Final
Technical Execution Plan for the Balefill Area Extinguishment and Supplemental Protection Barrier Project

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TITLE AND APPROVAL SHEET

Final Technical Execution Plan for the Balefill Area Extinguishment and Supplemental Protection Barrier Project, Pasco Landfill Site, Pasco, WA

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Attachment B Response to Ecology's Comments on Draft TEP
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LIST OF ACRONYMS AND ABBREVIATIONS

Anchor	Anchor QEA
bgs	below ground surface
CB	cement-bentonite
CBW Box	cement-bentonite wall box
cm/sec	centimeters per second
CFR	Code of Federal Regulations
CY	cubic yard
DPT	direct-push technique
Ecology	Washington State Department of Ecology
EL	Elevation
EO	Enforcement Order
EPA	U.S. Environmental Protection Agency
EPI	Environmental Partners, Inc.
°F	degrees fahrenheit
GCL	geosynthetic clay liner
GGBFS	ground granulated blast furnace slag
GIP	gas injection point
HDPE	high-density polyethylene
IWAG	Industrial Waste Area Generators Group III
lb	pound
MSL	mean sea level
MSW	municipal solid waste
NOC	Notice of Construction
pcf	pounds per cubic foot
PID	photoionization detector
PLP	potentially liable person
PPE	personal protective equipment
PSCAA	Puget Sound Clean Air Agency
psi	pounds per square inch
PSL, Inc.	Pasco Sanitary Landfill, Inc.
PSL Site	Pasco Sanitary Landfill Site
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control

RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
SCB	soil-cement-bentonite
SCB Wall	soil-cement-bentonite supplemental protection barrier
TCLP	Toxicity Characteristic Leaching Procedure
TEP	Technical Execution Plan
VB	thermocouple array location
VMP	vacuum monitoring point
VOC	volatile organic compound
WAC	Washington Administrative Code
Work Plan	Balefill Area Extinguishment and Protection Barrier Work Plan

1.0 INTRODUCTION

This Technical Execution Plan (TEP) has been prepared on behalf of the Industrial Waste Area Generators Group III (IWAG) by the technical consulting team consisting of Clearcreek Contractors (Clearcreek), AECOM, Anchor QEA (Anchor), and Environmental Partners, Inc (EPI). The TEP has been prepared in continued fulfillment of the requirements of Enforcement Order (EO) No. 10651 issued by the Washington State Department of Ecology (Ecology) to the potentially liable persons (PLPs) for the Pasco Sanitary Landfill Site (PSL Site). In preparing this TEP, the IWAG has acted in its capacity as one group of the PLPs for the PSL Site.

As described in the *Balefill Area Extinguishment and Supplemental Protection Barrier Work Plan* (Work Plan) dated April 27, 2015, this TEP presents the technical details of a planned action to both extinguish subsurface combustion in an area of loose waste between Zone A and the Balefill Area at the PSL Site and to install a barrier to protect Zone A from potential future combustion. The combustion was first noticed in a location near the interface between the Balefill Area and Zone A of the Industrial Waste Area. The supplemental protection barrier is intended to isolate Zone A from the documented area of combustion and from other areas of baled and loose municipal solid waste (MSW) north and east of Zone A. The baled and loose MSW are present beneath a thin and intermittent cover of native soil.

Ecology granted conditional approval of the Work Plan in a letter dated May 7, 2015. The conditional approval also provided comments to the Work Plan and requested that the TEP include additional specific information. A draft TEP was submitted to Ecology on June 5, 2015, as required in the May 7 letter.

In a letter dated July 8, 2015, Ecology provided a Conditional Approval of the draft TEP based on the understandings set forth in the conditional approval letter. A copy of the July 8, 2015 Conditional Approval letter is included as **Attachment A.** This Final TEP addresses the required elements in Ecology's Conditional Approval letter. **Attachment B** provides a table that summarizes Ecology's comments to the draft TEP and the IWAG's responses, which have been incorporated into the Final TEP as appropriate.

In addition, this Final TEP incorporates the construction of the supplemental protection barrier between Zone A and the buried waste to the north and the Balefill Area to the northeast, which was presented in the Work Plan but was not contained in the draft TEP. It was originally anticipated that an addendum to the TEP would be presented for installation of the supplemental protection barrier. The IWAG was able to accelerate the investigative actions necessary to finalize the design of the supplemental protection barrier and has included that information and the design elements into this Final TEP. Therefore, an addendum to the TEP for the construction of that supplemental protection barrier is not necessary.

2.0 DESCRIPTION OF PROJECT

This TEP satisfies the requirements of EO Task 2A for preparation of a work plan for extinguishment of the Balefill Area combustion. As noted above, this TEP includes the construction of a supplemental protection barrier between Zone A and wastes buried to the north and east of Zone A.

The proposed scope of work has two primary objectives:

- Extinguish the smoldering subsurface combustion and quench the elevated temperatures (i.e., greater than 170 degrees Fahrenheit (°F) as specified by Ecology) on the western margin of the Balefill Area
- Protect wastes and interim remedial actions in Zone A from future combustion in other areas of wastes present to the north and east of Zone A.

The extinguishment objective will be met by enclosing the documented area of elevated temperature above 170°F. A noncombustible cement-bentonite barrier, referred to as the "CBW Box enclosure," will be installed forming a box surrounding the target area to the necessary depth, after which the enclosed wastes, which includes the area of smoldering combustion, will be quenched by mixing and then entombing the material within an impermeable and noncombustible cement-bentonite matrix. A supplemental thermal investigation was completed on July 31, 2015 to further refine the current extent of elevated temperature materials. Those data were used to confirm and refine the location the CBW Box enclosure. The results of the supplemental thermal investigation are provided in **Attachment C**. The supplemental thermal investigation temperature monitoring locations are shown on Figure 1.

Protection of Zone A from the combustible wastes on its north and east margins will be accomplished by installing a low-permeability, soil-cement-bentonite barrier (referred to as the "SCB Protection Barrier") keyed into underlying native soils, typically Touchet Formation and/or the coarser-grained Transition Zone materials, to prevent the migration of heat or combustion into Zone A should another combustion event occur in MSW adjacent to Zone A.

In support of the design and placement of the SCB Protection Barrier a supplemental investigation was conducted in two phases to locate the alignment and depth of the barrier. The first phase of the investigation was conducted from June 15 through June 23, 2015, and consisted of advancing, logging, and sampling 15 borings (EB-1, EB-2A, EB-2B, EB-3 through EB-10, EB-11A, EB-11B, EB-12, and EB-13) using a hollow stem auger. The second phase was conducted July 22 and July 23, 2015, and consisted of advancing, logging, and sampling two additional borings (EB-14 and EB-15) to assess subsurface conditions along the southern portion of the SCB Protection Barrier alignment. Results of the supplemental geotechnical investigation are provided in **Attachment D.** Figure 2 shows the locations of the supplemental geotechnical investigation borings and of the SCB Protection Barrier alignment.

The following sections detail the technical approaches, means, and methods to be used in implementing the TEP.

3.0 TECHNICAL APPROACH

The technical approach detailed here provides an efficient and effective means to achieve the objectives described above. It involves two remedies:

- Containment and submerged (in-situ) quenching of the area of smoldering combustion and elevated temperatures in excess of 170°F (together, "elevated-temperature material") within the CBW Box enclosure
- Installation of a low-permeability SCB Protection Barrier to separate Zone A from the MSW waste along its north and east margins.

3.1 DESCRIPTION

The approach features retrieval of elevated-temperature material and placement into a slurry zone within a CBW Box enclosure to reduce and control its temperatures. During mixing, the waste material will remain under a slurry pool within the CBW Box enclosure. Termed a submerged quench operation, this approach will extinguish any smoldering materials, cool other materials exhibiting elevated temperatures, and isolate and entomb all such materials from possible future combustion.

3.1.1. CBW Box Enclosure

The CBW Box enclosure will be installed using a long-reach excavator (64-foot-long boom and stick) and specialized mixing equipment to produce a self-hardening slurry. Consisting of water, Portland cement, and a clay-based component of bentonite, the slurry will fill and be maintained within the CBW Box enclosure. As the work proceeds downward, the Box walls will be stabilized by keeping the slurry at a constant level. Shortly after the target depth is reached, the slurry mix will set up to form a low-permeability barrier. Residual heat within the waste material will aid in the curing of the CB mixture. By supporting the excavation's vertical walls, this proposed slurry construction method will result in a smaller footprint relative to an open-excavation method of extinguishment. As a result, the impact on the existing Zone A cover system and surrounding areas will be greatly reduced, lessening the risk to Zone A stacked drums. Drawing D-5 shows a cross section of the CBW Box enclosure.

The CBW Box enclosure will be constructed as a trench approximately 3 feet wide that completely surrounds the area of elevated-temperature material down to native soil (i.e., Touchet Formation or other native materials), thus containing it. During the excavation process, the trench will be kept full of slurry to minimize the potential for oxygen to contact the waste materials. This feature of the approach will prevent possible combustion of waste material outside the area of elevated-temperature material. The slurry will also act as a coolant for the hydraulic equipment, as well as quench any waste with which it comes into contact.

The construction of the CBW Box enclosure will proceed downward to an approximate depth of 35 to 40 feet below ground surface (bgs), until the CBW Box enclosure is keyed a minimum of 2 feet into the native materials (the Touchet Formation and/or the coarser-grained Transition Zone materials above the Upper Pasco Gravels). One side of the CBW Box enclosure will be constructed at a time, with the slurry allowed to harden before continuing the process. After each section of the CBW Box enclosure is completed to depth, additives will be mixed with the slurry, if necessary, to accelerate the set time of the barrier.

The result will be a 3-foot-wide, low-permeability cement bentonite barrier that fully penetrates the waste materials down to undisturbed native soil and fully surrounds waste materials with temperatures in excess of 170°F.

3.1.2. Recessed Box

After the CBW Box enclosure is completed, the upper 5 to 8 feet of the contents in the contained area will be removed. This will create a "recessed box," providing space in which to mix and quench the remaining waste in place. The "recessed box" area will be kept filled with slurry to a level approximately 3 feet below the top elevation of the CBW Box enclosure. A large container of approximately 12 to 20

cubic yards (CY) may, at the Contractor's discretion, be placed in or outside of the recessed CBW Box area to assist in controlling batching of the waste, bentonite slurry, and cement.

3.1.3. Submerged Quench

The submerged quench process will be employed to manage all elevated-temperature material, and eventually encapsulate and entomb the material in a cement and bentonite matrix. The currently documented elevated-temperature area extends from near the surface to between elevations of 390 and 385 feet mean sea level (msl). This is a depth of about 35 to 40 feet bgs based on existing grades at the site.

After the exterior walls of the CBW Box enclosure have hardened, the interior of the CBW Box will be mixed in approximately equal sections or "stages." To allow room for in situ quenching of the elevated-temperature material, the CBW Box enclosure volume will be larger than the volume of elevated-temperature materials above 170°F. The "extra" room within the CBW Box that contains MSW less than 170°F will comprise the "mixing shelf." The volume of material beneath the mixing shelf will not be quenched if the material is below the 170°F criterion. The temperature of the MSW materials adjacent to the walls of the shelf will be measured by the Contractor. Quenching operations will terminate once the outer edge of the walls are below 170°F.

The size of each stage will be adjusted so that the volume of waste material contained in the stage will be easily excavated and blended with the cement-bentonite mixture during the course of a normal eight hour shift. By minimizing the volume of each stage, the waste contained within each stage will be thoroughly blended or quenched with the cement-bentonite mixture by the end of the work day and allowed to setup overnight. The next day's excavation and blending activity will skip over the waste in the adjacent stage allowing the prior day's mixture to complete the hardening process while being supported by the adjacent materials. The mixing will continue in this alternating fashion. The waste between previously mixed and hardened areas will then be mixed. Drawing 7 illustrates the anticipated staging sequence.

Should the excavation and blending of the waste require more quench time or special handling, the width of each stage may be adjusted to accommodate the existing conditions. It is deemed more prudent to move through the waste mass in a slow and deliberate manner by stages than to run the risk of encapsulating a smoldering pocket of waste.

As each stage is mixed, cement will be added to allow the mass of slurry-waste to gain strength and to complete the extinguishment and encapsulation process. After the quench is complete and before the slurry has set, the material will be replaced into the trench from which it was excavated. As shown in Drawing 7, the quenching operation will extend to the native soils beneath the waste to completely encapsulate the area of elevated-temperature material.

The result of this approach is that all material within the CBW Box enclosure will be thoroughly mixed with bentonite and cement down to the depth of underlying native soils. This results in a hardened low-permeability material that fully extinguishes the existing smoldering and which has no realistic potential for future smoldering combustion.

3.1.4. SCB Protection Barrier

The SCB Protection Barrier will be constructed using bentonite slurry trench methods similar to those for the CBW Box enclosure. The backfill will be a mixture of soil from within the trench and from on-site sources, cement, and bentonite. The soil to be used will consist of the native soils taken from within the wall alignment, on-site borrow soils, or a combination of the two. The SCB Protection Barrier will exhibit permeability on the order of $1x10^{-7}$ centimeters per second (cm/sec), which is the generally accepted criterion for low-permeability barriers.

The final alignment of the SCB Protection Barrier is based on the results of the investigation described above. Drawing D-8 illustrates the alignment of the barrier relative to existing site features.

The SCB Protection Barrier will traverse about 350 lineal feet along the northern and northeastern portions of Zone A. A working surface for the SCB Protection Barrier will be established at elevation (EL) 426 to EL 422 feet MSL. The barrier will extend to depths of about 38 to 40 feet over its entire length.

The geomembrane on Zone A will be sealed to the completed SCB Protection Barrier to prevent uncontrolled atmospheric intrusion, potential vapor migration, and infiltration of precipitation or snowmelt. The revised cover will be integrated into the current and existing Zone A cap design.

The result of this task will be the completion of a low permeability barrier from the surface down to the depth of native soils in those areas of Zone A that are adjacent to buried MSW or other potentially combustible wastes.

3.2 CONSTRUCTION ACTIVITIES

Construction activities will consist of mobilization, site setup, CBW Box enclosure construction, submerged quench operation, and SCB Protection Barrier construction, as detailed in the following subsections.

3.2.1. Mobilization and Labor

The following equipment will be mobilized to the site:

- Construction trailer
- Sanitary facilities and construction waste dumpsters
- Cement silo (50-ton capacity)
- Slurry mixing equipment with tanks, pumps, hoses, and generator
- 20,000-gallon-capacity (each) storage and recirculation tanks (3 to 4)
- 100,000-pound (lb)-class long-reach (i.e., 64-foot) excavator
- Support excavators (various sizes at or below 75,000-lb capacity)
- Front end loader with forklift attachment

- Dozer (CAT D5 or D6 Model or equivalent)
- Quality control (QC) equipment
- Survey laser
- Light plants, as needed
- Supplied air equipment, miscellaneous support equipment, and small tools
- 4,000 gallon water truck.

Additional equipment may be mobilized to the site at the discretion of the Contractor as necessary to complete the scope of work in a safe and efficient manner.

The construction crew will typically consist of about 8 to 12 persons, but may vary depending on the needs of the Contractor. The construction crew will consist of the following Contractor personnel:

- Superintendent
- Site Safety Officer
- Construction Quality Control Inspector(s)
- Environmental Monitor
- Equipment Operators
- Tradesmen/Laborers

3.2.2. Site Setup

Site setup will consist of the following:

- installing a construction trailer and staging area
- clearing and grubbing work areas with care to prevent potential brushfires
- establishing a slurry mixing area (outside of the capped portion of Zone A)
- establishing a contamination exclusion zone, a decontamination zone, and support zones
- establishing lined waste handling containment areas; developing an on-site borrow area
- installing berms around the slurry mixing, waste handling, and actual construction areas for containment and spill control
- placing silt fence and hay bales or wattles in erosional areas for sediment control
- developing a borrow area on the west side of Dietrich Road
- installing roads for construction access
- providing security fencing, as required.

A spill control plan is provided in **Attachment E**.

3.2.3. Work Activities for CBW Box Enclosure and Submerged Quench

The following work activities will be performed in constructing the CBW Box enclosure[1] and submerged quench operation:

- Remove the upper portion of the Zone A landfill cover and existing ramp as needed for physical access and to prepare a relatively flat surface.
- Store reusable materials (engineered landfill cover or engineered fill) for future reuse in rebuilding the landfill cover.
- Mix slurry in staging area.
- Construct the CBW Box enclosure from the surface to a depth 2 feet into the native soils (at an approximate depth of 35 to 40 feet below the work platform), keeping the CBW Box enclosure filled with self-hardening slurry.
- Allow the self-hardening slurry to set, forming a low-permeability barrier to complete the CBW Box enclosure, thus providing containment for elevated-temperature materials.
- Begin the submerge quench process by removing the top 5 to 8 feet of the submerged quench area within the confines of the completed CBW Box enclosure.
- Transfer excess material removed during construction of the CBW Box enclosure to the designated lined waste handling area.
- Fill the recessed portion of the CBW Box enclosure with slurry while maintain at least 1.5 feet of freeboard.
- Cut alternating slots (also called stages) through waste under slurry conditions.
- Quench the material in the slurry pool within the confines of the CBW Box enclosure until monitoring indicates that temperatures are below the 170°F criterion.
- Add cement and mix thoroughly with slurry-waste material.
- Employ one or two 12- to 20-CY mixing box if additional batch control is needed.
- Replace mixed cement-bentonite-saturated waste back into the slot cut.
- Continue to the next step of the process (next slot cut/stage) and repeat the procedures, adding cement to each stage to encapsulate waste after quenching has been completed.
- Cover the completed work area in preparation for repair of landfill cap and establishment of final grades.

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[1] The CBW Box enclosure provides "pneumatic separation" of impacted waste from the surrounding vadose zone. Within the CBW Box, the vadose zone is completely isolated from impacted waste (smoldering MSW) by the placement of the cement-bentonite walls of the box and the cement-bentonite cap placed on top of the waste mass.

3.2.4. Work Activities for SCB Protection Barrier

Following completion of the submerged quench activity, an SCB Protection Barrier will be installed along the north and east sides of Zone A as shown in Drawing 4. Work activities for the SCB Protection Barrier will include the following:

- Remove the upper portion of the Zone A landfill cover and grade as needed for physical access and to prepare a relatively flat surface. High-density polyethylene (HDPE) membrane is pulled back to the extent indicated on Drawing D-8.
- Store reusable materials (i.e., engineered landfill cover) for future use in the landfill cover replacement.
- Mix slurry in slurry staging area.
- Construct the SCB Protection Barrier from the surface to a depth of approximately 2 feet into the native soils (at an approximate depth of 35 to 40 feet below the work platform) while keeping the trench filled with bentonite slurry.
- After the trenching proceeds to full depth for a distance of approximately 70 feet along the alignment of the SCB Protection Barrier, begin placing SCB backfill material to displace the slurry.
- Place waste materials (if encountered) in the designated lined waste handling area.
- Continue construction and backfill placement until the SCB Protection Barrier is complete. The elevation of the SCB Protection Barrier starts at EL 426.0-feet MSL at the northwest corner of Zone A. The barrier is about 350 feet in total length and slopes to the east approximately 1.1 percent. The elevation of the SCB Protection Barrier at its southeastern end is EL 422.0-feet MSL. Excavation of the SCB Protection Barrier trench may proceed from the west to the east or east to west based on the Contractor's discretion.
- Bentonite slurry will be continually added to the SCB Protection Barrier excavation. The elevation of the slurry will be maintained so that there is about 12-inches of freeboard for every 70-feet of SCB Protection Barrier wall. The required freeboard may be maintained by either keeping the slurry below the upper extent of the barrier excavation or placement of soil berms along the edges of the trench. Slurry which escapes the boundaries of the trench will be soaked up with soil from the trench and handled as excess soil. The work pads will be kept clear of major spills of the slurry mix. A spill plan is included as Attachment E.
- Cover the completed SCB Protection Barrier and integrate it with existing landfill cover system as indicated on Drawing D-8 through D-11. The cover system repair includes placement of one-way air intake vents that allow air to enter the subsurface below the HDPE membrane, but not allow landfill gases to escape into the atmosphere. Air intake piping details are shown on Drawing D-11.
- Manage and handle waste generated during the project.
- Clean up and demobilize slurry mixing plant.

4.0 GENERAL SPECIFICATIONS

4.1 STANDARDS AND DEFINITIONS

All materials and workmanship will be in accordance with the appropriate current ASTM Standards, including those listed in this Specification, except where the requirements of ASTM Standards are in conflict with this specification, in which case the latter will take precedence.

All work will be carried out in general accordance with applicable Washington state and federal regulations and relevant current codes of practice, including those referred to in this Specification.

In this Specification, the terms "approved," "approval," and "required" mean "approved by the Superintendent, "approval of the Superintendent," and "required by the Superintendent," respectively. In addition, the following definitions will apply:

- IWAG – the group of potentially liable parties funding the project. The IWAG is currently composed of Blount, Inc.; The Boeing Company; PACCAR, Inc.; Daimler Trucks North America LLC; PCC Structurals, Inc.; Goodrich Corporation (on behalf of Kalama Specialty Chemicals, Inc.); Weyerhaeuser NR Company; Crown Cork & Seal Company, Inc.; 3M Company; Georgia-Pacific LLC; Simpson Timber Company; The Standard Register Company; PPG Architectural Coatings Canada, Inc.; Pharmacia, LLC; Intalco Aluminum Corporation; and Union Oil Company of California.
- Superintendent – the lead field representative of the IWAG.
- Contractor – Clearcreek Contractors Inc. of Marysville, Washington. The Contractor is the entity under direct contractual responsibility with the IWAG. The Contractor is responsible for performing on-site remedial activities and will be in control of the site during construction activities.
- Site Supervisor –the lead field representative of the Contractor that is in control of site activities and logistics, and is responsible for field performance of the work.
- Bentonite slurry or "mud" – a suspension consisting of natural sodium bentonite or sodium-activated bentonite powder mixed with water. Other common drilling clays such as sepiolite or attapulgite may be substituted for bentonite if necessary to provide a stable slurry suspension under the site conditions.
- "Cementitious slurry or slurry – a mixture of bentonite (or acceptable substitute) and water in suspension with ordinary Portland cement; may also include pulverized fly ash or ground granulated blast furnace slag and plasticizers to regulate the pumpability of the slurry. Ecology approval will be sought for any admixtures other than Portland cement, bentonite, and soil used to produce the slurry, i.e., chemical analysis of slag cement or plasticizers.
- CBW Box enclosure – a barrier composed of cementitious slurry that hardens in place.
- Elevated-temperature material – landfill material with temperatures at or above 170°F.

- MSW – a subset of solid waste which includes unsegregated garbage, refuse, or similar solid waste material discarded from residential, commercial, institutional, and industrial sources and community activities, including residue after recyclables have been separated. Solid waste that has been segregated by source and characteristic may qualify for management as a non-MSW solid waste at a facility designed and operated to address the waste's characteristics and potential environmental impacts. The term MSW does not include the following:
    - Dangerous wastes other than wastes excluded from the requirements of Dangerous Waste regulations (Washington Administrative Code [WAC], chapter 173-303-071), such as household hazardous wastes
    - Mixed or segregated recyclable material that has been source-separated from garbage, refuse, and similar solid waste. The residual from source-separated recyclables is MSW.
    - Soil free of dangerous or solid wastes as defined above.
- Soil-cement-bentonite: A mixture of bentonite slurry, cement, and soil to form a low-permeability barrier having properties described in this document.
- Submerged quench operation: The process of mixing material while inundated with bentonite slurry to both cool elevated-temperature material and quench smoldering or actively burning material.

4.2 DRAWINGS

Eight drawings are referenced in this plan:

- Drawing D-1 – Location Plan and Index of Drawings
- Drawing D-2 – Site Plan and Construction Staging
- Drawing D-3 – General Construction Notes
- Drawing D-4 – Proposed Cement-Bentonite Box Enclosure and SCB Protection Barrier Location
- Drawing D-5 – Cement / Bentonite Wall Sections
- Drawing D-6 – Cement / Bentonite Box Layout and Work Pad
- Drawing D-7 – Submerged Quench Staging and Sequencing Plans
- Drawing D-8 – SCB Protection Barrier Plan and Profile
- Drawing D-9 – Zone A Cover Replacement Details Sheet 1
- Drawing D-10 – Zone A Cover Replacement Details Sheet 2
- Drawing D-11 – Air Intake Details
- Drawing D-12.1 through D-12.4 – SCB Protection Barrier Geotechnical Plan and Profile

4.3 SITE CONDITIONS

The PSL Site is located on Dietrich Road north of the intersection of Kahlotus Road and U.S. Highway 12, approximately 1.5 miles northeast of the city of Pasco, in Franklin County, Washington (Drawing D-1). The landfill is closed and no longer receives waste. An area of elevated-temperature material is currently located at depth in loose MSW and apparent tire debris which have been shown to extend, in part, under portions of the Zone A perimeter and on the western fringe of buried, stacked bales of waste that comprise the much larger Balefill Area. No hazardous materials are known to exist in the area of elevated-temperature material. Based on the available data, the maximum depth of the elevated-temperature material is approximately 35 feet.

The IWAG installed a temperature monitoring probe network to investigate the combustion/high-temperature area. To date, the IWAG has installed 17 multiple-depth gas injection points and 19 multiple-depth thermocouple arrays (VBs) within and surrounding the elevated-temperature zone in the Balefill Area. Between June 26, 2014 and March 13, 2015, IWAG injected a total of 238,590 pounds of liquid carbon dioxide into the subsurface during 20 liquid carbon dioxide injection events. Carbon dioxide injection was initially effective at reducing soil temperatures to less than 160° F throughout most of the area of elevated temperatures. However, in a limited area, soil temperatures have subsequently rebounded to greater than 170°F. A supplemental investigation was performed by EPI on July 28, 2015 to further delineate the spatial extent of temperatures greater than 170°F. The location of the CBW Box enclosure presented in this Final TEP is based on the information collected during this supplemental thermal investigation and the CBW Box enclosure contains elevated-temperature material above 170°F.

The project specifications and drawings are based on information provided by the IWAG. Supplemental investigations were conducted by the IWAG to further refine the extent of elevated-temperature material and further assess the soil conditions within the alignment of the SCB Protection Barrier. The results of these supplemental thermal investigation and supplemental geotechnical investigations are provided in **Attachments C and D**, respectively.

4.4 WORKMANSHIP

The Contractor will furnish necessary labor, equipment, materials, and incidentals to complete the work specified in this TEP and associated design drawings in accordance with applicable federal, state, and local requirements. The work will conform to these design drawings, and the TEP and will be conducted in a manner consistent with the level of care and skill ordinarily exercised by the engineering profession currently practicing under similar conditions in the State of Washington. All engineering documents prepared in support of the order referenced herein will be under the seal of a professional engineer registered by the State of Washington.

Upon completion of the submerged quench operation and SCB Protection Barrier, the disturbed area of the landfill will be re-graded with the lined areas re-established and modified as shown in the drawings and final cover placed as described in the TEP.

4.5 SITE ACCESS AND STAGING

Access routes to, from, and about the site along with site staging were developed and will be maintained as shown on Drawing 2. Deviations from the site access and staging specifications will be subject to approval of the Superintendent.

4.6 WORKING AREAS

Subject to the approval of the Superintendent, the Contractor will set out and delineate the limits of the site to be used during construction.

4.7 WORKING HOURS

Working hours, subject to local laws and regulatory agency requirements, will be unrestricted. The Contractor currently plans to maintain working hours from 0300 to 1200 hours Monday to Saturday on non-critical activities. Night work is a Health and Safety consideration for this project to reduce risks of heat stress to workers.

Ecology issued an addendum to the State Environmental Policy Act (SEPA) Determination of Non Significance (DNS) for this project pursuant to WAC 197-11-625 to recognize the change in proposed work hours from 3 a.m. to noon, instead of 7 a.m. to 7 p.m., as identified in the original SEPA checklist. Approval for additional working time during critical activities will be sought from the Superintendent, as required. Noise and dust limits will be monitored and controlled in accordance with local laws and regulatory agency requirements.

A pre-construction kick-off meeting will be held to discuss various aspects of this work and is scheduled for August 10, 2015. Attendees to this pre-construction meeting will include representatives of the Contractor, the IWAG, and Ecology. Additionally, Ecology will schedule an additional site walk with the Contractor and representatives of local public agencies including Franklin County Fire District #3 and others.

4.8 PERMITS AND EXEMPTIONS

Under RCW 70.105D.090, remedial actions conducted under a consent decree, order, or agreed order, and remedial action conducted by Ecology are exempt for the procedural requirements of certain laws. This exemption does not apply if Ecology determines that the exemption would result in loss of approval from a federal agency necessary for the state to administer any federal law. This exemption applies to the following laws:

- Chapter 70.94 RCW
- Chapter 70.95 RCW
- Chapter 70.105 RCW
- Chapter 75.20 RCW
- Chapter 90.48 RCW
- Chapter 90.58 RCW

- Any laws requiring or authorizing local government permits or approvals for the remedial actions

As described above, this interim remedial action is exempt from the procedural requirements of these laws under RCW 70.105D.090. However, this interim remedial action must comply with the substantive requirements of these laws.

Operation of the temporary batch plant is expected to trigger provisions of General Order of Approval No. 11AQ-GO-02, which will require review and approval by Ecology's Eastern Regional Office Air Quality Program. In an email dated July 28, 2015 from John Poffenroth of Ecology to Mike Riley of Anchor, Ecology approved the use of the temporary batch plant for this project providing that the Contractor operate it in accordance with the General Permit Conditions of Notice of Construction (NOC) 10598 (Reg. No. 29544) of Puget Sound Clean Air Agency (PSCAA), where the batch plant was previously permitted and operated. A copy of the PSCAA permit will be maintained at the PSL Site during construction activities.

4.9 SAFETY

Work will be performed in accordance with an approved site-specific Health and Safety Plan, which has been provided to Ecology under separate cover. Worker safety will consider the potential for encountering hazardous waste, although no hazardous waste is known to exist in the area of the work. Work will comply with applicable sections of 29 Code of Federal Regulations (CFR) 1910.120 (HAZWOPER Standard) and other applicable Occupational Safety and Health Act and Washington Industrial Safety and Health Act requirements. Site workers will participate in a medical surveillance program that meets the requirements of 29 CFR 1910.120(f). Site workers will also comply with the drug-free workplace requirements of the Anti-drug Abuse Act of 1988.

Air monitoring will be performed daily in the area of work and, if necessary, at the project boundary to ensure that engineering controls and/or personnel protective equipment (PPE) are adequate to protect workers and the public.

4.10 DISPOSAL OF WASTE

The construction of the CBW Box enclosure and SCB Protection Barrier will result in excess materials that will need to be characterized and managed consistent with that characterization. The disposal of any hazardous or dangerous waste generated during implementation of the TEP will be addressed based on the provision contained in the *Letter Agreement re: Removal of Hazardous Waste from Pasco Sanitary Landfill NPL site.* That agreement has been executed and allows EPI to act as an agent to PSL for the sole purpose of disposal of hazardous of dangerous waste generated during implementation of the TEP. EPI personnel will assist in characterizing, profiling, and managing hazardous/dangerous wastes associated with this project and will characterize and profile wastes in a manner consistent with applicable regulations.

MSW completely removed from the ground during the construction of the CBW Box enclosure and SCB Protection Barrier will be collected and temporarily stored on site in a plastic lined waste containment area pending disposition at an appropriately licensed facility. Excess soil from the SCB Protection Barrier construction will be reused on-site. Chemical analyses performed on samples collected from the SCB Protection Barrier alignment indicate that these soils are suitable for re-use as components of the low

permeability barrier. Unless field observations and screening with a photoionization detector (PID) indicate that the material is more contaminated than previously indicated by actual chemical analysis and if excavated material is obviously discolored, exhibits unusual olfactory indications of contamination or is otherwise of a consistency not expected of normal soil, the soil will re-used. If indications of unexpected contamination are encountered the material will be segregated for waste characterization. Sampling, analysis, and waste characterization for these excess materials are discussed in Section 7.0.

Excavated and stored MSW will be subject to disposal at an off-site facility. Those materials will be disposed as MSW at a Resource Conservation and Recovery Act (RCRA) Subtitle D landfill facility. It is currently anticipated that those materials will be transported by Basin Disposal Inc. (BDI) for disposal at Finley Buttes landfill in Boardman, Oregon.

4.11 DECOMMISSIONING OF THERMOCOUPLE ARRAYS, GAS INJECTION POINTS, AND VACUUM MONITORING POINTS

It is currently anticipated that all VBs and GIPs as well as VMPs 03, 07, and 11 through 16 will require decommissioning to allow for the planned extinguishment actions and for the SCB Protection Barrier. These procedures outlined below will be used to decommission this infrastructure and will serve to seal these locations to a condition as good as, or better than, the surrounding areas. The procedures presented herein are consistent with good practice and with applicable regulations. It may be necessary to modify some of these procedures based on the observed field conditions and the limits of practicability. Any modifications to these procedures will be documented in the field notes of the professional providing oversight and documentation.

Materials such as monuments and piping that are in good condition following removal may be set aside for potential reuse and repurposing at the Site.

4.11.1. VB Decommissioning

The procedure for decommissioning VBs will include the following:

- Cut and remove excess portions of thermocouple wires and remove data-logging assemblies for re-use.

- Remove above grade monument and concrete pads using a trackhoe or similar. A strap (or equivalent means) will be connected to the monument and it will be lifted out of the ground.

- Remove the polyvinyl chloride (PVC) support column and attached thermocouples. A nylon strap will be connected to the PVC support and an attempt will be made to pull the PVC and thermocouples from the subsurface. Once removed, the open portion of the borehole will be filled with powdered bentonite and hydrated.

- If the PVC breaks or otherwise does not completely come out of the ground, the remaining open portion of the borehole will be backfilled with powdered bentonite and hydrated. Some thermocouple arrays were located in areas of elevated temperature that may have weakened or damaged the PVC. Additionally, the PVC used consisted of flush threaded 1-inch diameter material and the threaded connections may be a weak point for extraction.

- If the PVC breaks at less than 5 feet below grade, and the VB is located in an area outside the CBW Box, the trackhoe will be used to excavate the PVC down to 5 feet and the top of the PVC will be capped with a concrete plug consisting of 1 cubic foot of redi-mix concrete.

4.11.2. GIP Decommissioning

The procedure for decommissioning GIPs will include the following:

- Removing the GIP welded cap and valve assembly and set aside for potential re-use.
- Connecting a nylon strap to the piping or under the concrete collar and use a trackhoe, or similar to lift the piping about 5 feet.
- Removing the sections of piping that include the concrete hold-down collar.
- Reconnecting the strap to extract and disconnect additional piping. Do not disconnect piping under tension. Only unscrew piping connections above the connecting strap. Use pipe wrenches or other supports as necessary to prevent the piping from falling into the hole following removal and as a health and safety precaution of working on equipment under tension.
- Repeating this process until all piping has been removed from the subsurface.
- Backfilling the open boreholes with hydrated bentonite powder.
- If the steel GIP piping breaks the open borehole will be backfilled with bentonite powder and hydrated.
- If the steel GIP piping breaks at less than 5 feet below grade, and the GIP is located in an area outside the CBW Box, the trackhoe will be used to excavate the GIP down to 5 feet and the top of the steel piping will be capped with a concrete plug consisting of about 1 cubic foot of redi-mix concrete.

4.11.3. VMP Decommissioning

The procedure for decommissioning the VMPs will include the following:

- If possible, removal of the stainless steel valve assembly at the top of the VMPs and setting aside for potential re-use.
- Removing the above grade monument using a trackhoe or similar. A strap will be connected to the monument and it will be lifted out of the ground.
- Connecting a nylon strap (or equivalent) to the piping and using a backhoe to lift the piping about 5 feet.
- Removing sections of piping and reconnecting the strap to extract and disconnect additional piping. Do not disconnect piping under tension. Only unscrew piping connections above the connecting strap. Use pipe wrenches or other supports as necessary to prevent the piping from falling into the hole following removal and as a health and safety precaution of working on equipment under tension.

- Repeating this process until all piping has been removed from the subsurface.
- Backfilling the open boreholes with hydrated bentonite powder.
- If the steel VMP piping breaks, the open borehole will be backfilled with bentonite powder and hydrated.
- If the steel VMP piping breaks at less than 5 feet below grade, and the VMP is located in an area outside the CBW Box, the trackhoe will be used to excavate the VMP down to 5 feet and the top of the steel piping will be capped with a concrete plug consisting of 1 cubic foot of redi-mix concrete.

4.12 PROJECT LAYOUT

Before construction of the CBW Box enclosure begins, the Contractor will mark out the position of the box enclosure with suitable identifiable survey pins or markers. A series of coordinate (x, y, z) points will be provided and maintained throughout the duration of the project by the Contractor. The SCB Protection Barrier will be similarly marked and delineated. The results of these supplemental investigations, including locations of all CBW Box enclosure and SCB Protection Barrier coordinate points, are provided in this Final TEP.

4.13 PROJECT SCHEDULE

Prior to commencement of the work, the Contractor will submit a project schedule for IWAG and Ecology review. The Contractor will provide a schedule update at the weekly project construction meetings.

5.0 CEMENT BENTONITE WALL BOX ENCLOSURE AND SUBMERGED QUENCH

The following provides information on the design and construction of the CBW Box enclosure and submerged quench operation.

5.1 PRE-CONSTRUCTION SUPPLEMENTAL INVESTIGATIONS

Supplemental subsurface investigations were performed to confirm the final limits of the CBW Box and area of mixing and to finalize the alignment of the SCB Protection Barrier. The area of smoldering and elevated temperatures is generally well characterized by the current network of multi-depth data-logging thermocouple arrays (thermocouple VBs), and subsequent temperature profile refinements based on the July 28, 2015 supplemental thermal investigation. The objective is for the CBW Box enclosure to encompass all materials with temperatures exceeding 170°F.

The supplemental investigation utilized methods and procedures that have been well established at the PSL Site and previously been approved and observed by Ecology. At each planned location, a 1.5-inch hollow DPT probe with an expendable tip was advanced approximately 1 to 2 feet into the known depth of the underlying native soils. The probe was retracted about 6 inches to disengage the expendable tip, and a K-type direct-reading thermocouple was inserted and extended beyond the bottom of the DPT stem. The temperature was then recorded after it stabilized to within ±2° F over a 60-second period.

Temperature measurements were recorded at not more than 4-foot vertical intervals (i.e., the length for a DPT rod). The temperatures were recorded in field logs for delineation of the final extent of the CBW Box. The temperature measurement locations and final area of the CBW Box are shown in Figure 1 and the temperature monitoring results are included in Attachment C.

5.2 CBW BOX ENCLOSURE SPECIFICATIONS

The CBW Box enclosure will be a minimum of 36 inches wide, and will be constructed such that no MSW extends across the enclosure wall (all MSW encountered in the trench will be removed and placed in the designated lined area for subsequent waste characterization and final disposition). The CBW Box enclosure will be constructed to a depth sufficient to key at least 2 feet into the underlying Touchet Formation or other native soils below the maximum depth of the baled waste and loose MSW. The depth of excavation is expected to range between approximately 35 and 40 feet (see Drawing D-5).

The CB slurry used to construct the CBW Box enclosure is to have a nominal mix design of 17 to 22 percent Portland Type I/II cement and 3 to 5 percent bentonite per CY of slurry, with the aim of achieving a target unconfined compressive strength of not less than 20 pounds per square inch (psi) at 28 days, and a target hydraulic conductivity of not more than $1x10^{-6}$ cm/sec. Ground Granulated Blast Furnace Slag (GGBFS) cement may also be used for constructing the CB wall. Proportions of GGBFS and bentonite for this mix design would be about 10 to 14 percent and 3 to 5 percent, respectively. Ligno-sulfate or other plasticizer will be considered to maintain cement bentonite fluidity during the construction. Viscosity and unit weight of the fresh slurry will be determined from a mix design in accordance with Section 5.4 prior to the CBW Box enclosure installation. Approximately 730 CY of mixed slurry will be required to form CBW Box. Based upon the Contractor's experience with other slurry walls and MSW landfills, an additional 10 to 30 percent might be expected to be lost to the adjacent formation during construction. If voids are encountered, significant additional losses might occur. The design parameters and goals indicated above are specified so that the slurry will obtain the following characteristics:

1. The CB wall material needs to achieve a nominal hydraulic conductivity of about $1x10^{-6}$ cm/sec to be as effective as the native soil formations in minimizing the lateral transmission of both soil gas and moisture;

2. The slurry needs to remain fluid and workable throughout the entire excavation/slurry placement process; therefore the slurry's ability to harden to the specified compressive strength needs to be delayed until each wall segment is in place; and

3. The minimum compressive strength of 20 psi has been specified because it is the bearing capacity which the walls are expected to experience during post closure maintenance activities and is sufficient to maintain vertical slopes at the edge of the shallow pool during quenching operations.

Set accelerators, retardants, and plasticizers may be used as necessary to adjust the pumpability and time for the cement-based slurry to set, although the use of these reagents are not currently anticipated. The latent heat from the elevated-temperature material will aid in the curing of the materials.

Each side wall of the CBW Box enclosure will be constructed as a separate unit and allowed to cure to a minimum strength of 10 psi before an adjacent wall is constructed and keyed into the existing wall. To

determine the minimum strength of the hardened slurry, the field superintendent will utilize a Concrete Pocket Penetrometer capable of measuring in place hardness between 0 to 700 psi.

Cement used for slurry production will be ordinary Portland Type I/II. The GGBFS, if used as the cementing agent, will be Grade 100, as supplied by Lafarge of North America.

Bentonite used for slurry production will be Hydogel as produced by Wyo-Ben of Lovell, Wyoming or equivalent. Water will be drawn from an approved local city water supply (e.g., hydrant at Basin Disposal, Inc.).

The CBW Box enclosure slurry will meet the requirements presented in Table 1.

TABLE 1
CEMENT-BENTONITE SLURRY TRENCH QUALITY CONTROL TESTING

Property	Requirement	Test Method
Initial Bentonite Slurry		
Viscosity	> 35 sec	API RP 13B-1
Density	> 64 pcf	API RP 13B-1
Initial Cement-Bentonite Slurry		
Viscosity	> 35 sec	API RP 13B-1
Density	> 68 pcf	API RP 13B-1
In-Trench Slurry		
Density	68-85 pcf	API RP 13B-1
Viscosity	> 40 sec	API RP 13B-1
CBW Box Enclosure Material after Set		
Density	For record	ASTM D 698
Permeability	$< 1x10^{-6}$ cm/sec	ASTM D 2434, ASTM D 5084
Compressive strength	>20 psi at 28 days	ASTM D2166

pcf = pounds per cubic foot

It should be noted that laboratory- determined hydraulic conductivity (permeability) value of $1x10^{-6}$ cm/sec has been shown to compare favorably with similar in-field permeability values. Because there slurry contains a specified volume of Portland or GGBFS cement and is buried, the hardened slurry material contained in the wall will not be subject to desiccation. It is the long term stability of cement-bentonite slurry walls which has made them viable for this type of installation as proven by over 50 years of successful application.

5.3 MSW THERMAL EXTINGUISHMENT

Submerged methods will be guided by specifications for the bentonite slurry mix described in Section 6.1. The target percentage of cement mixed with the waste will be 5 to 8 percent by weight of final mix. As described in Section 5.8, cylindrical samples will be collected to observe that the material is obtaining initial set and becoming firm. Should initial set not be reached within 2 days, additional cement may be added until the 8 percent by weight is criterion is met. Waste mixing will be contained by a minimum of 1.5 feet of freeboard.

5.4 TRIAL MIX DESIGN

Prior to the construction of the CBW Box enclosure, laboratory testing will be undertaken to measure the properties listed in this section, including unconfined compressive strength and hydraulic conductivity, of prepared test samples of the nominal mix designs stated above. The results of the mix designs will be provided to Ecology as a submittal after mobilization has been started.

At least two test mixes of the nominal CBW Box enclosure slurry mix design will be prepared. Six samples will be prepared for each mix for a total of 12 samples. Three to four samples for each mix will be tested for unconfined compressive strength at 7, 14, and 28 days after initial mixing. Two samples from each mix will be tested in the laboratory for hydraulic conductivity. Test methods are indicated in Table 1.

The construction of the CBW Box enclosure may proceed after testing of the 7-day trial test samples provided that the test results meet the target unconfined compressive strength and target hydraulic conductivity. If either of the 7-day unconfined compressive strength or hydraulic conductivity test results do not achieve the target values, but based on experience and published data are expected to do so by the nominated target days, then the Contractor will discuss the results with the Superintendent. Together, the Contractor and Superintendent, in consultation with Ecology, will decide whether to proceed with the construction of the CBW Box enclosure based on the results, wait for the 28-day test results, or revise the nominal mix design and repeat the trial laboratory testing program.

5.5 WALL MATERIALS

At least 5 days before their use at the site, the Contractor will provide for the Superintendent's approval, details of the proposed suppliers of materials including bentonite and cement. Once written approval has been given, the material and water suppliers will not be changed without further written approval by the Superintendent. Bentonite will be Hydrogel produced by Wyo-Ben of Lovell, Wyoming, or an approved equal.

Cement and cement additives used in preparing the CB slurry will conform to the following standards or equivalent:

- ASTM C159/C150M-12, Standard Specification for Portland Cement – Type I/II.
- ASTM C618-12a, Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- ASTM C989, Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars

Specification for retarding agents, set accelerators, and other additives (if used) and bentonite will be supplied by the Contractor to the Superintendent prior to commencement of their use. Ecology approval will be sought for any admixtures other than Portland cement, bentonite, and soil used to produce the slurry, i.e., chemical analysis of GGBFS or plasticizers.

The cement products used in the work will be adequately protected from moisture and contamination while in transit to, and in storage at, the job site. Reclaimed cement or cement containing lumps or deleterious matter will not be used.

5.6 CBW BOX ENCLOSURE DEPTH

The CBW Box enclosure will be constructed to a nominal depth sufficient to key at least 2 feet into the underlying Touchet Formation or other native soils below the maximum depth of the baled waste and loose MSW. Using a weighted tape, the Contractor will monitor the wall depth at intervals of distance not exceeding 20 feet. The Contractor, in consultation with the Superintendent, will confirm the wall depth at these intervals and note them in the Daily Work Records Report as a record of the installation works. The volume of slurry required for each wall segment will be batched at the beginning of the wall installation. Any additional slurry required will be recorded in the Contractor's Daily Field Report records and attributed to either onsite spillage or formation loss.

5.7 FLUID PROPERTIES OF SLURRY

The slurry supplied in the construction of the CBW Box enclosure will be in such condition that the mix components do not segregate. The Contractor will take measures to screen the majority of waste from the slurry and make corrections for drops in slurry level in the trenches.

5.8 SET PROPERTIES OF CBW BOX ENCLOSURE SLURRY

The following properties of the set slurry in the CBW Box enclosure will be measured throughout the course of the CBW Box enclosure construction by carrying out laboratory testing on cured samples of the slurry collected from various depths in the wall while the slurry remains fluid.

The target hydraulic conductivity of the set slurry is not more than $1x10^{-6}$ cm/sec. Permeability tests will be carried out on cured CBW Box samples cast from liquid samples recovered from the wall during construction. The preferred cast sample size is 3 inches in diameter by at least 6 inches high.

Permeability test samples will be saturated prior to permeability testing as per ASTM D5084 under a hydraulic gradient of at least 10 (change in influent/effluent head divided by flow length) after a minimum period of 12 hours for flow stabilization. Flow measurements will be made over at least 48 hours, with an effective confining pressure of 10 psi.

Accepted published data show that the permeability of test samples reduces with time after casting. Therefore, in order to obtain permeability test results during the work, at least four samples will be collected from the CBW Box enclosure and tested. This sample collection and testing procedure will continue until design permeability values are achieved. Failure to meet a permeability goal is not critical to the goal of extinguishing the area of elevated-temperature material.

To the extent practicable, all pre-construction mix trials specified in this TEP will be carried out using the same materials and water sources as proposed for the construction.

The Contractor will provide the Superintendent on a regular basis with supplier-provided certification for constituent materials of the slurry (e.g., Portland cement, bentonite). Such certificates will comply with the relevant standards listed in Sections 5.2 and 5.5.

If the slurry design includes admixtures, the admixtures will have been successfully used on previous slurry wall contracts, or their effects will be demonstrated in trial mixes prior to the commencement of the CBW Box enclosure project. Ecology approval will be sought for any admixtures other than Portland cement, bentonite, and soil used to produce the slurry, i.e., chemical analysis of GGBFS or plasticizers.

5.9 SLURRY MIXING

Mixing of cementitious slurry and bentonite slurry will be carried out in a two-stage process (unless otherwise approved by the Superintendent) in a temporary mixing plant set up at the site. Bentonite powder and water will be thoroughly mixed using high-shear colloidal mixing techniques, and the bentonite slurry will be tested to meet viscosity requirements prior to its being blended with the cement. Drawing D-2 shows the layout for the cement-bentonite slurry and bentonite slurry mixing operation.

Cement will be delivered to the site in bulk and stored in a portable silo set up in the mixing area. Cement will be placed in bulk sacks for delivery to the CB mixing area and to the submerged quench operations.

Bentonite will be delivered from Wyo-Ben's plant in Lovell, Wyoming (or equivalent supplier) directly to the site in bulk bags. Slurry mixing will be performed using individual 100-lb bags to batch with water in high-shear colloidal mixers. Bulk bags will be used for dry bentonite addition for soil-bentonite backfill mixing and as needed to increase the viscosity of slurry in the trench.

5.10 SLURRY BATCHING

Slurry will be batched using methods of weighing or proportioning the quantity of each individual component material to an accuracy of ±5 percent of the target quantity of that material to be used in the design mix.

5.11 SLURRY QUALITY ASSURANCE

The Contractor will inform the Superintendent of the target minimum viscosity and specific gravity of the bentonite suspension to be used for wall construction, based on the results of the laboratory mix trials or on the properties of the first batch of slurry mixed on site.

The following quality assurance (QA) procedures will be followed for the bentonite slurry:

- Sampling – Bentonite slurry will be sampled at least two times during each full production day from the mixing plant, bulk storage tanks, or both. The samples will be tested for the properties listed in Table 1. The estimated age of the fluid at the time of testing and location where sampled will be recorded.
- Viscosity – The viscosity will be measured using the Marsh funnel.

- Unit Weight – The unit weight of the bentonite slurry will be measured by the use of a fixed-volume container and balance scale or electronic weighing scale. The unit weight will be measured to an accuracy of ±0.5 pounds per cubic foot (pcf).

The following QA procedures will be followed for the cementitious slurry:

- The Contractor will inform the Superintendent of the target mix proportions, unit weight, and viscosity of the cementitious slurry mix to be used for the CBW Box enclosure construction based on results of the mix design. The target values as defined will be adhered to unless conditions indicate that adjustments are required. In the event that the measured values differ significantly from the target values, the Contractor will propose measures to rectify this situation to the Superintendent.
- Sampling – Cementitious slurry will be sampled from the mixing plant at least two times during each production day. The samples will be tested for the parameters required in this section. The estimated age of the cementitious slurry at the time of test and location where sampled will be recorded.
- Viscosity – The viscosity will be measured using the Marsh funnel.
- Unit Weight – The unit weight of the cementitious slurry will be measured by the use of a fixed-volume container and balance scale or electronic weighing scale. The unit weight will be measured to an accuracy of ±0.5 pcf.

