00	0.00	0.00	0.0	100.0
#10	0.00	0.00	0.00	0.00	0.0	100.0
#20	2.40	2.42	0.02	0.02	0.0	100.0
#40	1.98	2.01	0.03	0.05	0.1	99.9
#60	2.51	3.05	0.54	0.59	1.1	98.9
#100	1.92	7.31	5.39	5.98	11.0	89.0
#200	1.90	18.77	16.87	22.85	41.9	58.1

Data entered by: SR  
Data checked by: AD  
FileName: USH0SS01

Date: 10/05/2006  
Date: 10/6/06

ADVANCED TERRA TESTING, INC.

HYDROMETER ANALYSIS - SEDIMENTATION DATA  
ASTM D 422

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. SMT P SS01

SAMPLED

DEPTH

DATE TESTED

09-30-06 DPM

SAMPLE NO.

WASH SIEVE

Yes

SOIL DESCR.

DRY SIEVE

No

LOCATION

P.O. #05-06-P-9587

Hydrometer # ASTM 152 H

Temp., Deg. C

25.2

Sp. Gr. of Soil 2.65

Temp. Coef. K

0.01283

Value of "alpha" 1.00

Wt. Dry Sample "W"

54.559

Deflocculant Sodium Hexametaphosphate

% of Total Sample

100.0

Defloc. Corr'n 5.0

Meniscus Corr'n -1.0

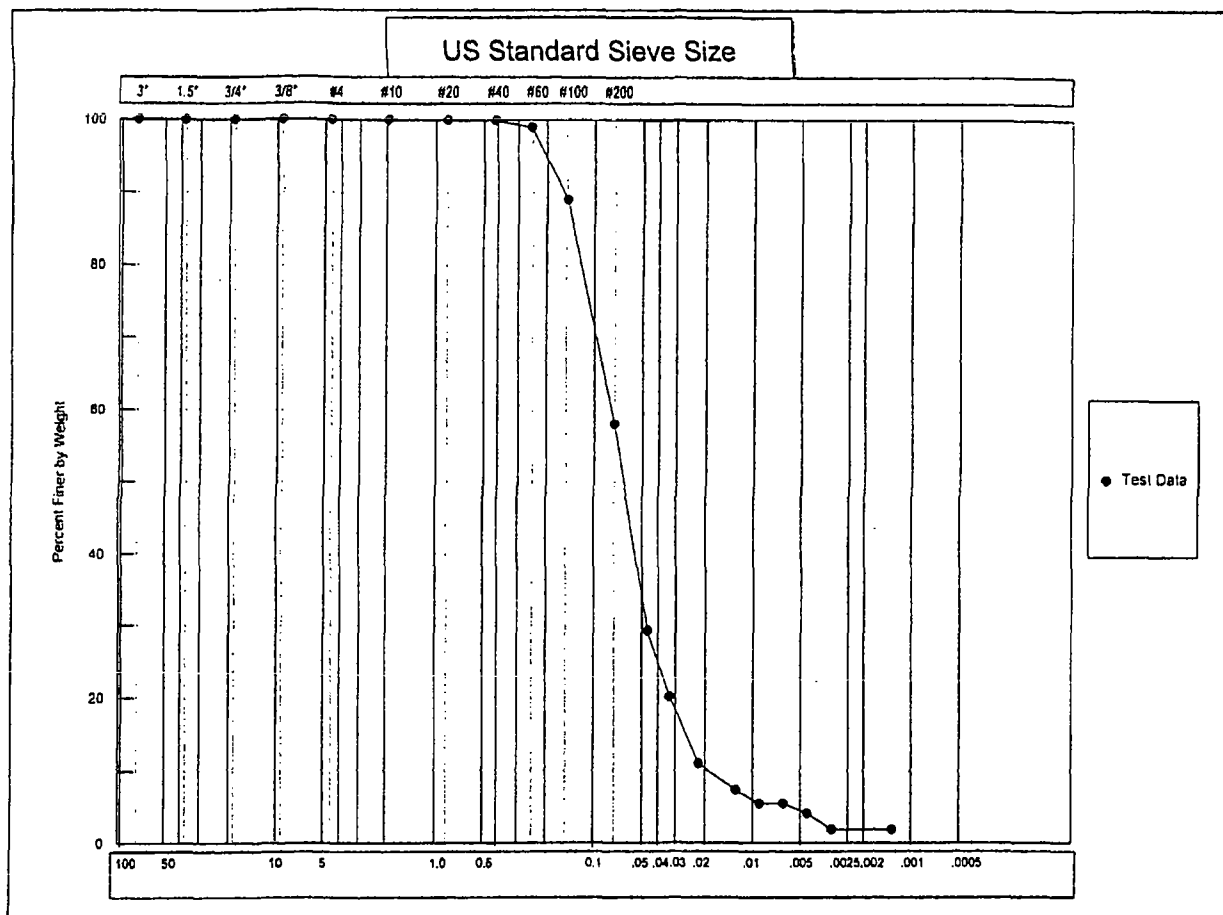
T Elapsed Time (min)	Hydrometer Reading Original	Corrected "R"	100Ra/W	% Total Sample	Effective Depth L	Grain Diameter (mm)
0.0	--	--	--	--	--	--
0.5	--	--	--	--	--	--
1.0	22.00	16.00	29.3	29.3	12.68	0.0457
2.0	17.00	11.00	20.2	20.2	13.50	0.0333
5.0	12.00	6.00	11.0	11.0	14.32	0.0217
15.0	10.00	4.00	7.3	7.3	14.65	0.0127
30.0	9.00	3.00	5.5	5.5	14.81	0.0090
60.0	9.00	3.00	5.5	5.5	14.81	0.0064
120.0	8.25	2.25	4.1	4.1	14.94	0.0045
250.0	7.00	1.00	1.8	1.8	15.14	0.0032
1440.0	7.00	1.00	1.8	1.8	15.14	0.0013