5.12 TEMPERATURE

The temperature of the bentonite slurry and cement slurry samples collected for the purposes of the QA procedures will be recorded at the time of testing the samples. The temperature of cement and bentonite mixed with waste in the submerged quench area will be recorded. Temperature readings will be performed using a Fluke Model 62MAX single laser infrared thermometer, or an approved alternative handheld device.

5.13 CEMENT-BENTONITE WALL CONSTRUCTION

5.13.1. Construction

The method of construction will be able to achieve the specified maximum depth (approximately 40 feet) and accommodate changes in depth while maintaining the CBW Box enclosure to a nominal depth sufficient to key 2 feet into the underlying Touchet Formation or other native soils below the maximum depth of the baled waste and MSW.

The Contractor will maintain the level of the fluid slurry in the trench at a height sufficient to minimize the risk of collapse of the trench sides. Any drop in level of the slurry due to infiltration, penetration, moisture loss, or any other cause will be made up by the Contractor to maintain stability. To maintain the stability of the trench sides, the top of slurry will be maintained at a height of between 12 and 24 inches from the top of the trench.

5.13.2. Wall Location and Dimensions

The CBW Box enclosure will be set out to a plan positional tolerance of ±0.3 foot and will be constructed to a plan positional tolerance of ±1.0 foot measured at the wall center line at the top of the trench. Deviations from the alignment due to obstructions or adverse conditions are acceptable but will be recorded and provided to the Superintendent.

The width of the CBW Box enclosure will not be less than 3 feet.

The depth of the wall below the working platform level will be recorded and verified by the Superintendent at distance intervals of not greater than 20 feet on center.

5.13.3. Temporary Safety Protection

Temporary protection measures in the construction area will be carried out by the Contractor for that section of wall currently being worked and thereafter until handover by the Contractor to others who may be carrying out the subsequent works along the wall alignment. Any such handover will not normally be earlier than 7 days after construction of a section of the wall and in no case until initial set of the slurry within the wall has taken place.

So far as is reasonably practicable, safety measures including roped barriers will be provided to prevent persons from falling into the fluid slurry or slipping on the set slurry.

Measures will be taken to cover completed trenches to limit desiccation prior to placement of final cover systems. Because the very top of the wall will be susceptible to desiccation cracks, placement of temporary cover consisting of plastic sheeting, soil, or both will be implemented until the slurry has reached a sufficient strength. Settlement as a result of desiccation is not usually experienced and settlement of the wall itself will be negligible after the cement sets.

5.13.4. Actions on Loss of Slurry or Collapse of Trench

In the event of a sudden or sustained loss of slurry, or a partial collapse of the trench wall, the Contractor will take immediate action to safeguard the work and will notify the Superintendent of these actions. The Superintendent will be consulted before the Contractor performs additional actions to safeguard the completed work.

Moderate slurry loss may be controlled by at least two methods:

- Placing soil in the trench to stop slurry leakage and re-excavating the trench through these areas
- Plugging leaks with various materials including geotextiles, plastics, rock, gravel, straw, or other inert debris.

5.13.5. Excessive Unit Weight of Slurry in Trench

If the slurry unit weight exceeds the limit stated in the Specification, the Contractor will immediately inform the Superintendent of the situation and offer suggestions as to how to proceed.

Slurry mixing and placement may proceed so long as the Contractor is satisfied that the prevailing mixed slurry conditions will not be detrimental to the CBW Box enclosure.

5.13.6. Capping

Temporary capping of the CBW Box enclosure with plastic or clean soil will take place as soon as practicable to prevent excessive drying out and subsequent desiccation of the top of the wall. The final capping layers will be placed in accordance with the drawings.

5.14 MSW THERMAL EXTINGUISHMENT

The MSW contained within the boundary of the CBW Box enclosure will be divided into a series of slot cuts (stages), which will be staggered until the entire area of elevated-temperature material is quenched. Each slot cut/stage will be roughly 6 to 8 feet wide, 30 to 40 feet long, and 30 to 35 feet deep. All MSW contained in a slot cut/stage will first be mixed with the bentonite slurry in the submerged quench area. No cement or other additives will be mixed with the waste until after all MSW contained within a stage is thoroughly mixed with the bentonite slurry.

After the MSW contained within the stage is thoroughly mixed with the bentonite slurry, Portland cement will be added to the MSW-bentonite mixture and thoroughly blended throughout the slot cut/stage. After the MSW in a slot cut/stage is thoroughly blended with both bentonite and Portland cement, temperature readings will be performed with a Fluke Model 62MAX single-laser infrared thermometer (or similar handheld noncontact temperature monitoring device) and then the material will be placed back into its original location, where it will be allowed to set over time as the Portland cement hydrates (hardens). The Contractor will proceed to a non-adjacent slot cut/stage and repeat the process. The Contractor will continue to alternate slot cut/stages until every other stage has been blended with both the bentonite and Portland cement and allowed to harden. The Contractor will then proceed to slot cut those stages located between the previously treated slot cut/stages in the same manner as the treated (completed) slot cuts/stages. Refer to Drawing D-7– Submerged Quench Staging and Sequencing Plans.

The process of staggered placement of the soil-cement-bentonite material is quite common for placement of barrier walls. The Contractor recently completed projects of this type to depths of over 25 feet at sites in Bellingham and Seattle.

Staggering of the quench operation is similar to the procedure used in deep barrier excavations. At a site overseen by AECOM, the Sevensons Road Landfill in Victoria, Australia, the barrier wall was over 1,200 feet in length and had an average depth of 90 feet. Each of three excavators installed one 6-foot-wide panel of cement-bentonite slurry to the required depth each day. The next day each machine would skip over the intervening panel and install the next alternate panel. Only after two panels on each side of the intervening panel had achieved full set, would the excavator mount the intervening panel and complete the link up.

Delays while cement hardens are not expected because of the elevated temperatures at the site. All excavations are to be conducted under slurry trench conditions, so the strength of the previously installed panels need only be a fraction of the final expected strength to maintain stable conditions.

6.0 SCB PROTECTION BARRIER

6.1 SCB PROTECTION BARRIER SPECIFICATIONS

The SCB Protection Barrier will be a minimum of 3 feet wide. The barrier will be constructed to a depth sufficient to key at least 2 feet into the underlying Touchet Formation or other native soils. Approximate depth is expected to be about 35 to 40 feet below the working grade. The approximate depth and alignment of the SCB Protection Barrier are indicated on Drawing D-8.

It should be noted that a work pad approximately 30 feet in width will be constructed to allow the excavator to install the SCB Protection Barrier. As shown in Drawing D-8, the 36-inch-wide SCB Protection Barrier will be placed along the centerline of the work pad. The construction of the work pad will be a balanced cut/fill operation in which soil from the uphill side of the work pad will be pushed to the downhill side of the work pad. As a result of the installation of the SCB Protection Barrier, the Zone A landfill cap will be regraded and its geomembrane liner will be realigned and anchored in the top of the SCB Protection Barrier. This regrading of the Zone A landfill cap will require regrading cap soil material and temporary relocation of the geomembrane liner. The entire Zone A landfill cap will be restored with 3:1 side slopes, which will meet Washington State regulatory slope stability criteria for landfill side slopes. Areas with soil cracks downslope of the barrier will be dug out and recompacted to a firm condition as part of the work pad construction activities.

The bentonite slurry used to construct the SCB Protection Barrier is to have a nominal mix design of 4 to 6 percent bentonite by weight of water in the slurry. Bentonite used for slurry production will be Hydogel, as produced by Wyo-Ben of Lovell, Wyoming, or an approved alternative. Water will be from an approved local city water supply (e.g., hydrant at Basin Disposal, Inc.).

Soil for backfill will be sandy silt or silty sand from within the excavation, the on-site borrow area, or both. Backfill will be mixed in containers using excavators, loaders, or other equipment capable of blending the soil, slurry, cement, and dry bentonite to the specified characteristics.

Slurry and SCB backfill properties will meet the requirements presented in Table 2.

TABLE 2
SCB SLURRY AND BACKFILL QUALITY CONTROL TESTING

Property	Requirement	Test Method
Initial Bentonite Slurry		
Density	> 64 pcf	API RP 13B-1
Viscosity	> 35 sec	API RP 13B-1
In-Trench Bentonite Slurry		
Density	64-85 pcf and at least 15 pcf less than SB backfill density	API RP 13B-1
Viscosity	> 40 sec	API RP 13B-1
Soil for Backfill Material Mixing		
Grain size	For record	ASTM D 422
Moisture content	For record	ASTM D 2216
Fines content	>20 percent silt and clay	ASTM D 1140
SCB Backfill		
Slump cone	3-6 inches	ASTM C 143/C 143M

Property	Requirement	Test Method
Density	At least 15 pcf > slurry wt	ASTM D 698/C 138
Permeability	$< 1x10^{-7}$ cm/sec	ASTM D 2434, ASTM D 5084
Unconfined compressive strength	>20 psi @ 28 days	ASTM D 2166

The SCB Protection Barrier has been located to miss any significant pockets of buried waste. Mixing of the slurry with minor amounts of waste material is to be expected; however, if during the installation of the SCB Protection Barrier, a large piece of waste material is exhumed, it will be separated for proper handling and disposal.

As shown in Drawing D-8, the installation of the SCB Protection Barrier will begin at station 0+00 and proceed towards station 3+50 or vice versa. To begin the trench installation, existing soil will be excavated from the trench to allow for the placement of the bentonite slurry. These soil materials will be placed in a separate mixing area for processing and replacement in the trench as SCB backfill. Any significant waste materials or obviously contaminated materials will be separated from the "clean" soil and placed in the waste storage area for off-site disposal. In the processing area, the "clean" soil material will be mixed with bentonite slurry, dry bentonite, and cement to produce the barrier trench backfill. The SCB backfill will then be placed into the trench using an excavator or loader to construct the barrier.

At the completion of the SCB Protection Barrier construction, some volume of excess soils and potentially other wastes will remain stockpiled within the lined containment area. Those materials will require off-site disposal at an appropriately licensed facility. Excess clean soil will be reused for on-site grading materials where appropriate and approved by Ecology.

The intent is that the majority of slurry placed in the trench will be consumed as part of the SCB backfill mixing operation; slurry remaining at the end of the barrier construction will be stabilized by mixing with clean borrow soil, sawdust, or cement and reused on-site as grading fill or disposed off-site, as appropriate.

6.2 TRIAL MIX DESIGN

Prior to the construction of the SCB Protection Barrier, laboratory trials will be undertaken to measure the properties listed in this section, including slump, density, hydraulic conductivity, and unconfined compressive strength of prepared test samples of the nominal mix designs stated above. Two nominal mix designs will be prepared, similar to the trial mix design for the CBW Box enclosure. Six samples will be prepared for each mix for a total of 12 samples. Three to four samples for each mix will be tested for unconfined compressive strength at 7, 14, and 28 days after initial mixing. Two samples from each mix will be tested in the laboratory for hydraulic conductivity. Test methods are indicated in Table 2.

6.3 PROTECTION BARRIER MATERIALS

At least 14 days before mobilizing to the site for SCB Protection Barrier construction, the Contractor will provide for the Superintendent's approval details of the proposed suppliers of materials including bentonite (or alternative clay), Portland cement, and water. Once written approval has been given, the material and water suppliers will not be changed without further written approval by the Superintendent.

Bentonite will be Hydrogel produced by Wyo-Ben of Lovell, Wyoming, or an approved equal. Cement will be normal Portland Type I/II, as supplied by LaFarge North America, Lehigh Cement Company, or CalPortland Company, or approved equal.

6.4 PROTECTION BARRIER TOE DEPTH

The SCB Protection Barrier will be constructed to a nominal depth sufficient to key at least 2 feet into the underlying Touchet Formation or other native soils. The wall depth will be monitored by the Contractor at intervals of distance not exceeding 20 feet and the Contractor will document this information in the Daily Work Records Report as a record of the SCB Protection Barrier installation.

6.5 FLUID PROPERTIES OF SLURRY

The slurry supplied in the construction of the SCB Protection Barrier will be in such condition that the mix components do not segregate. The Contractor will take measures to screen the majority of waste from the slurry and correct any drop in slurry level in the trenches.

6.6 SLURRY MIXING

Mixing of bentonite slurry will be carried out in a one-stage process (unless otherwise approved by the Superintendent) in a temporary mixing plant set up at the site. Bentonite powder and water will be thoroughly mixed using high-shear or colloidal mixing techniques, and the bentonite slurry will be tested to meet viscosity requirements prior to its introduction into the trench or excavation.

6.7 SLURRY BATCHING

Slurry will be batched using methods of weighing or proportioning the quantity of each individual component material to an accuracy of ±5 percent of the target quantity of that material to be used in the design mix.

6.8 SLURRY QUALITY ASSURANCE

The following QA procedures will be followed for the bentonite slurry:

- Sampling – Bentonite slurry will be sampled at least two times during each full production day from the mixing plant, bulk storage tanks, or both. The samples will be tested for the properties listed in Table 2. The estimated age of the fluid at the time of testing and location where sampled will be recorded.
- Viscosity – The viscosity will be measured using the Marsh funnel.
- Unit Weight – The unit weight of the bentonite slurry will be measured by the use of a fixed-volume container and balance scale or electronic weighing scale. The unit weight will be measured to an accuracy of ±0.5 pcf.

6.9 TEMPERATURE

The temperature of the bentonite slurry samples collected for the purposes of the QA procedures specified in Section 5.12 will be recorded at the time of testing the samples. The temperature of cement and

bentonite mixed with waste will be recorded in the submerged quench area. Temperature readings will be performed with a Fluke Model 62MAX single-laser infrared thermometer, or equal.

6.10 SCB PROTECTION BARRIER CONSTRUCTION

6.10.1. Construction

The anticipated alignment of the SCB Protection Barrier is indicated on Drawing 4. The depth of the wall will extend at least 2 feet into the underlying native soil materials.

The method of excavation will be able to achieve the specified maximum depth (approximately 40 feet), which may vary depending upon the elevation of the working surface. The method of excavation will accommodate changes in depth while maintaining the excavation to a nominal depth sufficient to key 2 feet into the underlying native soils below the maximum depth of the baled waste and MSW.

The Contractor will maintain the level of the fluid slurry in the trench excavation sufficiently high to minimize the risk of collapse of the trench sides. Any drop in level of the slurry due to infiltration, penetration, moisture loss, or any other cause will be made up by the Contractor to maintain excavation stability.

6.10.2. Protection Barrier Location and Dimensions

The SCB Protection Barrier will be set out to a plan positional tolerance of ±0.3 foot and will be constructed to a plan positional tolerance of ±1.0 foot measured at the wall center line at the top of the trench. Deviations from the alignment due to obstructions or adverse conditions are acceptable but will be recorded and provided to the Superintendent. The SCB Protection Barrier has been located so as to miss any significant pockets of buried waste. Mixing of the slurry with minor amounts of waste material is to be expected; however, if during the installation of the SCB Protection Barrier, a large piece of waste material is exhumed, it will be separated for proper handling and disposal.

The width of the SCB Protection Barrier will not be less than 3 feet.

The depth of the wall toe below working platform level will be recorded by the Contractor and verified by the Superintendent's representative at distance intervals not greater than 20 feet on center. The depth of the wall will be established at not less than 2 feet into the underlying native soil materials along the wall alignment. The depth of native materials will be based on the previously completed subsurface thermal/geotechnical investigation at the wall alignment.

6.10.3. Temporary Safety Protection

Temporary protection measures to the slurry wall excavation and backfilled trench will be carried out by the Contractor for that section of wall currently being excavated and thereafter until handover by the Contractor to others who may be carrying out the subsequent works along the wall alignment. Any such handover will not normally occur earlier than 7 days after construction of a section of the wall and in no case until initial settlement of the backfill within the wall has taken place.

So far as is reasonably practicable, safety measures including roped barriers will be provided to prevent persons from falling into the fluid slurry or stepping into the trench backfill.

Measures will be taken to cover completed trenches to limit desiccation prior to placement of final cap systems. Temporary cover with plastic or soil is acceptable.

6.10.4. Actions on Loss of Slurry or Collapse of Trench

In the event of a sudden or sustained loss of slurry or a partial collapse of the trench wall, the Contractor will take immediate action to safeguard the work and will notify the Superintendent of these actions. The Superintendent will be consulted before the Contractor carries out additional actions to safeguard the completed work.

Moderate slurry loss may be controlled by at least two methods:

- Placing soil in the trench to stop slurry leakage and re-excavating the trench through these areas
- Plugging leaks with various materials including geotextiles, plastics, rock, gravel, or other inert debris.

6.10.5. Excessive Unit Weight of Slurry in Trench

If the slurry unit weight exceeds the limit stated in the Specification, the Contractor will immediately inform the Superintendent of the situation and offer suggestions as to how to proceed.

Slurry mixing and placement may proceed so long as the Contractor is satisfied that the prevailing mixed slurry conditions will not be detrimental to the SCB backfill.

6.10.6. Capping

Temporary capping of the SCB Protection Barrier with plastic or clean soil will take place as soon as practicable to prevent excessive drying out and subsequent desiccation of the top of the wall. The final capping layers will be placed per the drawings.

6.10.7. Liner Removal and Replacement

Prior to constructing the SCB Protection Barrier work pad, the existing Zone A cover system (geosynthetic clay layer [GCL], 40-mil HDPE liner, composite drainage net, and other components) will be cut and removed approximately 5 to 10 feet beyond the limits of the work pad. These items will be disposed of at an off-site recycling or disposal facility. Soil material will be stockpiled separately for subsequent on-site reuse.

After constructing the SCB Protection Barrier, the cover system will be replaced to match pre-existing conditions. The new GCL will overlap and be glued to the existing GCL liner. A new 40-mil HDPE liner will be fusion-welded to the existing liner, overlain with a geocomposite drainage net, and covered with soil, as shown on Drawings D-9 and D-10.

7.0 SAMPLING AND ANALYSIS PLAN

Sampling and analysis for implementation of this TEP is limited to those actions necessary to properly characterize, manage, and dispose of exhumed excess wastes in accordance with applicable regulations.

As indicated above, the uppermost 5 to 8 feet of material within the CBW Box will be exhumed and placed into a lined area for temporary storage. The maximum anticipated volume is about 700 CY of material consisting of engineered fill from the northeast corner of Zone A, cover soil from the Balefill, MSW, and baled waste. These soils are not expected to be chemically impacted, and unless required by the receiving facility; there will be no sampling or analysis of these materials prior to final disposition at a RCRA Subtitle D landfill.

Some soil materials from below the 40-mil HDPE membrane will be excavated from Zone A during SCB Protection Barrier construction. Those materials will be placed in a separate lined storage area, along with soil materials excavated for the SCB Protection Barrier. To the extent possible, those soils will be reused within the SCB slurry mix. At the completion of the SCB Protection Barrier construction, some volume of excess soils and potentially other wastes will remain stockpiled within the lined containment area. Those non-soil materials will require off-site disposal at an appropriate facility. Excess soil will be reused for on-site grading materials where appropriate.

In order to assess the disposal requirements for excess materials removed from below the HDPE membrane, in accordance with the Washington State Dangerous Waste Regulations (WAC 173-303), representative samples will be collected and submitted for analysis, as appropriate for waste characterization based on requirements of the off-site disposal facility. After the estimated volume of excess material is determined, the following sampling and analysis may be conducted, as appropriate for waste characterization:

- Volatile organic compounds (VOCs) by U.S. Environmental Protection Agency (EPA) Method 8260C – One discrete sample will be collected for each 50 CY of material for off-site disposal.
- Semivolatile organic compounds by EPA Method 8270 – One three-component composite sample will be collected for each 100 CY of material for off-site disposal.
- Chlorophenoxy herbicides by EPA Method 8151A – One three-component composite sample will be collected for each 100 CY of material for off-site disposal.
- Polychlorinated biphenyls by EPA Method 8082A – One three-component composite sample will be collected for each 100 CY of material for off-site disposal.
- Metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, silver; "RCRA 8") using EPA SW846 6000- and 7000-Series methods – One three-component composite sample will be collected for each 100 CY of material for off-site disposal.

The results of these analyses will be compared to applicable regulatory thresholds that include those for Characteristic Wastes within the Dangerous Waste Regulations (WAC 173-303-090) and Washington State toxics and persistent wastes (WAC 173-303-100). The analytical results will also be compared to the requirements of the RCRA waste codes.

It may be necessary to perform follow-up analysis using the TCLP (EPA Method 1311). TCLP analysis would be performed on any soil sample that exhibits a chemical concentration 20 times the toxicity characteristic threshold in WAC 173-303-090.

Soil samples for VOC analysis will be collected using EPA Method 5035A to limit sample volatilization during collection.

Composite samples will be collected by removing the upper 1 foot of the stockpiled soil in the target sample location. A representative sample will then be placed in a decontaminated stainless steel mixing bowl using a decontaminated stainless steel spoon. After collection of the composite subsamples, the spoon will be used to thoroughly mix the soils. After mixing, the surface of the soil will be smoothed and divided into quadrants. Sample containers appropriate for the intended analysis will be filled using the spoon and from alternating quadrants of the bowl.

Upon collection, all sample containers will be labeled with the date, time, and a unique identifier. The location of the sample and subsamples will be noted on a map and in the field notes. Upon collection, all sample containers will be placed in an iced cooler pending transport to the storage refrigerator in the job trailer or delivery to the laboratory.

All samples will be transported via FedEx to ALS Environmental laboratories in Everett, Washington. Samples will be analyzed under standard turnaround times. ALS will perform normal in-house quality assurance/quality control (QA/QC) procedures such as method blanks, matrix spikes, and matrix spike duplicates. The data will be evaluated against standard surrogate recovery percentages and relative percent differences. Any data not meeting standard QA/QC thresholds will be appropriately flagged.

All samples will be handled and transported using standard chain-of-custody protocols.

8.0 SURFACE WORKS

8.1 CBW BOX AND ELEVATED-TEMPERATURE AREA

The following surface works will be necessary above the CBW Box enclosure:

Prior to the start of CBW Box enclosure installation:

- Pull back the cover and remove engineered fill to the location and section shown on the drawings.

At the completion of the submerged quench operations:

- Replace the engineered fill foundation layer (compacted to 90 percent Modified Proctor) as shown in Drawings D-9 and D-10.
- Install GCL material placed as shown on Drawings 9 and 10.
- Install HDPE geomembrane liner (of same thickness as existing liner) over the project area as shown on Drawings D-9 and D-10.
- Install geocomposite drainage layer as shown in the Drawings D-9 and D-10. The drainage layer/erosion control mat will be configured to discharge drainage to the surface drainage swales.
- Install a 12-inch-thick topsoil vegetative layer graded so as to drain to the drainage swales and revegetate with native grasses in the fall.
- Line drainage swales with erosion control mat as shown on Drawings D-8 through D-10. Note: the CBW Box enclosure and SCB Protection Barrier will not be susceptible to normal landfill

settlement. Therefore the regrading of the landfill cap will need to take this lack of settlement into account and still allow for settlement of the normal waste mass. As a result, there is a need to install drainage swales tied into the SCB Protection Barrier and still allow for controlled drainage to the eastern siltation basin. The edge of Zone A will be lowered, which will reduce the existing cover's susceptibility to runoff-related erosion. The drainage swale itself will be lined with an erosion control mat as shown on Drawings D-9 and D-10.

8.2 SCB PROTECTION BARRIER

Prior to the start of the SCB Protection Barrier installation:

- Pull back the cover and remove engineered fill to the location and section shown on the drawings.
- Cut/fill to planned top-of-wall elevation along centerline of SCB Protection Barrier alignment and prepare a working pad a minimum of 15 feet on either side of centerline (minimum total width of 30 feet)
- Compact working pad to 90 percent Modified Proctor.

At the completion of the SCB Protection Barrier installation:

- Clean the working pad of all excess slurry to firm sub-base.
- Replace the engineered fill foundation layer (compacted to 90 percent Modified Proctor) as shown on Drawings D-9 and D-10.
- Install GCL material placed as shown on Drawings 9 and 10.
- Install and fusion-weld 40-mil HDPE geomembrane liner (or matching the existing liner thickness) as shown on Drawings D-9 and D-10.
- Install air intake piping to allow ambient air to enter the subsurface, while preventing landfill gasses from escaping into the atmosphere, as shown on Drawing D-11. Install and fusion-weld the 40-mil HDPE boot around the risers for the air intake piping as shown on Drawing D-11.
- Install geocomposite drainage layer as shown in Drawings D-9 and D-10 and configure to discharge drainage to the surface drainage swales.
- Key all geosynthetics into drainage swale centered above SCB alignment as shown on Drawings D-8 through D-10.
- Install a 12-inch-thick topsoil vegetative layer graded so as to drain to the drainage swales and reseeded with native grasses in the fall.
- Line drainage swales with erosion control mat as shown on Drawings D-8 through D-10.

9.0 WORK RECORDS

General records of the project construction to be prepared by the Contractor daily during the work are to include the following at a minimum:

- Date of shift
- Names of key personnel and their duties
- Weather conditions including maximum and minimum daily temperatures, rainfall, and time lost to inclement weather
- Health and safety comments
- General description of work completed during the day
- Planned works for the subsequent day
- Notation of any visitors to the site and their affiliation
- Photographs of completed work for the day and milestone events.

Additional records to be compiled by the Contractor during the construction of the slurry wall (CBW or SCB) are to include the following, at a minimum:

- Daily progress, wall excavation depth, trench lengths to date, and difficulties encountered
- Daily testing and sampling report.

Additional records to be made by the Contractor during the MSW extinguishment phase of the project are to include the following, at a minimum:

- Daily progress of the MSW/bentonite slurry blending operation
- Daily progress of the addition of Portland cement to the MSW/bentonite slurry blending operation.

The following additional records will be made by the Contractor during construction of the final surface works, at a minimum:

- Daily progress of fill placement with compaction records
- Daily progress of HDPE geomembrane liner, GCL, and drain layer placement
- Daily progress of protective cap placement and surface drainage construction.

Upon completion of the works, a complete and detailed Construction Summary Report will be prepared and include the following items:

- Description of the construction activities including any deviations and changes from the original design
- Copies of material submittals, monitoring reports, and analytical test data
- Copies of daily progress reports, field compaction records, and liner welding test results
- Field temperature measurement records of excavated waste (both before and after slurry quenching)

- Photographs documenting construction activities
- As-built drawings tobe supplied by the Contractor to the Superintendent; the as-built drawings will include survey measurements of the installed features
- Monitoring data conducted in satisfaction of Task 2B of EO 10651
- Health and safety plan construction monitoring (including relevant air monitoring).

10.0 CONSTRUCTION QUALITY CONTROL

Construction quality control measures to be performed by the Contractor are discussed below.

10.1 SAMPLING FOR TESTING OF SET PROPERTIES

Samples for later testing of the set properties of the cementitious slurry will be made by pouring representative slurry samples collected from within the slurry-filled trench excavation into sample tubes; samples will be collected before the slurry sets.

Sample tubes will be 3-inch nominal diameter plastic cylinders with a minimum 6-inch length. The ends of the sample tubes will be square and free from burrs, and the inside of the tubes will be clean at the time of sampling. Filled sample tubes will be labeled with the contract name, location, date, and depth of sample, and will be assigned a unique reference number.

Sample location points will be at intervals of distance along the wall such that there is one sample location point per 1,500 square feet of projected wall area and not less than one set of sample locations per day's production. Samples will be collected the same day as the slurry is produced, except when excavation to full depth takes more than 1 day.

Representative wet sample sets of slurry will be collected from 5 to 10 feet below the top of the trench at each sample location point. The means of sample collection will ensure that the sample is taken from the zone intended.

The CB fluid slurry samples at each location will be carefully poured into five individual sample tubes in such a way that air is not entrapped in the slurry. Without delay, the sample tubes will be closed with a sealed lid or push-on end caps and then seal-taped to avoid moisture loss. Samples will be transported with care by hand, and transport will be avoided during the initial set phase. During storage and later transportation, care will be taken to avoid damage by impact or vibration. Samples will not be extruded until required for laboratory testing.

The samples will be stored in an environment such that they are not subject to extreme variations in temperature. Samples will be stored and transported upright at all times.

10.2 LABORATORY TESTING

Testing the set properties of the CB slurry will be performed at Material Testing and Consulting Inc., located in Tukwila, Washington. This laboratory has been previously used by Clearcreek and has suitable equipment and experience in testing cementitious slurries.

The Contractor will record and submit to the Superintendent a record of each sample taken for testing, giving the wall location, date, depth, and a reference number. The minimum testing requirement will be one strength test and one permeability test for each 100 lineal feet of wall length and a minimum of one test per sidewall of the CBW Box enclosure.

The samples will be carefully extruded vertically from the sample tubes and trimmed in a progressive manner to avoid shearing the material. Any hollows in the top or bottom of the sample will be removed by careful trimming off the surrounding high zones.

Specified slurry, permeability, and unconfined compression strength tests for the CBW will be carried out and reported in accordance with the procedures stated in Section 5.2.

Specified testing of the SCB Protection Barrier will be carried out and reported in accordance with the procedures stated in Section 6.1.

The Contractor will provide the Superintendent with a full copy of each laboratory test result within 1 week after receiving the test data from the laboratory.

11.0 POST-CONSTRUCTION MONITORING

This section addresses Scope of Work (SOW) Task 2B of Enforcement Order DE 10651 (EO). Task 2B stipulates that a monitoring network will be installed upon completion of the combustion extinguishment actions conducted under SOW Task 2A of the EO. The purpose of the monitoring network is to document that the extinguishment action has successfully addressed the subsurface combustion.

11.1 MONITORING APPROACH

Task 2B monitoring will consist of a subsurface thermocouple array using the same installation methods as for the current thermocouple array in the area. Thermocouples will be located at discrete depths around and within the CBW Box enclosure constructed for extinguishment of the subsurface combustion. The plan view location of the thermocouple array is shown on Figure 3. The thermocouples will be installed at 5-foot intervals from 5 feet bgs to approximately 5 feet below the bottom of the CBW (i.e., ±380 feet msl). The final thermocouple locations and depths will be determined based on final CBW orientation and depth determined during construction.

The thermocouple array will use the same model K-type thermocouples and data loggers as in the current thermocouple array. Data loggers will be programmed to record temperature hourly.

11.2 SCHEDULE

The thermocouples will be installed within 5 days of completion of the combustion extinguishment activities and demobilization of equipment from the CBW Box enclosure area, or as soon thereafter as possible based on drilling contractor availability. Installation of the thermocouple array may be delayed if access to the area is required for construction of the SCB Protection Barrier or if the newly installed thermocouples could be damaged by equipment movement during barrier construction.

Data will be downloaded weekly and a summary of subsurface temperatures provided to Ecology. If temperatures are stable for a period of 4 weeks, the data loggers will be reprogrammed to record daily. Data will be downloaded at the end of each month and provided to Ecology with the monthly status report. If temperatures remain below 170°F for a period of 6 months, the combustion extinguishment will be considered successful and thermocouple monitoring terminated.

FIGURES

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PROPOSED CONTAINMENT WALL

APPROXIMATE LIMITS OF BALEFILL AREA

APPROXIMATE LIMITS OF RAMP

PROPOSED CONTAINMENT WALL EXCAVATION LIMITS

0 2.5 5 10

APPROXIMATE SCALE: 1" = 10'

TB-24B REFUSAL-21'

TB-24D REFUSAL-18'

TB-24C REFUSAL

TB-24 2006267.8720 337888.1498

TB-25 2006285.0897 337886.0613

TB-23 2006258.6213 337877.5105

TB-26 2006295.6627 337876.8305

TB-27B 158.9°

TB-27 REFUSAL 2006305.6962 337869.5929

TB-28 2006317.7650 337859.4801

TB-29 2006308.1377 337830.2276

TB-30 2006302.6973 337824.5201

VEW-05

VMP-16S

VMP-15S

VMP-15D

VMP-12S

VMP-12D

VMP-14S

VMP-14D

SB-6B*

SB-6*

SB-4*

SB-5*

SB-2/1

SB-2/2

SB-2/3

SB-7*

SB-3*

SB-1

TB-1*

TB-2*

TB-3*

TB-4*

TB-5*

TB-6*

TB-7*

TB-8*

TB-9*

TB-10*

TB-11*

TB-12*

TB-13

TB-14

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TB-17

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TB-19

TB-20

TB-21

TB-22

GIP-6S*

GIP-6D

GIP-14

GIP-19

GIP-10

GIP-12

GIP-5S

GIP-5D

GIP-15

GIP-18

GIP-11

GIP-13

GIP-16

GIP-17

GIP-3S

GIP-3D

GIP-4S

GIP-4D

GIP-9

GIP-15

GIP-2S

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EB-5

EB-12

EB-6

EB-13

SP-6

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425

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425

Source: Environmental Partners Inc.

Job No. 60428541

Figure 1

Location of Supplemental Temperature Investigation and Final Layout of CBW Box

AECOM

IWAG Group III Pasco Landfill
1901 Dietrich Road, Pasco, WA

60428541_01.ai

FENCELINE

PROPOSED CONTAINMENT WALL

APPROXIMATE LIMITS OF BALEFILL AREA

PROPOSED CONTAINMENT WALL EXCAVATION LIMITS

Approximate Centerline of SCB Protection Barrier

APPROXIMATE LIMITS OF GEOMEMBRANE

INERT WASTE AREA

BURIED SVE PIPING

LINER NOTCH

EB-1
EB-2B
EB-2
EB-3
EB-4
EB-5
EB-12
EB-13
EB-6
EB-7
EB-8
EB-14
EB-15
EB-11
EB-11B
EB-9
EB-10

VEW-05
VEW-06I
VEW-06S
VEW-06D
VEW-07I
VEW-07S
VEW-07D
VEW-04

VMP-01
VMP-02
VMP-03
VMP-04
VMP-05
VMP-06
VMP-07
VMP-08
VMP-09
VMP-10
VMP-11S
VMP-11D
VMP-12S
VMP-12D
VMP-13S
VMP-13D
VMP-14S
VMP-14D
VMP-15S
VMP-15D
VMP-16S

VMW-50S
VMW-51I
VMW-51D

MW-52S
MW-53S
MW-14S

EE-2
PH-38

GIP-1S
GIP-1D
GIP-2S
GIP-2D
GIP-3S
GIP-3D
GIP-4S
GIP-4D
GIP-5S
GIP-5D
GIP-6S*
GIP-6D
GIP-7
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VB-19

0 10 20 40
APPROXIMATE SCALE: 1" = 40'

N

NOTES

EB-14	PROPOSED EXPLORATORY BORING LOCATION
EB-1	EXPLORATORY BORING LOCATION (JUNE 2015)
VEW-07S	VAPOR EXTRACTION WELL LOCATION
MW-53S	MONITORING WELL LOCATION
VMP-13S	VAPOR MONITORING PROBE LOCATION
VMW-51I	VAPOR MONITORING WELL LOCATION

Figure 2

Locations of Supplemental Geotechnical Borings and Approximate alignment of SCB Protection Barrier

Source: Environmental Partners Inc.

Job No. 60428541

AECOM

IWAG Group III Pasco Landfill
1901 Dietrich Road, Pasco, WA

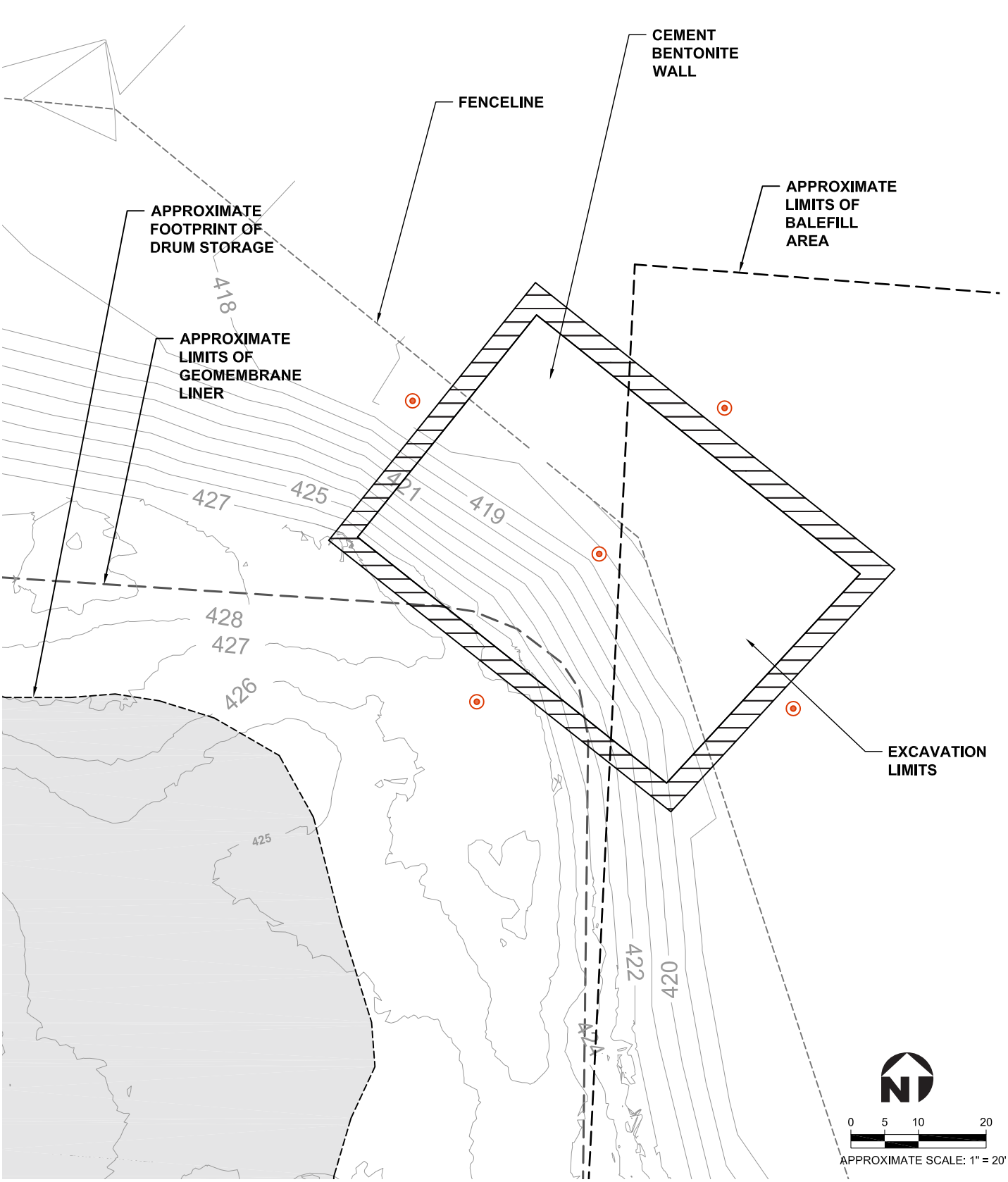

Figure 3

Post Extinguishment Thermocouple Array

Job No. 60428541

AECOM

IWAG Group III Pasco Landfill
1901 Dietrich Road, Pasco, WA

ATTACHMENT A

Ecology Conditional Approval Letter Dated July 8, 2015

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4601 N Monroe Street • Spokane, Washington 99205-1295 • (509)329-3400

July 8, 2015

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William (Chip) Goodhue, LG
Aspect Consulting LLC
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Sean Gormley, EAC, CHMM
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Portland, OR 97224

RE: Pasco Landfill – Ecology Conditional Approval - Technical Execution Plan for the Balefill Area Extinguishment and Supplemental Protection Barrier Project

Dear Messrs. Riley, Goodhue, and Gormley:

On June 5, 2015, Ecology received an electronic (.pdf) version of a document titled *Draft Technical Execution Plan for the Balefill Area Extinguishment and Supplemental Protection Barrier Project.* The draft document was prepared by the Industrial Waste Area Group (IWAG) Group III in association and consultation with AECOM, Anchor QEA, LLC, Clearcreek Contractors, Inc., and Environmental Partners, Inc. The draft Technical Execution Plan (TEP) provides technical details of a proposed plan to extinguish subsurface combustion near the interface between the Balefill Area and Zone A. The TEP also includes proposed activities to install a supplemental protection barrier designed to provide an expanded level of pneumatic isolation around portions of the Zone A waste repository, and an enhanced level of physical separation where municipal solid wastes (MSW) abut the northern and eastern edges of Zone A. The proposed activities described in the draft TEP are intended to partially satisfy the Task 2A requirements of Enforcement Order No. 10651.

Ecology has completed its review of the June 5, 2015 draft TEP. We discussed a number of specific TEP-related components during a conference call with representatives of the IWAG, their technical consultants, and Landfill Group representatives on June 30, 2015. This multi-party conference call provided a forum for discussion and clarification of several aspects of the proposed fire extinguishment, protection barrier wall construction, and monitoring-related activities described in the draft TEP. The June 30, 2015 discussions also highlighted certain air quality-related considerations and requirements that had not been addressed in the draft TEP.

In response to our review of the draft document and discussions with you on June 30, Ecology is providing conditional approval of the work elements described in the June 5, 2015 TEP. This conditional approval is based on the following understanding:

- PLPs will address and respond to the body of comments included herein and will incorporate appropriate changes into a revised version of the TEP, submitted to Ecology at least five working days prior to construction start-up.
- PLPs will provide Ecology with documentation confirming a waste management agreement is in place between the IWAG and Pasco Sanitary Landfill, Inc. (PSL) prior to initiation of the proposed construction activities. PLPs also shall provide confirmation of PSL's approval to locate the portable slurry/cement batch plant and material storage area from the Balefill Area to the fenced enclosure located due east of the PSL facility shop building.
- PLPs will provide Ecology with detailed boring logs from the latest SCB Barrier Wall Alignment investigation work as soon as possible. The documentation shall satisfy the requirements of subsection VIII.E of Enforcement Order No. 10651.
- PLPs will provide Ecology with a summary of overall findings from the SCB Barrier Wall Alignment investigation work, including the geotechnical and analytical testing results, and results from the forthcoming supplemental subsurface temperature evaluation. These shall be provided to Ecology at least five working days prior to construction start-up. The documentation shall satisfy the requirements of subsections VIII.E and VIII.G of Enforcement Order No. 10651.
- PLPs will address any and all air quality-related requirements associated with proposed batch plant activities prior to batch plant operations. These activities, for example, may trigger the provisions of General Order of Approval No. 11AQ-G0-02, administered by the WA State Department of Ecology Air Quality Program or any other requirements as stipulated in subsection VIII.N of Enforcement Order No. 10651.
- PLPs will provide Ecology with formal documentation describing any additional IWAG personnel who may be acting as technical representatives with decision-making authority over selected aspects of the construction work. This notification shall satisfy the requirements of subsection VIII.D of Enforcement Order No. 10651.
- PLPs will provide Ecology with the final footprint of the CBW Box and SCB Protection Barrier based on the information obtained from the supplemental investigations. Ecology will anticipate receipt of the supplemental investigation findings within 15 working days of completing the drilling and sampling work, including any revisions to the layout of the CBW Box and the SCB Protection Barrier.

Ecology will issue a written Construction Notice to Proceed once these conditional requirements have been fully satisfied and/or accepted by the PLPs in writing.

Ecology's comments on the draft June 5, 2015 TEP are presented below. They address many of the same issues discussed during our June 30, 2015 conference call with the IWAG and Landfill Group. Please notify Ecology immediately if these conditional approval requirements are not acceptable to the IWAG, or cannot be satisfied within the timeframes identified above.

General Comments

- The PLPs should consult and coordinate with local government entities including Fire District #3, City of Pasco, and Benton-Franklin Health District. In addition, a pre-construction kick-off meeting should occur and include the aforementioned entities as well as Ecology. The PLPs should specifically consult with Franklin County Fire District No. 3 regarding the specific fire-related equipment and approaches that will be utilized during the project. In addition, it may be prudent (or a requirement by the Fire District) to have a water tanker truck available on-site for emergency firefighting in the event of an unexpected flare-up or displaced ember.
- The PLPs should review the SEPA checklist associated with EO 10651 to ensure the activities described in the TEP align with descriptions in the SEPA checklist. Identification of any SEPA checklist-related changes in response to currently proposed construction activities (i.e., different work hours or work days; use of a light plant to support construction work; noise abatement measures when working non-typical hours; additional site security measures; etc.) may require an addendum to the existing SEPA checklist. If the PLPs identify any changes, please consult with Ecology to determine the best path forward.
- Please provide a Gantt chart that details the anticipated schedule for this project.

Specific Comments

1. **Page 1, Section 2.0:** Reference to Task 2B should be changed to Task 2A.

2. **Page 2, Section 2.0:** As noted elsewhere in the TEP, the bottom of the trench also may be keyed into coarser-grained Transition Zone materials above the Upper Pasco Gravels.

3. **Page 2, Section 3.0:** Somewhere it would be appropriate to see mention of the term "pneumatic separation" since we are dealing with vadose zone processes.

4. **Page 2, Section 3.1.1:** The second paragraph mentions how "...the trench will...prevent oxygen from contacting the waste materials." This statement may overstate what can be accomplished by the slurry trenches alone. The soils beneath the waste (and the waste itself) have some finite degree of pneumatic permeability. Natural barometric fluctuations

have been shown to move air vertically through the waste materials – this would include any waste materials located within the proposed interior of the CBW until the top of the Box enclosure is "sealed" with bentonite slurry. The slurry wall will reduce lateral vadose zone air movement, but the wall (by itself) will not "prevent" vertical movement of air/oxygen into the Box interior.

5. **Page 3, Section 3.1.3:** During our discussion with IWAG and Landfill Group representatives on June 30, 2015, Ecology sought additional explanation of the proposed submerged quench process, including the staggered-slot excavation approach. Ecology requested additional details from the contractor regarding possible stability limitations associated with parallel, 6-8' wide x 35' tall "slots" excavated within the waste mass. The draft TEP provides limited discussion of possible logistical or operational challenges to excavate, construct and maintain a stable, staggered sequence of slot trenches within the Balefill waste materials. Ecology requests additional discussion of the actual process by which the wastes within the CBW box will be equally mixed and quenched, and the potential challenges to achieve this goal. This proposed slot trench approach is a critical element of the proposed fire extinguishment process.

   Ecology recognizes there could be logistical impediments which limit the ability to fully excavate and/or mix slurry into all the waste materials within the limits of the CBW box enclosure. However, based on the information provided during the June 30 conference call, Ecology does not believe these potential limitations will undermine the goal of achieving a sufficient degree of slurry mixing and quenching to extinguish the combusting materials. Ecology views these potential limitations as an acceptable consequence of using this approach. Please, however, provide additional discussion of these potential limitations in the revised TEP. If unforeseen problems or complications arise with this proposed approach, the revised TEP also should discuss contingency actions to be performed to ensure the combusting/smoldering/high temperature wastes are adequately stabilized and extinguished. Please also see Comment 35.

6. **Page 4, Section 3.2.1:** Integration with local fire district: It may be prudent (or a requirement) to have a water tanker truck available on-site for emergency firefighting in the event of an unexpected flare-up or displaced ember. Additional discussion of any specific fire-related equipment or approaches should be discussed with Franklin County Fire District No. 3 prior to initiation of the construction work.

7. **Page 6, Section 3.2.4:** For a 380' long alignment, there will be about five separate 70' sections where the slurry will be "displaced" and replaced by SCB backfill material. Please specify what methods will be employed to limit the spread of slurry (potentially containing low levels of contamination resulting from incorporation of trench side-wall material) away from the immediate trench area and maintain a safe work zone near the trench.

8. **Page 7, Section 4.1, fifth bullet:** Ecology will require approval of any admixtures other than Portland cement, bentonite, and soil used to produce a cementitious slurry. For example, additional chemical analysis information will be required before granulated blast furnace slag, fly ash, and/or plasticizers are approved for use.

9. **Page 7, Section 4.1, MSW definition:** This work constitutes a remedial action under MTCA. These loose wastes and Balefill materials are considered MSW. Ecology is unclear what point of clarification is being presented, or is intended, by the second sub-bullet. Please revise or further clarify.

10. **Page 8, Section 4.3:** Please note that the loose MSW and apparent tire debris have been shown to extend, in part, under portions of the Zone A perimeter. Please revise this description.

11. **Page 9, Section 4.3:** As of the date of these comments, additional subsurface information has become available and is expected to result in modifications to certain elements of the existing draft TEP. Ecology will require the opportunity to review and discuss the anticipated implications of these new findings on the preliminary design concepts presented in the draft TEP before issuing an approval and notice to proceed with the proposed construction activities.

12. **Page 9, Section 4.4, first paragraph:** In order to comply with EO 10651, all engineering documents prepared in support of this order shall be under the seal of a professional engineer registered by the State of Washington.

13. **Page 9, Section 4.4, second paragraph:** The TEP should include a sheet showing anticipated final grading elevations within the footprint of the construction areas following completion of all fire extinguishment work.

14. **Page 9, Section 4.5:** During our conference call with IWAG and Landfill Group representatives on June 30, 2015, an alternative location for the slurry plant was discussed. Please modify the design drawings to reflect this proposed relocation of the slurry plant and material storage area, and include the anticipated haul and access routes to be used by on-site heavy equipment in support of the proposed construction work. Please also see Comments 32 and 55.

15. **Page 9, Section 4.7:** Franklin County Fire District No. 3 and/or Franklin County Emergency Management have the jurisdictional authority to issue a stop-work notice in the event that site or weather conditions pose or present a potential fire threat. The Franklin County Fire District and Franklin County Emergency Management will need to be notified of this latest phase of proposed fire extinguishment work. The PLPs should discuss the proposed extinguishment activities with these local entities (including Ecology participation) before any construction work commences to ensure compliance with any local fire district and/or emergency management requirements. For example, the

need to maintain a water truck on-site for emergency fire extinguishment purposes may be identified as a local jurisdictional requirement.

16. **Page 9, Section 4.7:** Per discussions with IWAG and Landfill Group representatives on June 30, 2015, Ecology understands revisions to the originally proposed working hours (7 a.m. to 7 p.m.) are being considered. Specifically, the IWAG's contractor (Clearcreek) has proposed working hours of 3 a.m. to 12 noon to limit heat-related health and safety issues for its workers. These hours fall outside the timeframe originally specified in the SEPA checklist. These non-standard work hours introduce possible concerns related to noise, traffic, and/or the use of temporary lighting. Ecology will confirm any SEPA-related modifications that may be required to support these modified work hours. If allowed, the TEP and/or Health and Safety Plan must provide a description of the specific limits that will be established for noise, light and local truck traffic, and how these limits will be monitored during the active construction period.

17. **Page 10, Section 4.8:** As noted above, given the nature of the proposed fire extinguishment activities, additional notification and approval from the Franklin County Fire District No. 3 and/or Franklin County Emergency Management also may be required.

18. **Page 10, Section 4.9:** Please note that material of unknown composition was encountered in EB-2 during the recent supplemental drilling. Ecology understands this material will undergo full suite laboratory analysis to better determine its composition. More generally, the proposed work is occurring within the footprint of Zone A, which is known to contain considerable quantities of industrial hazardous waste. Work activities should be designed to maintain an awareness of potentially unrecognized conditions, including the presence of hazardous substances within the footprint of Zone A and/or within the Balefill Area waste materials. Note also that combustion of municipal wastes and/or tire debris potentially can generate combustion by-products which categorize as hazardous substances.

19. **Page 10, Section 4.10, first paragraph:** As noted earlier in this letter, construction will not be given the authorization to proceed without an agreement in place specifying the waste disposal protocols and responsibilities of all parties involved. See conditional approval Bullet 2.

20. **Page 10, Section 4.10, second paragraph:** The PLPs will be responsible for determining the disposition of any soil and/or waste materials requiring off-site disposal based on appropriate methods of waste profiling and characterization. Ecology is unclear regarding the protocols that will be followed, and the degree of documentation generated, to support instances where waste characterization authority and waste management decisions will be guided solely by "other generator knowledge." If so, Section 4.1 needs to include a specific definition for the term "generator" describing persons or entities who

will be acting in such a capacity and their specific role in making waste disposal decisions.

21. **Page 10, Section 4.10, third paragraph:** As noted in Comment 19 and conditional approval Bullet 2, construction shall not occur until a waste disposal agreement is in place between the PLPs, and the agreement has been shared with, reviewed by, and endorsed by Ecology. All waste materials excavated in support of the proposed construction activities shall be characterized and managed in accordance with applicable solid waste regulations.

22. **Page 11, Section 5.1, first paragraph:** Time-series temperature measurements from the dedicated (VB-series) thermocouples, spot temperature measurements taken at existing Gas Injection Probes (GIPs), and supplemental subsurface temperature information from the EB-series boreholes will establish the basis for determining the 170° F isotherm. The TEP must identify the likely components of this existing monitoring/gas injection network that will undergo decommissioning, and the method(s) that will be used to properly decommission these devices.

23. **Page 11, Section 5.1, second paragraph:** Please identify the anticipated locations of the supplemental DPT investigation boreholes. Please provide a map showing their anticipated locations.

24. **Page 12, Section 5.2, first paragraph:** Based on experience at other slurry wall sites, please specify the estimated volume of CB slurry that likely will be required to complete the CBW Box enclosure based on currently estimated excavation depths, side-wall dimensions, and anticipated slurry loss volumes. Sizable voids may be present within the waste materials and may result in a higher volume of slurry to construct and maintain the CBX Box enclosure.

25. **Page 12, Section 5.2, second paragraph:** The TEP provides limited discussion of the underlying technical basis for establishing these particular design goals and design parameters for the slurry wall. Please provide additional discussion regarding the technical and/or logistical basis for these particular specifications.

26. **Page 12, Section 5.2, fourth paragraph:** How will this slurry wall strength specification be determined in the field? Who will make this determination? Please specify.

27. **Page 13, Section 5.2, Table 1:** The ultimate purpose for the CB slurry trench forming the CBW box enclosure is twofold: create a non-combustible barrier around the existing zone of combustion that limits potential lateral spreading of the subsurface fire; and minimize passive air movement within the containment box, creating an oxygen-limited isolation zone. Please provide additional discussion of how the proposed laboratory-determined hydraulic conductivity (permeability) value of 1E-06 cm/sec will compare to

in-field, pneumatic permeability values that will develop once the CB slurry trench wall has fully cured, and experiences desiccation over time.

28. **Page 14, Section 5.5:** Ecology will require chemical laboratory testing results for any coal fly ash and/or granulated blast furnace slag used as additives in the CB slurry mix.

29. **Page 14, Section 5.6:** Other than gauging off the length of the bucket arm, what specific method will be used to verify the wall depths? In addition, the total quantity of slurry added to the trenches should be compared to the estimated trench volume so the total volume (mass) of slurry used to create the CBW box enclosure can be calculated, and the volume of "formation loss" can be estimated. Based on the CBW box dimensions shown on Figure 1 (186' x 35' x 3'), the trench will have a nominal volume of around 19,500 cu ft. or about 725 cu yds.

30. **Page 14, Section 5.8:** Ecology notes that the proposed design permeability of the CBW box enclosure slurry wall is 1E-06 cm/sec, whereas the proposed design permeability of the SBC Protection Barrier wall is 1E-07 cm/sec. Please provide an explanation somewhere in the document describing the technical rationale for the specific permeability goals selected for these two components of the proposed work. Ecology assumes the 1E-06 permeability value will apply within the "shared" portion of the slurry wall (i.e., southwest side of the CBW box enclosure) into which the north and east SCB Protection Barrier Walls are keyed.

31. **Page 15, Section 5.8:** See earlier Comment 28 regarding the analytical testing requirements for any coal fly ash and/or granulated blast furnace slag that may be used as an additive or admixture in the slurry mix design.

32. **Page 15, Section 5.9:** As discussed in the June 30 conference call, Ecology is concerned with establishing the slurry mixing operation over portions of the Balefill Waste disposal area. The static and dynamic loads potentially involved with the material storage, vehicle traffic, and slurry plant infrastructure have not been specified, and the overall stability of the balefill wastes and associated soil cover has not been investigated in this area to support these proposed activities. Furthermore, these proposed activities, while relatively short-term in duration, are not consistent with typical landfill cover post-closure activities as envisioned under WAC 173-304 and/or WAC 173-351. Please identify a suitable alternative location for this operation that affords appropriate geotechnical stability and accommodates anticipated traffic flow. The TEP should include a traffic control plan and a spill control plan which address the specific protocols to be taken for managing on-site movement of large equipment (dump trucks, loaders, etc.) and the specific actions to take in the event of a vehicle-related release or spill. Please also see Comment 14.

33. **Page 17, Section 5.13.1:** The quantity of slurry loss likely could be significant. Ecology requests additional discussion of the anticipated slurry height to maintain the stability of the trench wall based on experiences at other sites.

34. **Page 17, Section 5.13.3:** Based on experiences at other sites, please specify how much localized settlement is expected to occur over the trenches as the result of desiccation.

35. **Page 18, Section 5.14:** See earlier Comment 5 from Section 3.1.3. Ecology requests additional discussion of the anticipated stability of the slurry-infused waste to support the staggered-slot excavation approach. Please describe where this approach has been successfully applied at other sites involving trench depths of 35-40 feet. Please discuss possible consequences and/or alternative excavation approaches that the IWAG's contractor will use if this excavation and waste stabilization approach cannot be completed, as planned.

36. **Page 18, Section 6.1:** The revised TEP must address any potential slope stability or geotechnical concerns associated with the north end Zone A soil cracks discovered during a June 18, 2015 site visit, and possible actions the construction contractor will take to address this recently-identified condition. This concern was discussed with the IWAG and its technical representatives during our June 30, 2015 conference call.

37. **Page 19, Section 6.1, Table 2:** Section 3.2.4 describes how the bentonite slurry used during excavation of the SCB protection barrier trench will be "displaced" by the SCB backfill. Please provide additional explanation of what happens to the displaced bentonite slurry (i.e., does all or some get mixed into the SCB backfill? What is its final disposition?). If contaminants become incorporated into this displaced slurry material, please describe the approaches that will be used to manage these materials.

38. **Page 21, Section 6.10.2:** As noted in Comment 18, material of unknown composition was encountered in borehole EB-2A during the recent supplemental drilling event. Ecology understands this material will undergo full suite laboratory analysis to better determine its composition. Companion borehole EB-2B, excavated several feet north of EB-2A, did not appear to encounter this same material. As the SCB protection barrier trench is excavated, it is possible that zones or pockets of contaminated material could be encountered. Given the space constraints along the existing alignment, trench width requirements, and possible geotechnical considerations in this area, maintaining an adequate offset distance from areas of known contamination may be challenging. The TEP should provide additional discussion describing operational protocols or adjustments in the event unexpected contamination or waste debris is encountered as trenching proceeds.

39. **Page 22, Section 7.0, second paragraph:** The contracted waste disposal facility will be responsible for determining whether supplemental sampling and analysis of soils and/or waste materials excavated from within the top 5-8 feet of the CBW Box is required to satisfy its waste characterization and acceptability requirements.

40. **Page 22, Section 7.0, third paragraph:** The existing Zone A geomembrane consists of 40 mil HDPE. Please revise. In addition, the recent supplemental boring investigation work has confirmed that much of the SCB Barrier Trench (north arm) will occur within the footprint of the Zone A geomembrane; thus, soil material lying beneath the geomembrane will (not *may*) be excavated down to the native soil unit. Please revise this discussion accordingly in the revised TEP.

41. **Page 22, footnote 1:** As noted in Comments 19 and 21, no construction activities shall occur until a multi-party Waste Management Plan has been developed, and Ecology receives documentation verifying the necessary legal and administrative arrangements are in place between the PLPs to address all waste management and disposal elements required for this work.

42. **Page 23, Section 7.0, top paragraph:** Any soils exhibiting evident indications of contamination (e.g., VOCs in soil headspace >20ppm; notable chemical odors; physical appearance, oily sheen) must be segregated and designated for additional characterization and offsite disposal. These questionable materials should not be reused within the SCB slurry mix.

43. **Page 23, Section 7.0, second paragraph:** As noted above, the existing Zone A geomembrane consists of 40 mil HDPE – not LLDPE. Please revise. Please also revise the reference to LLDPE in Sections 8.1 and 8.2.

44. **Page 23, Section 7.0, second paragraph and bullets:** Given the potential variability in the composition of Zone A waste materials, this proposed number of samples seems inadequate for characterization purposes. Please consider increasing the current sampling frequency by a factor of 2. For a trench length of 380 feet (per drawing 7), a total of 1480 Cy will be excavated. Ecology understands that much of this material potentially could be reused (if clean) for preparation of the SCB backfill. Characterization requirements for "excess soils" ultimately will be determined by the waste disposal facility receiving this material. Please ensure that all waste characterization-related laboratory analysis results are included in the final construction report.

45. **Page 23, Section 7.0, fifth paragraph:** With respect to VOC analysis of soils, please follow the protocols identified in Ecology's June 17, 2004 memorandum titled ""Collecting and Preparing Soil Samples for VOC Analysis, Implementation Memorandum #5" (document no. 04-09-087).

46. **Page 24, Section 7.0, second paragraph:** Please specify the reporting limits for these various laboratory analyses.

47. **Page 24, Section 8.1, fifth bullet:** The term "Cap Plans" is referenced here. Please specify the document or drawings to which this term is applied.

48. **Page 24, Section 8.1, seventh bullet:** Ecology requests further description of the technical basis and engineering design rationale for the perimeter edge drainage swales. How will this current engineering modification to Zone A change the cover's existing susceptibility to run-off related erosion? Please describe. This topic was touched upon during Ecology's June 30, 2015 conference call with IWAG and Landfill Group representatives.

49. **Page 24, Section 8.2:** The draft TEP includes a design for the SCB Protection Barrier Wall involving an above-grade extension of nearly 5 feet in some locations. Ecology discussed the rationale for this design element during our conference call with IWAG and Landfill Group representatives on June 30, 2015. Please incorporate a discussion of the updated SCB Protection Barrier Wall design and construction elements into the revised TEP.

50. **Page 25, Section 8.2, top bullet:** This bullet reconfirms the likelihood that some slurry will be displaced out of the SCB trench by the backfill installation process. Please see earlier Comment 37 and concerns over the proper containment and management of contaminated slurry.

51. **Page 25, Section 8.2, fifth bullet:** Drawings 8-10 show the 8" diameter perforated ADS Collector Pipe positioned directly below the geomembrane. The risers would need to pass through the geomembrane, and be booted properly. Please provide a typical boot design detail drawing in the revised TEP.

52. **Page 25, Section 9.0:** The revised TEP needs to describe the documentation that will be prepared following completion of the construction work. Ecology expects preparation of a detailed construction summary report describing the approaches used, submittals, monitoring and analytical testing data, material quantities used, physical properties testing results, deviations and changes from the original design, daily progress reports, field compaction records, field temperature measurements of the excavated waste materials (both before and after slurry quenching), photographs, final as-built design drawings, and any other applicable documentation to adequately document this work in satisfaction of EO 10651. The report also shall include all monitoring data conducted in satisfaction of Task 2B of EO 10651.

    Air monitoring conducted in support of this work (including monitoring conducted in accordance with the AECOM Health and Safety Plan, and air monitoring activities conducted in accordance with the April 27, 2015 Addendum to Health and Safety Plan prepared by EPI) shall be recorded and included as part of the project records.

53. **Page 27, Section 10.2, second paragraph:** The proposed protocol of sampling for strength and permeability on a per 100 lineal foot of wall basis will result in four samples to represent the SCB Barrier Wall and two samples to represent CBW Box enclosure. Ecology seeks to verify if this number of samples is considered adequate to satisfy

project construction QC requirements. Please consider adding additional samples for laboratory testing to enhance the level of construction QC associated with this effort, if appropriate.

54. **Page 27, Section 11.1:** Ecology prefers to have ongoing, subsurface temperature monitoring during all phases of the proposed construction. However, based on discussions with IWAG and Landfill Group representatives on June 30, 2015, Ecology understands most of the existing network of thermocouples, gas injection probes (GIPs), and gas monitoring probes are expected to fall within the "active" construction zone. These probes and monitoring devices will undergo decommissioning just prior to construction start-up. Ecology understands a supplemental subsurface temperature investigation also will be conducted within two weeks of starting construction. This supplemental DPT-based temperature assessment, along with final temperature measurements from the existing network of thermocouples and GIPs, will provide the basis for determining the fire's extent and any late-stage changes in CBW box wall design/extent. Please describe this understanding in the revised TEP. Please also describe the anticipated methods to decommission these monitoring devices and probes, and the associated documentation that will be generated. Please also include a figure showing which existing monitoring devices will be retained for possible future use.

    Ecology concurs with the post-construction monitoring planned for the area around and within the CBW Box. Ecology may require additional thermocouple monitoring stations beyond what is shown on Figure 1; for example, placing an additional station due west of the CBW Box near the "425" contour value shown on Figure 1. These monitoring requirements will be discussed with the IWAG upon completion of the fire extinguishment efforts within the CBW Box.

55. **Drawings D2 and D4:** As noted in Comments 14 and 32, please consider repositioning the slurry mixing and staging area off of the Balefill Area.

56. **Drawing D4:** Please highlight the area where soil cracks have been recently identified along the northern flanks of Zone A. In addition, please revise the proposed position of the CBW Box and the SCB Protection Barrier to reflect the updated zone of combustion (i.e., pre-construction thermocouple and GIP measurements, and data from the supplemental DPT investigation). Please also revise the anticipated position of the subsurface soil/waste contact zone along the northern and eastern margins of Zone A.

57. **Drawing D5:** Ecology notes that no native "blue clay layer" has been identified elsewhere at this site at the elevation shown in the cross section. This material should be identified as "non-native material of unknown composition." It is not believed to represent a native hydrostratigraphic unit. Please locate the Upper Pasco Gravel *Transition Beds* below any associated reference to the "Touchet Beds." Previous project-related documentation has depicted the *Transition Beds* beneath the Touchet Beds.

58. **Drawing D6:** Please include directional notations for Cross Sections A-A' and B-B' on the upper plan views. Please modify the apparent outline of the 170°F iso-contour to reflect updated temperature measurements as described in Comments 54 and 56. In addition, please locate the Upper Pasco Gravel *Transition Beds* below any associated reference to the "Touchet Beds." Previous project-related documentation has depicted the *Transition Beds* beneath the Touchet Beds.

59. **Drawing D7:** Please highlight the area where soil cracks have been recently identified along the northern flanks of Zone A. Please locate the Upper Pasco Gravel *Transition Beds* below any associated reference to the "Touchet Beds." Previous project-related documentation has depicted the *Transition Beds* beneath the Touchet Beds. Please update the drawing to include recent features and contours, such as the access ramp located at the northeast edge of Zone A. Please also show the footprint of the east evaporation pond. Please specify the basis for the elevation contours depicted on this diagram, and insert appropriate contour values. Please call out the different materials shown in the shaded portion of the lower cross section.

60. **Drawings D8-D10:** Please upgrade these diagrams to reflect subsurface findings from the supplemental boring investigation work, including the estimated bottom and top elevations of the SCB Protection Barrier and the CBW Box Enclosure Wall. Please identify the likely vertical positioning and location of waste materials within the subsurface profile. Include directional indicators (i.e., north, south, etc.) on the ends of the cross sections.

61. **Drawing D11:** Please include a separate detail sketch for a riser pipe boot assembly. The riser pipes should be appropriately booted and sealed where they pass through the GCL and the geomembrane.

In response to this conditional approval letter, Ecology expects the PLPs will provide the information and deliverables described in the preamble of this letter and will move forward with the planned pre-construction investigation activities as described in the June 5, 2015 draft TEP. The activities performed shall--unless agreed to otherwise by Ecology--embody the requested changes/additions as detailed in Ecology's above-listed comments. Ecology will prepare the necessary SEPA review documentation prior to construction start-up. Ecology will anticipate participation in a pre-construction coordination meeting including PLP representatives, construction contractors, local government entities, and other interested parties immediately prior to commencing any intrusive activities. For workload scheduling purposes, please provide all parties at least two weeks advance notice of the proposed date for a pre-construction meeting so any necessary schedule adjustments can be arranged.

Please contact me at (509) 329-3439 or by email (chgr461@ecy.wa.gov) if you have any specific questions regarding Ecology's comments or expectations associated with this conditional approval.

Sincerely,

Chuck Gruenenfelder

Chuck Gruenenfelder
Site Manager
Toxics Cleanup Program

CG:mr

Electronic cc: Mike Hibbler, Ecology-ERO
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ATTACHMENT B

Response to Ecology's Comments on Draft TEP

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General Comments	Implications/Response
Coordination with local gov: • FD #3 • City of Pasco Benton-Franklin Health District	Ecology will coordinate with local agencies, including but not limited to Franklin County Fire District No. 3, City of Pasco, and Benton-Franklin Health District. A pre-construction meeting will be held prior to intrusive construction activities, and Ecology may invite other agencies to participate in that meeting.
Pre-construction kick-off meeting with above parties invited & Ecology	Preconstruction meeting will be held on August 10, prior to start of work. An additional pre-construction meeting will be held with Ecology and other agencies that Ecology decides to invite.
Verify TEP activities compliant with EO SEPA checklist	Confirmed. Ecology issued SEPA amendment to cover night work and use of the cement batch plant (aka "silo").
Provide Gantt chart of project schedule	Project schedule will be provided at Pre-construction meeting.

#	Specific Comments	Implications/Response
1	**Page 1, Section 2.0:** Reference to Task 2B should be changed to Task 2A	This has been changed in Final TEP
2	**Page 2, Section 2.0:** As noted elsewhere in the TEP, the bottom of the trench also may be keyed into coarser-grained Transition Zone materials above the Upper Pasco Gravels.	Noted. TEP has been amended to include Touchet beds or other native materials.

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#	Specific Comments	Implications/Response
3	**Page 2, Section 3.0:** Somewhere it would be appropriate to see mention of the term "pneumatic separation" since we are dealing with vadose zone processes.	The following bullet is added to Section 3.2.3: •The CBW Box provides "pneumatic separation" of impacted waste from the surrounding vadose zone - Within the CBW Box, the vadose zone is completely isolated from impacted waste (smoldering MSW) by the placement of the cement-bentonite walls of the box and the cement-bentonite cap placed on top of the waste mass. The following bullet is added to Section 3.2.4: •The SCB Wall provides "pneumatic separation" within the vadose zone - The SCB Wall isolates the Zone A vadose zone from adjacent MSW by providing a horizontal barrier to soil gas movement, while keying in the geomembrane liner to the top of the SCB Wall provides a vertical barrier so that the movement of soil gas is controlled.
4	**Page 2, Section 3.1.1:** The second paragraph mentions how "...the trench will...prevent oxygen from contacting the waste materials." This statement may overstate what can be accomplished by the slurry trenches alone.	The TEP has been amended to indicate that during the excavation process, the trench will be constantly filled with slurry to minimize the potential of oxygen contacting the waste materials.

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#	Specific Comments	Implications/Response
5	**Page 3, Section 3.1.3: …** provide additional discussion of these potential limitations in the revised TEP. If unforeseen problems or complications arise with this proposed approach, the revised TEP also should discuss contingency actions to be performed to ensure the combusting/smoldering/high temperature wastes are adequately stabilized and extinguished.	The following has been added after the first paragraph: After the exterior walls of the CBW Box enclosure have hardened, the interior of the CBW Box will be divided into equal sections or equal stages. The size of each stage will be adjusted so that the volume of waste material contained in the stage will be easily excavated and blended with the cement-bentonite mixture during the course of a normal eight hour shift. By minimizing the volume of each stage thusly, all waste contained within each stage will be thoroughly blended or quenched with the cement-bentonite mixture by the end of the work day and allowed to setup overnight. The next day's excavation and blending activity will skip over the waste in the adjacent stage allowing the prior days mixture to complete the hardening process. Should the excavation and blending of the waste require more quench time or special handling, the width of each stage will be adjusted to accommodate the existing conditions. It is deemed more prudent to move through the waste mass in a slow and deliberate manner by stages than to run the risk of encapsulating a smoldering pocket of waste. As previously described, the construction (excavation and blending operations) will proceed in stages (see Drawing 7).
6	Page 4, Section 3.2.1: have a water tanker truck on-site … Additional discussion of any specific fire-related equipment or approaches should be discussed with Franklin County Fire District No. 3 prior to initiation of the construction work.	The TEP has been amended to indicate that a water tanker truck will be kept on site. Additionally, text was added to section 3.2.2 to indicate that clearing and grubbing work areas will be performed with care to prevent fires.

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#	Specific Comments	Implications/Response
7	**Page 6, Section 3.2.4:** … specify what methods will be employed to limit the spread of slurry away from the immediate trench area and maintain a safe work zone near the trench.	The following has been added to Section 3.2.4: • The elevation of the SCB Protection Barrier starts at 426.0-feet msl at the west end of the Barrier and slopes downward to the east at an approximate slope of -1.143 feet for every 100 feet of barrier. The elevation of the Barrier at its eastern end is 422.0-feet msl. Excavation of the Barrier trench may proceed from the west to the east or east to west. Bentonite slurry will be continually added to the SCB Barrier excavation. The elevation of the slurry will be maintained so that there are about 12-inches of free board for every 75-feet of Barrier wall. The required free-board may be maintained by either keeping the slurry below the upper extent of the barrier excavation or placement of soil berms along the edges of the trench. Slurry which escapes the boundries of the trench will be soaked up with soil from the trench and handled as excess soil. The work pads will be kept clear of major spills of the slurry mix.
8	**Page 7, Section 4.1, fifth bullet:** Ecology will require approval of any admixtures other than Portland cement, bentonite, and soil used to produce the slurry, i.e., chemical analysis of slag, fly ash or plasticizers	The following sentence was added to the end of the bullet: Ecology approval will be sought for any admixtures other than Portland cement, bentonite, and soil used to produce the slurry, i.e., chemical analysis of slag cement or plasticizers.
9	**Page 7, Section 4.1, MSW definition:** Ecology is unclear what point of clarification is being presented, or is intended, by the second sub-bullet. Please revise or further clarify.	The second bullet has been removed from the final TEP.
10	**Page 8, Section 4.3:** Please note that the loose MSW and apparent tire debris have been shown to extend, in part, under portions of the Zone A perimeter. Please revise this description.	Text Revised as follows: An area of elevated-temperature material is currently located at depth in loose MSW and apparent tire debris which have been shown to extend, in part, under portions of the Zone A perimeter and on the western fringe of buried, stacked bales of waste that comprise the much larger Balefill Area.

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Response to Ecology's Comments on Draft TEP

#	Specific Comments	Implications/Response
11	**Page 9, Section 4.3:** As of the date of these comments, additional subsurface information has become available and is expected to result in modifications to certain elements of the existing draft TEP. Ecology will require the opportunity to review and discuss the anticipated implications of these new findings on the preliminary design concepts presented in the draft TEP before issuing an approval and notice to proceed with the proposed construction activities.	Acknowledged.
12	**Page 9, Section 4.4, first paragraph:** all engineering documents prepared in support of this order shall be under the seal of a professional engineer registered by the State of Washington.	The following sentence has been added: All engineering documents prepared in support of the order referenced herein shall be under the seal of a professional engineer registered by the State of Washington.
13	**Page 9, Section 4.4, second paragraph:** The TEP should include a sheet showing anticipated final grading elevations within the footprint of the construction areas following completion of all fire extinguishment work.	Final grades are depicted on Drawings D-9 and D-10. Final elevations will also be shown on As-Built drawings to be provided after completion of construction work.
14	**Page 9, Section 4.5:** modify the design drawings to reflect this proposed relocation of the slurry plant and material storage area, and include the anticipated haul and access routes to be used by on-site heavy equipment in support of the proposed construction work.	See Drawing D-2 for revised locations of slurry plant and material storage area, as well as vehicle access routes.
15	**Page 9, Section 4.7:** The Franklin County Fire District and Franklin County Emergency Management will need to be notified of this latest phase of proposed fire extinguishment work. The PLPs should discuss the proposed extinguishment activities with these local entities (including Ecology participation) before any construction work commences	The following has been added to Section 4.7: A pre-construction kick-off meeting is planned to be held to discuss various aspects of this work. Ecology will be responsible for inviting other agencies to the kick-off meeting. Separate discussions with Mike Harris of FCFD #3 were conducted by Dan Hawk of Clearcreek Contractors and the following measures will be incorporated into the construction. 1. A water truck will be maintained on-site during all work activities. 2. Work areas will be cleared of brush and care will be taken during clearing operations to avoid the start of brush fires.

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#	Specific Comments	Implications/Response
16	**Page 9, Section 4.7:** Ecology will confirm any SEPA- related modifications that may be required to support these modified work hours. If allowed, the TEP and/or Health and Safety Plan must provide a description of the specific limits that will be established for noise, light and local truck traffic, and how these limits will be monitored during the active construction period.	This comment has been addressed by Ecology through a SEPA addendum, as noted in Section 4.8 of TEP. Observations of noise, light conditions, and local truck traffic conditions will be made by the construction manager or his designee and recorded in the Contractor's daily reports.
17	**Page 10, Section 4.8:** As noted above, given the nature of the proposed fire extinguishment activities, additional notification and approval from the Franklin County Fire District No. 3 and/or Franklin County Emergency Management also may be required.	Comment noted. Please see response to comment No. 15.
18	**Page 10, Section 4.9:** … Work activities should be designed to maintain an awareness of potentially unrecognized conditions, including the presence of hazardous substances within the footprint of Zone A and/or within the Balefill Area waste materials. Note also that combustion of municipal wastes and/or tire debris potentially can generate combustion by-products which categorize as hazardous substances.	Comment is noted.
19	**Page 10, Section 4.10, first paragraph:** construction will not be given the authorization to proceed without an agreement in place specifying the waste disposal protocols and responsibilities of all parties involved.	The waste disposal agreement was documented in letter dated July 16, 2015, which was previously provided to Ecology.
20	**Page 10, Section 4.10, second paragraph:** Ecology is unclear regarding the protocols that will be followed, and the degree of documentation generated, to support instances where waste characterization authority and waste management decisions will be guided solely by "other generator knowledge." If so, Section 4.1 needs to include a specific definition for the term "generator" describing persons or entities who will be acting in such a capacity and their specific role in making waste disposal decisions.	Waste characterization and profiling will be in accordance with EPI letter dated July 16, 2015, which was provided to Ecology under separate cover. Agreements are in place between IWAG (or their designee) and the Pasco Sanitary Landfill, Inc. for off-site disposition of hazardous/dangerous wastes.

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#	Specific Comments	Implications/Response
21	**Page 10, Section 4.10, third paragraph:** construction shall not occur until a waste disposal agreement is in place between the PLPs, and the agreement has been shared with, reviewed by, and endorsed by Ecology. All waste materials excavated in support of the proposed construction activities shall be characterized and managed in accordance with applicable solid waste regulations.	See response to Comment No. 19.
22	**Page 11, Section 5.1, first paragraph:** The TEP must identify the likely components of this existing monitoring/gas injection network that will undergo decommissioning, and the method(s) that will be used to properly decommission these devices.	Section 4.11 of the revised TEP addresses decommissioning of existing monitoring/gas injection infrastructure.
23	**Page 11, Section 5.1, second paragraph:** Please identify the anticipated locations of the supplemental DPT investigation boreholes. Please provide a map showing their anticipated locations.	The locations of the supplemental DPT investigation boreholes are shown in Figure 1.
24	**Page 12, Section 5.2, first paragraph:** Based on experience at other slurry wall sites, please specify the estimated volume of CB slurry that likely will be required to complete the CBW Box	The following were added to Section 5.2: Ground Granulated Blast Furnace Slag (GGBFS) cement may also be used for constructing the CB wall. Proportions of GGBFS and bentonite for this mix design would be about 10 to 14% and 3 to 5%, respectively. Ligno-sulfate or other plasticizer will be considered to maintain cement bentonite fluidity during the construction. Based upon the currently approximately 960 CY of mixed slurry will be required to form the Box assumed dimensions of the CBW Box. Based upon the Contractor's experience with other slurry walls and MSW landfills, an additional 10% to 30% might be expected to be lost to the adjacent formation during construction. If voids are encountered, significant additional losses might occur.

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#	Specific Comments	Implications/Response
25	**Page 12, Section 5.2, second paragraph:** The TEP provides limited discussion of the underlying technical basis for establishing these particular design goals and design parameters for the slurry wall. Please provide additional discussion regarding the technical and/or logistical basis for these particular specifications	The following was added to Section 5.2: The design parameters and goals indicated above are specified so that the slurry will obtain the following characteristics: 1.The CB wall material needs to achieve a nominal hydraulic conductivity of about $1x10^{-6}$ cm/sec to be as effective as the native soil formations in minimizing the lateral transmission of both soil gas and moisture; 2.The slurry needs to remain fluid and workable throughout the entire excavation/slurry placement process; therefore the slurry's ability to harden to the specified compressive strength needs to be delayed until each wall segment is in place; and 3.The minimum compressive strength of 20 psi has been specified because it is the bearing capacity which the walls are expected to experience during post closure maintenance activities and is sufficient to maintain vertical slopes at the edge of the shallow pool during quenching operations.
26	**Page 12, Section 5.2, fourth paragraph:** How will this slurry wall strength specification be determined in the field? Who will make this determination? Please specify.	The following sentences were added to Section 5.2: To determine the minimum strength of the hardened slurry, the Contractor will utilize a Concrete Pocket Penetrometer capable of measuring in place strength. Alternatively, Ground Granulated Blast Furnace Slag (GGBFS) used as the cementing agent will be Grade 100 GGBFS as supplied by Lafarge of North America.

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#	Specific Comments	Implications/Response
27	**Page 13, Section 5.2, Table 1:** Please provide additional discussion of how the proposed laboratory- determined hydraulic conductivity (permeability) value of 1E-06 cm/sec will compare to in-field, pneumatic permeability values that will develop once the CB slurry trench wall has fully cured, and experiences desiccation over time.	The following has been added immediately after Table 1: It should be noted that a laboratory- determined hydraulic conductivity (permeability) value of $1x10^{-6}$ cm/sec has been shown to compare favorably with similar in-field permeability values. Because the slurry contains a specified volume of Portland cement (or GGBFS) and is buried, the hardened slurry material contained in the wall will not be subject to significant desiccation. It is the long term stability of cement-bentonite slurry walls which has made them viable for this type of installation as proven by over 50 years of successful application.
28	**Page 14, Section 5.5:** Ecology will require chemical laboratory testing results for any coal fly ash and/or granulated blast furnace slag used as additives in the CB slurry mix.	The following sentence was added to Section 5.5: Ecology approval will be sought for any admixtures other than Portland cement, bentonite, and soil used to produce the slurry, i.e., chemical analysis of GGBFS or plasticizers.
29	**Page 14, Section 5.6:** Other than gauging off the length of the bucket arm, what specific method will be used to verify the wall depths? In addition, the total quantity of slurry added to the trenches should be compared to the estimated trench volume so the total volume (mass) of slurry used to create the CBW box enclosure can be calculated, and the volume of "formation loss" can be estimated.	Section 5.6 has been updated to include the use of a weighted tape to verify the wall depth. Wall depth measurements will be made by the Contractor at intervals of distance not exceeding 20 feet. The estimated volume of slurry required for each wall segment will be planned and batched during the wall installation. Any additional slurry required will be recorded in the Contractor's Daily Field Report records and attributed to either onsite spillage or formation loss.

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#	Specific Comments	Implications/Response
30	**Page 14, Section 5.8:** the proposed design permeability of the CBW box enclosure slurry wall is 1E-06 cm/sec, whereas the proposed design permeability of the SBC Protection Barrier wall is 1E-07 cm/sec. Please provide an explanation somewhere in the document describing the technical rationale for the specific permeability goals selected for these two components.	Permeability for the CBW Box of $1x10^{-6}$ cm/sec is considered sufficient for the containment and quenching operations in the area of elevated temperature material and will prevent any future fire in this isolated location. CB material using Portland cement without the addition of soil was selected for this application because of its many advantages in rapidly and effectively surrounding the existing area of elevated temperature materials. CB produced with these ingredients does not consistently obtain permeabilities on the order of $1x10^{-7}$ cm/sec. The SCB Protection Barrier serves a different purpose and will act to protect Zone A from future fires as well as to assist with the vacuum extraction systems being implemented in Zone A. The combination of silty sand, bentonite and cement can consistently achieve permeabilities of $1x10^{-7}$cm/sec, which is the generally accepted criterion for low-permeability barriers.
31	**Page 15, Section 5.8:** See earlier Comment 28 regarding the analytical testing requirements for any coal fly ash and/or granulated blast furnace slag that may be used as an additive or admixture in the slurry mix design.	The following sentence has been added to Section 5.8: Ecology approval will be sought for any admixtures other than Portland cement, bentonite, and soil used to produce the slurry, i.e., chemical analysis of GGBFS or plasticizers.
32	**Page 15, Section 5.9:** Please identify a suitable alternative location for slurry mixing operation rather than on the Balefill Area. The TEP should include a traffic control plan and a spill control plan which address the specific protocols to be taken for managing on-site movement of large equipment and the specific actions to take in the event of a vehicle-related release or spill.	Please see drawing D-2 for location of slurry mixing operation and traffic patterns. A spill control plan is included as Attachment E to the TEP.

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#	Specific Comments	Implications/Response
33	**Page 17, Section 5.13.1:** Ecology requests additional discussion of the anticipated slurry height to maintain the stability of the trench wall based on experiences at other sites.	Stability of the trench is primarily contingent on the height of slurry above the water table, which acts to neutralize the hydraulic stress impact of the slurry. In the absence of a water table, full hydraulic pressure of slurry on the trench sidewalls will be experienced and levels of slurry may fluctuate significantly (say up to 5') without anything but minor surface sloughing to be expected. Given these considerations, the following sentence has been added to Section 5.13.1: To maintain the stability of the trench sides, the top of slurry will be maintained at a height of between 12-inches and 24-inches from the top of the trench.
34	**Page 17, Section 5.13.3:** Based on experiences at other sites, please specify how much localized settlement is expected to occur over the trenches as the result of desiccation.	The following has been added to Section 5.13.3: Because the very top of the wall will be susceptible to desiccation cracks, placement of temporary cover consisting of plastic sheeting and/or soil will be implemented until the slurry has reached a sufficient strength. Settlement as a result of desiccation is not usually experienced and settlement of the wall itself will be negligible after the cement sets.

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#	Specific Comments	Implications/Response
35	**Page 18, Section 5.14:** Ecology requests additional discussion of the anticipated stability of the slurry-infused waste to support the staggered-slot excavation approach. Please describe where this approach has been successfully applied at other sites involving trench depths of 35-40 feet. Please discuss possible consequences and/or alternative excavation approaches that the IWAG's contractor will use if this excavation and waste stabilization approach cannot be completed, as planned.	The following has been added to Section 5.14: The process of staggered placement of the soil-cement-bentonite material is quite common for placement of barrier walls. The Contractor recently completed projects of this type to depths of over 25' at sites in Bellingham and Seattle. Staggering is a required procedure in deep barrier excavations. At a site overseen by AECOM, the Sevensons Road Landfill in Victoria Australia, the Barrier Wall was over 1200 feet in length and had an average depth of 90 feet. Each of three excavators installed one six foot wide panel of cement-bentonite slurry to the required depth each day. The next day each machine would skip over the intervening panel and install the next alternate panel. Only after two panels on each side of the intervening panel had achieved full set, would the excavator mount the intervening panel and complete the link up. It is not anticipated that delays waiting for cement to harden will be an issue due to the elevated temperatures at the site. All excavations are planned to be conducted under slurry trench conditions, so the strength of the previously installed panels need only be a fraction of the final expected strength to maintain stable conditions.

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#	Specific Comments	Implications/Response
36	**Page 18, Section 6.1:** The revised TEP must address any potential slope stability or geotechnical concerns associated with the north end Zone A soil cracks discovered during a June 18, 2015 site visit, and possible actions the construction contractor will take to address this recently-identified condition.	The following has been added to Section 6.1: It should be noted that a work pad approximately 30 feet in width will be constructed to allow the excavator to install the SCB Protection Barrier. As shown in Drawing D-7, the 36-inch wide SCB Protection Barrier will be placed along the centerline of the work pad. The construction of the work pad will be a balanced cut/fill operation in which soil from the uphill side of the work pad will be pushed to the downhill side of the work pad. This regrading of the Zone A landfill Cap will require regrading cap soil material and temporary relocation of the geomembrane liner. As a result of the installation of the SCB Protection Barrier, the Zone A landfill cap will be regraded and its geomembrane liner will be realigned so as to be anchored in the top of the SCB Protection Barrier. The portion of the Zone A landfill cap that is removed will be restored with maximum 3:1 side slopes which will meet Washington State regulatory slope stability criteria for landfill side slopes. Areas with soil cracks downslope of the barrier will be dug out and re-compacted to a firm condition as part of the work pad construction activities.

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#	Specific Comments	Implications/Response
37	**Page 19, Section 6.1, Table 2:** Please provide additional explanation of what happens to the displaced bentonite slurry (i.e., does all or some get mixed into the SCB backfill? What is its final disposition?). If contaminants become incorporated into this displaced slurry material, please describe the approaches that will be used to manage these materials.	Large non-soil debris, if encountered, will be removed and placed in a temporary stockpile for characterization and appropriate off-site disposal. If excavated materials in the trench are contaminated based on visual, olefactory, or PID readings (greater than 25 ppm), then these materials will also be separated and characterized for on-site or off-site disposition as appropriate. As shown in drawing D-8, the installation of the SCB Protection Barrier will begin at station 0+00 and proceed towards station 3+50 or vice versa. To begin the trench installation, clean soil will be excavated from the trench to allow for the placement of the bentonite slurry. The clean soil materials will be placed in a separate mixing area for processing and replacement in the trench as SCB backfill. Any significant waste materials will be separated from the clean soil and placed in the waste storage area for off-site disposal. In the processing area, the clean soil material will be sluiced with bentonite slurry from the trench and dry bentonite and cement added to produce the barrier trench backfill. At the completion of the SCB Protection Barrier construction, some volume of excess soils and potentially other wastes will remain stockpiled within the lined containment area. Those non-soil materials will require off-site disposal at an appropriate facility. Excess clean soil may be reused for on-site grading where appropriate. The intent is that the majority of slurry placed in the trench will be consumed as part of the SCB backfill mixing operation; however, there will be slurry remaining at the end of the barrier construction that will be stabilized by mixing with soil, saw dust or cement and reused on-site as grading fill or disposed off-site as appropriate.

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#	Specific Comments	Implications/Response
38	**Page 21, Section 6.10.2:** The TEP should provide additional discussion describing operational protocols or adjustments in the event unexpected contamination or waste debris is encountered as trenching proceeds.	The following has been added to Section 6.10.2: As a result of the initial geotechnical investigation, the SCB Protection Barrier has been located so as to miss any significant pockets of buried waste. Mixing of the slurry with minor amounts of waste material is to be expected; however, if during the installation of the SCB Protection Barrier, a large piece of waste material is excavated, it will be separated for proper handling and disposal.
39	**Page 22, Section 7.0, second paragraph:** The contracted waste disposal facility will be responsible for determining whether supplemental sampling and analysis of soils and/or waste materials excavated from within the top 5-8 feet of the CBW Box is required to satisfy its waste characterization and acceptability requirements.	Acknowledged.
40	**Page 22, Section 7.0, third paragraph:** The existing Zone A geomembrane consists of 40 mil HDPE. Please revise. In addition, the recent supplemental boring investigation work has confirmed that much of the SCB Barrier Trench (north arm) will occur within the footprint of the Zone A geomembrane; thus, soil material lying beneath the geomembrane will (not *may)* be excavated down to the native soil unit. Please revise this discussion accordingly in the revised TEP.	Sentence corrected to read as follows: Some soil materials from below the 40 mil high density polyethylene (HDPE) membrane will be excavated from Zone A during SCB Protection Barrier construction.
41	**Page 22, footnote 1:** As noted in Comments 19 and 21, no construction activities shall occur until a multi-party Waste Management Plan has been developed, and Ecology receives documentation verifying the necessary legal and administrative arrangements are in place between the PLPs to address all waste management and disposal elements required for this work.	Acknowledged.

Attachment B
Response to Ecology's Comments on Draft TEP

#	Specific Comments	Implications/Response
42	**Page 23, Section 7.0, top paragraph:** Any soils exhibiting evident indications of contamination (e.g., VOCs in soil headspace >20ppm; notable chemical odors; physical appearance, oily sheen) must be segregated and designated for additional characterization and offsite disposal. These questionable materials should not be reused within the SCB slurry mix.	Acknowledged. Headspace sampling will be performed at approximately every 25 linear feet of trenching.
43	**Page 23, Section 7.0, second paragraph:** As noted above, the existing Zone A geomembrane consists of 40 mil HDPE - not LLDPE. Please revise. Please also revise the reference to LLDPE in Sections 8.1 and 8.2.	All references to LLDPE have been corrected to HDPE.
44	**Page 23, Section 7.0, second paragraph and bullets:** Given the potential variability in the composition of Zone A waste materials, this proposed number of samples seems inadequate for characterization purposes. Please consider increasing the current sampling frequency by a factor of 2.	Profiling and characterization of waste materials will be meet the requirements of the off-site disposal facility.
45	**Page 23, Section 7.0, fifth paragraph:** With respect to VOC analysis of soils, please follow the protocols identified in Ecology's June 17, 2004 memorandum titled ""Collecting and Preparing Soil Samples for VOC Analysis, Implementation Memorandum #5" (document no. 04-09-087).	Comment noted. Soil sampling and analysis for profiling and waste characterization will meet the reporting limits and requirements of the disposal facility. Off-site disposal facility requirements will be provided to Ecology prior to off –site transporation and disposal.
46	**Page 24, Section 7.0, second paragraph:** Please specify the reporting limits for these various laboratory analyses.	Laboratory reporting limits will vary depending on the analytical method. Reporting limits will meet the requirements of the off-site disposal facility. Off-site disposal facility requirements will be provided to Ecology prior to off – site transporation and disposal.
47	**Page 24, Section 8.1, fifth bullet:** The term "Cap Plans" is referenced here. Please specify the document or drawings to which this term is applied.	See Drawings D-9 and D-10

Attachment B
Response to Ecology's Comments on Draft TEP

#	Specific Comments	Implications/Response
48	**Page 24, Section 8.1, seventh bullet:** Ecology requests further description of the technical basis and engineering design rationale for the perimeter edge drainage swales. How will this current engineering modification to Zone A change the cover's existing susceptibility to run-off related erosion?	Further description has been added to address Ecology's comment regarding drainage. The design incorporates drainage swales that anticipate future settlement of the landfill.
49	**Page 24, Section 8.2:** The draft TEP includes a design for the SCB Protection Barrier Wall involving an above-grade extension of nearly 5 feet in some locations. Ecology discussed the rationale for this design element during our conference call with IWAG and Landfill Group representatives on June 30, 2015. Please incorporate a discussion of the updated SCB Protection Barrier Wall design and construction elements into the revised TEP.	The final TEP seperates the CBW Box from the SCB Protective Barrier. The revised elevations of the excavator work pad allows for a more uniform elevation of the tops of the two barriers. The SCB Protective Barrier starts at an elevation of EL 426.0 feet msl at station 0+00 and drops to an elevation of EL 422.0 feet msl at station 3+50. At station 1+75 the elevation of the SCB Protective Barrier is approximately EL 424.0 feet msl while the top of the CBW Box is at about EL 419.0. The revised SCB Protection Barrier design is shown on Figure 3 and Drawings D-4 and D-8.
50	**Page 25, Section 8.2, top bullet:** This bullet reconfirms the likelihood that some slurry will be displaced out of the SCB trench by the backfill installation process. Please see earlier Comment 37 and concerns over the proper containment and management of contaminated slurry	The revised design drawings show the elevations of the SCB protetive Barrier to be more uniform, with a slope which will readily control potential for displacement of slurry. Slurry is not displaced out of the trench, but is controlled by the rate of backfill and excavation. During the latter stages of barrier construction, slurry is pumped from the trench at the rate of backfill progression. Some slurry drips from the bucket during excavation and some slurry is spread on the work pad as slurry distribution lines are repositioned. The work pad becomes doused over time with slurry residue. A small berm can be placed at the outer edge of the work pad to contain slurry residue and spills. Slurry handling is addressed in the Contractor's Spill Control Plan in Attachment E.

Attachment B
Response to Ecology's Comments on Draft TEP

#	Specific Comments	Implications/Response
51	**Page 25, Section 8.2, fifth bullet:** Drawings 8-10 show the 8" diameter perforated ADS Collector Pipe positioned directly below the geomembrane. The risers would need to pass through the geomembrane, and be booted properly. Please provide a typical boot design detail drawing in the revised TEP.	The following has been added to Section 8.2: Install the 40 mil HDPE Boot around the risers for the air intake piping as shown on Drawing D-11.
52	**Page 25, Section 9.0:** The revised TEP needs to describe the documentation that will be prepared following completion of the construction work. Ecology expects preparation of a detailed construction summary report describing the approaches used, submittals, monitoring and analytical testing data, material quantities used, physical properties testing results, deviations and changes from the original design, daily progress reports, field compaction records, field temperature measurements of the excavated waste materials (both before and after slurry quenching), photographs, final as-built design drawings, and any other applicable documentation to adequately document this work. The report also shall include all monitoring data conducted in satisfaction of Task 2B of EO 10651. Air monitoring conducted in support of this work (including monitoring conducted in accordance with the AECOM Health and Safety Plan, and air monitoring activities conducted in accordance with the April 27, 2015 Addendum to Health and Safety Plan prepared by EPI) shall be recorded and included as part of the project records	The following text has been added to Section 9.0: Upon completion of the works, a complete and detailed Construction Summary Report will be prepared and include the following items: • Description of the construction activities including any deviations and/or changes from the original design; • Copies of material submittals, monitoring reports, and analytical test data; • Copies of daily progress reports, field compaction records, and liner welding test results; • Field temperature measurement records of excavated waste (both before and after slurry quenching); • Photos documenting construction activities; • As-Built drawings will be supplied by the Contractor to the Superintendent. The As-built drawings will include survey measurements of the installed features; • Monitoring Data collected in satisfaction of Task 2B of EO 10651; and • HASP Construction Monitoring.(including relevant air monitoring).
53	**Page 27, Section 10.2, second paragraph:** The proposed protocol of sampling for strength and permeability on a per 100 lineal foot of wall basis will result in four samples to represent the SCB Barrier Wall and two samples to represent CBW Box enclosure. Ecology seeks to verify if this number of samples is considered adequate to satisfy project construction QC requirements. Please consider adding additional samples for laboratory testing to enhance the level of construction QC associated with this effort, if appropriate.	The frequencies of testing are consistent with general barrier wall installation practices. This is not a large barrier and four tests are considered appropriate. The test frequency has been changed (increased) in Section 10.2 to include a minimum of 1 test per side of the CBW Box.

Attachment B
Response to Ecology's Comments on Draft TEP

#	Specific Comments	Implications/Response
54	**Page 27, Section 11.1:** Ecology understands a supplemental subsurface temperature investigation also will be conducted within two weeks of starting construction. This supplemental DPT-based temperature assessment, along with final temperature measurements from the existing network of thermocouples and GIPs, will provide the basis for determining the fire's extent and any late-stage changes in CBW box wall design/extent. Please describe this understanding in the revised TEP. Please also describe the anticipated methods to decommission these monitoring devices and probes, and the associated documentation that will be generated. Please also include a figure showing which existing monitoring devices will be retained for possible future use. Ecology may require additional thermocouple monitoring stations beyond what is shown on Figure 1. These monitoring requirements will be discussed with the IWAG upon completion of the fire extinguishment efforts within the CBW Box.	The supplemental temperature investigation has been described in the revised TEP, and the location of the CBW Box enclosure has been informed by the supplemental temperature investigation results, and fully contains the zone where temperatures exceed 170 °F identifed in the supplemental DPT temperature investigation (see Figure 1). Decommissioning procedures for the temperature monitoring devices have been included in Section 4.11 of the TEP. Figure 2 of the TEP shows locations of proposed new temperature monitoring points after extinguishment is completed. Comment regarding potential additional temperature monitoring points is noted.
55	**Drawings D2 and D4:** As noted in Comments 14 and 32, please consider repositioning the slurry mixing and staging area off of the Balefill Area.	Please see Drawing D-2 for revised location of slurry mixing and staging area that is off of the Balefill Area.

Attachment B
Response to Ecology's Comments on Draft TEP

#	Specific Comments	Implications/Response
56	**Drawing D4:** Please highlight the area where soil cracks have been recently identified along the northern flanks of Zone A. In addition, please revise the proposed position of the CBW Box and the SCB Protection Barrier to reflect the updated zone of combustion (i.e., pre-construction thermocouple and GIP measurements, and data from the supplemental DPT investigation). Please also revise the anticipated position of the subsurface soil/waste contact zone along the northern and eastern margins of Zone A.	The approximate location of the soil cracks are identified on Drawing D-2. The position of the CBW Box and the SCB Protection Barrier has been updated to reflect the results of the supplemental thermal investigation and supplemental geotechnical investiations. Summary profile of the boring logs are shown on Drawings D12.1 through 12.4. Geotechnical boring logs and soil photographs taken during the geotechnical investigation are included in Attachment D.
57	**Drawing D5:** Ecology notes that no native "blue clay layer" has been identified elsewhere at this site at the elevation shown in the cross section. This material should be identified as "non-native material of unknown composition." It is not believed to represent a native hydrostratigraphic unit. Please locate the Upper Pasco Gravel *Transition Beds* below any associated reference to the "Touchet Beds." Previous project-related documentation has depicted the *Transition Beds* beneath the Touchet Beds.	Geological cross sections will be provided under separate cover. The identification of Upper Pasco Gravel Transition beds below any associated reference to Touchet beds is not considered necessary for the construction of the CBW Box enclosure.