Grain Diameter =  $K \cdot (\text{SQRT}(L/T))$

Data entered by: 168 SR  
Data checked by: 168  
FileName: USH0SS01

Date: 10/05/2006  
Date: 10/6/06

ADVANCED TERRA TESTING, INC.



COBBLES	GRAVEL		SAND			SILT OR CLAY	
	COARSE	FINE	CRS	MEDIUM	FINE		
COBBLES	PEBBLE GRAVEL			SAND			
TO BOULDERS	COARSE	MED	FINE GRAN	COARSE	MED	FINE	

USCS

WENTWORTH

Client: URS Operating Services  
 Job Number: 2562-10  
 Classification: Classification Not Performed

Sample No.:

Advanced Terra Testing, Inc.



ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT URS Operating Services

JOB NO. 2562-10

BORING NO. SMTP S001

DATE SAMPLED

DEPTH

DATE TESTED 10-02-06 RS

SAMPLE NO.

SOIL DESCR.

Project #22238347

LOCATION

Standard Mine P.O. #OS-06-P-9587

Plastic Limit  
Determination

Wt Dish & Wet Soil

Wt Dish & Dry Soil

Wt of Moisture

Wt of Dish

NON-PLASTIC

Wt of Dry Soil

Moisture Content

Liquid Limit  
Determination

Device Number 0966

Number of Blows

Wt Dish & Wet Soil

Wt Dish & Dry Soil

Wt of Moisture

Wt of Dish

NON-PLASTIC

Wt of Dry Soil

Moisture Content

Liquid Limit NP  
Plastic Limit NP  
Plasticity Index NP

Atterberg Classification NP

Data entry by:  
Checked by: DM  
FileName:

SR Date: 10/02/2006  
Date: 10/02/06  
USG05001

ADVANCED TERRA TESTING, INC.

ATTERBERG LIMITS TEST  
ASTM D 4318

CLIENT	URS Operating Services	JOB NO.	2562-10
BORING NO.	SMT P SS01	DATE SAMPLED	
DEPTH		DATE TESTED	10-02-06 BKL
SAMPLE NO.			
SOIL DESCR.	Project #22238347		
LOCATION	Standard Mine P.O. #OS-06-P-9587		

Plastic Limit  
Determination

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish  
Wt of Dry Soil  
Moisture Content

NON-PLASTIC

Liquid Limit Determination	Device Number	0966
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Number of Blows

Wt Dish & Wet Soil  
Wt Dish & Dry Soil  
Wt of Moisture  
Wt of Dish  
Wt of Dry Soil  
Moisture Content

NON-PLASTIC

Liquid Limit	NP
Plastic Limit	NP
Plasticity Index	NP

Atterberg Classification	NP
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Data entry by:  
Checked by: DP/17  
FileName:

SR Date: 10/02/2006  
Date: 10/02/06  
USG0S501

ADVANCED TERRA TESTING, INC.