Attachment B
Response to Ecology's Comments on Draft TEP

#	Specific Comments	Implications/Response
58	**Drawing D6:** Please include directional notations for Cross Sections A-A' and B-B' on the upper plan views. Please modify the apparent outline of the 170°F iso-contour to reflect updated temperature measurements as described in Comments 54 and 56. In addition, please locate the Upper Pasco Gravel *Transition Beds* below any associated reference to the "Touchet Beds." Previous project-related documentation has depicted the *Transition Beds* beneath the Touchet Beds.	Directional notations for A-A' and B-B' are located on Drawing D-7. The 170°F contour line is replaced by the results of the supplemental DPT temperature investigation (see Figure 1 and Attachment C) See response to comment number 57.
59	**Drawing D7:** Please highlight the area where soil cracks have been recently identified along the northern flanks of Zone A. Please locate the Upper Pasco Gravel *Transition Beds* below any associated reference to the "Touchet Beds." Previous project-related documentation has depicted the *Transition Beds* beneath the Touchet Beds. Please update the drawing to include recent features and contours, such as the access ramp located at the northeast edge of Zone A. Please also show the footprint of the east evaporation pond. Please specify the basis for the elevation contours depicted on this diagram, and insert appropriate contour values. Please call out the different materials shown in the shaded portion of the lower cross section.	Please note that the drawing numbers in the Final TEP have changed since the draft version. Drawing D-2 has been revised to show the approximate locations of the soil cracks along the norther flanks of Zone A. Features below the Touchet Beds have not been shown on the drawings. The CBW Box enclosure and SCB Protection Barrier will be keyed at least 2 feet into native materials, as observed during construction Drawing D-2 has been revised to show the approximate locations of the observed soil cracks along the northern flanks of Zone A. The footprint of the east evaporation poin is shown on the Drawing D-2 and Figure 3. Elevations of pertinent features have been added to the drawing. Drawing D-7 has been revised with

Attachment B
Response to Ecology's Comments on Draft TEP

#	Specific Comments	Implications/Response
60	**Drawings D8-Dl0:** Please upgrade these diagrams to reflect subsurface findings from the supplemental boring investigation work, including the estimated bottom and top elevations of the SCB Protection Barrier and the CBW Box Enclosure Wall. Please identify the likely vertical positioning and location of waste materials within the subsurface profile. Include directional indicators (i.e., north, south, etc.) on the ends of the cross sections.	Please see revised drawings. No significant waste materials were identified within the proposed alignment of the SCB Protection Barrier. Please see Attachment D for photo logs of soil samples from geotechnical investigation. Directional notations for A-A' and B-B' are located on Drawing D-7.
61	**Drawing D11:** Please include a separate detail sketch for a riser pipe boot assembly.	See Drawing D-11 for boot detail.

ATTACHMENT C

Supplemental Thermal Investigation Results

Balefill Area GeoProbe Temperatures
Thermal Investigation
Pasco Landfill NPL Site
1901 Dietrich Road, Pasco, Washington

Thermal Boring ID	Approximate Ground Surface Elevation (AMSL)	Depth (Feet BGS)	Elevation (Feet AMSL)	Temperature (ºF)
TB-23	417	7	410	112.0
		9	408	132.5
		11	406	123.0
		13	404	130.0
		15	402	132.1
		17	400	133.9
		19	398	140.0
		21	396	142.5
		23	394	126.4
		25	392	134.3
		27.5	389.5	147.8
		29	388	140.0
		31	386	138.8
		33	384	149.7
		35.5	381.5	151.5
TB-24	417	6	411	133.5
		8	409	135.0
		10	407	136.3
		12	405	137.0
		14	403	138.3
		16	401	135.8
		18	399	126.9
		20	397	136.0
		22	395	143.8
		23.5	393.5	134.3
		25.5	391.5	126.1
TB-25	419	9	410	116.1
		11	408	122.0
		13	406	124.7
		15	404	126.1
		17	402	125.9
		19	400	123.5
		21	398	130.4
		23	396	139.5
		25	394	120.1
		27	392	124.6
		29	390	131.7
		31	388	130.4
		33	386	129.5
		35	384	128
		37.5	381.5	115
TB-26	420	7	413	136.6
		9	411	143.7
		11	409	144.1
		13	407	140.3
		15	405	151.5
		17	403	151.9
		19	401	155.1
		21	399	151.4
		23	397	157.4
		25	395	160.6
		27	393	165.0
		29	391	158.3
		31	389	167.0
		33	387	139.7
		35	385	161.1
		37	383	161.3
		38.5	381.5	161.5

Thermal Boring ID	Approximate Ground Surface Elevation (AMSL)	Depth (Feet BGS)	Approximate Elevation (Feet AMSL)	Temperature (ºF)
TB-27B	417	5	412	123.5
		7	410	133.0
		9	408	132.1
		11	406	139.9
		13	404	147.7
		15	402	152.5
		17	400	151.5
		19.5	397.5	145.5
		21	396	152.7
		23	394	154
		25	392	158.9
		27	390	153.3
		29	388	158.1
		31	386	144.6
		32.5	384.5	151.7
TB-28	417	8	409	133.6
		10	407	145.5
		12	405	149.5
		14	403	137.5
		16	401	157.5
		18	399	155.1
		20	397	158.0
		22	395	156.7
		24	393	165.3**
		26	391	150.5
		28	389	150.3
		30	387	155.5
		32	385	161.6
		34	383	155.1
TB-29B	417	8	409	123.2
		10	407	127.7
		12	405	125.3
		14	403	124.4
		16	401	128.7
		18	399	126.3
		20	397	133.9
		22	395	132.6
		24	393	134.7
		26	391	134.7
		28	389	135.5
		30	387	134.7
		32	385	132.3
		34	383	133.1
		35.5	381.5	128.6
TB-30	417	8	409	117.3
		10	407	118.7
		12	405	123.3
		14	403	119.3
		16	401	122.3
		18	399	120.3
		20	397	123.6
		22	395	130.3
		24	393	131.3
		26	391	131.5
		28	389	130.5
		30	387	135.3
		32	385	136.1
		34	383	136.3
		35.5	381.5	131.1

Notes:

AMSL	Above mean sea level.
BGS	Below ground surface.
ºF	Degrees Fahrenheit.
**	Only a couple of inches of airspace below rods. Temperature was most likely elevated due to proximity to hot drill rod.

7/30/15 03914.1 Thermal Investigation
630 EJensen, M.McElheron Holder, Cascade onsite
Health & Safety Meeting
705 Pushing rods @ TB-25
Starting elevation ~ 419' (on ramp)
Pushed point to 38'

depth	temp °F		depth	temp	
37.5' bgs	115	air	19'	123.5	air
35'	128	air	17'	125.9	air
33'	129.5	air	15'	126.1	air
31'	130.4	air	13'	124.7	air
29	131.7	air	11'	122.0	air
27	124.6	air	9'	116.1	air
25	120.1	air	backfill w/ hydrated bentonite		
23	139.5	air	8:36 pulled out rods		
21	130.4	air	Decon rods		

855 Pushing rods at TB-26
Starting elevation ~ 420' on ramp.
Pushed to 39'

depth	temp		depth	temp
38.5 bgs	161.5	air	27'	165.0
37	161.3	air	25'	160.6
35	161.1	air	23'	157.4
33	139.7	air	21'	151.4
31	167.0	air	19'	155.1
29	158.3	air		

around cBW Box

7/30/15

depth	temp °F		depth	temp	
17'	151.9	air	11'	144.1	air
15'	151.5	air	9'	143.7	air
13'	140.3	air	7'	136.6	air

27" E of stake
72" NW of survey/marker on VB-11
Called Adam. Do not need to step out.
10:08 finished. backfilled w/ hydrated bentonite and pulled out rods. Decon rods.
1039 Pushing rods @ TB-27 Backfilled w/ bentonite hydrated
Refusal @ 12'. Stepping over to the east 2.5'. ~5' ~NNW of VB-11
TB-27B
Pushed point to 33' bgs. Elevation ~ 417'
TB-27B Pulled rods back to 32'. 90° air temp in shade.
Refusal @ 33' (Hard drilling before) Surface Elev ~417'

depth	temp °F		depth	temp °F	
32.5' bgs	151.7	air	13'	147.7	air
31'	144.6	air	11'	139.9	air
29'	158.1	air	9'	132.1	air
27'	153.3	air	7'	133.0	air
25'	158.1	air	5'	123.5	air
23'	154.	air			
21'	152.7	air	1208 finished		
hole collapsed 19.5'	145.5	air	backfill w/ hydrated bentonite		
17'	151.5	air	pulled out rods		
15'	152.5	air			

7/30/15 03914.1 Thermal Investigation

1230 Pushing rods @ TB-28
Hard drilling then refusal @ 35'.
Surface elevation ~ 417' amsl.
Pushed out/off point. Pull rods up 1 foot.

Depth	temp		depth	temp	
34' bgs	155.1°	air	16'	157.5°	air
32'	161.6°	air	14'	137.5°	air
30'	155.5°	air	12'	149.5°	air
28'	150.3°	air	10'	145.5°	air
26'	150.5°	air	8'	133.6°	air
24'	165.3°	cave in probably rod temp			
22'	156.7°	air	1337 Finished		
20'	158.0°	air	Backfilled w/ hydrated		
18'	155.1°	air	bentonite. Removed rods.		
			Decon rods.		

1345 Pushing rods at TB-29
Refusal @ 12' bgs. Backfilled w/hydrated bentonite. Stepped over ~2' east. 44" to west corner of VB3

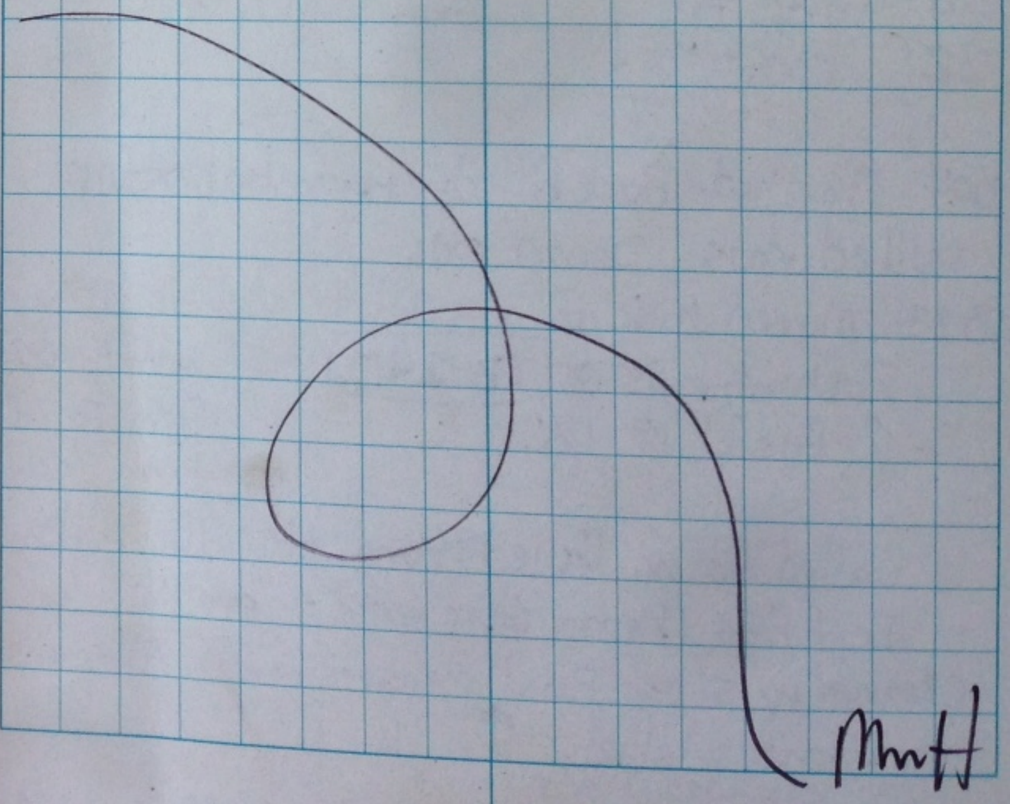
TB-29B Pushed to 36'. pushed off point. 70" from GIP 1S
94" from VB2 SE
Pulled rods up to 35' bgs.

Depth	Temp	Depth	temp
36' bgs	128.6°	30'	134.7°
34'	133.1°	28'	135.5°
32'	132.3°	26'	134.7°

around CBW box.

Depth (bgs)	temp (°F)	
24'	134.7°	air
22'	132.6°	air
20'	133.9°	air
18'	126.3°	air
16'	128.7°	air
14'	124.4°	air

1453 Cascade & EPI offsite



Ambient 105.5°

7/30/15

Depth	temperature
12'	125.3°
10'	127.7°
8'	123.2°

1438 Fini!
Backfilled w/hydrated bentonite.
Removed rods.
Decon rods

MrtH

7/31/15 03914.1
6:30 EPI & Cascade on site
7:15 Started pushing rods @ TB-30
Pushed to 36' bgs, pulled back to 35'.
Starting elevation 417' asml.

Depth('bgs)	Temperature(°F)		depth.	Temp.	
35.5'	131.1°	air	20'	123.6°	air
34'	136.3°		18'	120.3°	
32'	136.1°		16'	122.3°	
30'	135.3°		14'	119.3°	
28'	130.5°		12'	123.3°	
26'	131.5°		10'	118.7°	
24'	131.3°		8'	117.3	
22'	130.3°				

804 Finished. Backfilled w/ Hydrated bentonite.
pulled rods. Decon rods
823 Moved back to TB-24 to attempt 35' again.
Pushing rods @ TB-24D ~~35~~ NW of TB-24
Refusal @ 18'. 42" From TB-24
1/3 from BoxN

Called Adam. Called Thom. He called Mike.
Text from Thom - Youre good to demob...
Cleaned up site. Final measurements. All measured locations staked.
930 cascade off site
1015 EPI off site to return to office Issaquah

ATTACHMENT D

Supplemental Geotechnical Investigation Results

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Key to Log of Boring and Descriptive Terms for Soil

Unified Soil Classification System (ASTM D2487 & D2488)

Major Divisions			Symbols: Graph	Symbols: Letter	Typical Descriptions
Coarse Grained Soils: More than 50% of No. 200 Sieve Size	Gravels: More than 50% of Coarse Fraction Retained in No. 4 Sieve	Clean Gravels (less than 5% fines)		GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or no Fines
				GP	Poorly-Graded Gravels, Gravel-Sand Mixtures, Little or no Fines
		Gravels with Fines (more than 12 % fines)		GM	Silty Gravels, Gravel-Sand-Silt Mixtures
				GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	Sands: More than 50% of Coarse Fraction Passing through No. 4 Sieve	Clean Sand (less than 5% fines)		SW	Well-Graded Sands, Gravelly Sands, Little or no Fines
				SP	Poorly Graded Sands, Gravelly Sands, Little or no Fines
		Sands with Fines (more than 12 % fines)		SM	Silty Sands, Sand-Clay Mixtures
				SC	Clayey Sands, Sand-Clay Mixtures
Fine Grained Soils: More than 50% of Material is Smaller than No. 200 Sieve Size	Silts and Clays: Liquid Limit Less than 50%			ML	Inorganic Silts and very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity
				CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
				OL	Organic Silts and Organic Silty Clays of Low Plasticity
	Silts and Clays: Liquid Limit Greater than 50%			MH	Inorganic Silts, Micaceous or Diatomaceous Fine Sand or Silty Soils
				CH	Inorganic Clays of High Plasticity, Fat Clays
				OH	Organic Clays of Medium to High Plasticity, Organic Silts
Highly Organic Soils				PT	Peat, Humus, Swamp Soils with High Organic Contents (see ASTM D4427-92)

Relative Density or Consistency

Coarse-Grained Soils		Fine-Grained Soils	
Relative Density	**N, SPT Blows / ft**	**Relative Consistency**	**N, SPT Blows / ft**
Very loose sand	0 - 4	Very soft	< 2
Loose	4 - 10	Soft	2 - 4
Medium dense	10 - 30	Medium stiff	4 - 8
Dense	30 - 50	Stiff	8 - 15
Very dense	Over 50	Very stiff	15 - 30
		Hard	Over 30

Minor Descriptors

Trace	0 - 5%
Slightly (clayey, silty, sandy, gravelly)	5 - 12%
Clayey, silty, sandy, gravelly	12 - 30%
Very (clayey, silty, sandy, gravelly)	30 - 50%

Moisture Content

Dry	Absence of moisture, dusty
Moist	Damp but no visible water
Wet	Visible free water, from below the water table

Abbreviations

SA	Sieve Analysis
M	Moisture
DD	Dry Density
AL	Atterberg Limits
HA	Hydrometer Analysis
C	Consolidation
Pc	Constant Head Permeability
Pf	Falling Head Permeability
DS	Direct Shear
TX	Triaxial
TV	Torvane Shear
LV	Laboratory Vane Shear
PP	Pocket Penetrometer
OVA	Organic Vapor Analyzer
OC	Organic Content
N	Number of hammer blows for last 12 inches sampled

Sampler Symbols

- 3" O.D. Split Spoon Sample with brass rings
- 3" O.D. Shelby Tube Sample
- Core
- Piston Sample
- Non-standard penetration test
- Grab Sample
- 2" O.D. Split Spoon with 140lb Hammer and 30-inch drop (SPT)

Typical Well Graphic Symbols

- One pipe in bentonite pellets
- One slotted pipe in filter pack
- One pipe in filter pack
- Bentonite Seal
- Two-pipe group, two pipes

NOTES:

1. Descriptions and stratum lines are interpretive; field descriptions may have been modified to reflect lab test results. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced; they are not warranted to be representative of subsurface conditions at other locations or times.
2. Dual Symbols are used to indicate borderline soil classifications

Figure

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-1

Date(s) Drilled	**6/15/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**51.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**434.61**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT/Shelby**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
430	0						SM	Light brown silty fine SAND, trace fine, angular to rounded gravel, dry, loose. [FILL]			
	5		EB-1-5	6 6 5 N=11	56			Same as above but also trace fiber, medium dense.			81.1°F PID = 0.0 ppm
425	10		EB-1-10	7 5 5 N=10	67			Light brown silty fine SAND, moist, loose. [FILL]			80°F PID = 0.4 ppm
420	15		EB-1-15	6 5 9 N=14	67		SW/ SM	15 to 15.2ft: Same as above; 15.2 to 16.5ft: Brown well-graded fine to coarse SAND with silt, trace fine, angular to rounded gravel, moist, medium dense. [FILL]			80°F PID = 0.0 ppm
415	20		EB-1-20	18 15 9 N=24	100		SP/ SM	Brown poorly-graded fine SAND with silt, trace plastic pieces & fine, subangular to subrounded gravel, moist, medium dense. [FILL]			87°F PID = 0.2 ppm
410	25										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-1

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
	25										
			EB-1-25	3 2 3 N=5	67		SM	Brown silty fine SAND, trace fine, angular to subrounded gravel, moist, loose. [FILL]			90°F PID = 0.7 ppm
								Same as above.			89°F
			EB-1-26.5		58						Collected 3" diameter Shelby sample. Driller noted loose from 26.5 to 28.5ft.
405	30										
			EB-1-30	15 20 23 N=43	100		SM	Brown silty fine SAND, moist, dense. [NATIVE]			100°F PID = 0.3 ppm
400	35										
			EB-1-35	40 15 17 N=32	100			Dark brown to brown silty fine SAND, moist, dense. [NATIVE]			98°F PID < 1.0 ppm
395	40										
			EB-1-40	25 15 16 N=31	100			Same as above.			97°F PID = 1.3 ppm
390	45										
			EB-1-45	20 25 23 N=48	100			Same as above.			96°F PID = 0.7 ppm
385	50										
			EB-1-50	24 27 25 N=52	100		SP/ SM	50 to 50.5ft: Same as above. Brown poorly-graded fine to medium SAND with silt, moist, very dense. [NATIVE]			93°F PID = 0.8 ppm
								Boring was completed to 51.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-2A

Sheet 1 of 2

Date(s) Drilled	**6/16/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**33 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**431.80**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT/D&M**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
430	0						SM	Gray silty fine to coarse SAND, trace fine, angular to rounded gravel, dry, loose. [FILL]			Driller: Black liner at 2.5ft.
425	5		EB-2A-5	13 16 17 N=33	78			Brown silty fine SAND, trace fine, subangular gravel & geomembrane liner, moist, dense. [FILL]			85°F PID = 1.5 ppm
420	10		EB-2A-10	6 8 6 N=14	89			Brown silty fine SAND, trace fine, subangular gravel, moist, medium dense. [FILL]			86°F PID = 0.0 ppm Geotech sample collected.
415	15		EB-2A-15	7 7 12 N=19	78			Same as above.			94°F PID = 0.4 ppm
410	20		EB-2A-20	7 3 2 N=5	78			Brown silty fine SAND, trace fine to coarse, subangular gravel, moist, loose. [FILL]			104°F PID = 0.3 ppm
			EB-2A-21.5	30 25 14 N=39	33			Same as above but also some fibers, dense.			106°F PID = 0.9 ppm
	25										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-2A

Sheet 2 of 2

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
405	25		EB-2A-25	4 6 5 N=11	100			25 to 26.2ft: Reddish brown to dark silty fine SAND, trace metal pieces, moist, medium dense; 26.2 to 26.5ft: Brown silty fine SAND, moist, medium dense. [FILL]			106°F PID = 4.2 ppm
											Driller: 28 to 30ft felt void or very soft soil
400	30		EB-2A-30	2 7 10 N=17	56			107°F PID = 53.2 ppm Brown silty fine to coarse SAND, trace fine gravel & plastic pieces, moist, medium dense. Outside of SPT sampler coated with dark material like mud or tar, slight odor. [FILL]	20.1	32.0	Geotech sample EB-2A-30 from cuttings.
								Boring was completed to 33 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. Ended this boring, and moved 7ft north to drill Boring EB-2B. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			
395	35										
390	40										
385	45										
380	50										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-2B

Sheet 1 of 2

Date(s) Drilled	**6/16/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**51.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**432.50**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT/D&M**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
430	0						SM	Light brown silty fine SAND, trace fine, subangular gravel, dry, loose. [FILL]			
	5		EB-2B-5	6 8 9 N=17	78			Same as above but trace liner pieces, moist, medium dense.			83.5°F PID = 0.4 ppm
425											
	10		EB-2B-10	3 2 3 N=5	67			Brown silty fine SAND, trace fine, subangular gravel, moist, loose. [FILL]			84°F PID = 0.4 ppm
420			EB-2B-11.5	12 50/3"	100			Same as above but medium dense.			95°F PID = 0.4 ppm 6" long undisturbed D&M sample collected after SPT.
	15		EB-2B-15	4 5 12 N=17	67			Brown silty fine to medium SAND, trace fiber, moist, medium dense. [FILL]			92°F PID = 0.7 ppm
415											
	20		EB-2B-20	17 13 9 N=22	83			Brown silty fine SAND, trace geomembrane liner, moist, medium dense. [FILL]			103°F PID = 0.5 ppm
410											
	25										

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Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-2B

Sheet 2 of 2

Elevation feet	Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
	25		EB-2B-25	3 2 3 N=5	100		SM	Brown silty fine SAND, trace plastic, moist, loose. [FILL]			84°F PID = 0.7 ppm
405			EB-2B-26.5	16 7 9 N=16	78			Same as above.			111°F 6" long undisturbed D&M sample collected.
	30		EB-2B-30	4 2 3 N=5	67			Brown silty fine SAND, trace fiber & fine, angular to subangular gravel, moist, loose. [FILL]			102°F PID = 0.6 ppm
400							SM/ ML	Brown silty fine SAND, moist, dense. [NATIVE]			
	35		EB-2B-35	16 18 22 N=40	100						114°F PID = 0.7 ppm
395											
	40		EB-2B-40	19 15 22 N=37	100			Brown sandy SILT, moist, dense. [NATIVE]	56.0	11.1	114°F PID = 0.4 ppm
390											
	45		EB-2B-45	15 18 25 N=43	100			Same as above but more silt.			112°F PID = 0.7 ppm
385											
	50		EB-2B-50	22 20 20 N=40	100			Same as silty SAND above but sand fine to medium.			105°F PID = 0.5 ppm
380								Boring was completed to 51.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
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Log of Boring EB-3

Date(s) Drilled	**6/16/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**41.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**429.15**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
425	0						SM	Light brown silty fine SAND, trace fine, subangular gravel, dry to moist, loose. [FILL]			
	5		EB-3-5	6 5 6 N=11	89			Same as above but no gravel, moist, medium dense.			90°F PID = 0.7 ppm
420	10		EB-3-10	13 22 30 N=52	100			Same as above but trace fine, subangular gravel, very dense.			101°F PID = 0.5 ppm
415	15		EB-3-15	6 6 6 N=12	100			Same as above but medium dense.			101°F PID = 0.3 ppm
410	20		EB-3-20	13 4 8 N=12	83			Brown silty fine SAND, trace fine, subangular gravel, moist, medium dense. [FILL] @ 22ft a 1ft dia red plastic piece from auger cutting.			113°F PID = 0.8 ppm Driller: a piece of blue plastic at 20ft.
405	25										

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Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-3

Sheet 2 of 2

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
	25		EB-3-25	15 8 9 N=17	67		SM	Brown silty fine SAND, with black layer that smelled like blue plastic, warm rubber, white glass in top 5", trace fine, subangular gravel, moist, medium dense. [FILL]			121°F PID = 0.4 ppm
400											
	30		EB-3-30	14 14 16 N=30	78			30 to 30.3ft: Blue plastic trash.			124°F PID = 0.4 ppm
							SM	30.3 to 31.5ft: Brown to light brown silty fine SAND, moist, medium dense. [NATIVE]			
395											
	35		EB-3-35	13 19 21 N=40	89			Brown silty fine SAND, moist, dense. [NATIVE] Blue plastic at top of sample in photo assumed to be from cuttings left in hole after cleaning.			124°F PID = 1.9 ppm
390											
	40		EB-3-40	16 25 30 N=55	78			40 to 41.2ft: Same as above. Blue plastic at top of sample in photo assumed to be from cuttings left in hole after cleaning. 41.2 to 41.5ft: Brownish gray silty fine SAND, moist, very dense. [NATIVE]			123°F PID = 1.5 ppm
								Boring was completed to 41.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			
385											
	45										
380											
	50										
375											

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Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-4

Date(s) Drilled	**6/17/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**46 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**428.96**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
425	0						SM				
			EB-4-2.5	1 2 1 N=3	44			Light brown silty fine to coarse SAND, trace fine, subangular gravel, dry, loose. [FILL]			
	5		EB-4-5	loose	35			Light brown silty fine SAND, trace fine, angular gravel, dry, loose. [FILL]			
420											
	10		EB-4-10	22 10 6 N=16	61			Light brown silty fine to coarse SAND, trace fine, angular gravel, black PVC pieces at bottom, dry, medium dense. [FILL]			82°F PID = 0.0 ppm
415											Fiber liner came out from cuttings.
	15		EB-4-15	17 12 15 N=27	67			Brown silty fine SAND, trace fine, angular gravel, moist, medium dense. [FILL]			114°F PID = 0.6 ppm
410											
	20		EB-4-20	5 4 5 N=9	22			Brown silty fine SAND, moist, loose. [FILL]			105°F PID = 0.4 ppm
405	25										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-4

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
400	25		EB-4-25	6 6 5 N=11	100		SM	Same as above but trace fine, angular gravel, moist, medium dense. [FILL]			126°F PID = 0.4 ppm
395	30		EB-4-30	13 14 10 N=24	89			Brown silty fine SAND, moist, medium dense. [FILL] @ 30ft: pieces of plastic wood, PVC trash from cuttings.			127°F PID = 1.5 ppm
390	35		EB-4-35	14 24 29 N=53	100		SM/ ML	35 to 35.3ft: Same as above; 35.3 to 36.5ft: Light gray silty fine SAND, moist, very dense. [NATIVE]			130°F PID = 5.5 ppm
385	40		EB-4-40	18 25 30 N=55	100			Gray sandy SILT, moist, very dense. [NATIVE]	65.0	12.6	126°F PID = 20.2 ppm SPT sample collected.
380	45		EB-4-45	35 50/6"	100			Grayish brown silty fine to medium SAND, moist, very dense. [NATIVE]			121°F PID = 3.1 ppm
375	50							Boring was completed to 46 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			

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Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-5

Date(s) Drilled	**6/17/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**46.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**427.40**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
425	0						SM	Light brown silty fine SAND, trace fine, subangular gravel, dry to moist, loose. [FILL]			
	5		EB-5-5	7 4 4 N=8	78			Same as above but moist.			98°F PID = 0.3 ppm
420											
	10		EB-5-10	4 6 4 N=10	56			Same as above but fine to medium.			105°F PID = 0.2 ppm
415											
	15		EB-5-15	10 5 5 N=10	67			Same as above.			116°F PID = 1.8 ppm
410											
	20		EB-5-20	19 7 17 N=24	56			20 to 20.4ft: Same as above; 20.4 to 20.9ft: Dark brown silty fine SAND with trash (fiber, tire pieces etc), moist, medium dense. [FILL]			123°F PID = 0.5 ppm
405								Trash (portion of plastic bag) from auger cuttings at ~20ft.			
	25										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-5

Sheet 2 of 2

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
400	25	EB	5-25	7 10 12 N=22	83		SM	Brown silty fine to coarse SAND, trace fine, subangular gravel, moist, medium dense. [FILL]			130°F PID = 1.3 ppm
395	30	EB	5-30	10 17 20 N=37	67			30 to 30.3ft: Small piece of trash at top; 30.3 to 31.5ft: Brown silty fine SAND, moist, dense. [FILL]			136°F PID = 2.5 ppm
390	35	EB	5-35	15 18 22 N=40	100		SM	35 to 35.5ft: Brown to light brown silty fine SAND, trace trash at top, moist, dense. [FILL] 35.5 to 36.5ft: Brown to light brown silty fine SAND, moist, dense. [NATIVE]			138°F PID = 1.0 ppm
385	40	EB	5-40	23 28 25 N=53	78		SM ML	40 to 41.3ft: Brown silty fine SAND, moist, very dense; 41.2 to 41.5ft: Grayish brown sandy SILT, moist, very dense. [NATIVE]			140°F PID = 1.6 ppm
380	45	EB	5-45	18 20 25 N=45	78		SW/ SM	Brown well-graded fine to coarse SAND with silt, moist, dense. [NATIVE]			129°F PID = 0.8 ppm
375	50							Boring was completed to 46.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			

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Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-6

Date(s) Drilled	**6/18/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**51.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**426.56**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
425	0						SM	Light brown silty fine to coarse SAND, trace fine, subangular gravel, dry, loose. [FILL]			
	5		EB-6-5	5 8 9 N=17	78			Same as above but moist, medium dense. [FILL]	26.6	1.9	88°F PID = 0.6 ppm
420	10		EB-6-10	10 12 20 N=32	67			Same as above but trace liner, fiber, no gravel, dense. [FILL]			96°F PID = 0.5 ppm
415	15		EB-6-15	18 18 18 N=36	89			Brown silty fine SAND, moist, dense. [FILL]			107°F PID = 0.6 ppm
410	20		EB-6-20	10 8 8 N=16	56			Brown silty fine SAND, a piece of tire at bottoml, moist, medium dense. [FILL] @ 20ft a piece of rubber tire from cuttings.			117°F PID = 0.9 ppm
405	25										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-6

Sheet 2 of 2

Elevation feet	Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
400	25	EB-6-25		22 7 5 N=12	17		SM	Brown silty fine SAND, trace fine, subrounded gravel, damp, medium dense. [FILL]			107°F PID = 1.2 ppm
								@ 25 to 30ft a piece of tire from cuttings.			
395	30	EB-6-30		32 27 20 N=47	67			Brown to light brown silty fine SAND, trace tire fiber (thread), moist, dense. [FILL]			136°F PID = 1.8 ppm
390	35	EB-6-35		50 50/6"	50			Brown silty fine SAND, with woven fabric in tip of sampler, iron wire on top and bottom, moist, very dense. [FILL]			128°F PID = 0.9 ppm
385	40	EB-6-40		50/1"	0			No recovery, maybe tire material encountered.			
		EB-6-41		100/4"	0			No recovery, cuttings with some rubber tire and steel wires.			
380	45	EB-6-45		50/5" 50/6"	36		SM	45 to 45.2ft: Dark brownish silty fine SAND with wood pieces, fiber trash, moist. [FILL] 45.2 to 45.4ft: Grayish brown silty fine to medium SAND, moist, very dense. [NATIVE]			131°F PID = 2.0 ppm Trash including fiber, plastic, wires, glass from cuttings from 45 to 50ft.
375	50	EB-6-50		50 30 30 N=60	78			Brown poorly-graded fine to medium SAND with silt, moist, very dense. [NATIVE]			119°F PID = 0.7 ppm
								Boring was completed to 51.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			

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AECOM

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-7

Date(s) Drilled	**6/22/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**41.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**425.44**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
425	0						SM	Light brown silty fine to coarse SAND, trace fine, subangular to subrounded gravel, dry, loose. [FILL]			
420	5		EB-7-5	4 5 6 N=11	56			Same as above but dry to moist, medium dense. [FILL]			91°F PID = 0.6 ppm
415	10		EB-7-10	6 9 10 N=19	78			Same as above but brown, moist. [FILL]			98°F PID = 1.2 ppm
410	15		EB-7-15	11 10 16 N=26	72			Same as above but at bottom 2" reddish brown with some wood, white fiber. [FILL]			111°F PID = 0.6 ppm
405	20		EB-7-20	50 50/3"	89			Light brown silty fine to coarse SAND, moist, medium dense. [FILL]	44.2	6.7	105°F PID = 0.4 ppm
								One small piece of rubber tire from cuttings from 20 to 25ft.			Driller: hard to drill from 22 to 23ft due to possible wood pieces.
	25										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-7

Sheet 2 of 2

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
400	25		EB-7-25	27 8 8 N=16	72		SM	25 to 25.2ft: Same as above; 25.2 to 26.5ft: Dark gray silty fine SAND, trace fine, angular gravel, moist, medium dense, slight odor. [FILL]			119°F PID = 30.2 ppm
395	30		EB-7-30	12 13 15 N=28	83		SM	30 to 30.5 ft: Gray silty fine SAND, trash at tip, moist, medium dense, slight odor. [FILL] 30.5 to 31.5 ft: Gray silty fine SAND, moist, medium dense, slight odor. [NATIVE]			124°F PID = 28.0 ppm
390	35		EB-7-35	25 25 25 N=50	78			Gray silty fine SAND, moist, medium dense, slight odor. [NATIVE]			124°F PID = 41 ppm
385	40		EB-7-40	17 24 25 N=49	78		SP/ SM	Brownish gray poorly-graded fine to medium SAND with silt, moist, dense. [NATIVE]			117°F PID = 8.0 ppm
380	45							Boring was completed to 41.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			
375	50										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-8

Date(s) Drilled	**6/18/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**46.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**425.10**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT/D&M**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
425	0						SM	Light brown silty fine SAND, trace fine, subangular gravel, dry, loose. [FILL]			Boring is moved 8ft to north from original location.
420	5		EB-8-5	6 6 12 N=18	61			Same as above but trace fine gravel angular, medium dense. [FILL]			92°F PID = 1.1 ppm
								@ 9ft a 3/4" dia steel pipe in auger cuttings.			
415	10		EB-8-10	5 1 3 N=4	0			No recovery. Loose.			101°F PID = 0.4 ppm
			EB-8-11.5	15 19 30 N=49	56			Brown silty fine to coarse SAND, trace wood pieces, plastic pieces, moist, dense. [FILL]	36.8	7.6	Collected 6" long D&M sample at 11.5ft.
410	15		EB-8-15	15 4 3 N=7	83			Same as above but loose.			106°F PID = 1.2 ppm
405	20		EB-8-20	50/4"	0			No recovery, except piece of wood in tip of sampler.			
	25										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-8

Sheet 2 of 2

Elevation feet	Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
400	25		EB-8-25	50 30 20 N=50	11		SM	Brown silty fine to medium SAND, with some rubber pieces and fine, angular gravel, moist, dense. [FILL]			Not enough sample for temprature measurement. PID = 2.1 ppm
395	30		EB-8-30	20 17 12 N=29	72			Brown to light brown silty fine SAND, trace wood pieces and fine, subangular gravel, moist, medium dense. [FILL]			125°F PID = 1.1 ppm
390	35		EB-8-35	20 25 30 N=55	78			Brown to light brown silty fine SAND, moist, very dense. [FILL]			120°F PID = 1.5 ppm
385	40		EB-8-40	37 33 35 N=68	78		SM/ SP SM	40 to 40.6ft: Brown silty fine SAND, trace fiber & fine, subangular gravel. [FILL] 40.6 to 41.5ft: Grayish brown poorly-graded fine to medium SAND with silt, moist, very dense. [NATIVE]			125°F PID = 2.1 ppm
380	45		EB-8-45	18 23 22 N=45	100		SP/ SM	Grayish brown poorly-graded fine to medium SAND with silt, moist, dense. [NATIVE]			108°F PID = 0.3 ppm
375	50							Boring was completed to 46.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-9

Sheet 1 of 2

Date(s) Drilled	**6/19/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**41.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**423.50**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT/D&M**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
	0						SM	Light brown silty fine SAND, trace fine, subangular gravel, dry, loose. [FILL]			
420											
	5		EB-9-5	5 6 7 N=13	56			Light brown silty fine to medium SAND, trace fine, subangular gravel, moist, medium dense. [FILL]			81°F PID = 0.8 ppm
415											
	10		EB-9-10	WOH WOH WOH N=0	56			Same as above but with some wood pieces, very loose.			87°F PID = 0.1 ppm WOH - Weight of Hammer. Driller: Possible void at 10 ft.
410											
	15		EB-9-15	8 5 10 N=15	67			Brown silty fine SAND, trace plastic & a piece of 1" diameter concrete, moist, medium dense. [FILL]			94°F PID = 0.2 ppm
			EB-9-16.5	25 50/6"	83			Same as above but fine to coarse sand, no plastic. [FILL]	34.9	6.9	Collected two 5" long D&M samples in tubes.
405											Trash (plastic liner, rubber tire, brick) from cuttings 0 to 20ft.
	20		EB-9-20	50/1"	0			No recovery.			
400											
	25										

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Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-9

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
	25		EB-9-25	50/4"	50		SM	Brown silty fine SAND, moist, very dense or high N-value possibly due to trash obstruction. [FILL]			PID = 1.1 ppm
395											
	30		EB-9-30	100/5"	100			Grayish brown silty fine SAND, with tire fiber at bottom, moist, very dense or high N-value possibly due to trash obstructionv. [FILL]			110°F PID = 0.6 ppm Collected 6" long D&M sample.
390											
	35		EB-9-35	15 15 25 N=40	67		SM	35 to 35.5 ft: Brown silty fine SAND, trace fiber, moist, dense. [FILL] 35.5 to 36.5ft: Brown silty fine SAND, moist, dense. [NATIVE]			105°F PID = 1.9 ppm
385											
	40		EB-9-40	17 20 25 N=45	72			40 to 40.2ft: Same as above; 40.2 to 41.5ft: Grayish brown poorly-graded fine to medium SAND with silt, moist to dry, dense. [NATIVE]			101°F PID = 0.6 ppm
380								Boring was completed to 41.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			
	45										
375											
	50										
370											

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-10

Date(s) Drilled	**6/19/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**41.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**421.96**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT/Shelby**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
420	0						SM	Light brown silty fine SAND, trace fine, subangular gravel, dry, loose. [FILL]			
	5		EB-10-5	4 7 10 N=17	78			Light brown silty fine SAND (last 3" fine to coarse), trace fine, subangular gravel, dry, medium dense. [FILL]			94°F PID = 0.8 ppm
415											
	10		EB-10-10	50/2"	100			Same as above but with one 1.5" diameter piece of concrete, moist, very dense. [FILL]			N/A for °F PID = 0.3 ppm Driller: possible void at ~10ft, then hard drilling.
410											
	15		EB-10-15	1 2 2 N=4	89			15 to 15.8ft & 16 to 16.3ft: Brown, 15.8 to 16ft: Black silty fine SAND, trace fine to coarse, subangular gravel & trash (plastic), moist, loose. [FILL]			96°F PID = 0.0 ppm
405			EB-10-26.5		100			Top dark brown, bottom brown silty fine to medium SAND, dry to moist. [FILL]			100°F Collected 3" diameter Shelby sample.
	20		EB-10-20	4 5 6 N=11	89			Dark brown to brown silty fine SAND, trace fine, subangular gravel, moist, medium dense. [FILL]			99°F PID = 0.1 ppm
400											
	25										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-10

Sheet 2 of 2

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
	25		EB-10-25	14 14 25 N=39	78		SM	Brown silty fine SAND, trace wood pieces, moist, dense, strong odor. [FILL]			105°F PID = 165 ppm
395											
	30		EB-10-30	20 25 30 N=55	72		SM	30 to 30.2ft: Same as above; 30.2 to 31.5ft: Gray silty fine SAND, dry, very dense, some odor. [NATIVE]			106°F PID = 31.4 ppm
390											
	35		EB-10-35	25 25 25 N=50	78			Gray silty fine SAND, dry, dense, no odor. [NATIVE]			107°F PID = 1.4 ppm
385											
	40		EB-10-40	22 25 27 N=52	100			Gray poorly-graded fine to medium SAND with silt, moist, very dense,. [NATIVE]			97°F PID = 0.9 ppm
380								Boring was completed to 41.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			
	45										
375											
	50										
370											

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Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-11A

Sheet 1 of 1

Date(s) Drilled	**6/22/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**1.67 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**417.0**
Borehole Backfill	**Onsite Soil**	Sampling Method(s)		Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
417	0						SM	2" thick Light brown silty fine SAND, dry, loose; then double-layer black geomembrane with geotextile below; then brown silty fine SAND, moist to 20" deep; then refusal on metal (possible buried metal drum). [FILL]			
415								Boring was stopped at refusal of 1.67 ft deep bgs. Goundwater was not encountered in the hole. Backfilled with onsite sandy soil, dust tape on geomembrane liner.			
	5										
410											
	10										
405											
	15										
400											
	20										
395											
	25										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-11B

Sheet 1 of 2

Date(s) Drilled	**6/22/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**36.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**416.5**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT/D&M**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
415	0						SM	Double-layer black geomembrane with geotextile below.			
	5		EB-11B-5	3 2 10 N=12	100			Brown to reddish brown silty fine SAND, trace fiber at top & small pieces of concrete at bottom, moist, medium dense. [FILL]			97^0F PID = 1.4 ppm
410											Driller: hit some metal at ~8ft.
	10		EB-11B-10	6 5 4 N=9	78			Brown silty fine SAND, moist, loose. [FILL]			106^0F PID = 0.7 ppm
405											
	15		EB-11B-15	6 5 6 N=11	22			Brown silty fine SAND with some wood pieces at bottom, moist, medium dense. [FILL]			N/A for ^{0}F PID = 0.9 ppm
400											Rig wobbling during drilling.
	20			60/5"	0			No recovery.			Some trash in cuttings from 20 to 25 ft.
395				50/2"	0			No recovery.			
	25										

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Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-11B

Sheet 2 of 2

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
390	25		EB-11B-25	8 12 17 N=29	72			Brown silty fine SAND, moist, medium dense. [FILL]	32.7	8.1	109°F PID = 2.6 ppm
385	30		EB-11B-30	25 28 32 N=60	83			Same as above but very dense. [FILL]			122°F PID = 4.0 ppm Steel baling wires from cuttings near 30 ft. Some metal, plastic in cuttings near 32 ft.
							SM				
380	35		EB-11B-35	20 22 23 N=45	83		SP/ SM	Grayish brown poorly-graded fine to medium SAND with silt, moist, dense. [NATIVE]			108°F PID = 2.0 ppm
								Boring was completed to 36.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil, dust tape on geomembrane liner. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			
375	40										
370	45										
365	50										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-12

Sheet 1 of 2

Date(s) Drilled	**6/23/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**41.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**426.5**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT/D&M**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
425	0						SM	Light brown silty fine SAND, trace fine, subangular gravel, dry, loose. [FILL]			
	5		EB-12-5	5 4 6 N=10	67			Light brown to brown silty fine SAND, trace fine, subangular gravel, dry to moist, loose. [FILL]			90°F PID = 1.0 ppm
420	10		EB-12-10	7 4 4 N=8	61			Same as above but fine to coarse sand.			103°F PID = 0.5 ppm
415	15		EB-12-15	7 12 5 N=17	56			Same as above but brown to dark brown with some rubber, wood, moist, medium dense.			121°F PID = 1.1 ppm Cuttings have some plastic bags and hard green plastic in auger flights.
410	20		EB-12-20	30 50/6"	67			Light brown silty fine to coarse SAND with some trash (plastic bags, etc), moist, very dense. [FILL]	23.2	4.5	130°F PID = 1.1 ppm Collected 6" long D&M sample.
405	25										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-12

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Blows/ 6in.	SAMPLES Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
	25		EB-12-25	50/2"	100		SM	Same as above but contain some wires.			123°F PID = 2.1 ppm
400								Some trash from cuttings.			
	30		EB-12-30	17 20 16 N=36	67		SM	30 to 30.2ft: Top trace wire trash. 30.2 to 31.5ft: Light brown to brown silty fine SAND, dry to moist, dense. [NATIVE]			138°F PID = 2.1 ppm
395											
	35		EB-12-35	22 25 27 N=52	78			Brown to light brown silty fine SAND, trace fine, subangular gravel & wood at top 2", moist, very dense. [NATIVE]			143°F PID = 3.7 ppm
390											
	40		EB-12-40	21 23 25 N=48	89		SM/ ML	Brown silty fine SAND, with 41.2 to 41.4 ft brown sandy SILT, moist, dense. [NATIVE]			140°F PID = 1.5 ppm
385								Boring was completed to 41.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			
	45										
380											
	50										
375											

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-13

Sheet 1 of 2

Date(s) Drilled	**6/23/15**	Logged By	**K. Yang**	Checked By	**M. Walbaum**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**41.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**426.6**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT/D&M**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
425	0						SM	Light brown silty fine SAND, trace fine, subangular gravel, dry, loose. [FILL]			
	5		EB-13-5	4 4 4 N=8	67			Same as above but moist.			99°F PID = 0.2 ppm
420											
	10		EB-13-10	6 7 9 N=16	78			Same as above but also trace fibers, medium dense.			105°F PID = 0.0 ppm
415											
	15		EB-13-15	17 17 20 N=37	89			Brown silty fine SAND, trace fine, subangular gravel, moist, dense. [FILL]			117°F PID = 0.2 ppm
410											
	20		EB-13-20	25 11 6 N=17	56			Brown silty fine SAND, trace fine, subangular gravel, 20.5 to 20.8 ft trash of reddish brown wood, plastic etc, moist, medium dense. [FILL]			128°F PID = 1.0 ppm
405											
	25										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-13

Sheet 2 of 2

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
400	25		EB-13-25	50/4"	100		SM	Same as above but tire fiber at bottom.			113°F PID = 0.6 ppm
								From 25 to 30 ft trash in cuttings.			
395	30		EB-13-30	50/2"	100			Same as above.			110°F PID = 1.6 ppm
390	35		EB-13-35	15 15 18 N=33	89		SM	35 to 35.5 ft: Grayish brown silty fine SAND with trash (wood, rubber tire); [FILL] 35.5 to 36.5ft: Gray silty fine SAND, moist, dense. [NATIVE]			129°F PID = 11.7 ppm
385	40		EB-13-40	18 20 25 N=45	78			Brown to gray silty fine SAND, with 2" gray sandy SILT, moist, dense/hard. [NATIVE]			126°F PID = 17.1 ppm
380	45							Boring was completed to 41.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil. PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			
375	50										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-14

Sheet 1 of 2

Date(s) Drilled	**7/22/15**	Logged By	**Eric S.**	Checked By	**K. Yang**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**41 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**423**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
420	0						SM	Light brown silty fine SAND, trace fine, angular to rounded gravel, dry, loose. [FILL]			
	5		EB-14-5	30 20 18 N=38	100			Same as above but mixture of medium brown, fine to coarse sand, dense.			93°F PID = 3.8 ppm
415	10		EB-14-10	15 19 16 N=35	0			No recovery, but dense.			
410			EB-14-12.5	31 50/4"	40			Same as above. Piece of ceromic (toilet).			102°F PID = 2.0 ppm
	15		EB-14-15	50/4"	20			Same as above but some string and rubber.			99°F PID = 1.1 ppm
405	20		EB-14-20	50 10 30 N=40	80		SP/ SM	Dark brown fine to medium SAND with silt, trace gravel, bottom with trash of tires, dry, dense, odor. [FILL]			117°F PID = 4.3 ppm
400	25										

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-14

Sheet 2 of 2

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
395	25		EB-14-25	31 45 50 N=95	90		SM	Same as above but silty fine to medium SAND, trace coarse sand.			118°F PID = 1.1 ppm
								Soil cuttings dropped into potential void space.			
390	30		EB-14-30	39 50/6"	70			30 to 31 ft: Same as above.			117°F PID = 0.8 ppm
			EB-14-31.5	39 50/6"	70		SP/ SM	Gray poorly-graded fine SAND with silt, dry, very dense, transition to Native soil. No odor. [NATIVE] D&M sample 31.5 to 32.5ft, 6" long rings.			122°F PID = 1.2 ppm
385	35		EB-14-35	49 50/6"	70			Same as above but become more gray. [NATIVE]			122°F PID = 2.5 ppm
380	40		EB-14-40	39 50/6"	95			40 to 40.5 ft: Same as above.			115°F PID = 0.6 ppm
							SW/ SM	40.5 to 41ft: Brown well-graded medium SAND with silt, angular to subangular, dry, very dense. [NATIVE]			
	45							Boring was completed to 41 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil.			
375								PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			
	50										
370											

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-15

Date(s) Drilled	**7/23/15**	Logged By	**Eric S.**	Checked By	**K. Yang**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**8-5/8-inch O.D.**	Total Depth of Borehole	**41.5 feet**
Drill Rig Type	**CME55 Track**	Drilling Contractor	**Cascade Drilling**	Surface Elevation	**423**
Borehole Backfill	**Bentonite Chips & Onsite Soil**	Sampling Method(s)	**SPT**	Hammer Data	**140-lb wireline**
Location	**Pasco Sanitary Landfill Site**				

Elevation feet	Depth, feet	SAMPLES Type	SAMPLES Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
420	0						SM	Light brown silty fine SAND, trace fine, angular to rounded gravel, dry, loose. [FILL]			
	5		EB-15-5	32 31 29 N=60	80			Same as above but medium brown, some fine debris pieces.			97°F PID = 0.6 ppm
415	10		EB-15-10	25 23 30 N=53	70			Same as above but becoming finer, contains some gravel, dry, reduced grading, no debris.			100°F PID = 0.4 ppm
410	15		EB-15-15	16 50/5"	60			Reddish brown silty fine to medium SAND, trace coarse sand and gravel, dry, nodebris, very dense. [FILL]			106°F PID = 0.4 ppm
405	20		EB-15-20	27 50/6"	25		SP/ SM	Dark brown fine to medium SAND with silt with ~50% trash of carboard, plastic bags, glass, dry, dense, garbage odor. [FILL]			118°F PID = 0.7 ppm
400	25										126°F

Project: Balefill Area Extinguishment & Supplement Barrier
Project Location: Pasco Sanitary Landfill Site, WA
Project Number: 60428541

Log of Boring EB-15

Sheet 2 of 2

Elevation feet	Depth, feet	SAMPLES Type	Number	Blows/ 6in.	Recovery, %	Graphic Log	USCS	MATERIAL DESCRIPTION	Fines Content (%<#200 Sieve)	Moisture Content	REMARKS AND OTHER TESTS
395	25		EB-15-25	37 50/6"	90		SM	Same as above but brown silty fine SAND, mottled with red string at ~26ft, very dense, at 26.5ft more gray, no debris, no odor.			PID = 1.4 ppm
390	30		EB-15-30	48 50/6"	80			Brown silty fine to medium SAND, at 31.5ft very silty, dry, no debris, slight odor.			123°F PID = 0.6 ppm
			EB-15-31.5	49 50/6"	80						119°F PID = 6.6 ppm
385	35		EB-15-35	47 50/6"	60			Same as above but become more gray. [FILL]			120°F PID = 22 ppm
			EB-15-38.5	38 50/6"	80			Same as above, at 39.5ft, salt & pepper well-graded silty SAND, dry. [FILL]			118°F PID = 6.6 ppm
380	40		EB-15-39.5	36 50/6"	90		SP/ SM	Gray poorly-graded fine SAND with silt, dry, very dense, no odor, transition to native soil. [NATIVE]			111°F PID = 2.3 ppm
			EB-15-40.5	48 50/6"	50			D&M sample collected at 40.5ft.			111°F PID = 0.8 ppm
375	45							Boring was completed to 41.5 ft bgs. Goundwater was not encountered in the hole. Boring was backfilled with bentonite chips up to 5ft, 0 to 5ft with onsite sandy soil.			
370	50							PID measurements as obtained with a MiniRAE 3000 Model 4327 Multigas Monitor with a 10.6eV Lamp.			

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **001**	
Photo Taken: **06/15/15**	
Description: Boring: EB-1 Depth: 5.0-ft to 6.5-ft bgs	

Photo No. **002**	
Photo Taken: **06/15/15**	
Description: Boring: EB-1 Depth: 5.0-ft to 6.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG

Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **003**

Photo Taken: **06/15/15**

Description:

Boring: EB-1
Depth: 10.0-ft to 11.5-ft bgs

Photo No. **004**

Photo Taken: **06/15/15**

Description:

Boring: EB-1
Depth: 15.0-ft to 16.5-ft bgs

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **005**	
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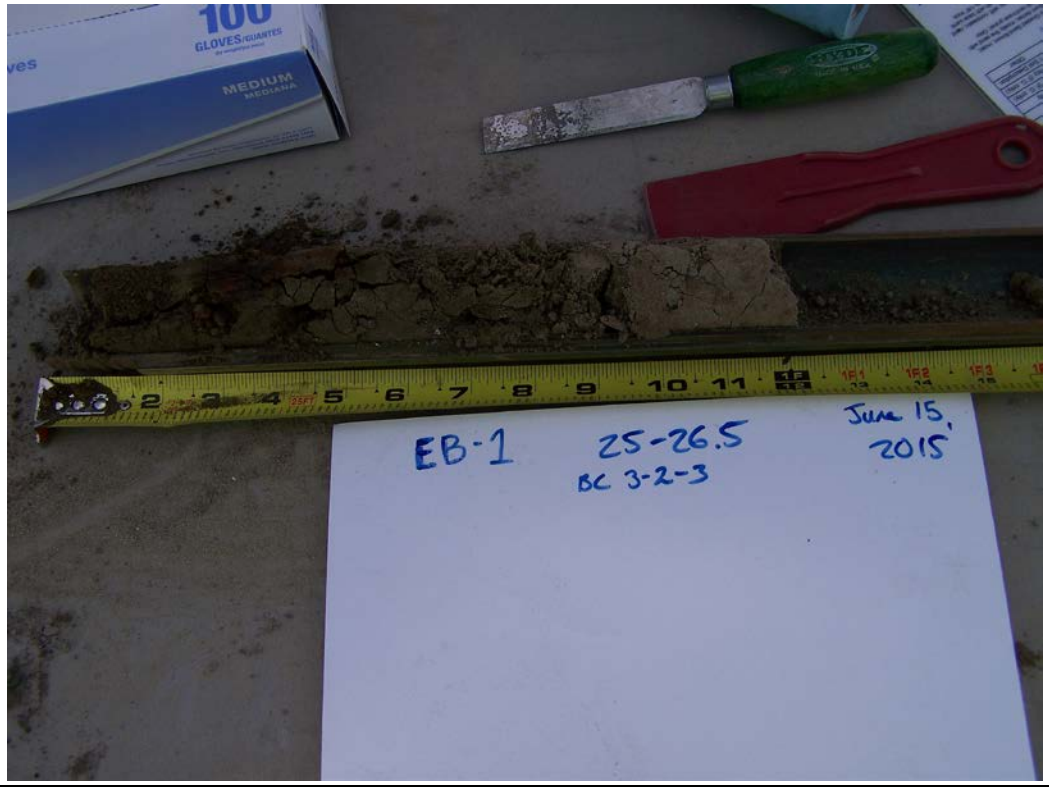
Photo No. **006**	
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Description: Boring: EB-1 Depth: 25.0-ft to 26.5-ft bgs	

AECOM

PHOTOGRAPHIC LOG

Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No.
007

Photo Taken:
06/15/15

Description:

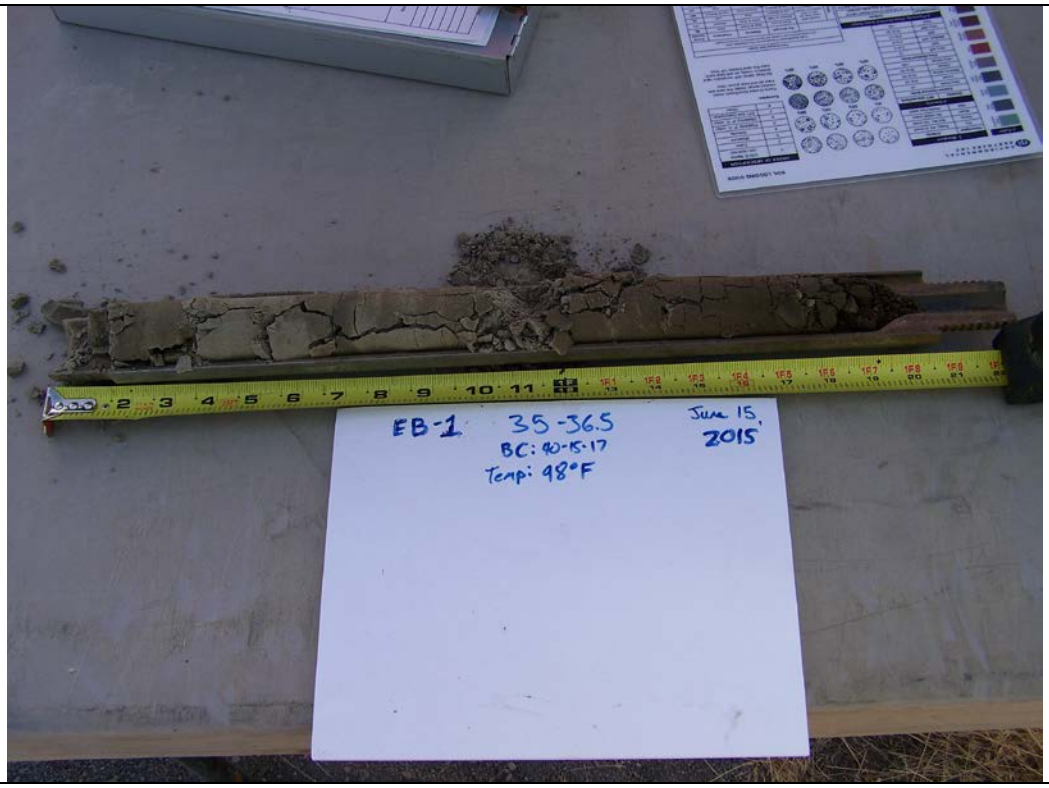
Boring: EB-1
Depth: 30.0-ft to 31.5-ft bgs

Photo No.
008

Photo Taken:
06/15/15

Description:

Boring: EB-1
Depth: 35.0-ft to 36.5-ft bgs



AECOM	PHOTOGRAPHIC LOG

Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No.
009

Photo Taken:
06/15/15

Description:

Boring: EB-1
Depth: 40.0-ft to 41.5-ft bgs

Photo No.
010

Photo Taken:
06/15/15

Description:

Boring: EB-1
Depth: 45.0-ft to 46.5-ft bgs

AECOM	PHOTOGRAPHIC LOG

Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **011**	
Photo Taken: **06/15/15**	
Description: Boring: EB-1 Depth: 50.0-ft to 51.5-ft bgs	

Photo No. **012**	
Photo Taken: **06/16/15**	
Description: Boring: EB-2A Depth: 5.0-ft to 6.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **013**	
Photo Taken: **06/16/15**	
Description: Boring: EB-2A Depth: 10.0-ft to 11.5-ft bgs	

Photo No. **014**	
Photo Taken: **06/16/15**	
Description: Boring: EB-2A Depth: 15.0-ft to 16.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

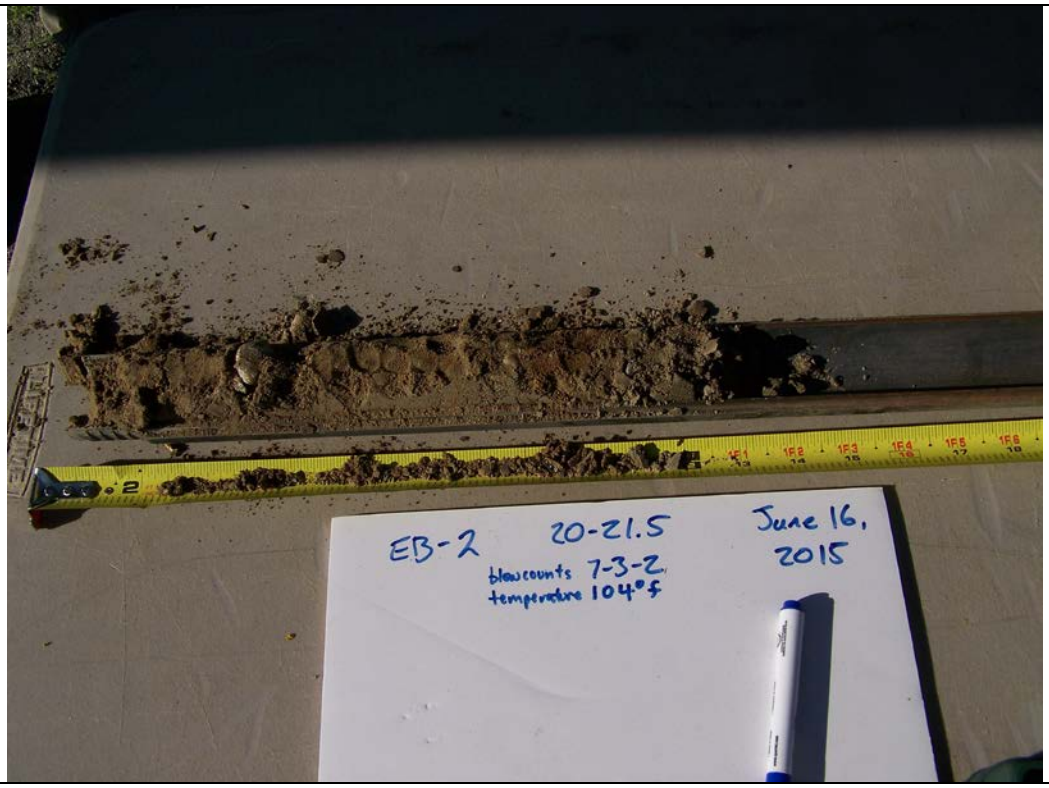
Photo No. **015**	
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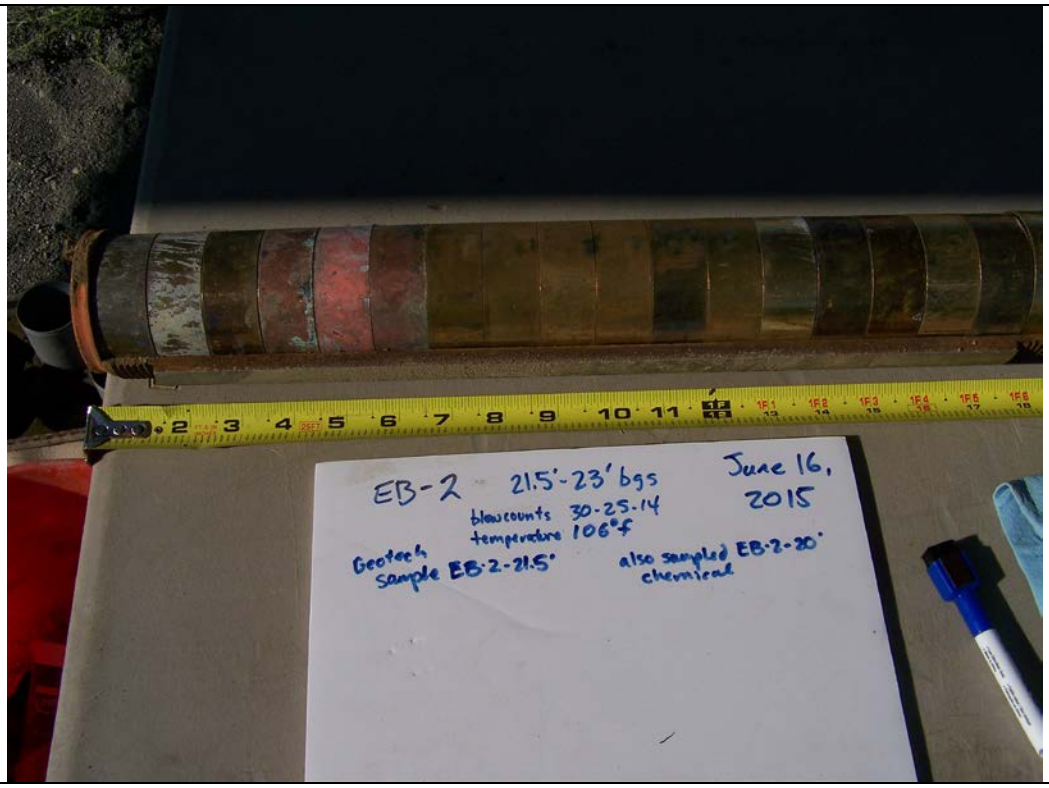
Photo No. **016**	
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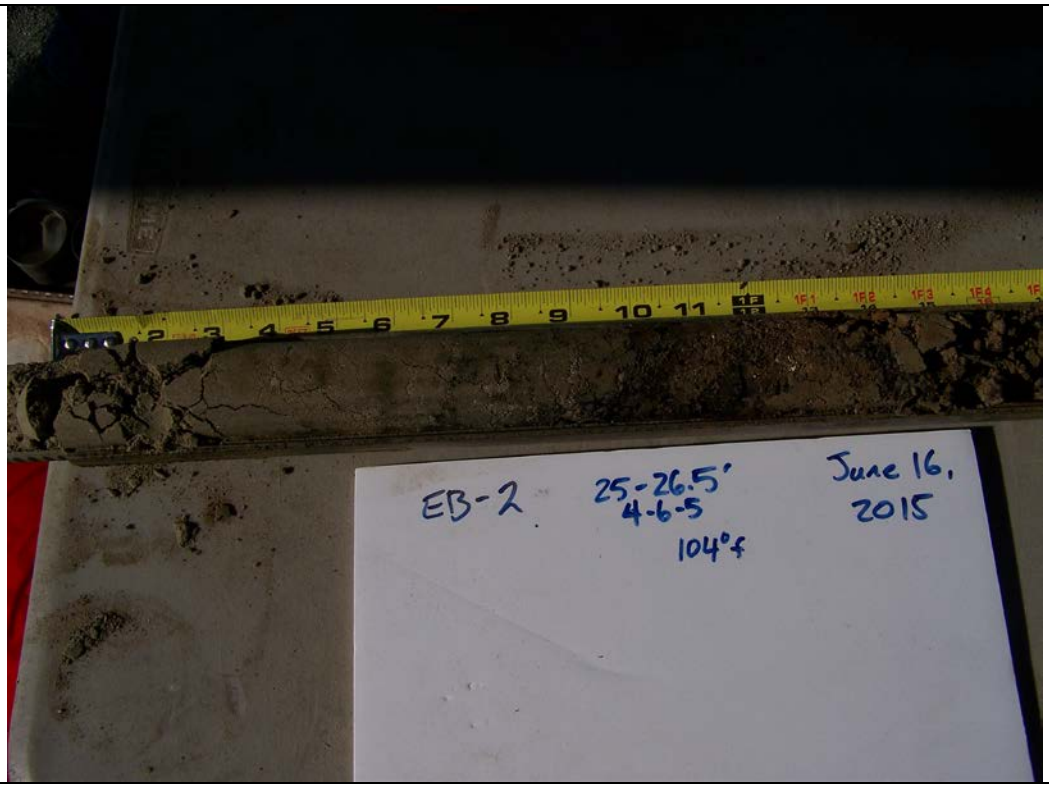
Description: Boring: EB-2A Depth: 21.5-ft to 23.0-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **017**	
Photo Taken: **06/16/15**	
Description: Boring: EB-2A Depth: 21.5-ft to 23.0-ft bgs	

Photo No. **018**	
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Description: Boring: EB-2A Depth: 25.0-ft to 26.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

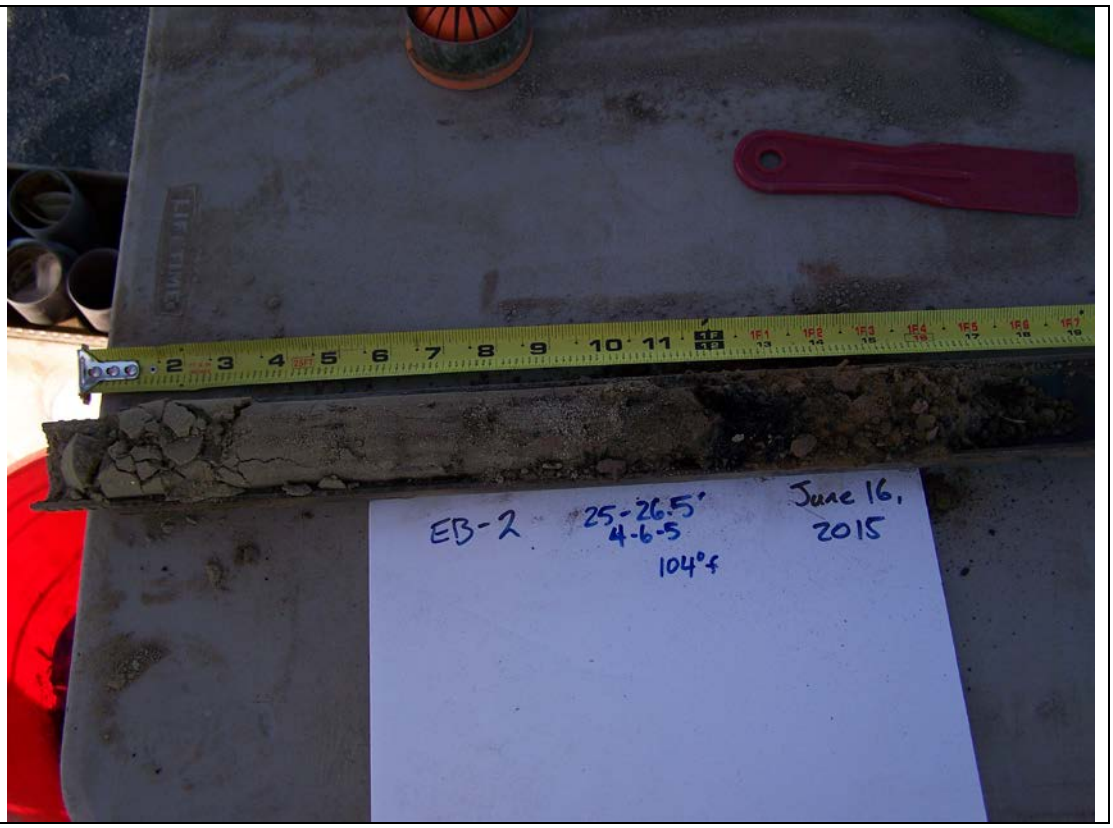
Photo No. **019**	
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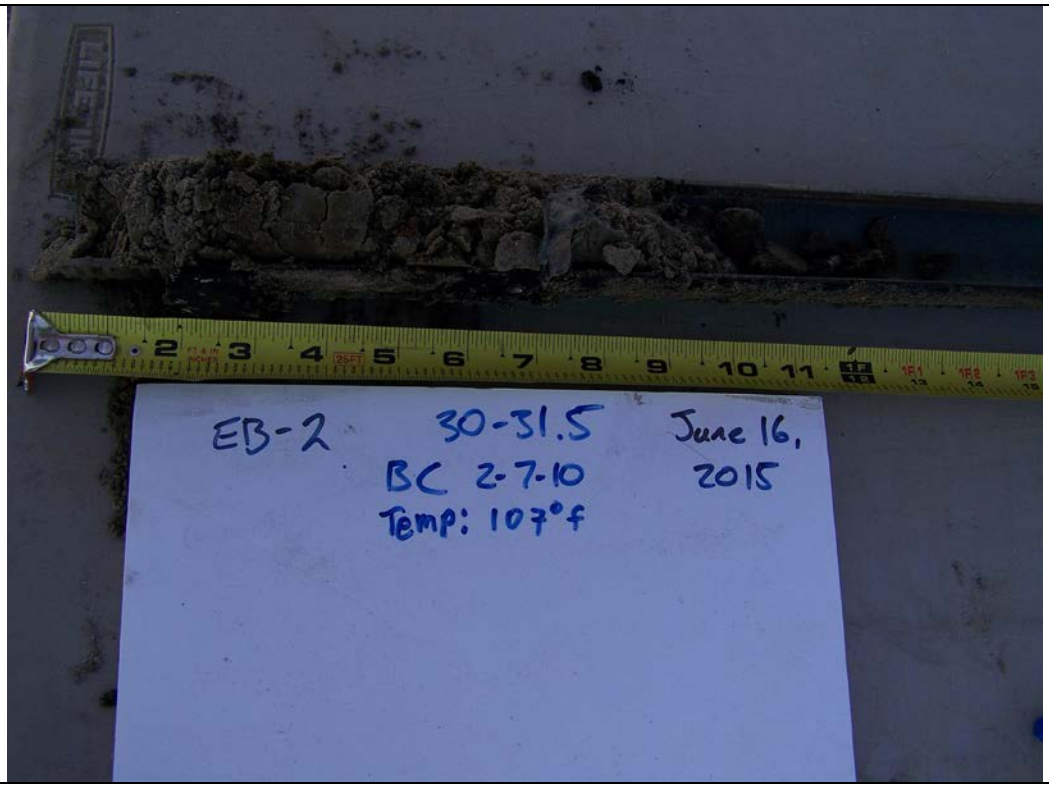
Photo No. **020**	
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Description: Boring: EB-2A Depth: 30.0-ft to 31.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **021**	
Photo Taken: **06/16/15**	
Description: Boring: EB-2B Depth: 5.0-ft to 6.5-ft bgs	

Photo No. **022**	
Photo Taken: **06/16/15**	
Description: Boring: EB-2B Depth: 10.0-ft to 11.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

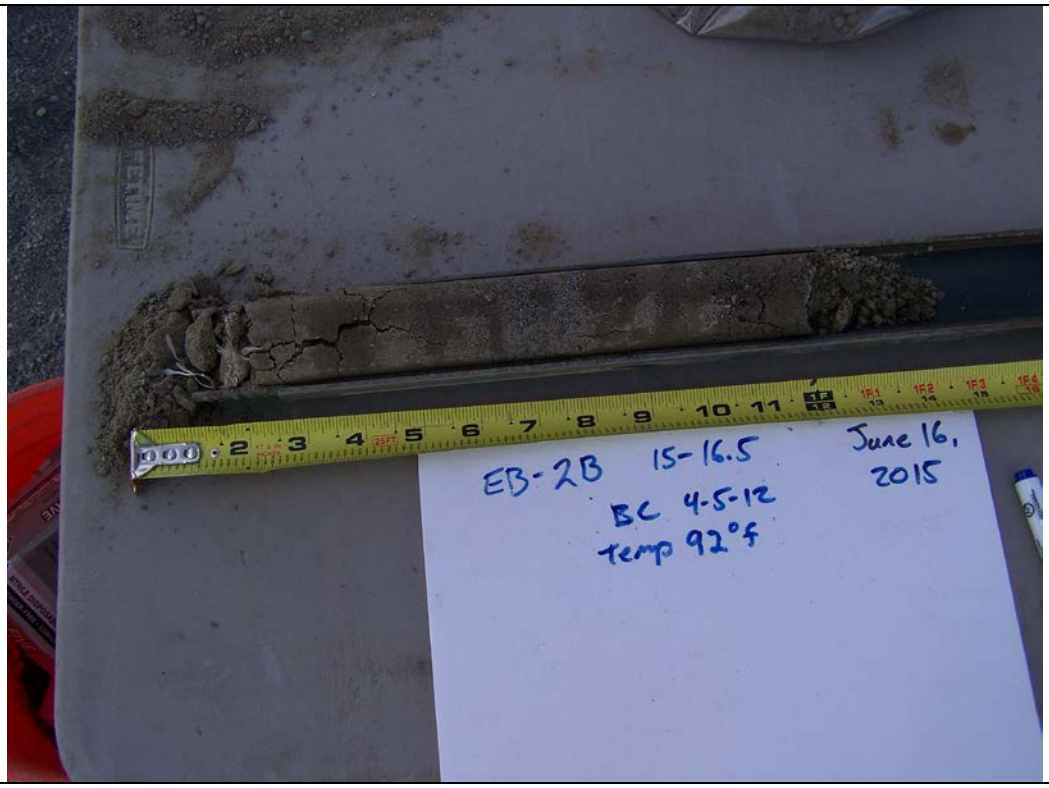
Photo No. **023**	
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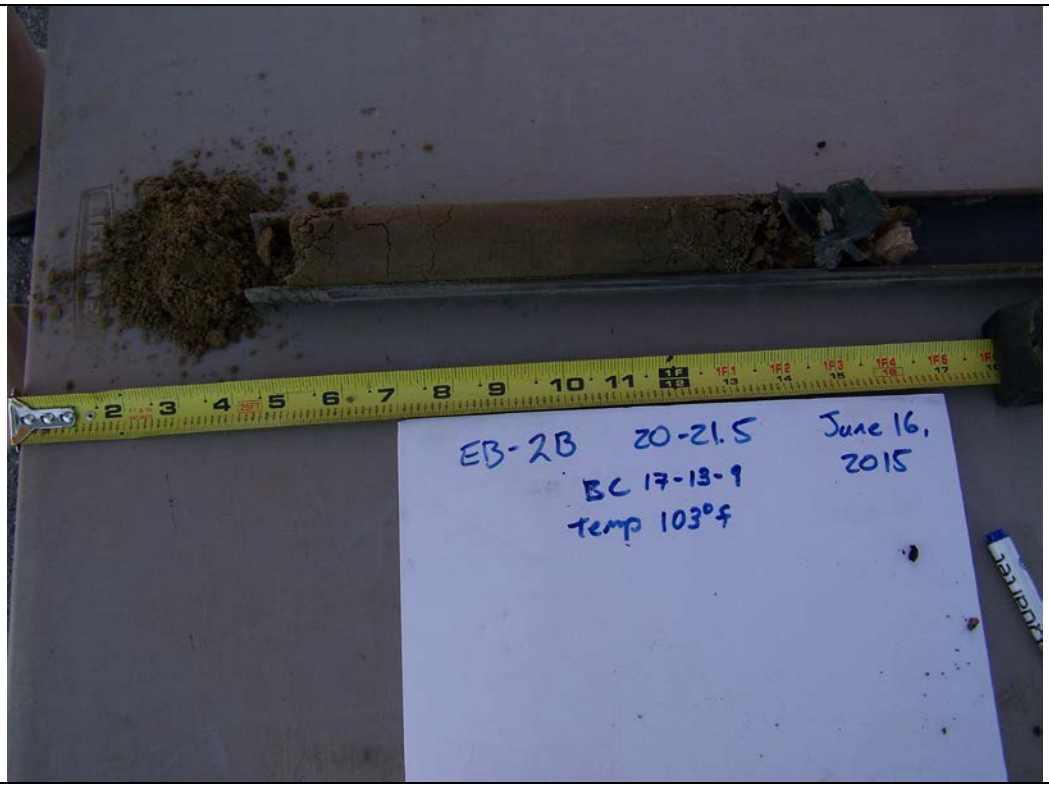
Photo No. **024**	
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Description: Boring: EB-2B Depth: 20.0-ft to 21.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **025**	
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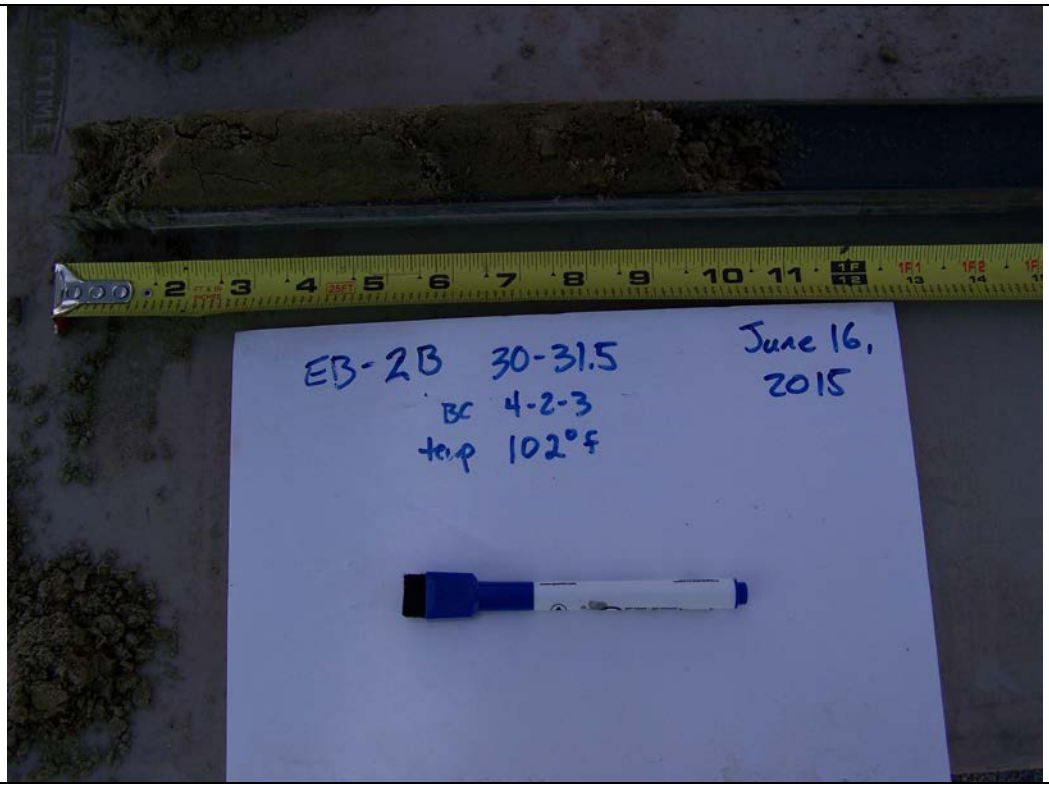
Photo No. **026**	
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AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

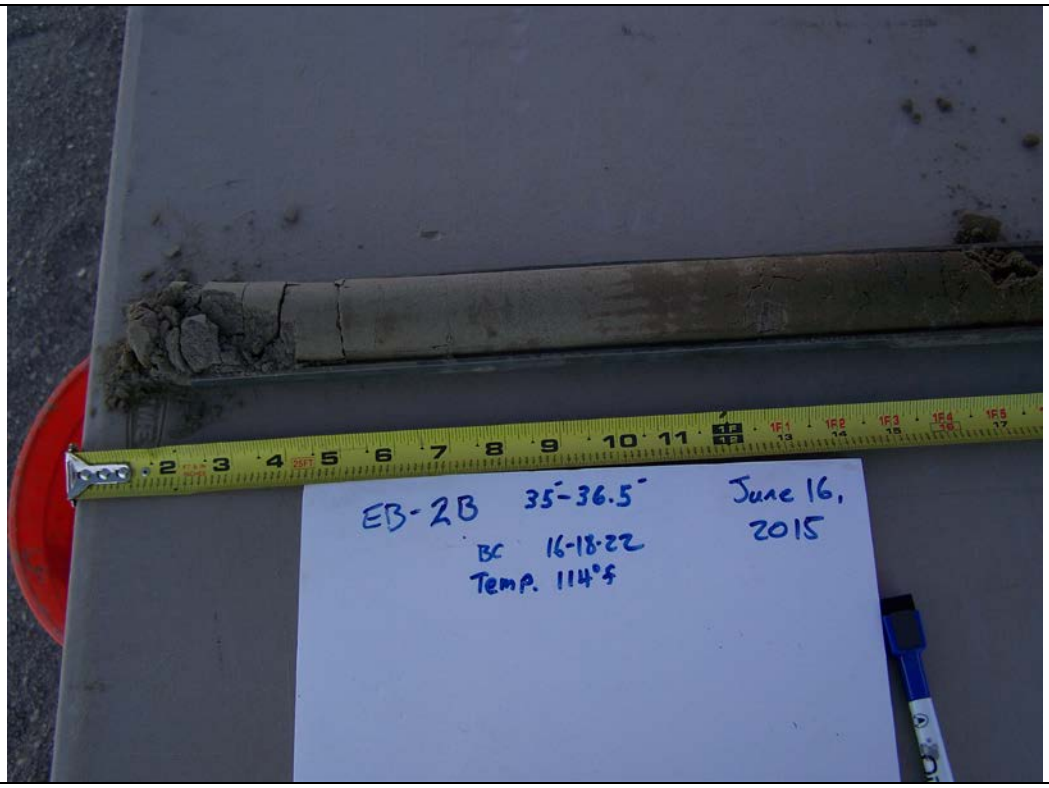
Photo No. **027**	
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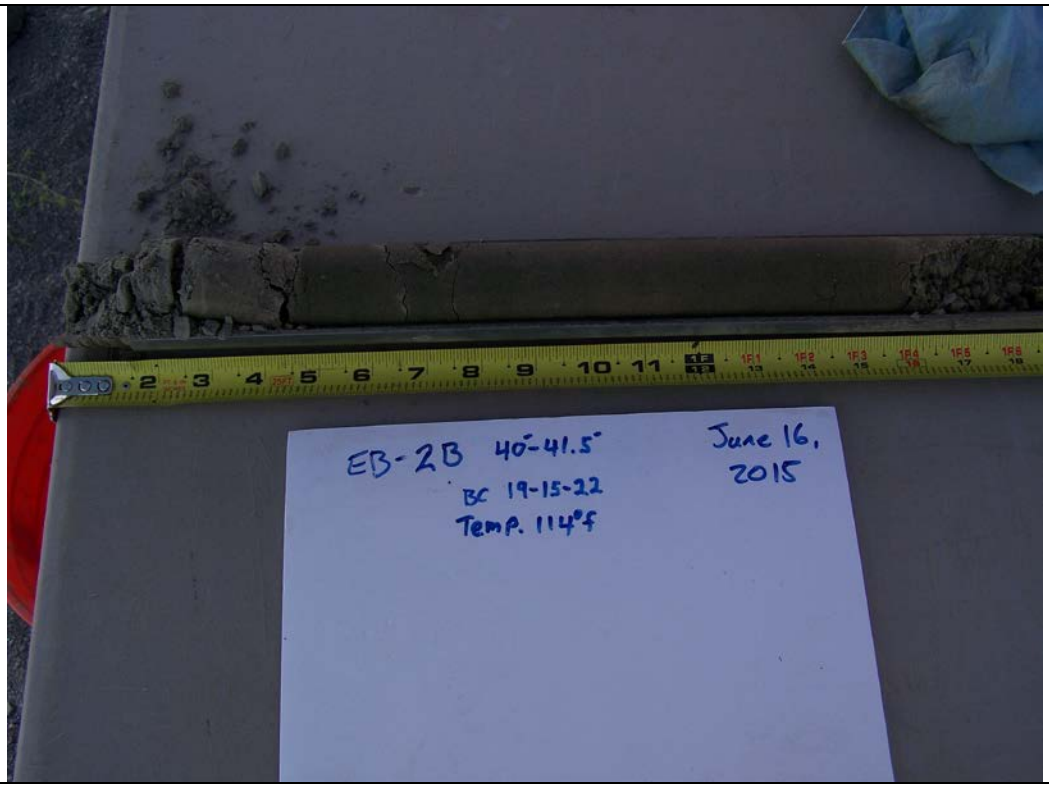
Photo No. **028**	
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Description: Boring: EB-2B Depth: 40.0-ft to 41.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

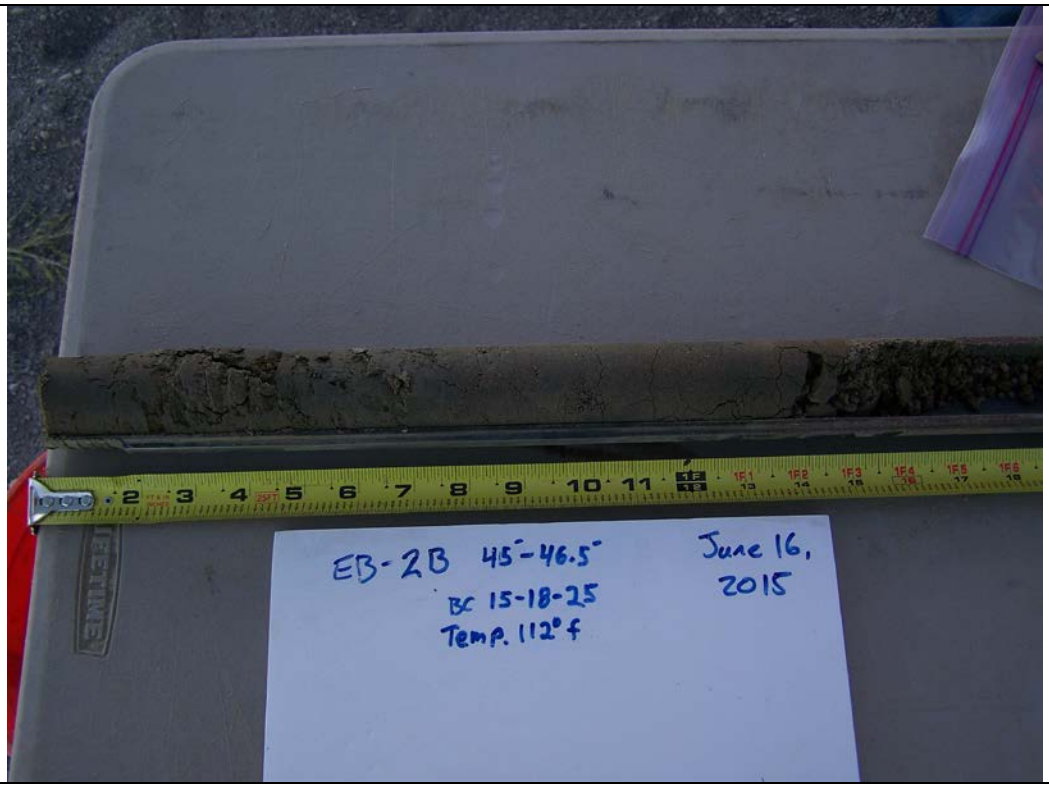
Photo No. **029**	
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Photo No. **030**	
Photo Taken: **06/16/15**	
Description: Boring: EB-2B Depth: 50.0-ft to 51.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

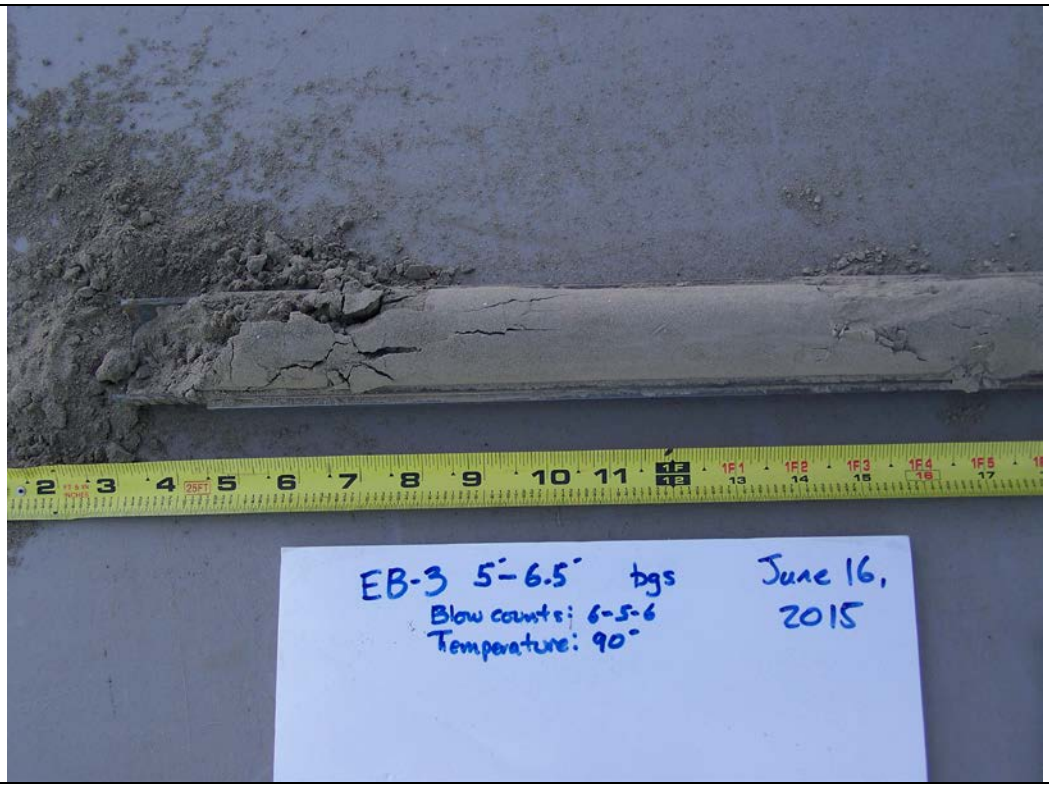
Photo No. **031**	
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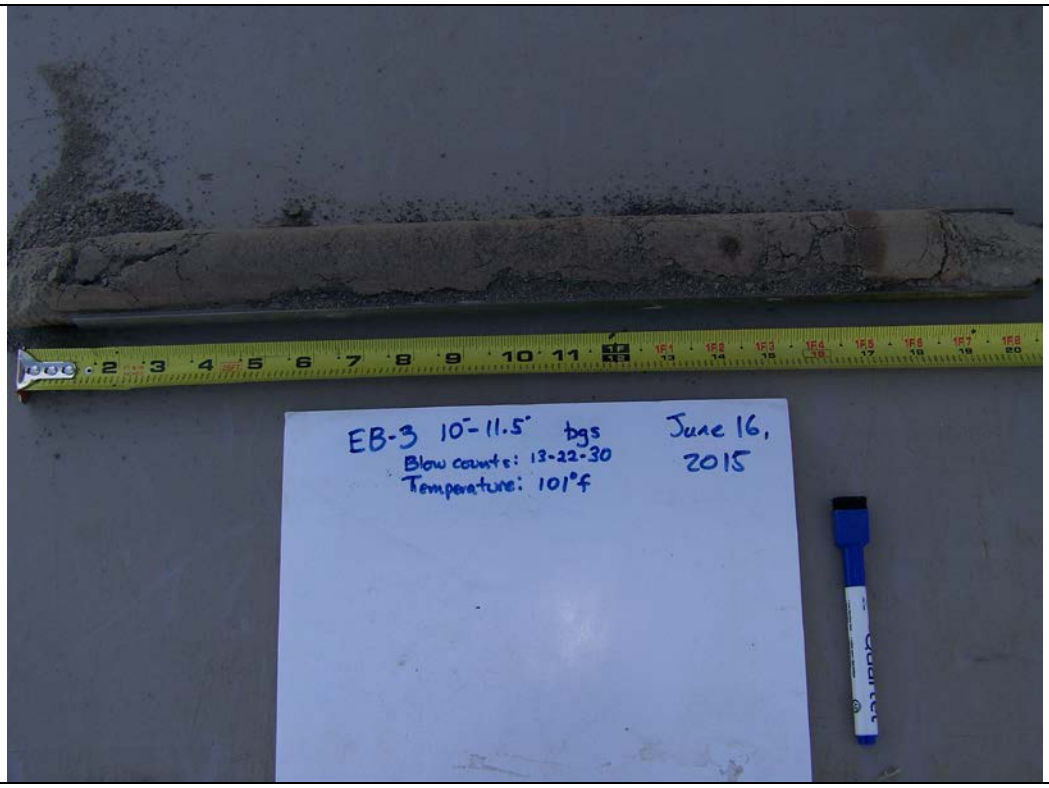
Photo No. **032**	
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AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

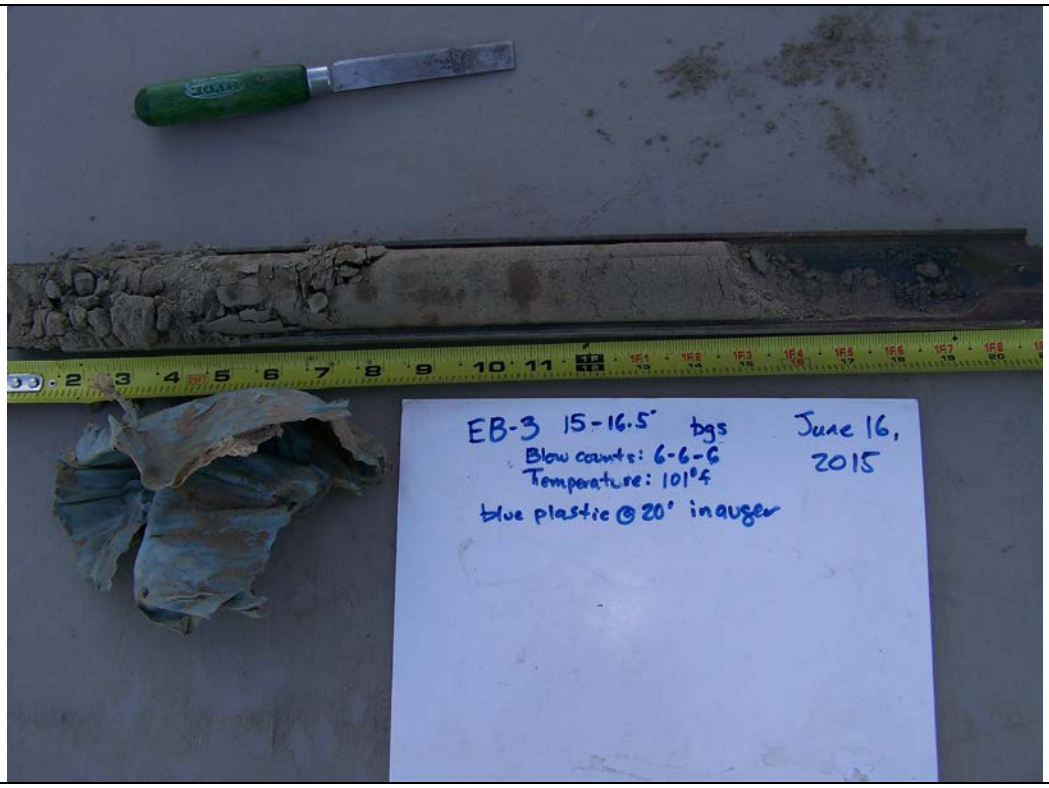
Photo No. **033**	
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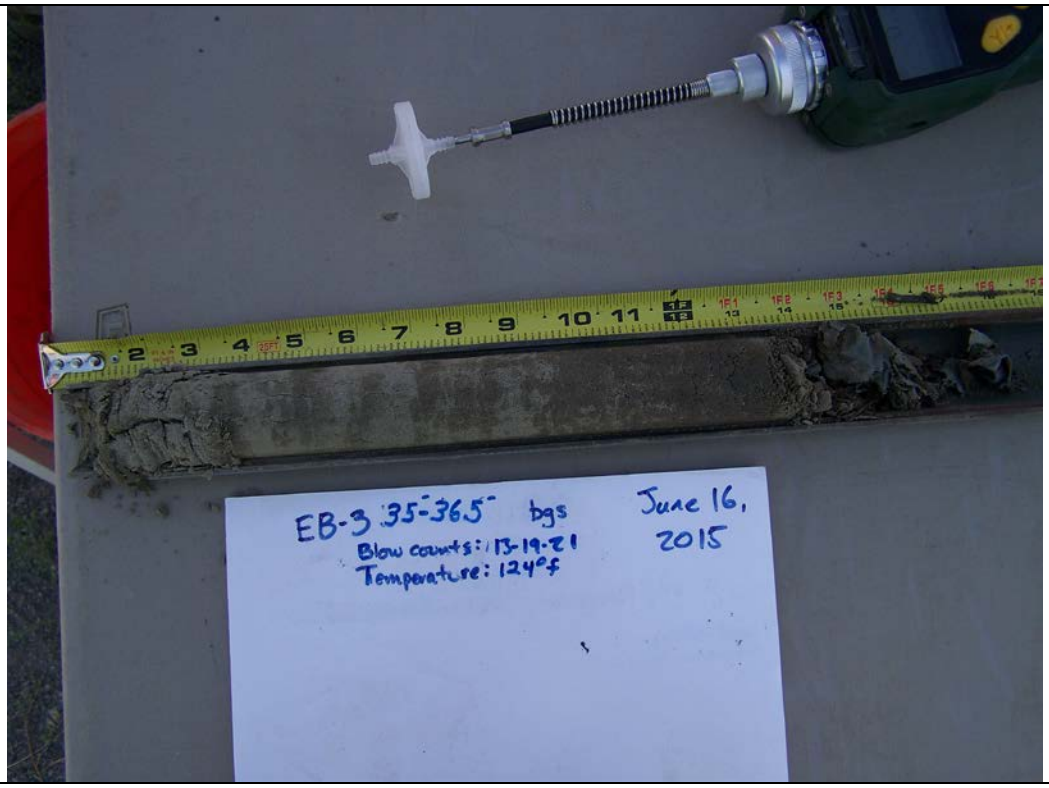
Photo No. **034**	
Photo Taken: **06/16/15**	
Description: Boring: EB-3 Depth: 20.0-ft to 21.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **035**	
Photo Taken: **06/16/15**	
Description: Boring: EB-3 Depth: 25.0-ft to 26.5-ft bgs	

Photo No. **036**	
Photo Taken: **06/16/15**	
Description: Boring: EB-3 Depth: 30.0-ft to 31.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **037**	
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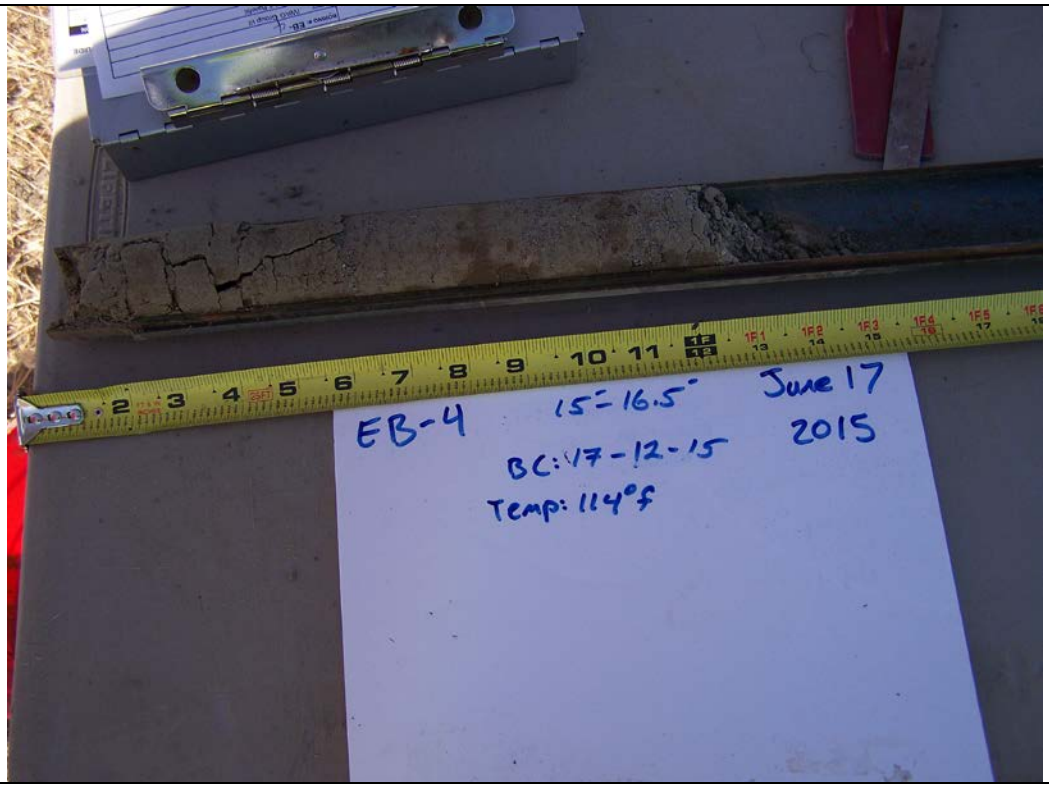
Description: Boring: EB-3 Depth: 35.0-ft to 36.5-ft bgs	

Photo No. **038**	
Photo Taken: **06/16/15**	
Description: Boring: EB-3 Depth: 40.0-ft to 41.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **039**	
Photo Taken: **06/17/15**	
Description: Boring: EB-4 Depth: 10.0-ft to 11.5-ft bgs	

Photo No. **040**	
Photo Taken: **06/17/15**	
Description: Boring: EB-4 Depth: 15.0-ft to 16.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

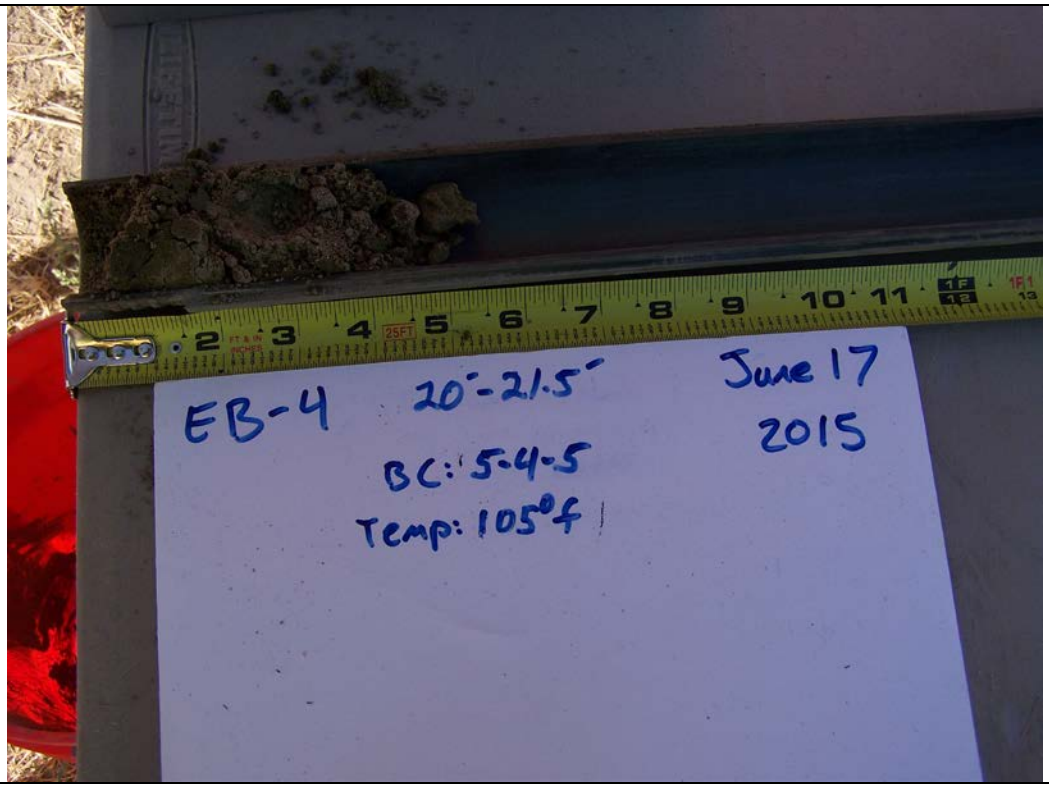
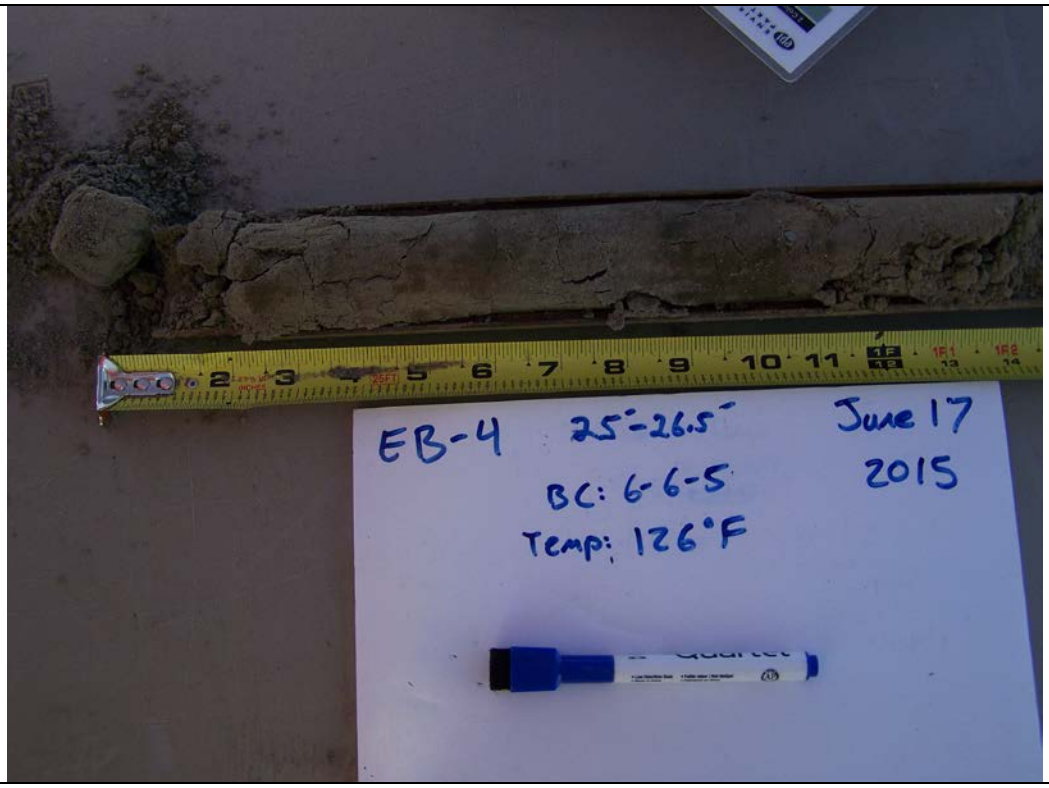
Photo No. **041**	
Photo Taken: **06/17/15**	
Description: Boring: EB-4 Depth: 20.0-ft to 21.5-ft bgs	

Photo No. **042**	
Photo Taken: **06/17/15**	
Description: Boring: EB-4 Depth: 25.0-ft to 26.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

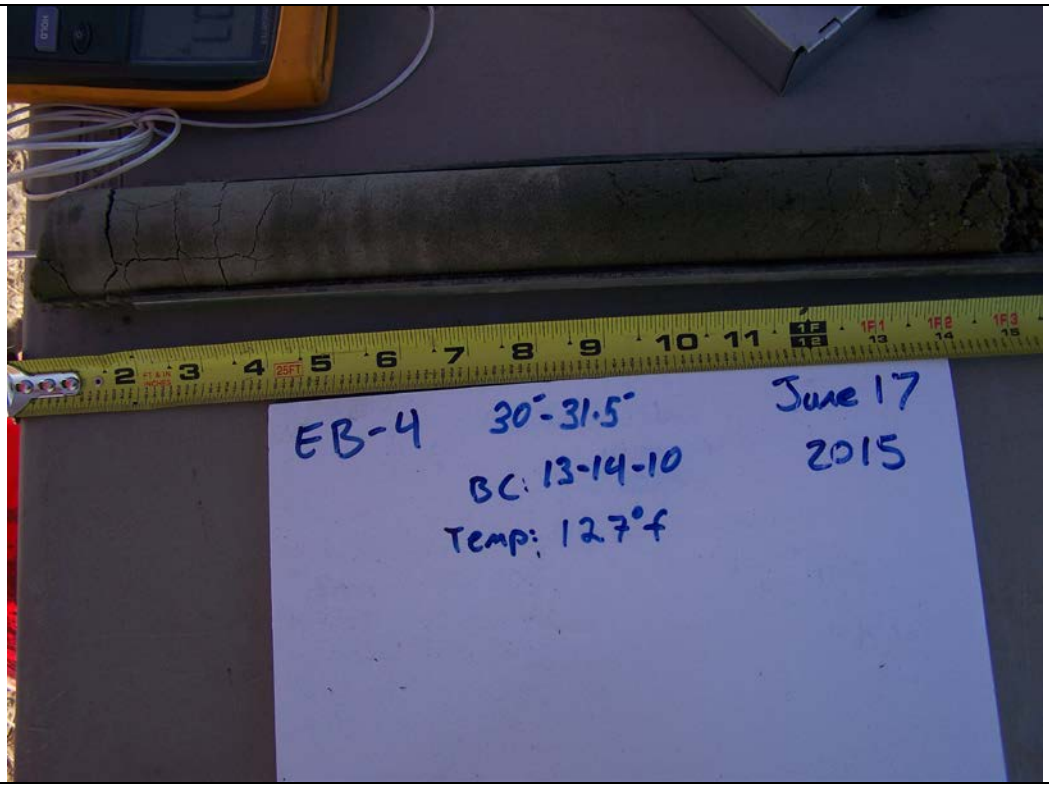
Photo No. **043**	
Photo Taken: **06/17/15**	
Description: Boring: EB-4 Depth: 30.0-ft to 31.5-ft bgs	

Photo No. **044**	
Photo Taken: **06/17/15**	
Description: Boring: EB-4 Depth: 35.0-ft to 36.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

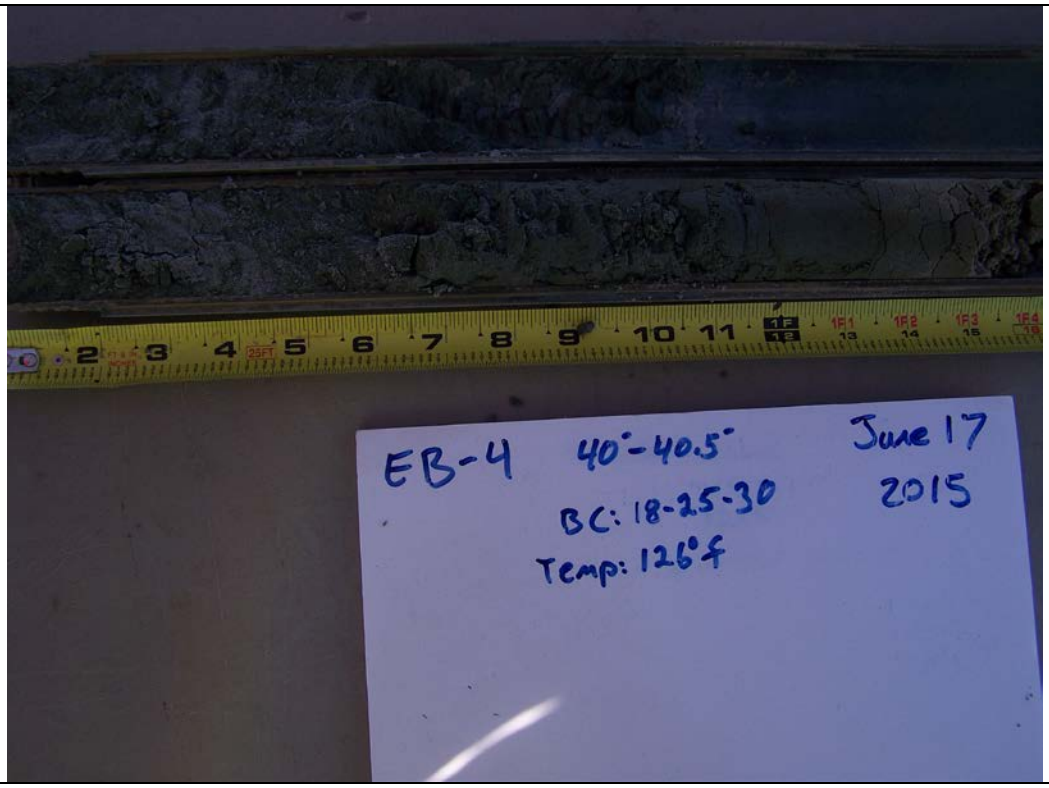
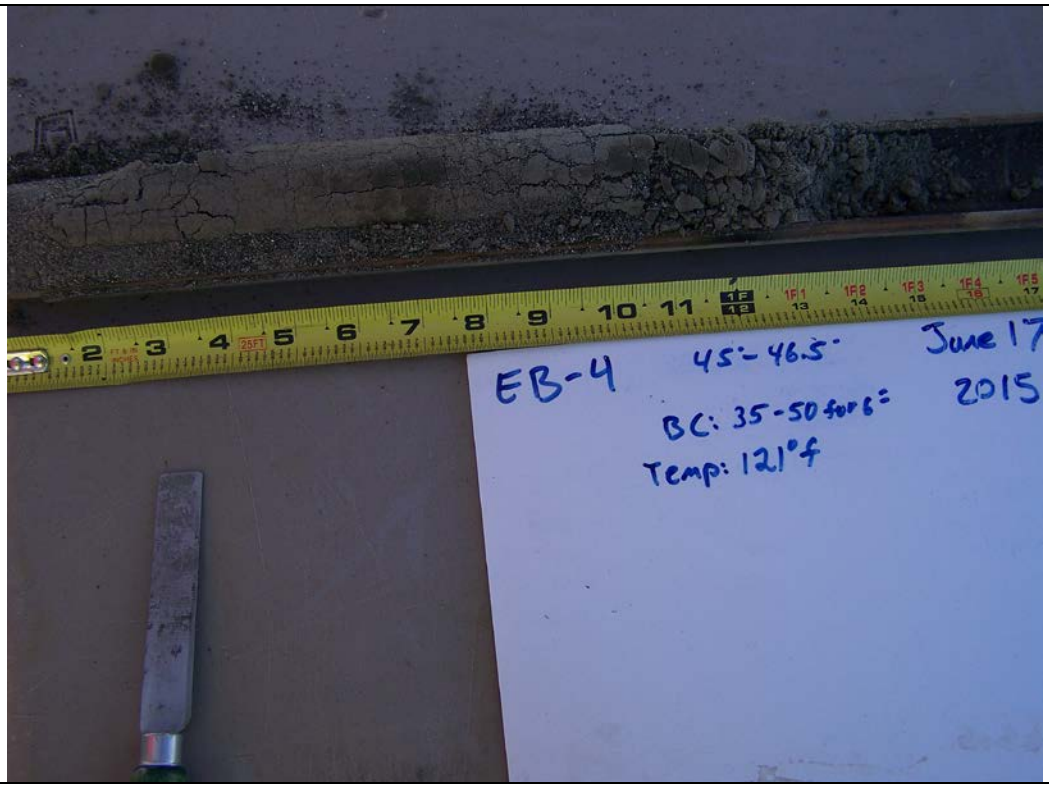
Photo No. **045**	
Photo Taken: **06/17/15**	
Description: Boring: EB-4 Depth: 40.0-ft to 40.5-ft bgs	

Photo No. **046**	
Photo Taken: **06/17/15**	
Description: Boring: EB-4 Depth: 45.0-ft to 46.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **047**	
Photo Taken: **06/17/15**	
Description: Boring: EB-5 Depth: 5.0-ft to 6.5-ft bgs	

Photo No. **048**	
Photo Taken: **06/17/15**	
Description: Boring: EB-5 Depth: 10.0-ft to 11.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

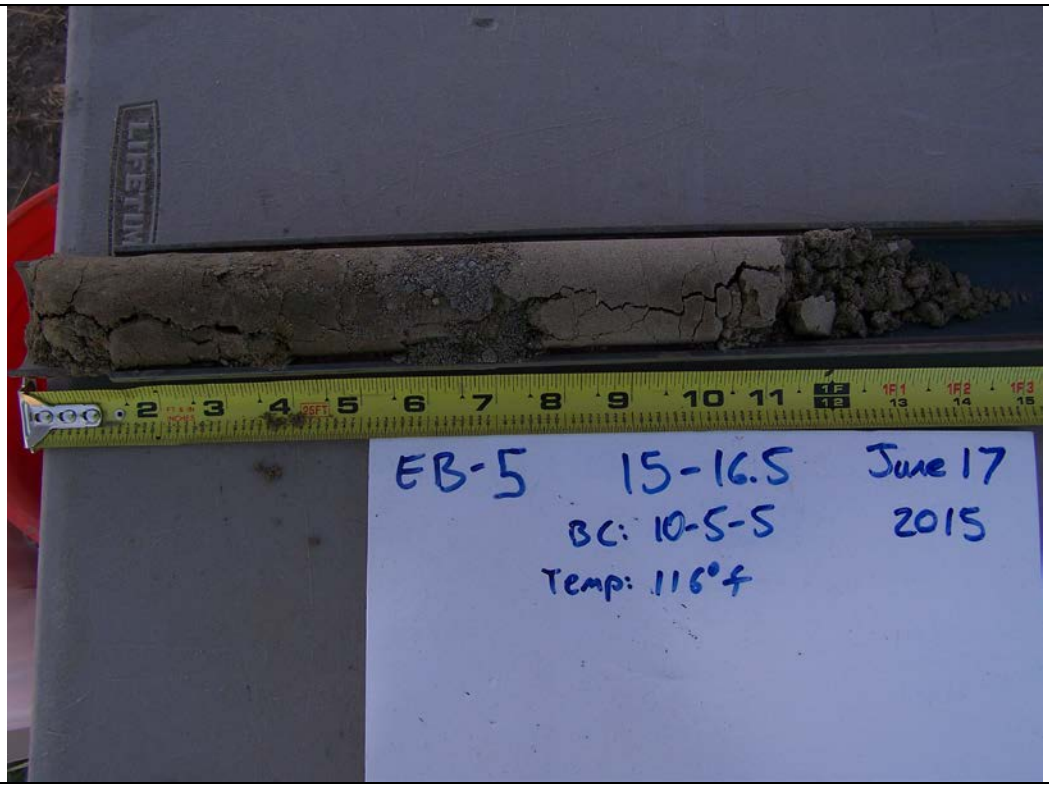
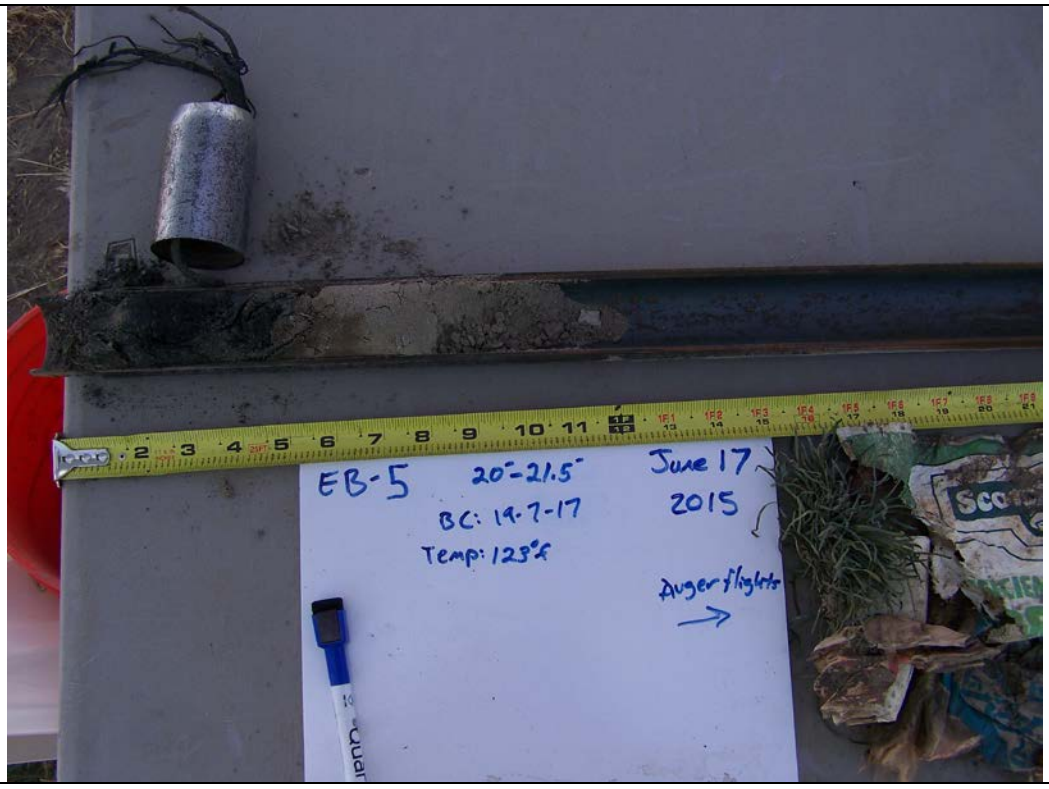
Photo No. **049**	
Photo Taken: **06/17/15**	
Description: Boring: EB-5 Depth: 15.0-ft to 16.5-ft bgs	

Photo No. **050**	
Photo Taken: **06/17/15**	
Description: Boring: EB-5 Depth: 20.0-ft to 21.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **051**	
Photo Taken: **06/17/15**	
Description: Boring: EB-5 Depth: 25.0-ft to 26.5-ft bgs	

Photo No. **052**	
Photo Taken: **06/17/15**	
Description: Boring: EB-5 Depth: 30.0-ft to 31.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

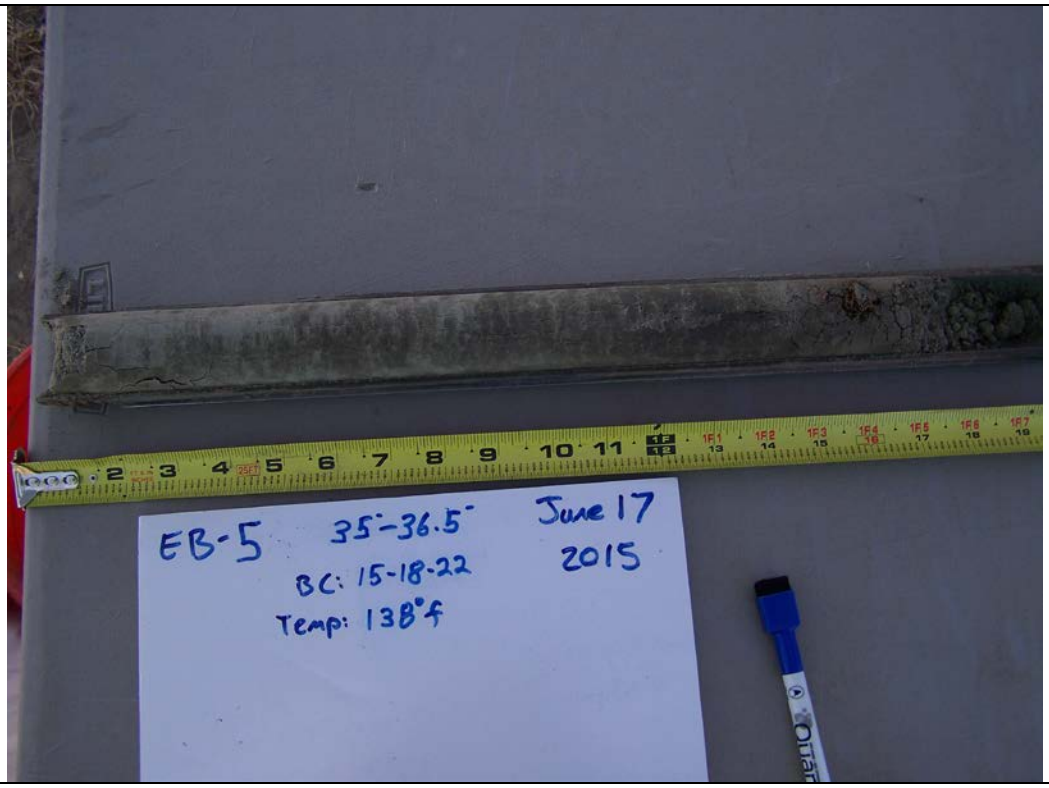
Photo No. **053**	
Photo Taken: **06/17/15**	
Description: Boring: EB-5 Depth: 35.0-ft to 36.5-ft bgs	

Photo No. **054**	
Photo Taken: **06/17/15**	
Description: Boring: EB-5 Depth: 40.0-ft to 41.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

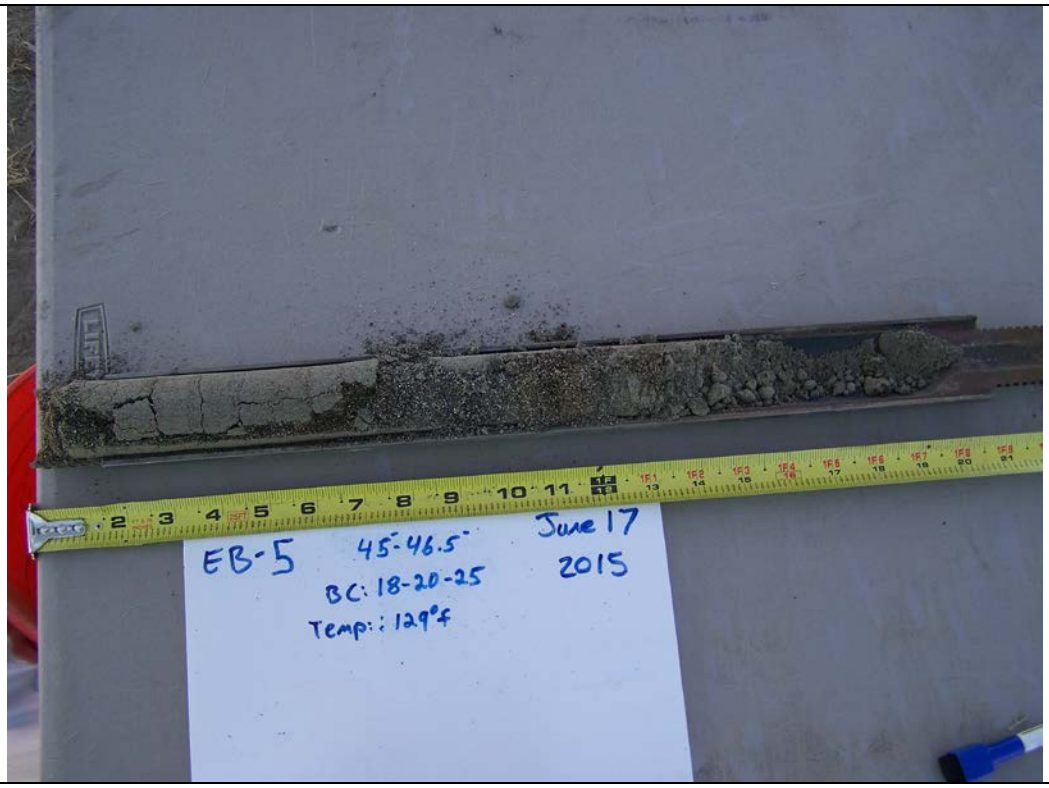
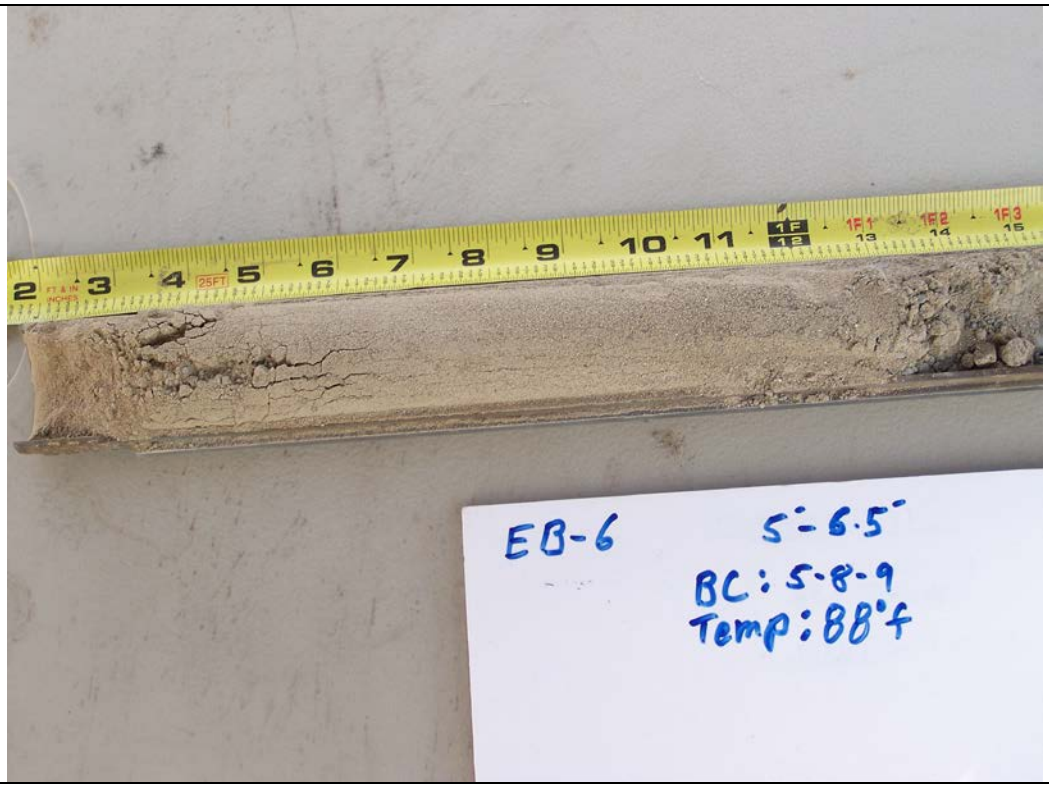
Photo No. **055**	
Photo Taken: **06/17/15**	
Description: Boring: EB-5 Depth: 45.0-ft to 46.5-ft bgs	

Photo No. **056**	
Photo Taken: **06/18/15**	
Description: Boring: EB-6 Depth: 5.0-ft to 6.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **057**	
Photo Taken: **06/18/15**	
Description: Boring: EB-6 Depth: 10.0-ft to 11.5-ft bgs	

Photo No. **058**	
Photo Taken: **06/18/15**	
Description: Boring: EB-6 Depth: 15.0-ft to 16.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

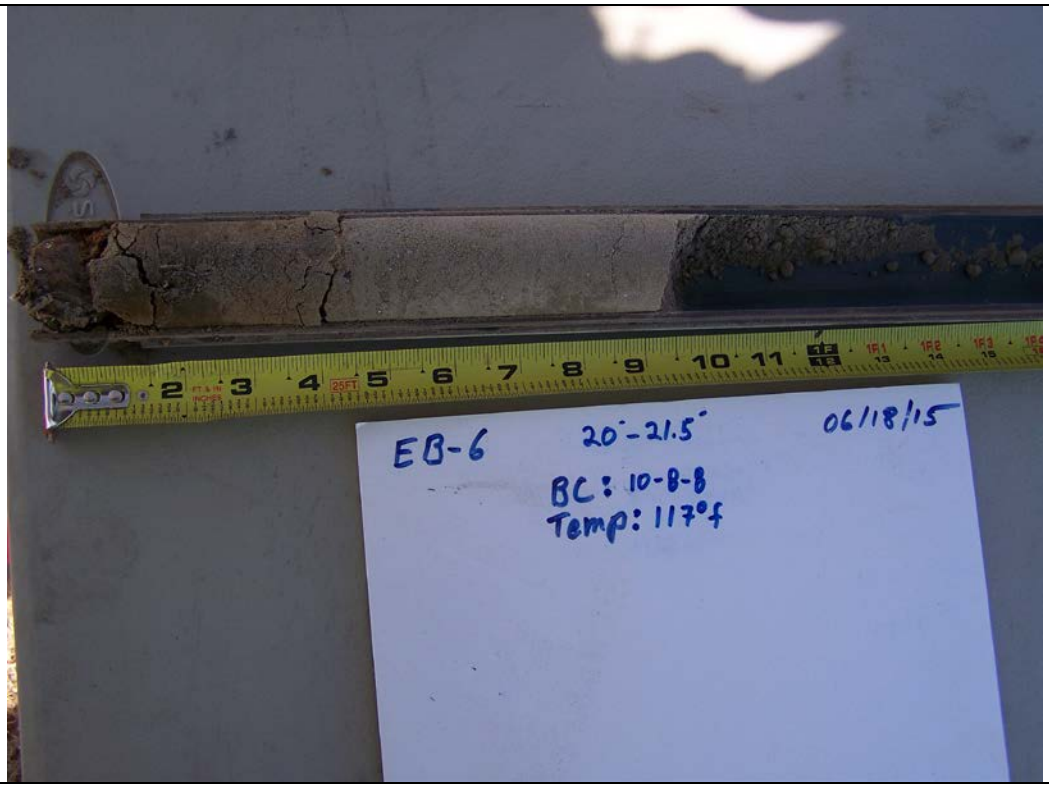
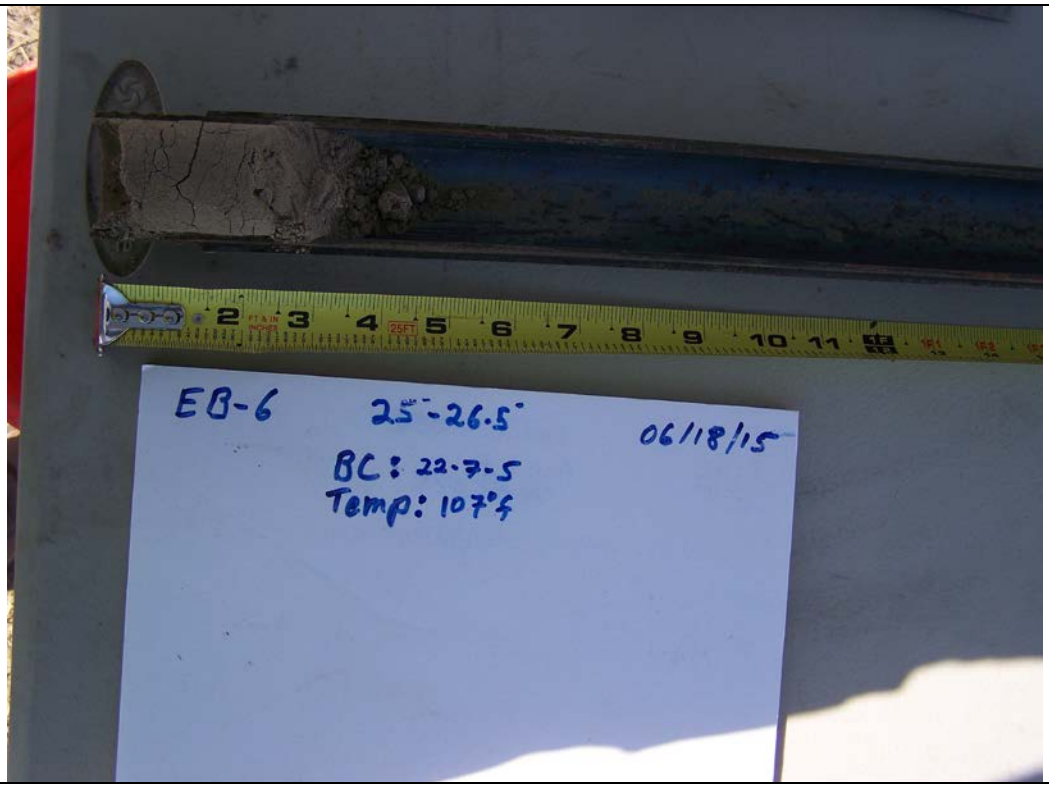
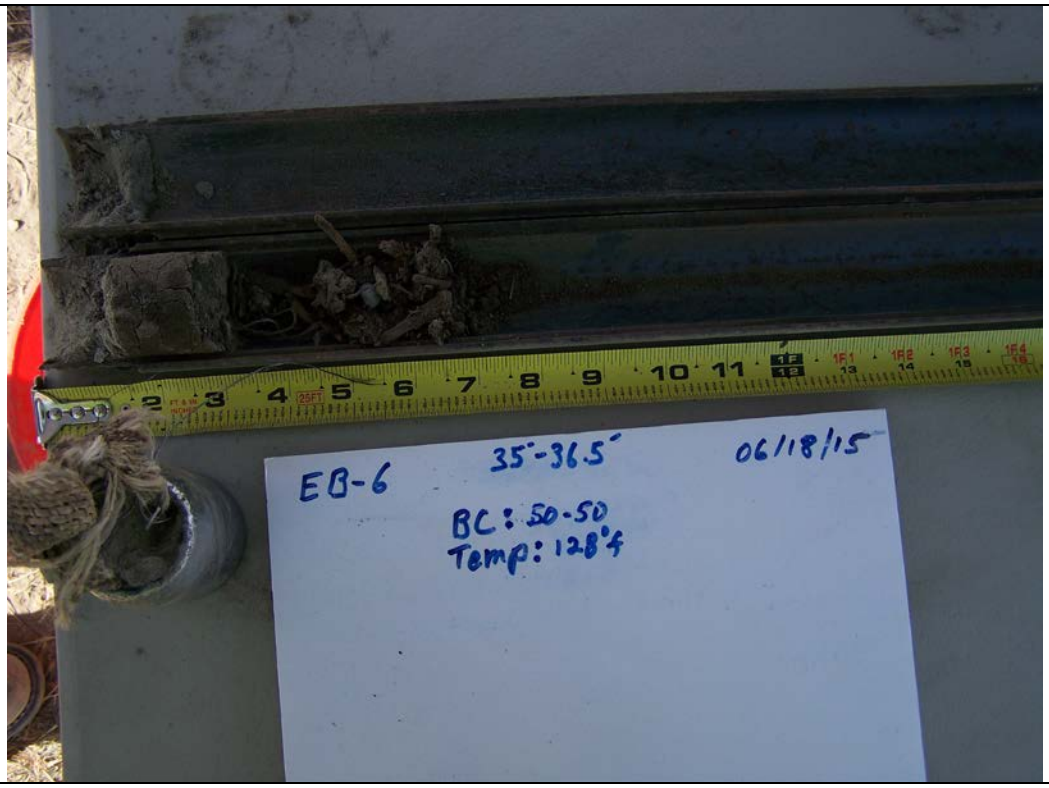
Photo No. **059**	
Photo Taken: **06/18/15**	
Description: Boring: EB-6 Depth: 20.0-ft to 21.5-ft bgs	

Photo No. **060**	
Photo Taken: **06/18/15**	
Description: Boring: EB-6 Depth: 25.0-ft to 26.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **061**	
Photo Taken: **06/18/15**	
Description: Boring: EB-6 Depth: 30.0-ft to 31.5-ft bgs	

Photo No. **062**	
Photo Taken: **06/18/15**	
Description: Boring: EB-6 Depth: 35.0-ft to 36.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **063**	
Photo Taken: **06/18/15**	
Description: Boring: EB-6 Depth: 45.0-ft to 46.0-ft bgs	

Photo No. **064**	
Photo Taken: **06/18/15**	
Description: Boring: EB-6 Depth: 50.0-ft to 51.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

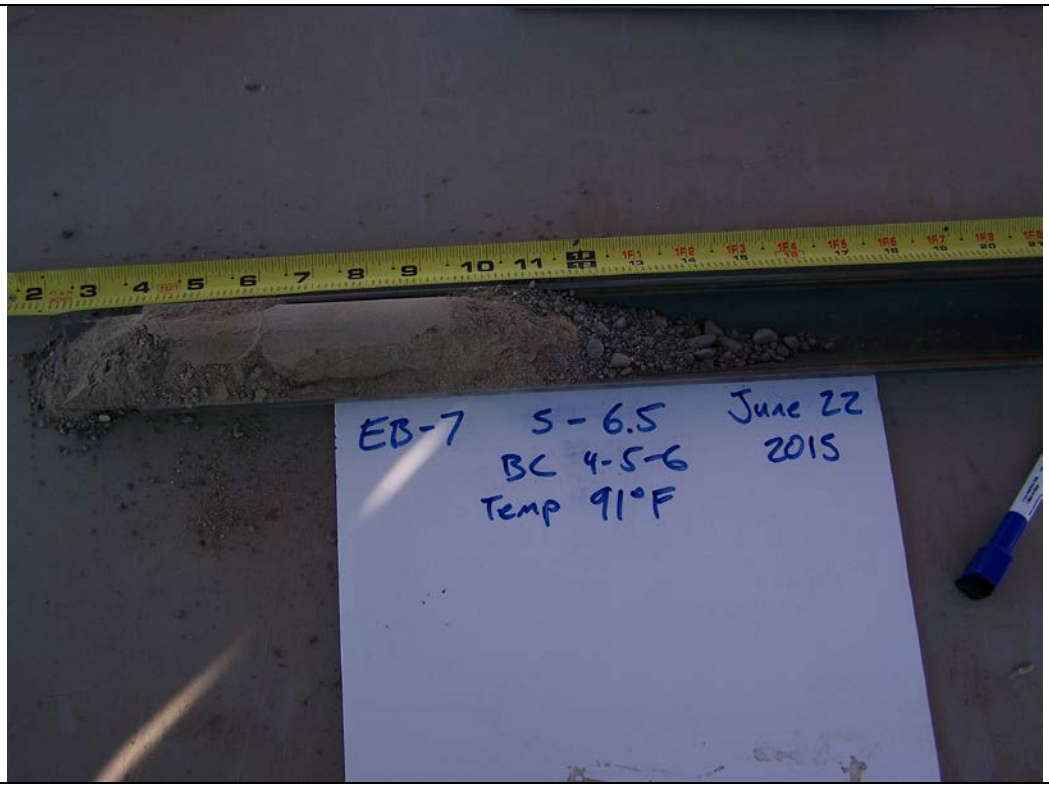
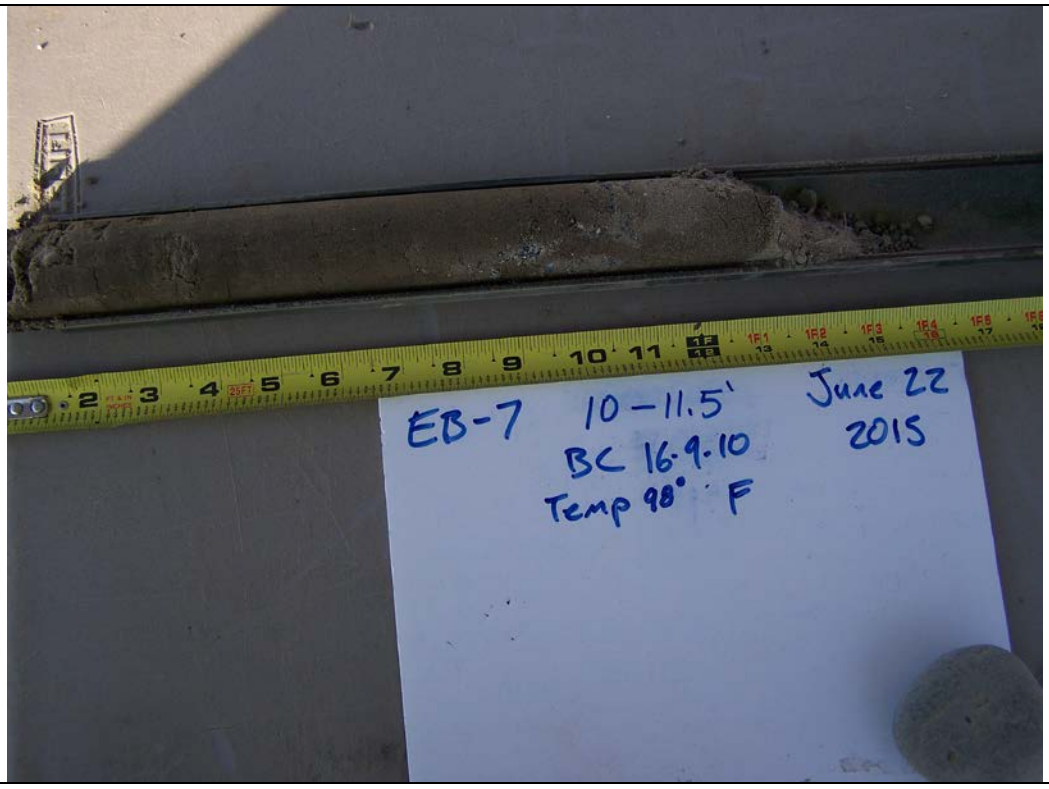
Photo No. **065**	
Photo Taken: **06/22/15**	
Description: Boring: EB-7 Depth: 5.0-ft to 6.5-ft bgs	

Photo No. **066**	
Photo Taken: **06/22/15**	
Description: Boring: EB-7 Depth: 10.0-ft to 11.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

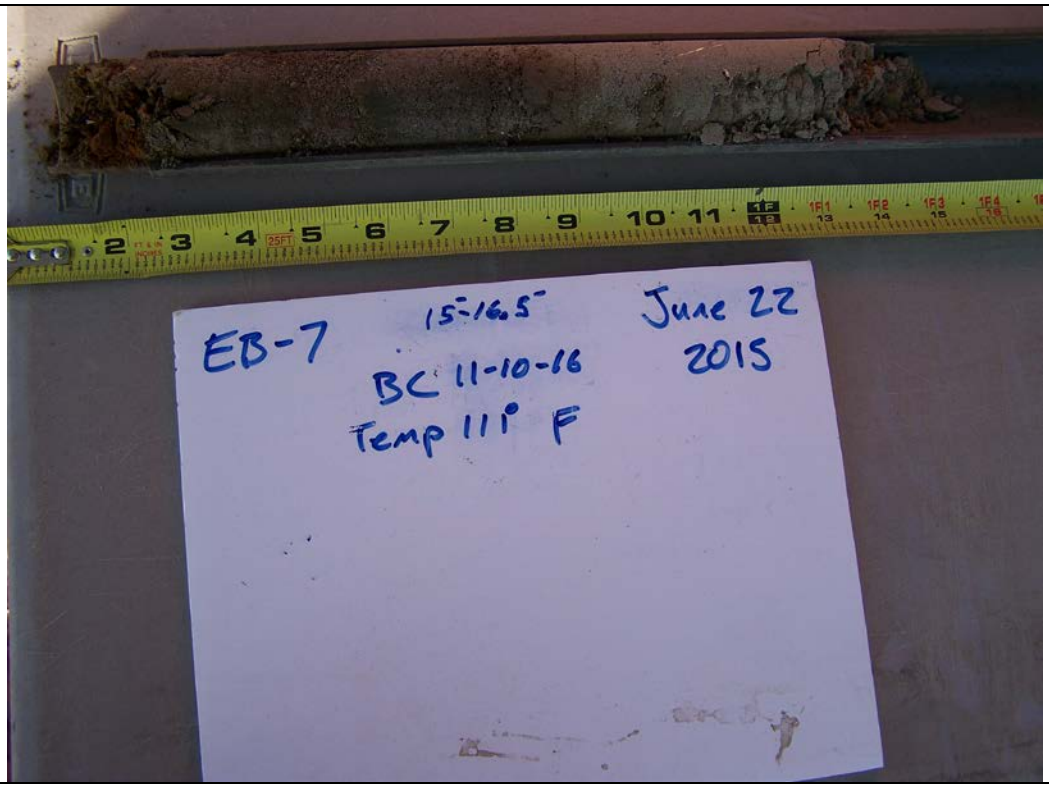
Photo No. **067**	
Photo Taken: **06/22/15**	
Description: Boring: EB-7 Depth: 15.0-ft to 16.5-ft bgs	

Photo No. **068**	
Photo Taken: **06/22/15**	
Description: Boring: EB-7 Depth: 20.0-ft to 20.8-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

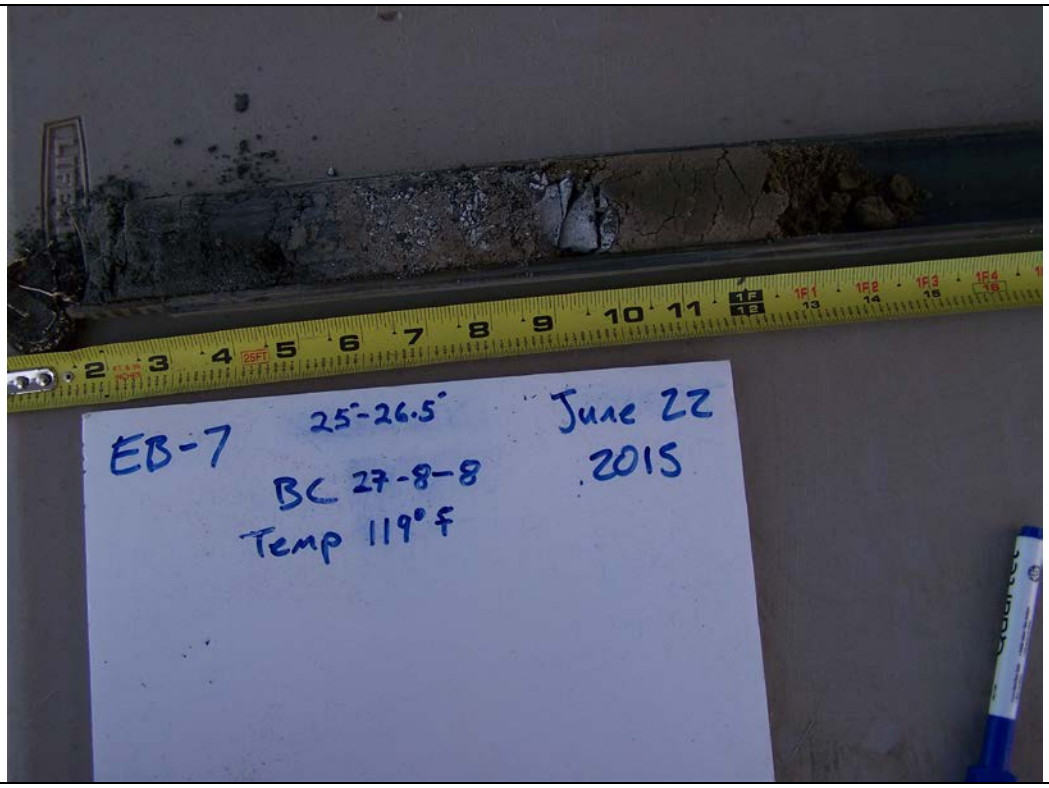
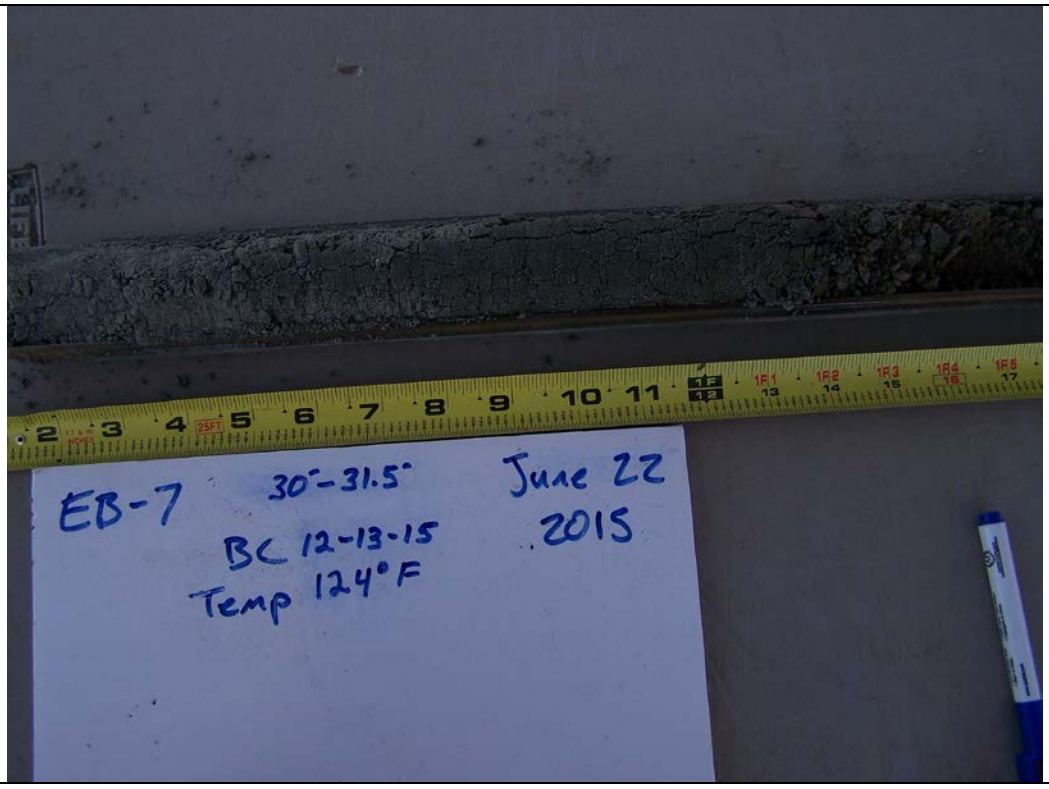
Photo No. **069**	
Photo Taken: **06/22/15**	
Description: Boring: EB-7 Depth: 25.0-ft to 26.5-ft bgs	

Photo No. **070**	
Photo Taken: **06/22/15**	
Description: Boring: EB-7 Depth: 30.0-ft to 31.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

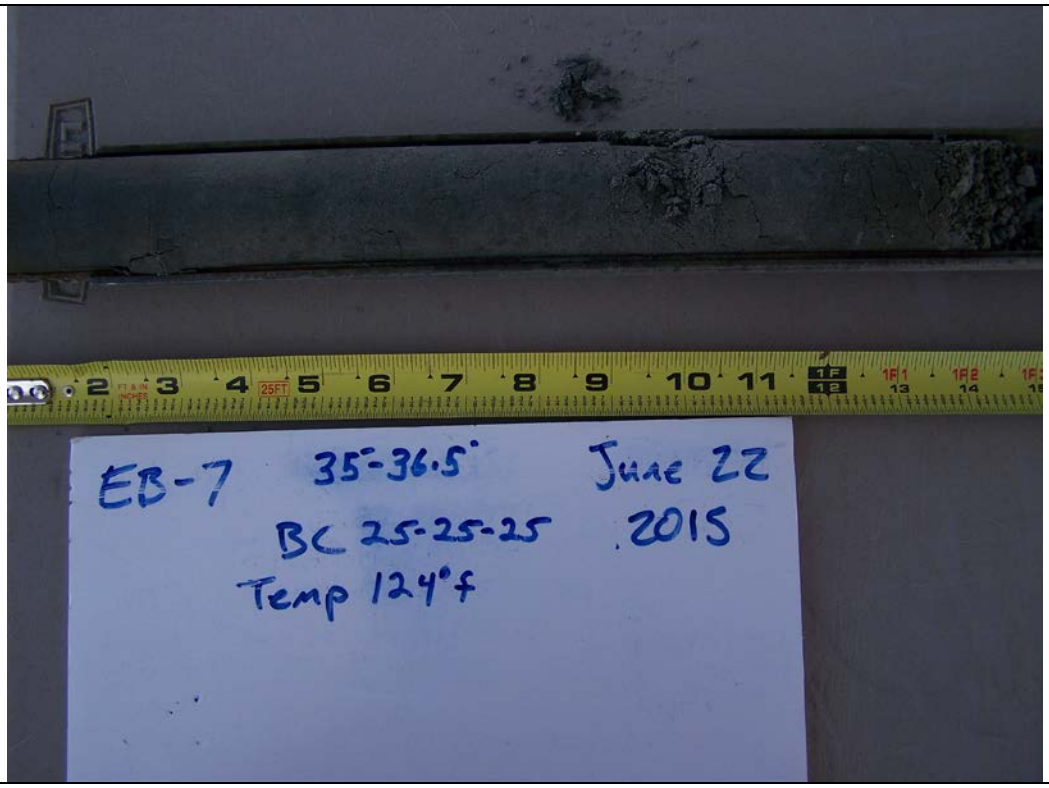
Photo No. **071**	
Photo Taken: **06/22/15**	
Description: Boring: EB-7 Depth: 35.0-ft to 36.5-ft bgs	

Photo No. **072**	
Photo Taken: **06/22/15**	
Description: Boring: EB-7 Cuttings to depth 35-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

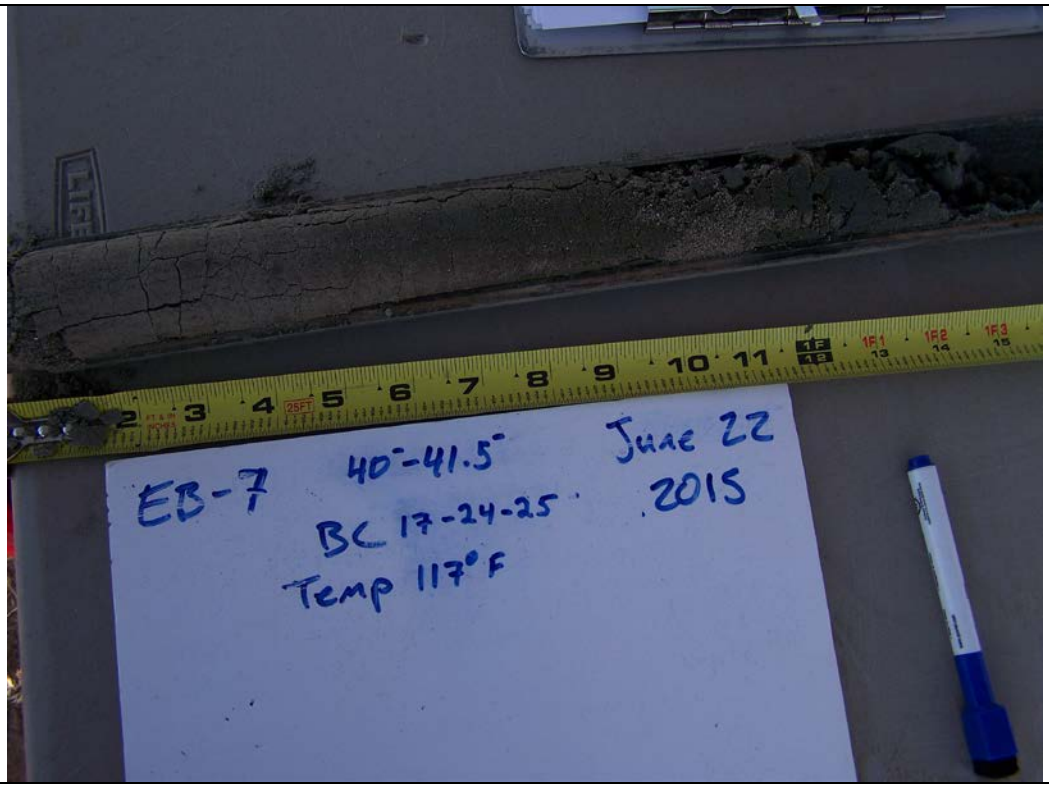
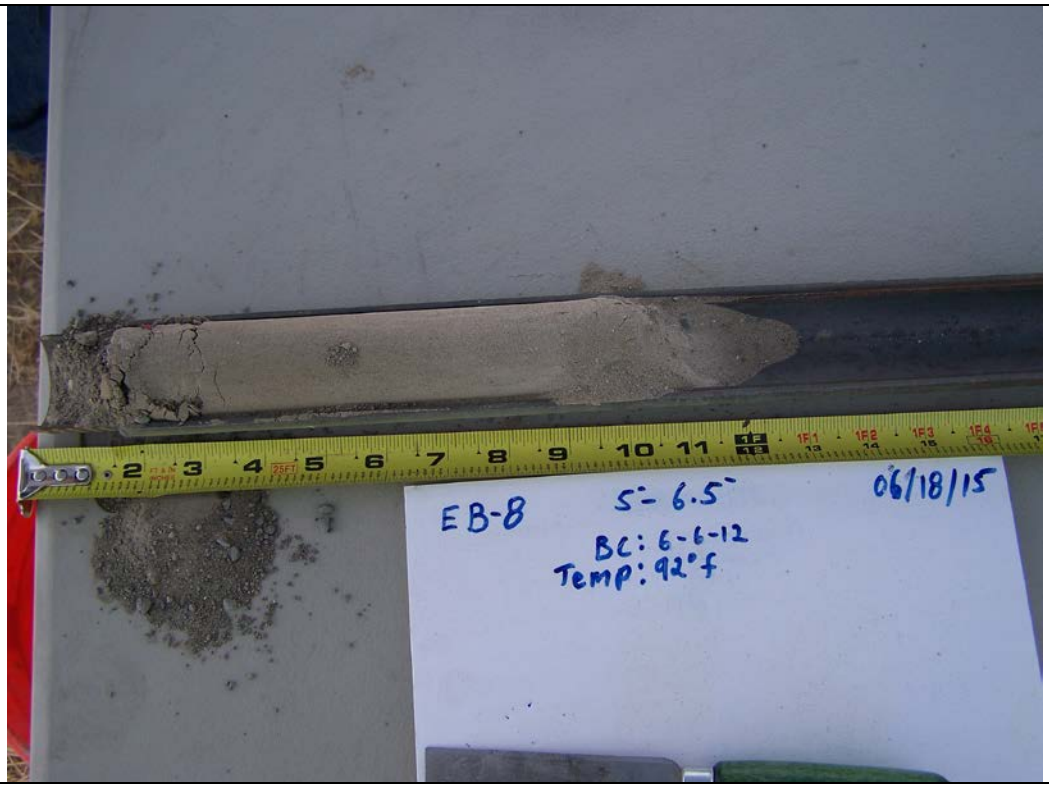
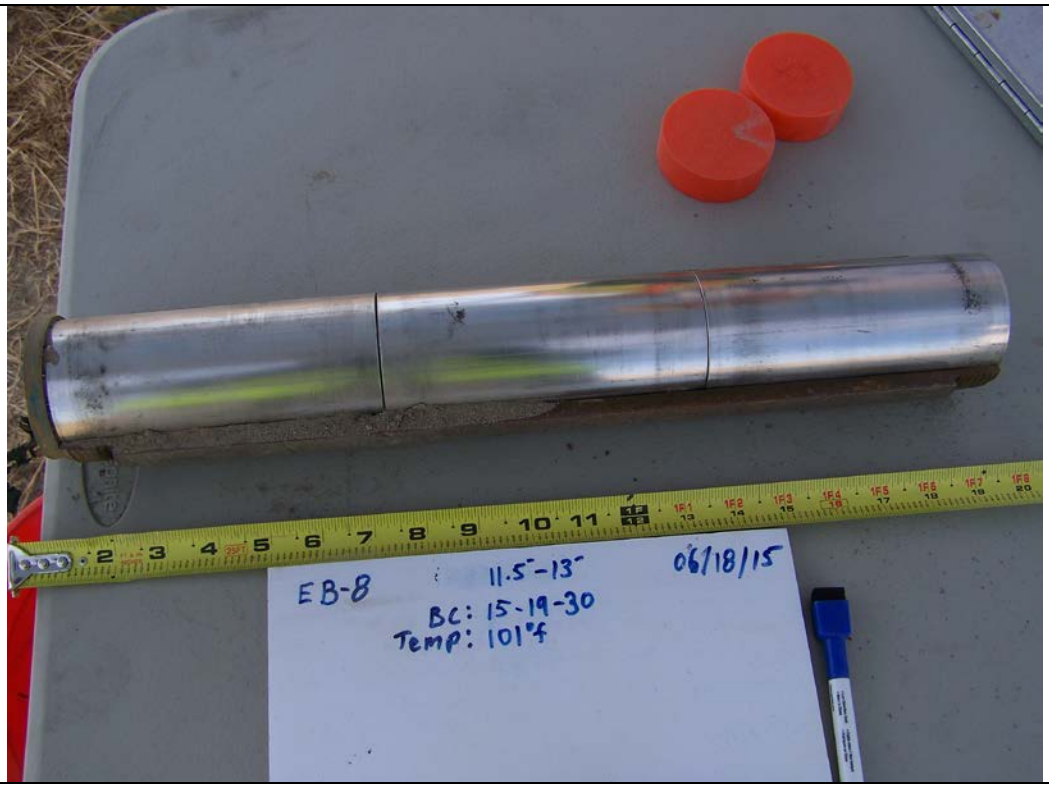
Photo No. **073**	
Photo Taken: **06/22/15**	
Description: Boring: EB-7 Depth: 40.0-ft to 41.5-ft bgs	

Photo No. **074**	
Photo Taken: **06/18/15**	
Description: Boring: EB-8 Depth: 5.0-ft to 6.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **075**	
Photo Taken: **06/18/15**	
Description: Boring: EB-8 Depth: 5.0-ft to 6.5-ft bgs	

Photo No. **076**	
Photo Taken: **06/18/15**	
Description: Boring: EB-8 Depth: 11.5-ft to 13.0-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **077**	
Photo Taken: **06/18/15**	
Description: Boring: EB-8 Depth: 15.0-ft to 16.5-ft bgs	

Photo No. **078**	
Photo Taken: **06/18/15**	
Description: Boring: EB-8 Depth: 25.0-ft to 26.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

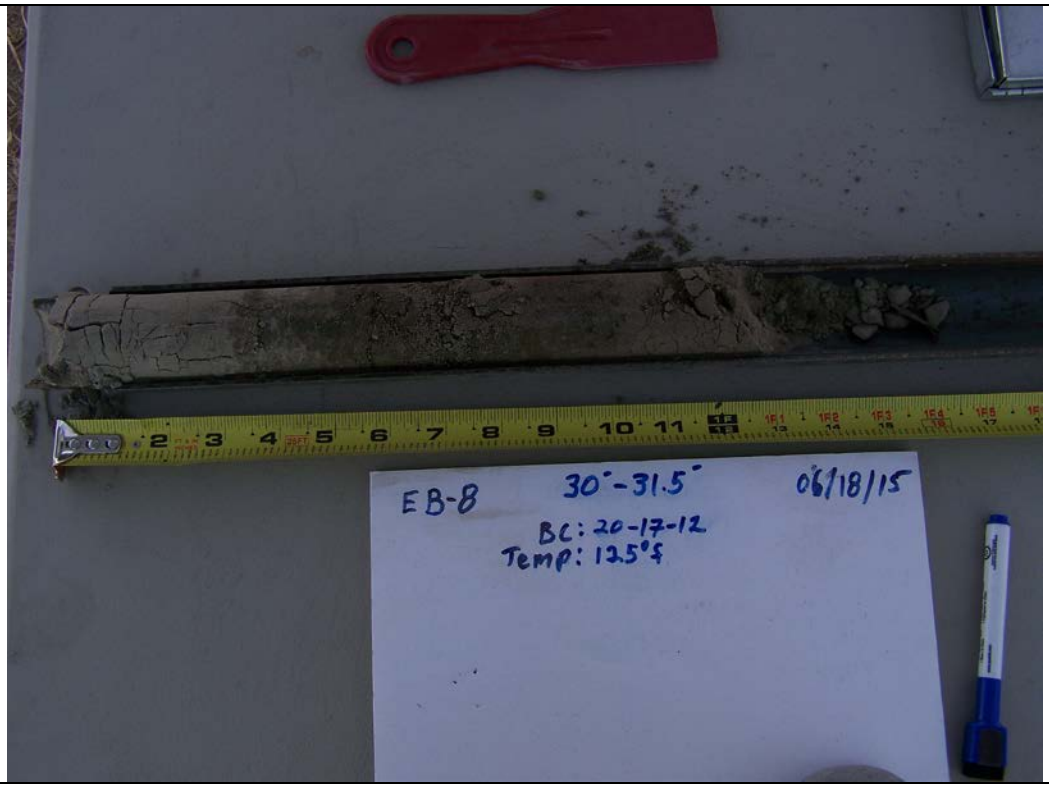
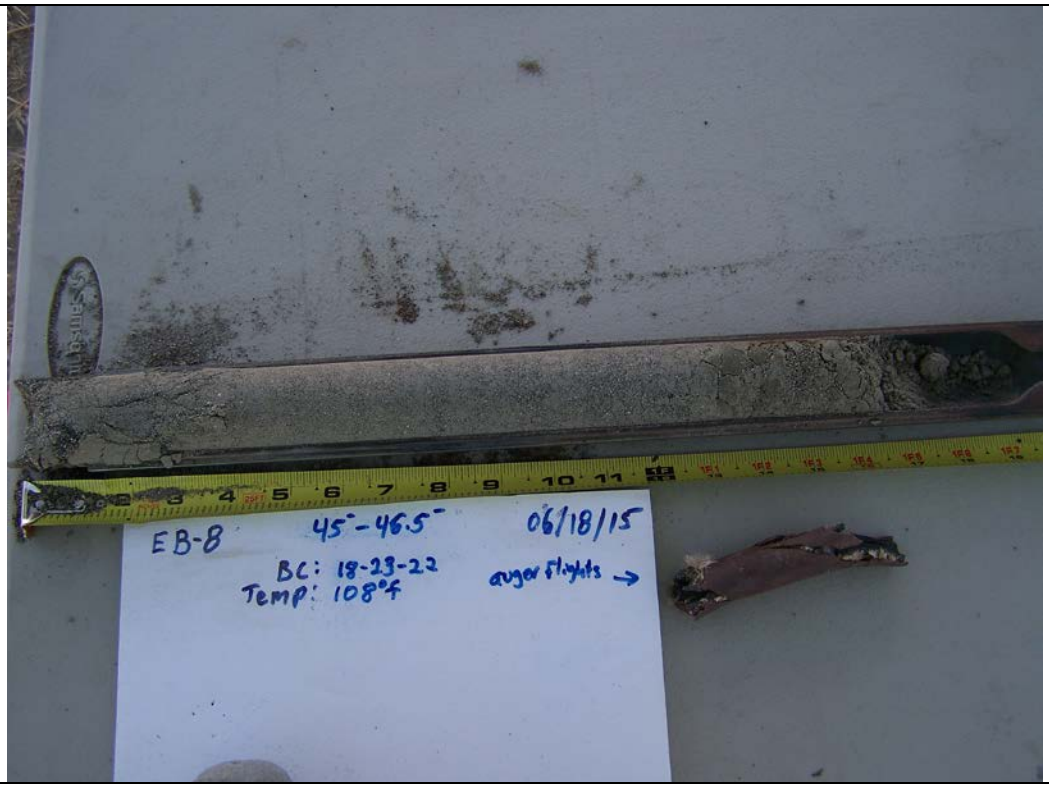
Photo No. **079**	
Photo Taken: **06/18/15**	
Description: Boring: EB-8 Depth: 30.0-ft to 31.5-ft bgs	

Photo No. **080**	
Photo Taken: **06/18/15**	
Description: Boring: EB-8 Depth: 35.0-ft to 36.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **081**	
Photo Taken: **06/18/15**	
Description: Boring: EB-8 Depth: 40.0-ft to 41.5-ft bgs	

Photo No. **082**	
Photo Taken: **06/18/15**	
Description: Boring: EB-8 Depth: 45.0-ft to 46.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

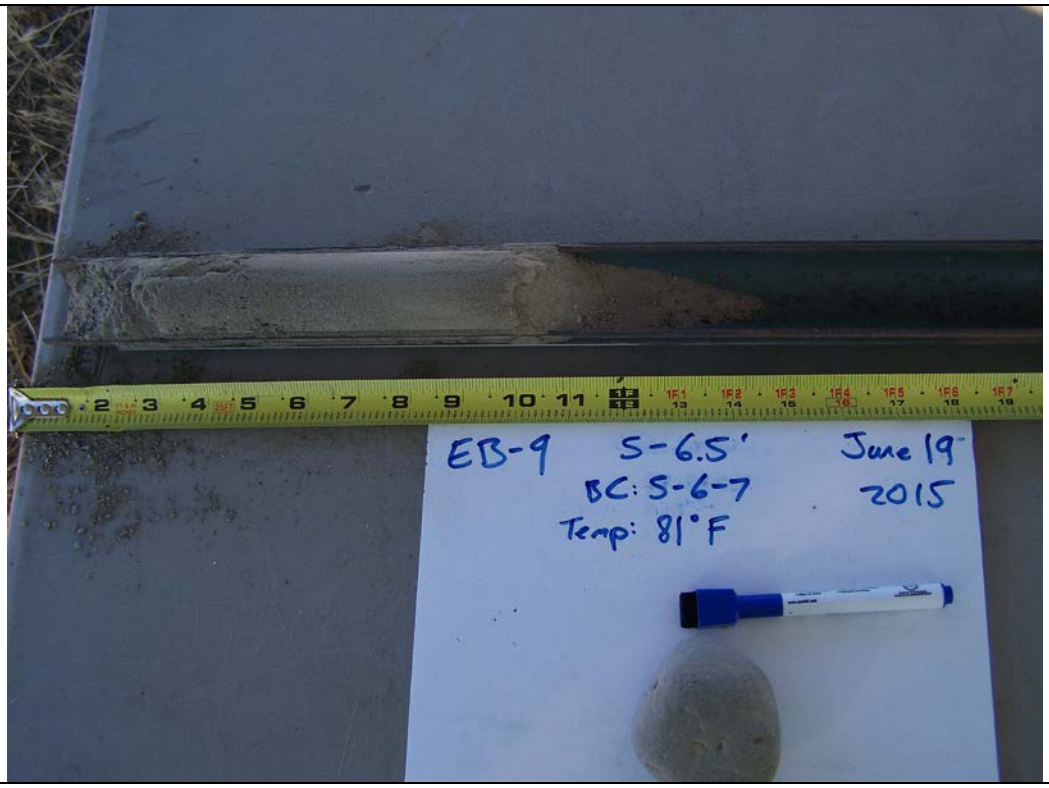
Photo No. **083**	
Photo Taken: **06/19/15**	
Description: Boring: EB-9 Depth: 5.0-ft to 6.5-ft bgs	

Photo No. **084**	
Photo Taken: **06/19/15**	
Description: Boring: EB-9 Depth: 10.0-ft to 11.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **085**	
Photo Taken: **06/19/15**	
Description: Boring: EB-9 Depth: 15.0-ft to 16.5-ft bgs	

Photo No. **086**	
Photo Taken: **06/19/15**	
Description: Boring: EB-9 Depth: 16.5-ft to 18.0-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **087**	
Photo Taken: **06/19/15**	
Description: Boring: EB-9 Depth: 16.5-ft to 18.0-ft bgs	

Photo No. **088**	
Photo Taken: **06/19/15**	
Description: Boring: EB-9 Depth: 20.0-ft to 21.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **089**	
Photo Taken: **06/19/15**	
Description: Boring: EB-9 Depth: 30.0-ft to 31.5-ft bgs	

Photo No. **090**	
Photo Taken: **06/19/15**	
Description: Boring: EB-9 Depth: 35.0-ft to 36.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

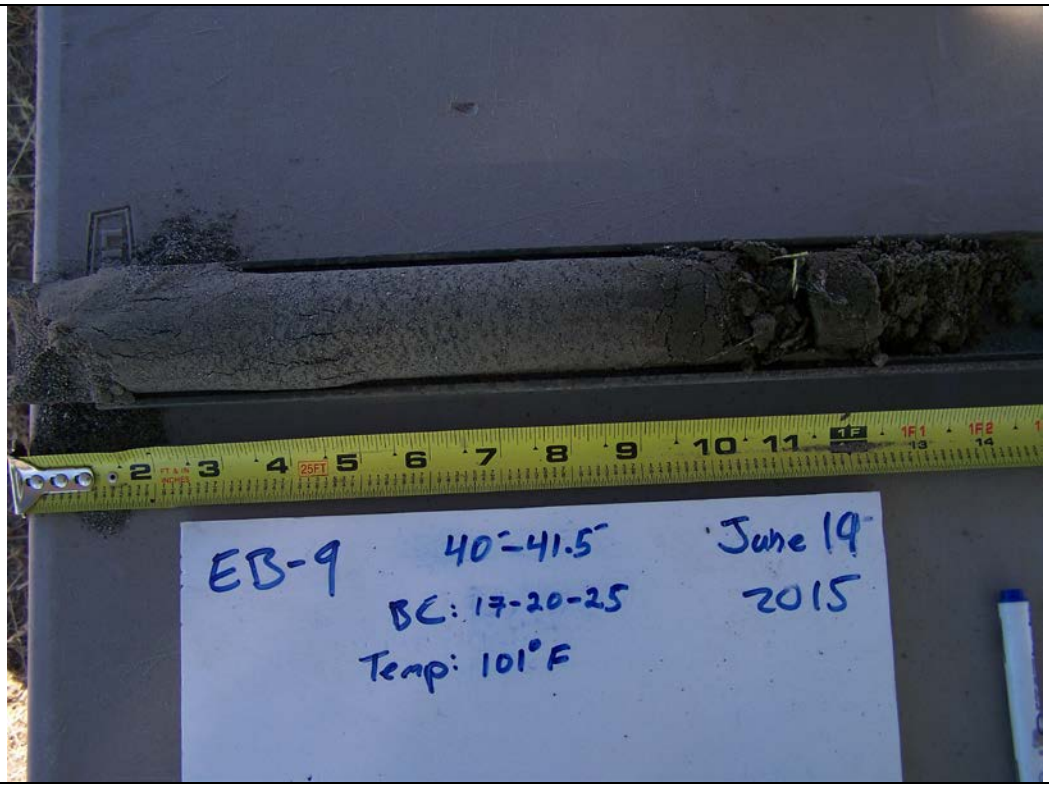
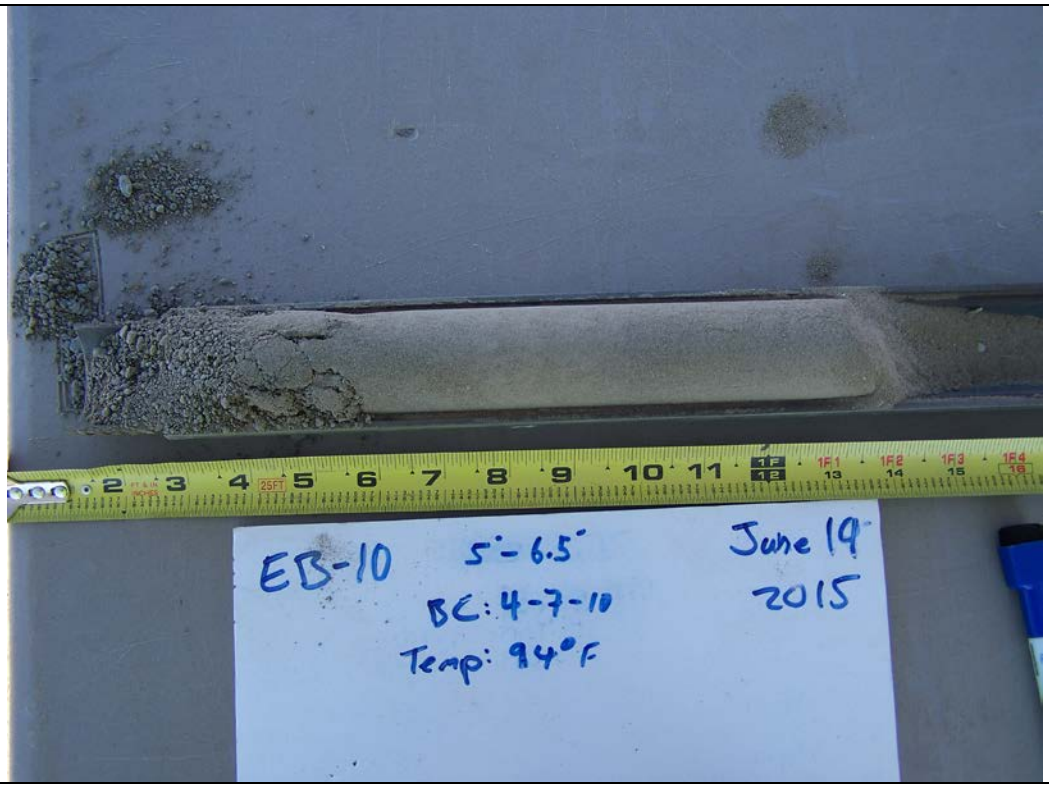
Photo No. **091**	
Photo Taken: **06/19/15**	
Description: Boring: EB-9 Depth: 40.0-ft to 41.5-ft bgs	

Photo No. **092**	
Photo Taken: **06/19/15**	
Description: Boring: EB-10 Depth: 5.0-ft to 6.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

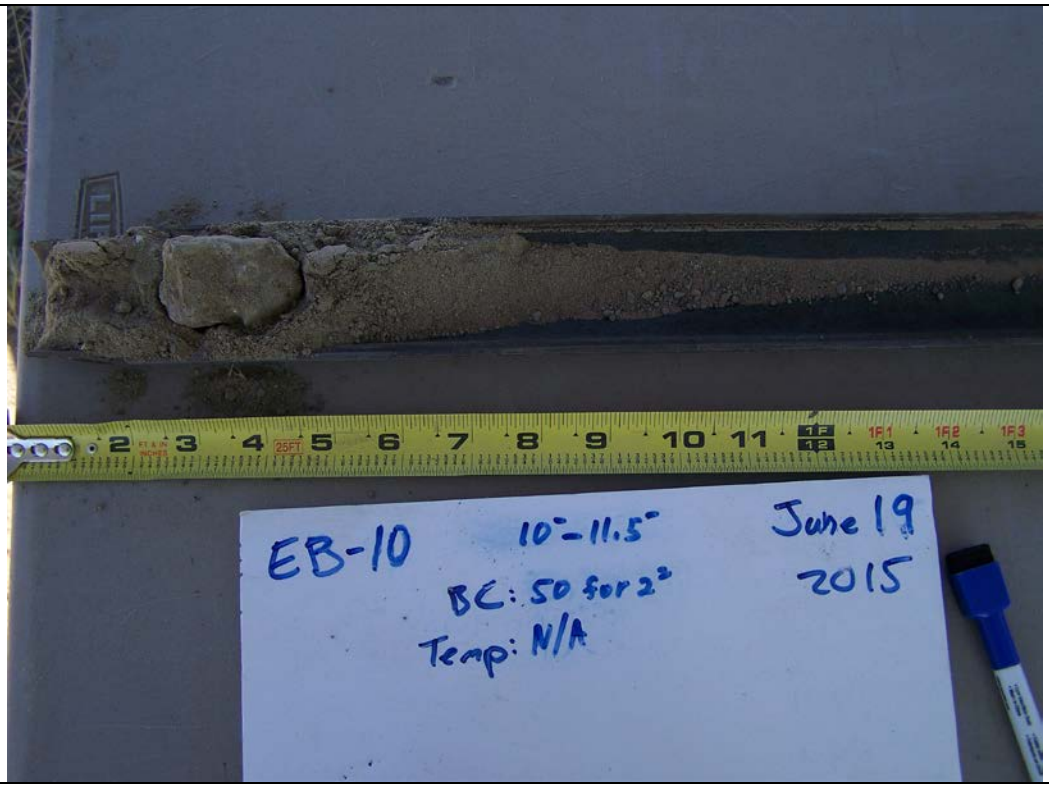
Photo No. **093**	
Photo Taken: **06/19/15**	
Description: Boring: EB-10 Depth: 10.0-ft to 11.5-ft bgs	

Photo No. **094**	
Photo Taken: **06/19/15**	
Description: Boring: EB-10 Depth: 15.0-ft to 16.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **095** **Photo Taken:** **06/19/15** **Description:** Boring: EB-10 Depth: 15.0-ft to 16.5-ft bgs	

Photo No. **096** **Photo Taken:** **06/19/15** **Description:** Boring: EB-10 Depth: 16.5-ft to 18.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **097**	
Photo Taken: **06/19/15**	
Description: Boring: EB-10 Depth: 16.5-ft to 18.5-ft bgs	

Photo No. **098**	
Photo Taken: **06/19/15**	
Description: Boring: EB-10 Depth: 20.0-ft to 21.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

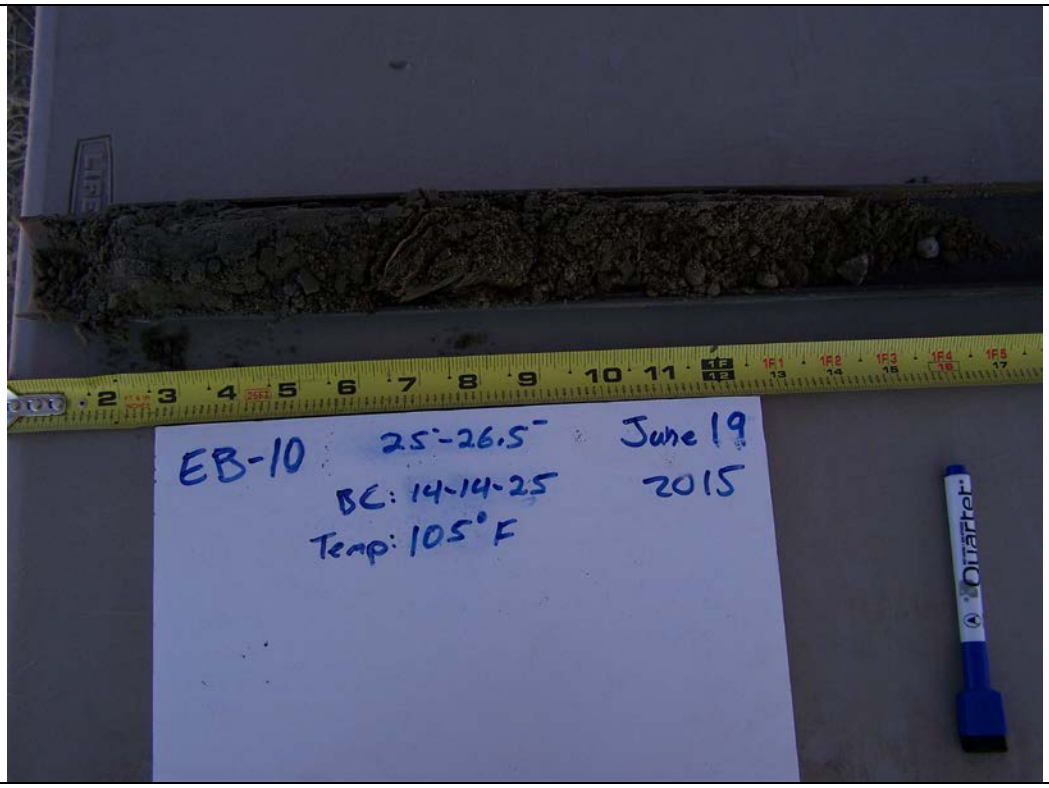
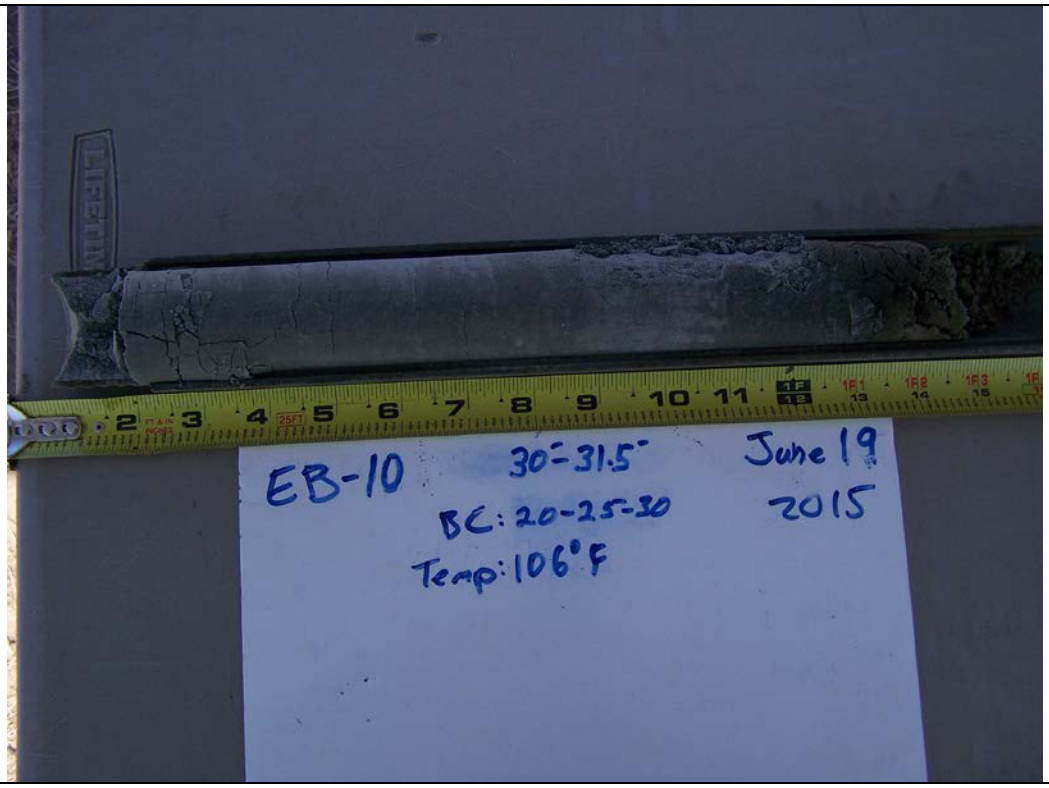
Photo No. **099**	
Photo Taken: **06/19/15**	
Description: Boring: EB-10 Depth: 25.0-ft to 26.5-ft bgs	

Photo No. **100**	
Photo Taken: **06/19/15**	
Description: Boring: EB-10 Depth: 30.0-ft to 31.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

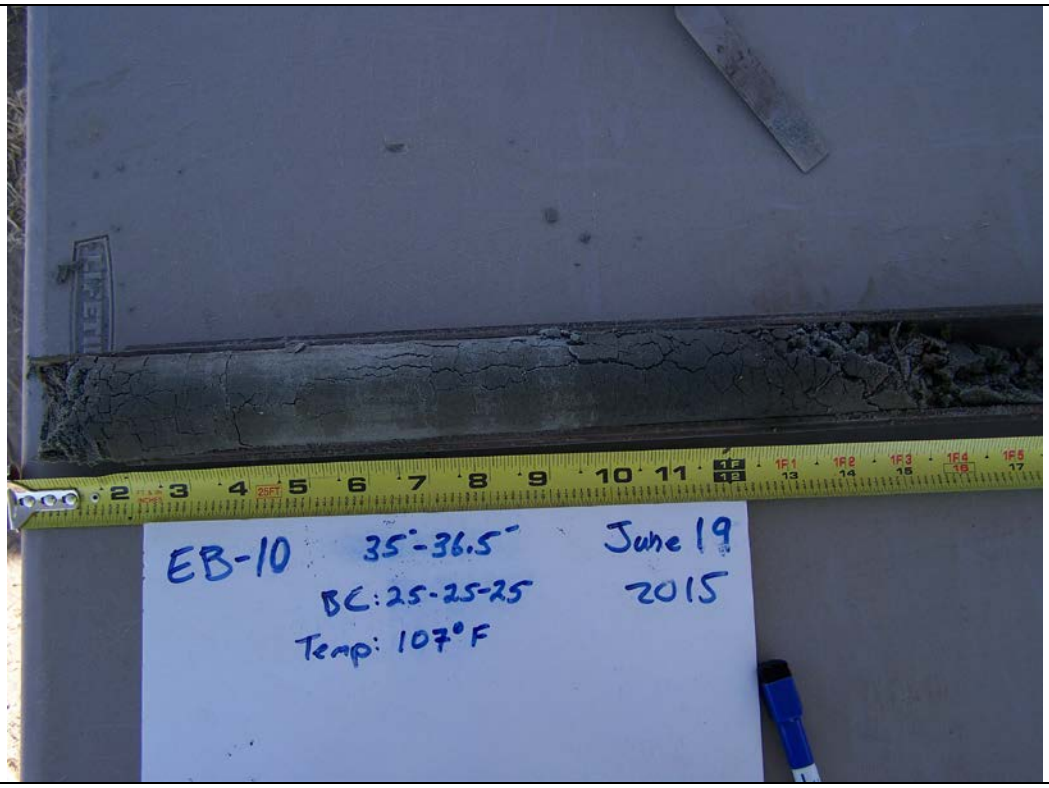
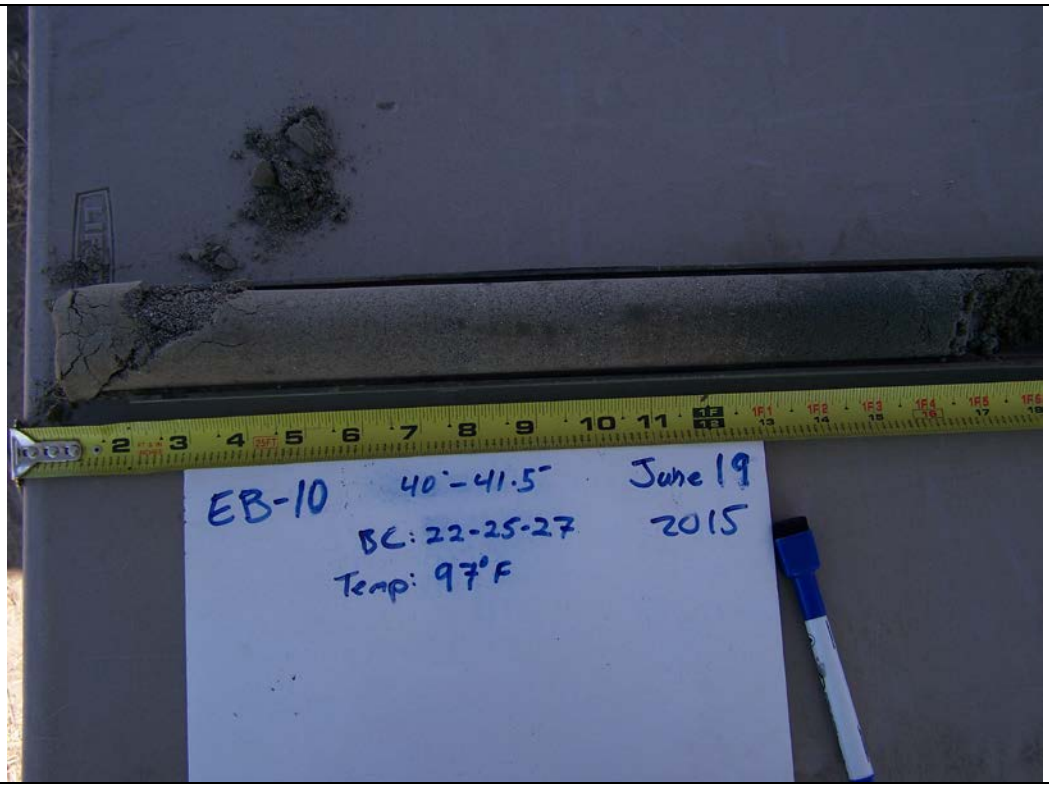
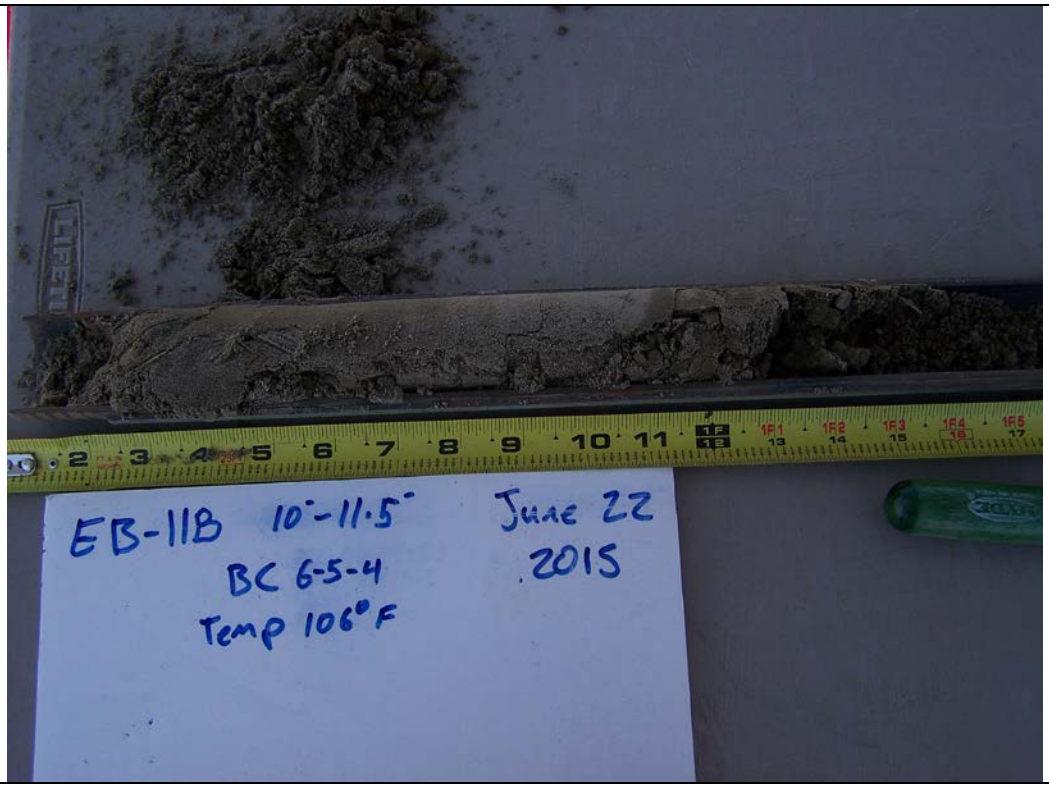
Photo No. **101**	
Photo Taken: **06/19/15**	
Description: Boring: EB-10 Depth: 35.0-ft to 36.5-ft bgs	

Photo No. **102**	
Photo Taken: **06/19/15**	
Description: Boring: EB-10 Depth: 40.0-ft to 41.5-ft bgs	

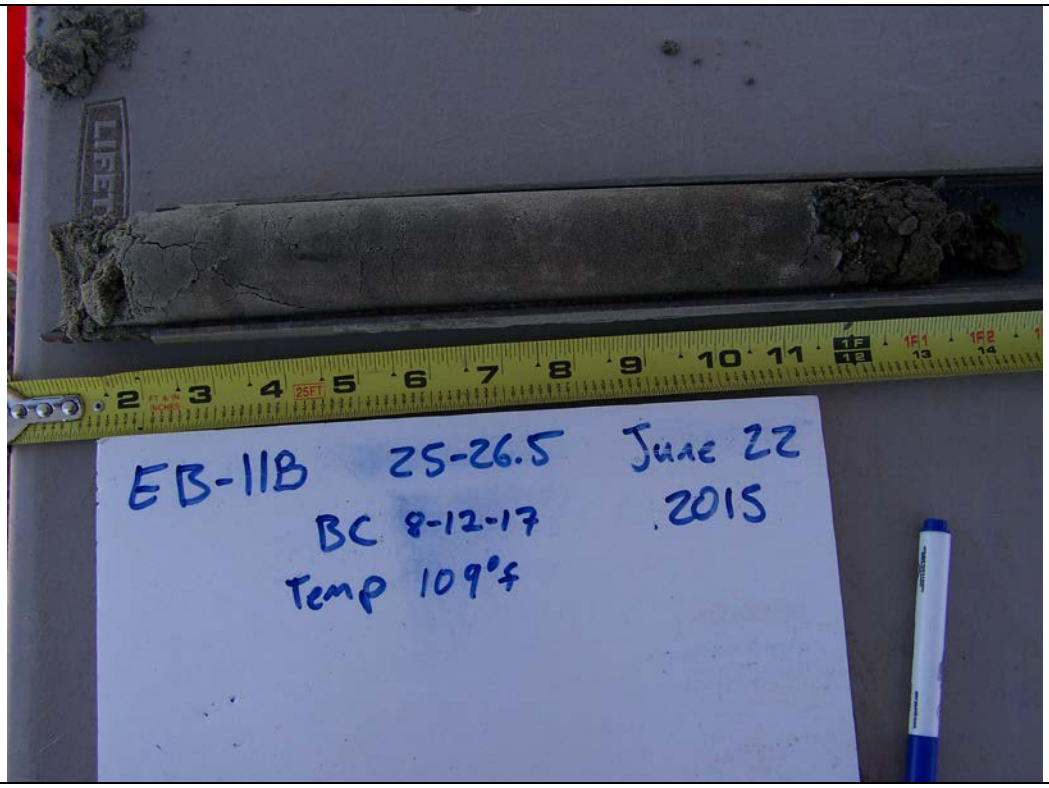
AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **103**	
Photo Taken: **06/22/15**	
Description: Boring: EB-11B Depth: 5.0-ft to 6.5-ft bgs	

Photo No. **104**	
Photo Taken: **06/22/15**	
Description: Boring: EB-11B Depth: 10.0-ft to 11.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **105**	
Photo Taken: **06/22/15**	
Description: Boring: EB-11B Depth: 15.0-ft to 16.5-ft bgs	

Photo No. **106**	
Photo Taken: **06/22/15**	
Description: Boring: EB-11B Depth: 25.0-ft to 26.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

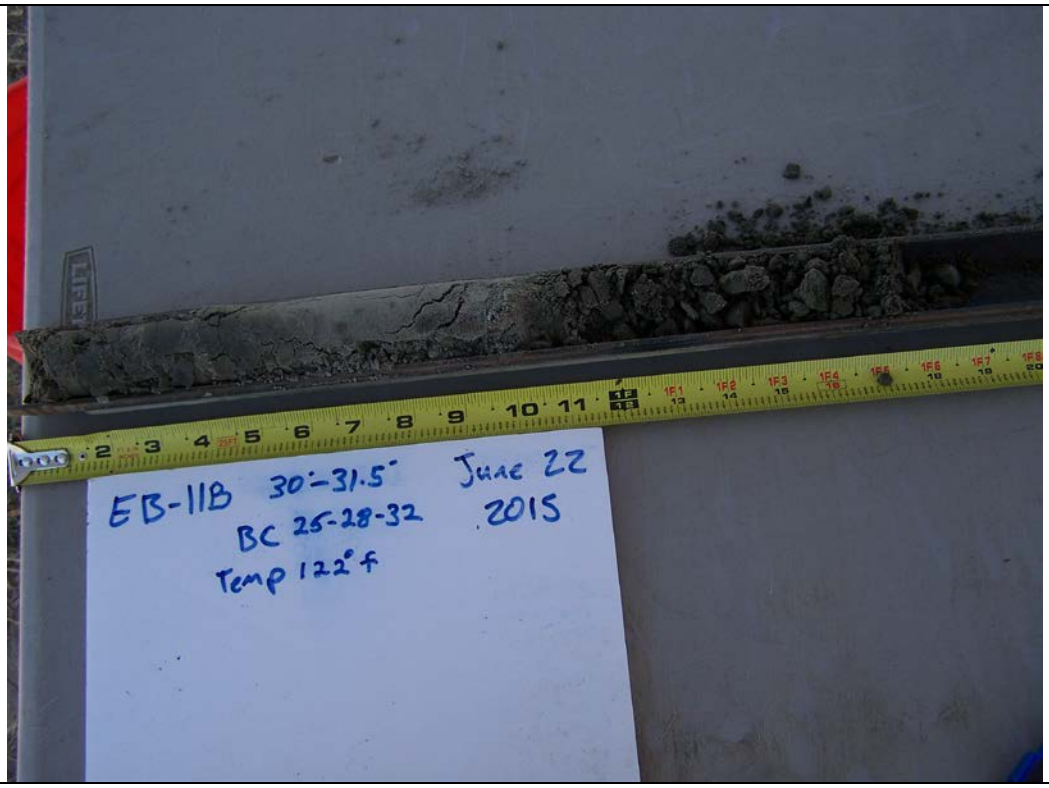
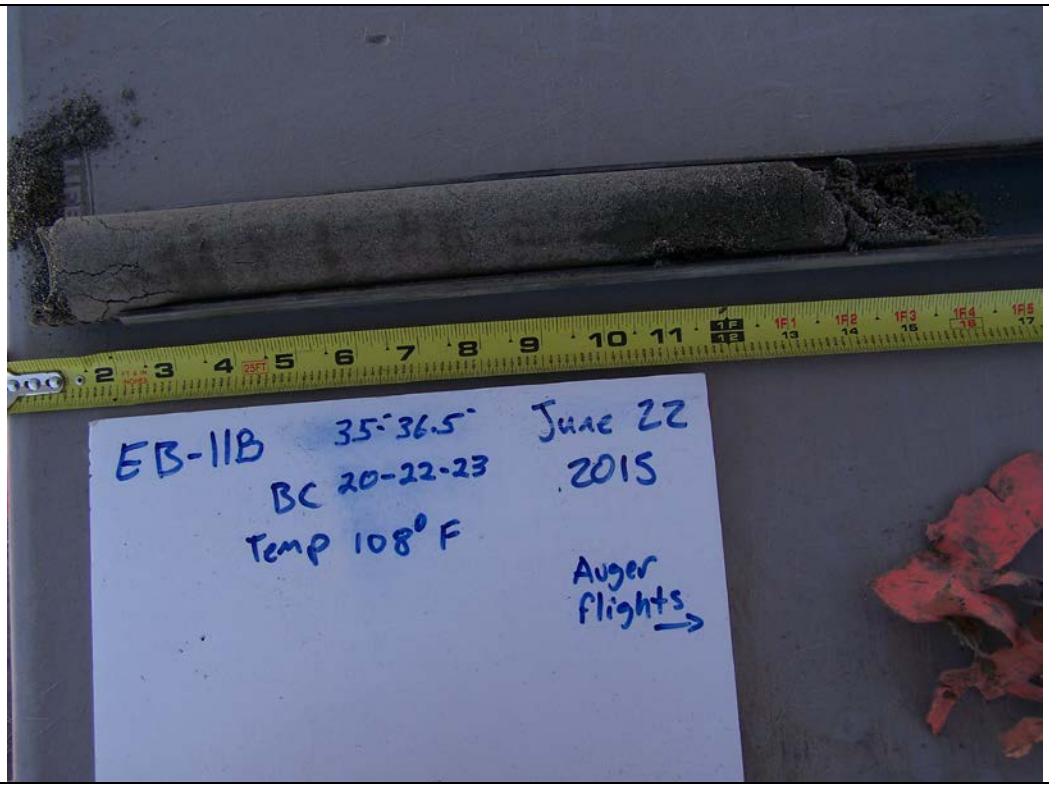
Photo No. **107**	
Photo Taken: **06/22/15**	
Description: Boring: EB-11B Depth: 30.0-ft to 31.5-ft bgs	

Photo No. **108**	
Photo Taken: **06/22/15**	
Description: Boring: EB-11B Depth: 35.0-ft to 36.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

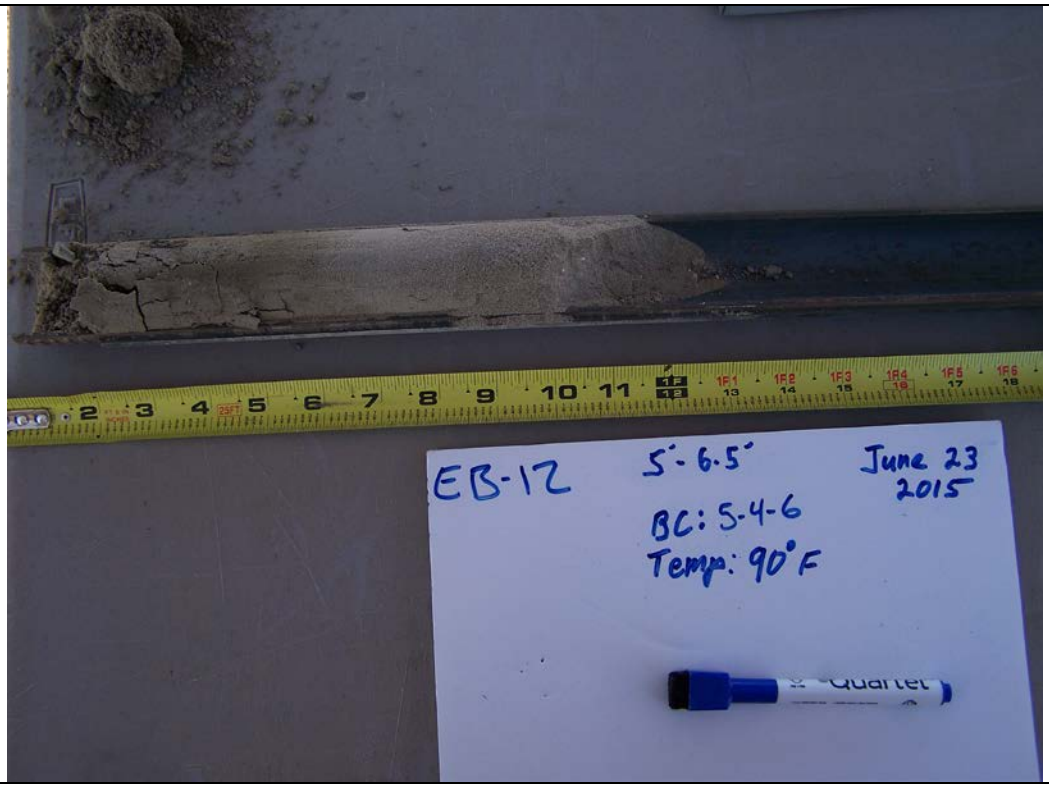
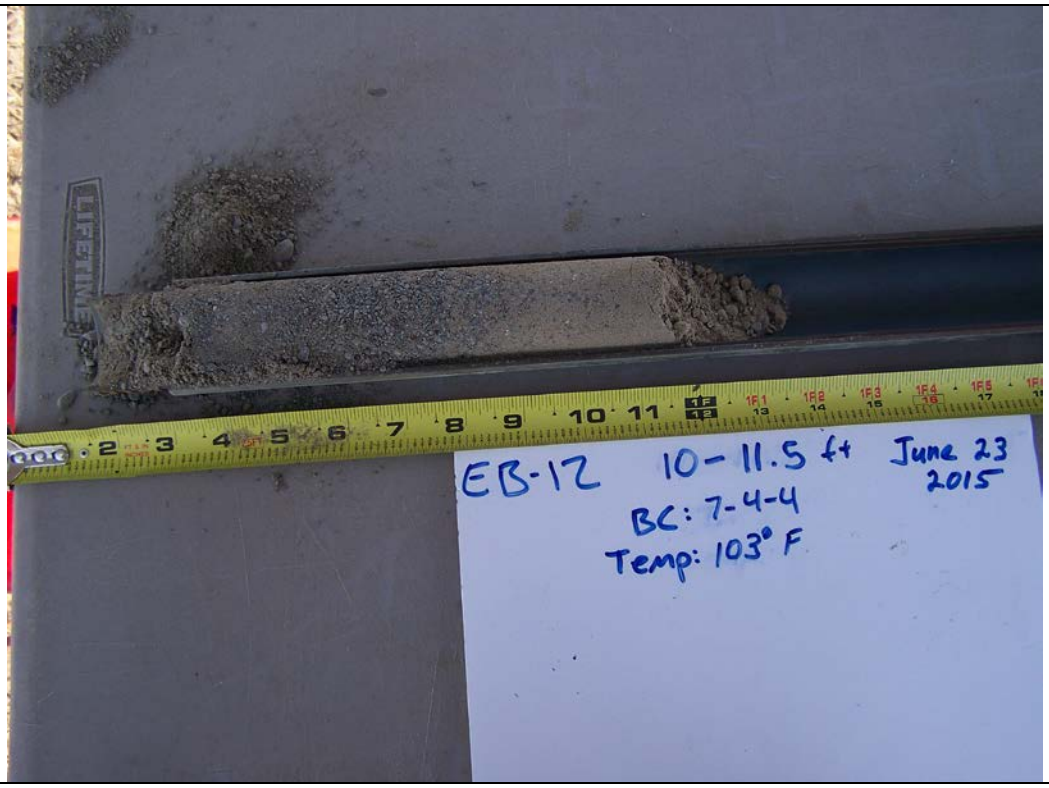
Photo No. **109**	
Photo Taken: **06/23/15**	
Description: Boring: EB-12 Depth: 5.0-ft to 6.5-ft bgs	

Photo No. **110**	
Photo Taken: **06/23/15**	
Description: Boring: EB-12 Depth: 10.0-ft to 11.5-ft bgs	

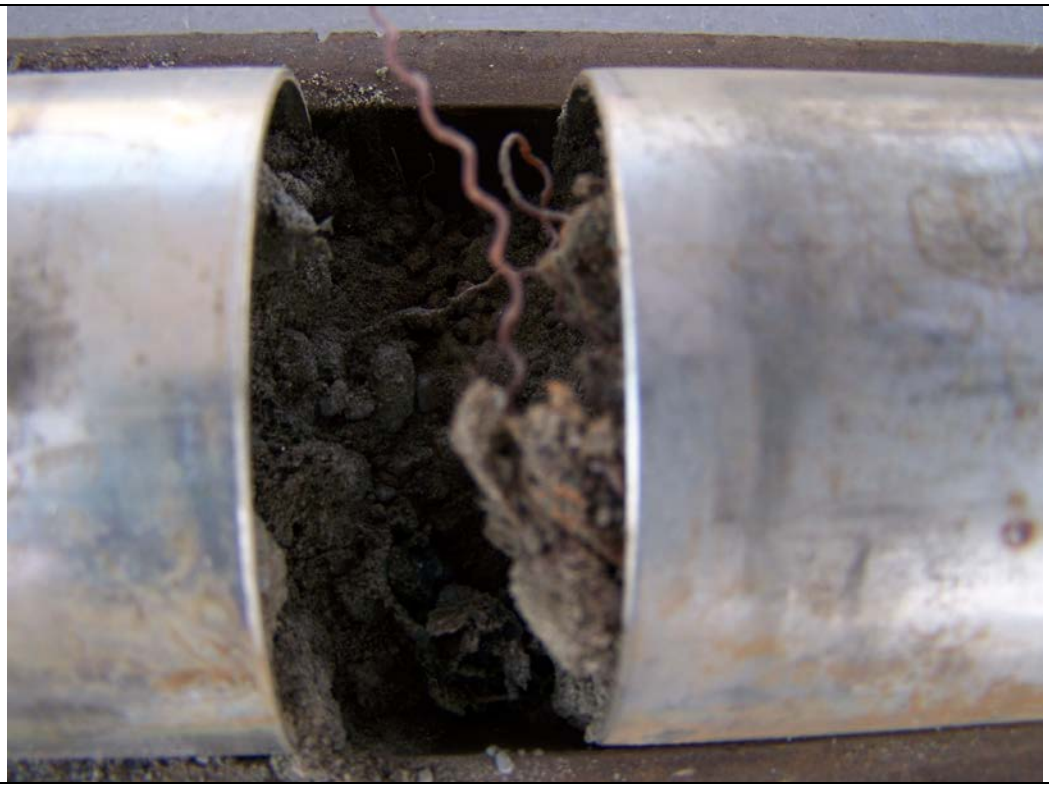
AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **111**	
Photo Taken: **06/23/15**	
Description: Boring: EB-12 Depth: 15.0-ft to 16.5-ft bgs	

Photo No. **112**	
Photo Taken: **06/23/15**	
Description: Boring: EB-12 Depth: 15.0-ft to 16.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **113**	
Photo Taken: **06/23/15**	
Description: Boring: EB-12 Depth: 20.0-ft to 21.0-ft bgs	

Photo No. **114**	
Photo Taken: **06/23/15**	
Description: Boring: EB-12 Depth: 20.0-ft to 21.0-ft bgs	

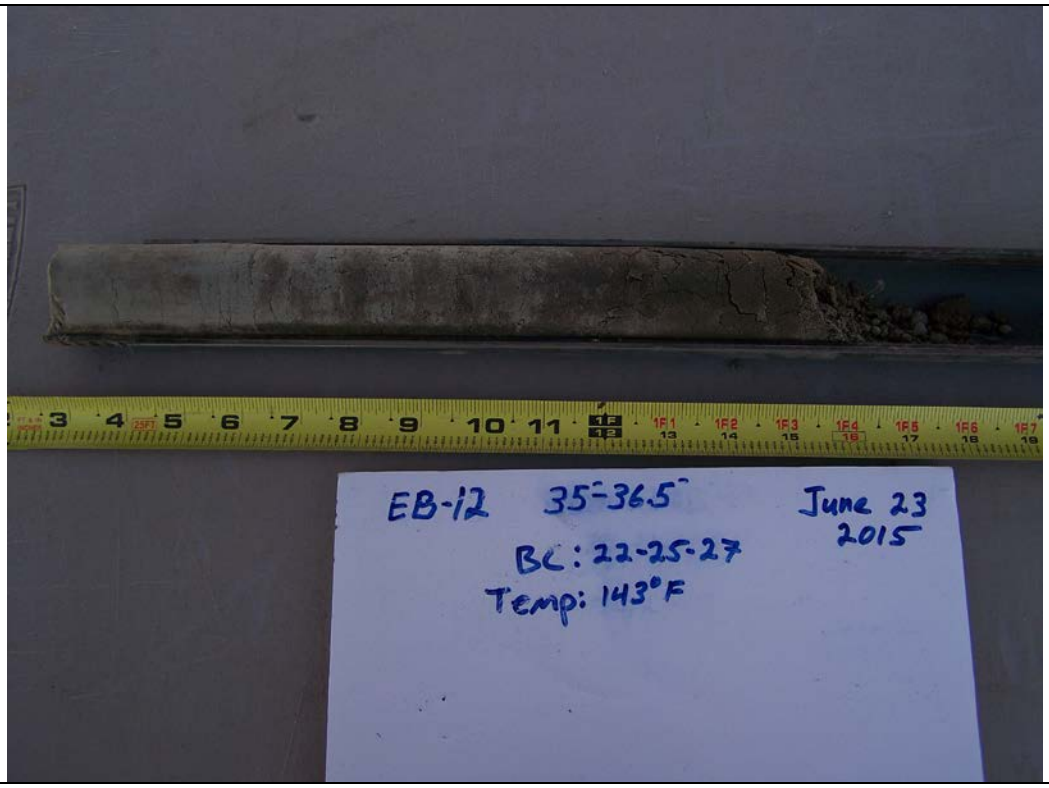
AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **115**	
Photo Taken: **06/23/15**	
Description: Boring: EB-12 Depth: 20.0-ft to 21.0-ft bgs	

Photo No. **116**	
Photo Taken: **06/23/15**	
Description: Boring: EB-12 Depth: 25.0-ft to 26.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **117**	
Photo Taken: **06/23/15**	
Description: Boring: EB-12 Depth: 30.0-ft to 31.5-ft bgs	

Photo No. **118**	
Photo Taken: **06/23/15**	
Description: Boring: EB-12 Depth: 35.0-ft to 36.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **119**	
Photo Taken: **06/23/15**	
Description: Boring: EB-12 Depth: 40.0-ft to 41.5-ft bgs	

Photo No. **120**	
Photo Taken: **06/23/15**	
Description: Boring: EB-13 Depth: 5.0-ft to 6.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **121**	
Photo Taken: **06/23/15**	
Description: Boring: EB-13 Depth: 10.0-ft to 11.5-ft bgs	

Photo No. **122**	
Photo Taken: **06/23/15**	
Description: Boring: EB-13 Depth: 15.0-ft to 16.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **123**	
Photo Taken: **06/23/15**	
Description: Boring: EB-13 Depth: 20.0-ft to 21.5-ft bgs	

Photo No. **124**	
Photo Taken: **06/23/15**	
Description: Boring: EB-13 Depth: 25.0-ft to 26.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **125**	
Photo Taken: **06/23/15**	
Description: Boring: EB-13 Depth: 30.0-ft to 30.2-ft bgs	

Photo No. **126**	
Photo Taken: **06/23/15**	
Description: Boring: EB-13 Depth: 30.0-ft to 30.2-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

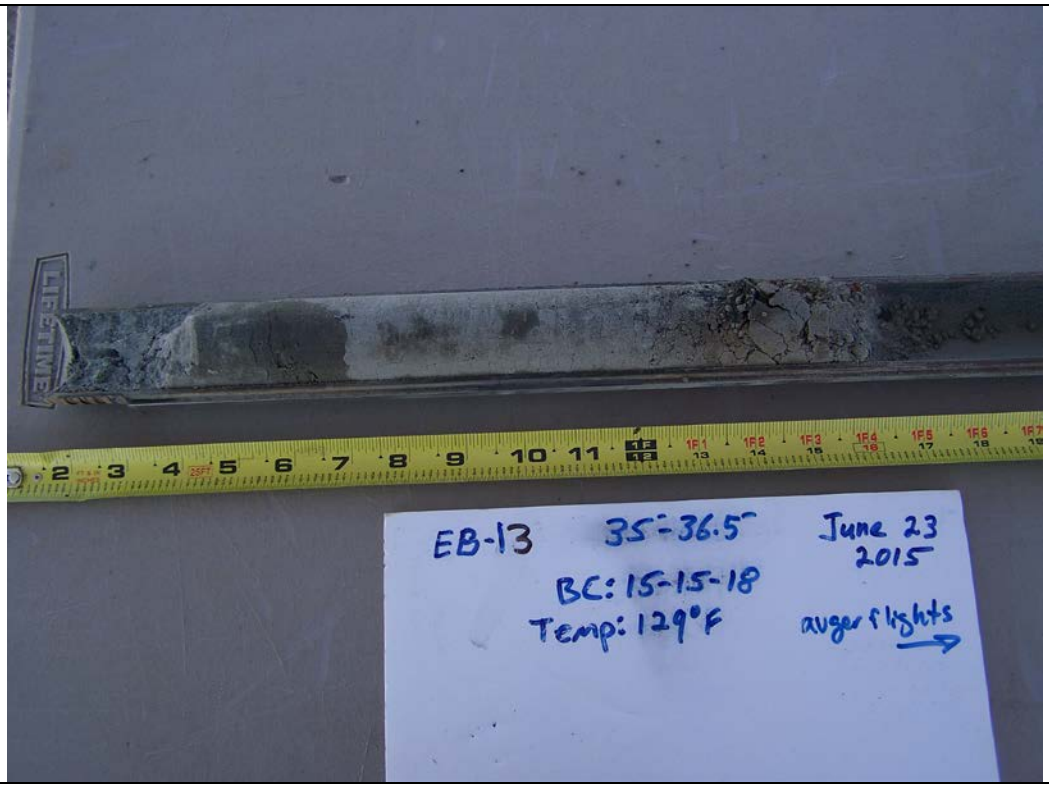
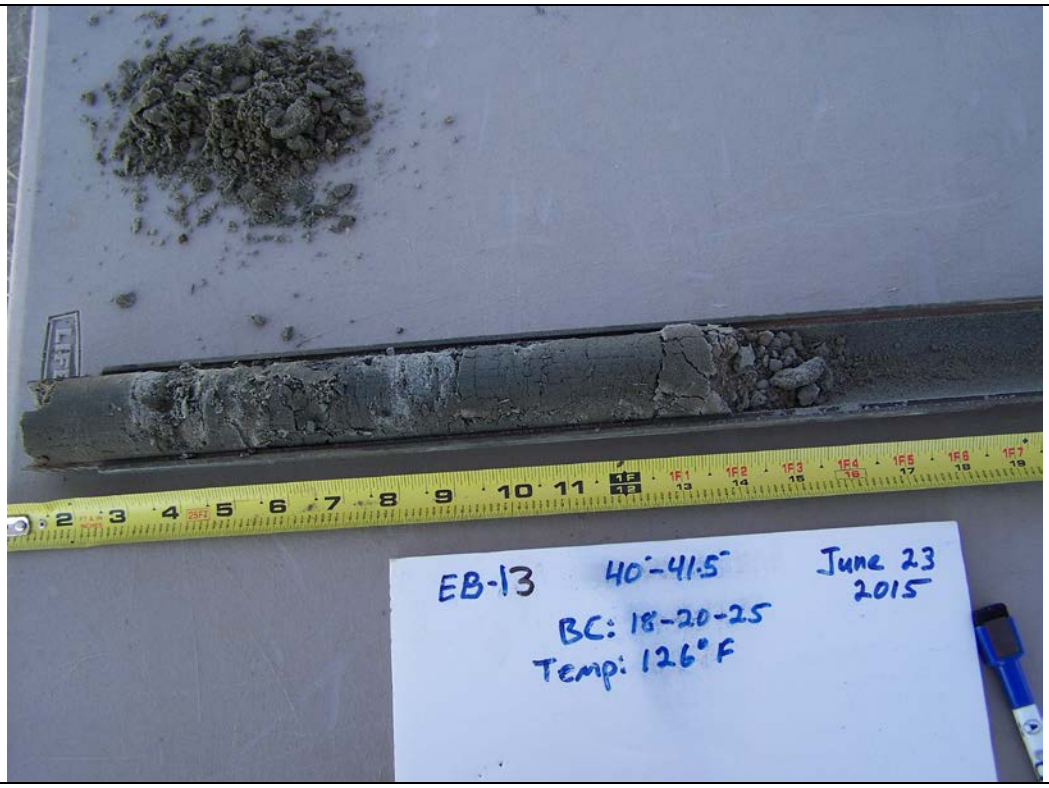
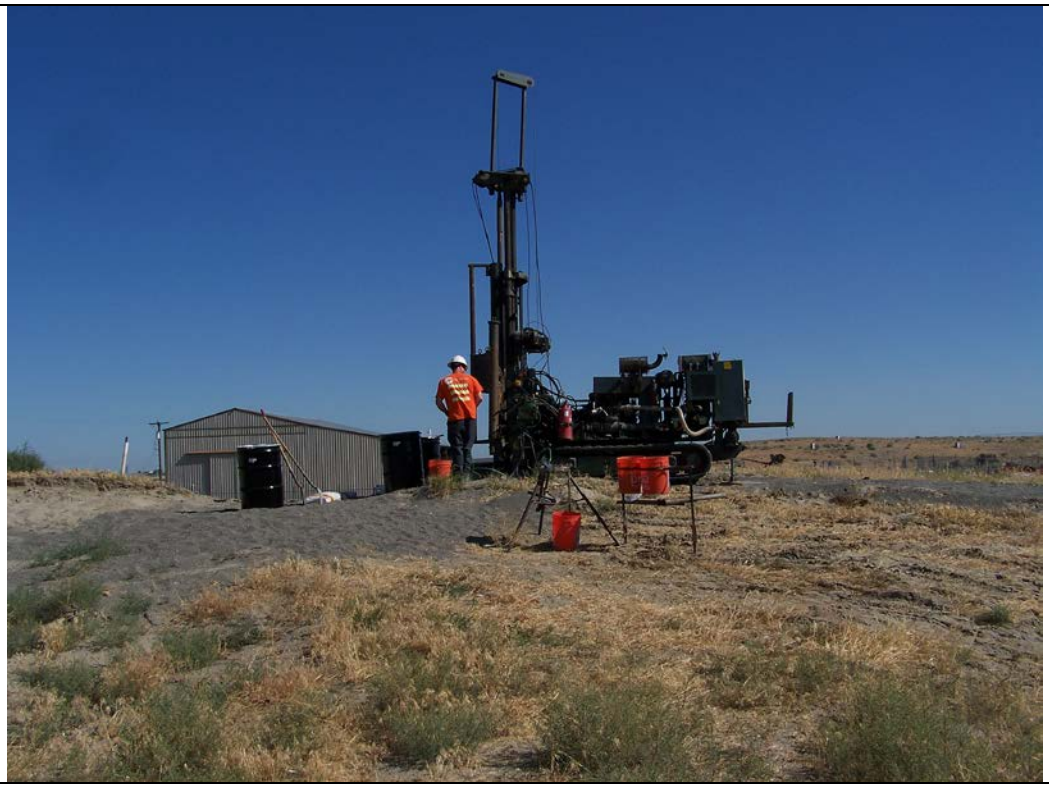
Photo No. **127**	
Photo Taken: **06/23/15**	
Description: Boring: EB-13 Depth: 35.0-ft to 36.5-ft bgs	

Photo No. **128**	
Photo Taken: **06/23/15**	
Description: Boring: EB-13 Depth: 40.0-ft to 41.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **129**	
Photo Taken: **06/23/15**	
Description: Boring: EB-13 Depth: 40.0-ft to 41.5-ft bgs	

Photo No. **130**	
Photo Taken: **06/17/15**	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **131**	
Photo Taken: **06/17/15**	

Photo No. **132**	
Photo Taken: **06/17/15**	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **133** **Photo Taken:** **06/17/15**	

Photo No. **134** **Photo Taken:** **06/17/15**	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **135**	
Photo Taken: **06/17/15**	

Photo No. **136**	
Photo Taken: **06/19/15**	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **137**	
Photo Taken: **06/19/15**	

Photo No. **138**	
Photo Taken: **06/19/15**	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **139** **Photo Taken:** **06/19/15**	

Photo No. **140** **Photo Taken:** **06/19/15**	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **141** **Photo Taken:** **06/19/15**	

Photo No. **142** **Photo Taken:** **06/19/15**	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **143** **Photo Taken:** **06/19/15**	

Photo No. **144** **Photo Taken:** **06/19/15**	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **145**	
Photo Taken: **06/19/15**	

Photo No. **146**	
Photo Taken: **06/19/15**	
.	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **147**	
Photo Taken: **06/19/15**	

Photo No. **148**	
Photo Taken: **06/19/15**	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **149**	
Photo Taken: **06/22/15**	

Photo No. **150**	
Photo Taken: **06/22/15**	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **151**	
Photo Taken: **06/22/15**	

Photo No. **152**	
Photo Taken: **06/22/15**	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **153** **Photo Taken:** **06/22/15**	

Photo No. **154** **Photo Taken:** **06/22/15**	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **155**	
Photo Taken: **06/22/15**	

Photo No. **156**	
Photo Taken: **06/23/15**	

AECOM	PHOTOGRAPHIC LOG

Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **001**

Photo Taken: **07/22/15**

Description:

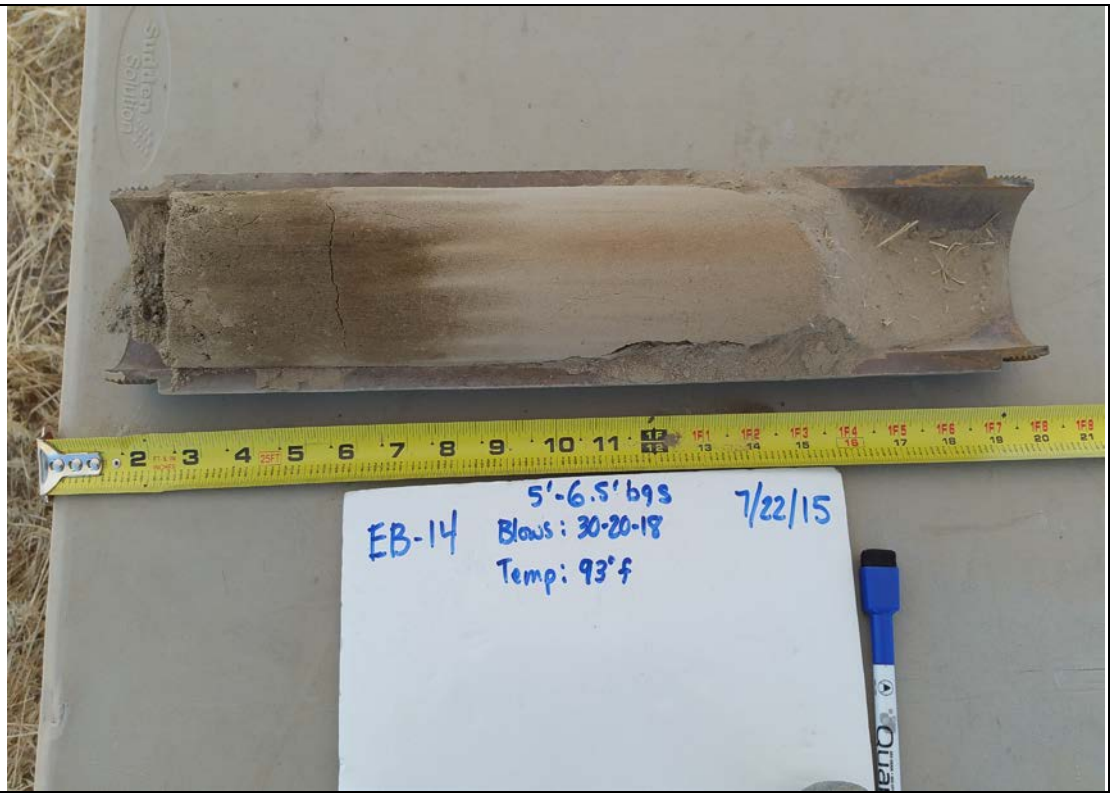
Boring: EB-14
Drill rig setup prior to boring installation.

Photo No. **002**

Photo Taken: **07/22/15**

Description:

Boring: EB-14
Depth: 5.0-ft to 6.5-ft bgs



AECOM

PHOTOGRAPHIC LOG

Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No.
003

Photo Taken:
07/22/15

Description:

Boring: EB-22
Depth: 12.5-ft to 14-ft bgs

Photo No.
004

Photo Taken:
07/22/15

Description:

Boring: EB-14
Depth: 15.0-ft to 16.5-ft bgs

AECOM	PHOTOGRAPHIC LOG

Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **005**

Photo Taken: **7/22/15**

Description:

Boring: EB-14
Depth: 20.0-ft to 21.5-ft bgs

Photo No. **006**

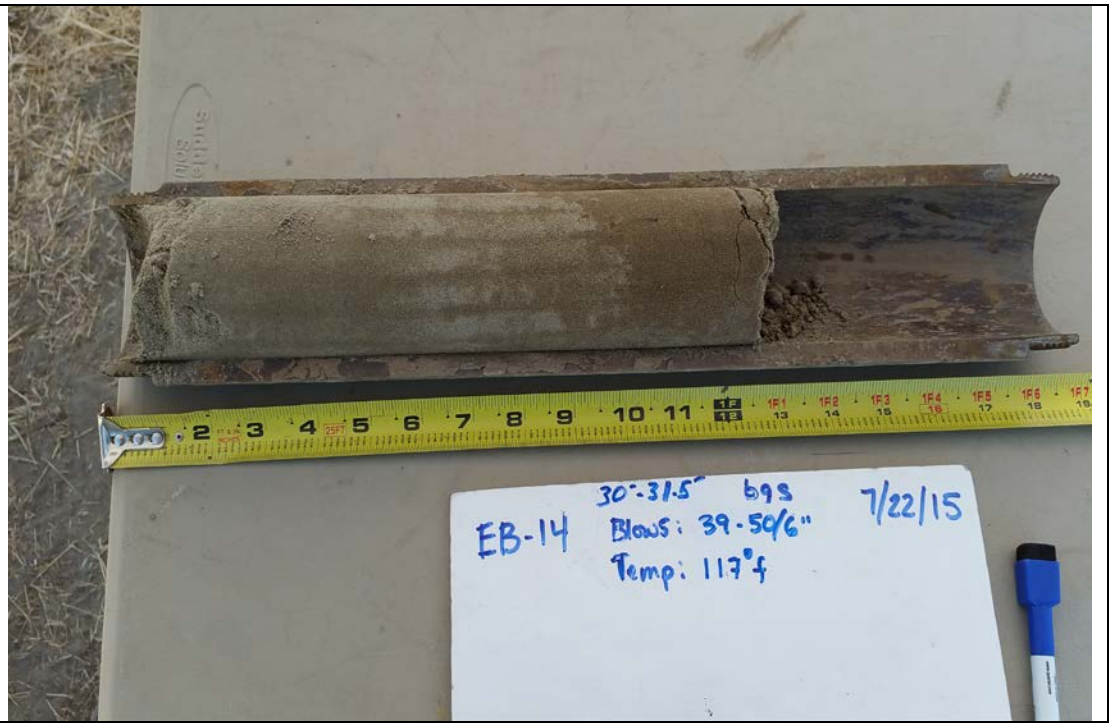
Photo Taken: **07/22/15**

Description:

Boring: EB-14
Depth: 25.0-ft to 26.5-ft bgs

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **007**	
Photo Taken: **0722/15**	
Description: Boring: EB-14 At boring surface to show soil sloughing (potential void) at 25' bgs.	

Photo No. **008**	
Photo Taken: **07/22/15**	
Description: Boring: EB-14 Depth: 30.0-ft to 31.5-ft bgs	

AECOM

PHOTOGRAPHIC LOG

Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No.
009

Photo Taken:
07/22/15

Description:

Boring: EB-14
Sample EB-14-31.5

Photo No.
010

Photo Taken:
07/22/15

Description:

Boring: EB-14
Depth: 35.0-ft to 36.5-ft bgs

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **011**	
Photo Taken: **07/22/15**	
Description: Boring: EB-14 Depth: 40.0-ft to 41.5-ft bgs	

Photo No. **012**	
Photo Taken: **07/23/15**	
Description: Boring: EB-15 Drill rig setup over EB-15 prior to drilling.	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **013**	
Photo Taken: **07/23/15**	
Description: Boring: EB-15 Depth: 5.0-ft to 6.5-ft bgs	

Photo No. **014**	
Photo Taken: **07/23/15**	
Description: Boring: EB-15 Depth: 10.0-ft to 11.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

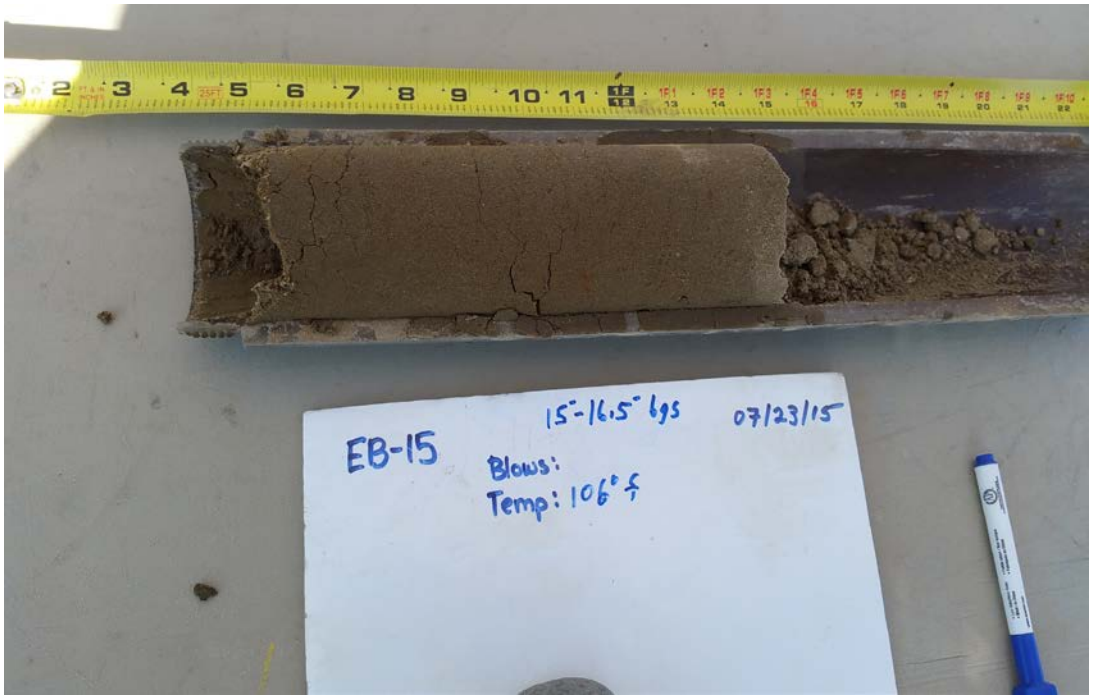
Photo No. **015**	
Photo Taken: **07/23/15**	
Description: Boring: EB-15 Depth: 15.0-ft to 16.5-ft bgs	

Photo No. **016**	
Photo Taken: **07/23/15**	
Description: Boring: EB-2A Showing representative debris found in soil cuttings.	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **017**	
Photo Taken: **07/23/15**	
Description: Boring: EB-15 Depth: 20.0-ft to 21.5-ft bgs	

Photo No. **018**	
Photo Taken: **07/23/15**	
Description: Boring: EB-15 Depth: 25.0-ft to 26.5-ft bgs	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **019**	
Photo Taken: **07/23/15**	
Description: Boring: EB-15 Depth: 30.0-ft to 31.5-ft bgs	

Photo No. **020**	
Photo Taken: **07/16/15**	
Description: Boring: EB-15 Sample EB-15-31.5	

AECOM		PHOTOGRAPHIC LOG
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

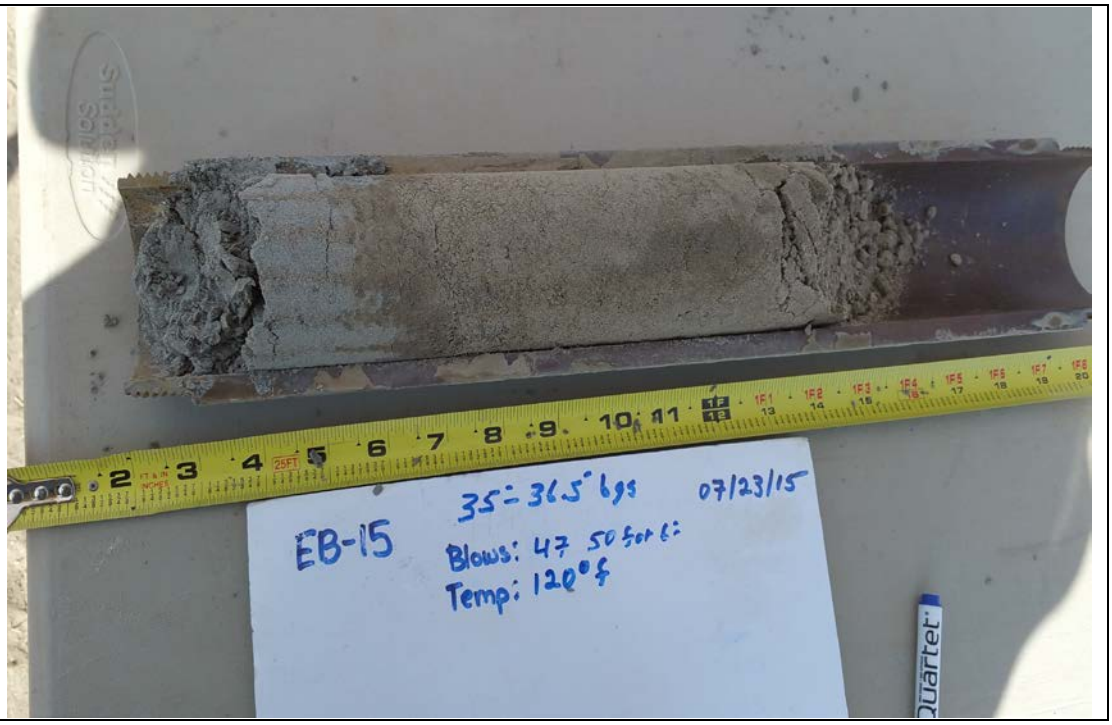
Photo No. **021**	
Photo Taken: **07/23/15**	
Description: Boring: EB-15 Depth: 35.0-ft to 36.5-ft bgs	

Photo No. **022**	
Photo Taken: **07/23/15**	
Description: Boring: EB-15 Depth: 10.0-ft to 11.5-ft bgs	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

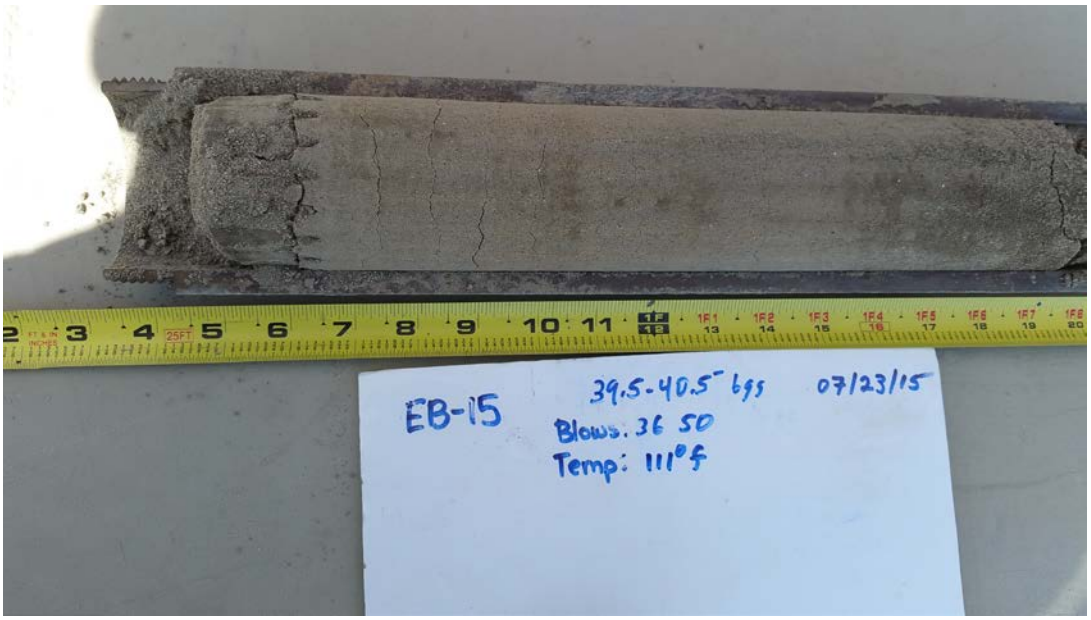
Photo No. **023**	
Photo Taken: **07/23/15**	
Description: Boring: EB-15 Depth: 39.5-ft to 40.5-ft bgs	

Photo No. **024**	
Photo Taken: **07/23/15**	
Description: Boring: EB-15 Sample EB-15-40.5	

AECOM	PHOTOGRAPHIC LOG	
Pasco Sanitary Landfill Site	**Balefill Area Extinguishment & Supplemental Barrier Project** Franklin County, Washington	**AECOM Project No.:** 60428541

Photo No. **025**	
Photo Taken: **07/23/15**	
Description: Taped outline of the containment wall box.	

Photo No. **026**	
Photo Taken: **07/23/15**	
Description: Taped outline of the containment wall box.	

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project:	Pasco Landfill	Date Sampled:	NA
Project #:	15T010	Sampled By:	Client
Client:	Clearcreek Contractors	Date Tested:	7/12/2015
Sample ID	EB-1	Tested by:	H Benny

Project Number	15T010	LVDT	Load Cell	Strain Ratio	Corrected Area	Deviator Stress	Corrected Stress	Pore Pressure	Δ U	Induced Pore Pressure	σ'3	σ'1	σ'1/σ'3	(σ1−σ3)/2	(σ'1+σ'3)/2
Units		.001"	lbs		ft^2	psf	psf	psi	psi	psf	psf	psf			
Sample #	1	0	0	0	0.0439	0	0	28.0	0.0	0	994	994	1	0	994
Depth	26.5	5	22	0.001	0.0439	501	501	28.3	0.3	43	950	1451	1.53	250	1201
Cell pressure, stage 1	34.9	10	37	0.002	0.0440	841	841	28.6	0.6	86	907	1748	1.93	421	1328
Cell pressure, stage 2	41.9	15	49	0.003	0.0440	1113	1113	28.9	0.9	130	864	1977	2.29	557	1420
Cell pressure, stage 3	55.8	20	58	0.004	0.0441	1317	1316	29.0	1.0	144	850	2165	2.55	658	1508
Back Pressure	28	25	63	0.005	0.0441	1429	1428	29.1	1.1	158	835	2263	2.71	714	1549
Strain Rate	0.005	50	78	0.009	0.0443	1761	1759	29.3	1.3	187	806	2566	3.18	881	1686
Initial Platten Height	0	78	83	0.014	0.0445	1864	1861	29.4	1.4	202	792	2653	3.35	932	1723
Initial Load Cell Reading	0	100	84	0.018	0.0447	1879	1875	29.7	1.7	245	749	2624	3.50	940	1687
Initial Length	5.610	125	83	0.023	0.0449	1848	1844	29.9	1.9	274	720	2564	3.56	924	1642
Initial Area	0.0439	150	82	0.027	0.0451	1818	1812	30.1	2.1	302	691	2503	3.62	909	1597
Height after Saturation	5.579	175	81	0.032	0.0453	1787	1781	30.2	2.2	317	677	2457	3.63	894	1567
Height after Consolidation	5.548	200	80	0.036	0.0455	1757	1749	30.3	2.3	331	662	2412	3.64	878	1537
		225	80	0.041	0.0457	1749	1740	30.4	2.4	346	648	2388	3.69	874	1518
		250	79	0.045	0.0460	1719	1709	30.5	2.5	360	634	2343	3.70	859	1488
		275	79	0.050	0.0462	1711	1700	30.6	2.6	374	619	2320	3.75	855	1469
		300	78	0.054	0.0464	1681	1670	30.6	2.6	374	619	2289	3.70	840	1454
		300	0	0.054	0.0464	0	0	28.0	0.0	0	2002	2002	1		
		305	47	0.055	0.0464	1012	1001	28.6	0.6	86	1915	2916	1.52	506	2415
		310	83	0.056	0.0465	1785	1774	29.1	1.1	158	1843	3617	1.96	893	2730
		315	104	0.057	0.0465	2235	2223	29.5	1.5	216	1786	4009	2.25	1117	2897
		320	118	0.058	0.0466	2533	2521	29.9	1.9	274	1728	4249	2.46	1267	2989
		325	127	0.059	0.0466	2724	2712	30.2	2.2	317	1685	4397	2.61	1362	3041
		350	148	0.063	0.0468	3159	3146	31.3	3.3	475	1526	4673	3.06	1580	3100
		375	157	0.068	0.0471	3335	3321	31.8	3.8	547	1454	4776	3.28	1668	3115
		400	160	0.072	0.0473	3382	3368	32.2	4.2	605	1397	4765	3.41	1691	3081
		425	162	0.077	0.0475	3408	3393	32.3	4.3	619	1382	4775	3.45	1704	3079
		450	163	0.081	0.0478	3412	3396	32.4	4.4	634	1368	4764	3.48	1706	3066
		475	165	0.086	0.0480	3437	3420	32.5	4.5	648	1354	4774	3.53	1719	3064
		500	165	0.090	0.0482	3420	3402	32.6	4.6	662	1339	4742	3.54	1710	3040
		525	166	0.095	0.0485	3424	3405	32.6	4.6	662	1339	4745	3.54	1712	3042
		550	166	0.099	0.0487	3407	3388	32.7	4.7	677	1325	4712	3.56	1704	3019
		575	167	0.104	0.0490	3410	3390	32.7	4.7	677	1325	4715	3.56	1705	3020
		600	167	0.108	0.0492	3393	3372	32.8	4.8	691	1310	4683	3.57	1697	2997
		600	0	0.108	0.0492	0	0	28.0	0.0	0	4003	4003	1.00		
		605	105	0.109	0.0493	2131	2110	28.5	0.5	72	3931	6041	1.54	1066	4986
		610	164	0.110	0.0493	3326	3304	29.7	1.7	245	3758	7063	1.88	1663	5411
		615	196	0.111	0.0494	3971	3949	30.7	2.7	389	3614	7563	2.09	1985	5589
		620	220	0.112	0.0494	4452	4430	31.9	3.9	562	3442	7872	2.29	2226	5657
		625	234	0.113	0.0495	4731	4709	32.4	4.4	634	3370	8078	2.40	2365	5724
		650	268	0.117	0.0497	5391	5368	34.8	6.8	979	3024	8392	2.78	2695	5708
		675	281	0.122	0.0500	5623	5600	35.6	7.6	1094	2909	8509	2.93	2812	5709
		700	287	0.126	0.0502	5714	5690	36.2	8.2	1181	2822	8512	3.02	2857	5667
		725	292	0.131	0.0505	5783	5759	36.5	8.5	1224	2779	8538	3.07	2892	5658
		750	295	0.135	0.0508	5812	5787	36.7	8.7	1253	2750	8537	3.10	2906	5644
		775	298	0.140	0.0510	5841	5815	36.9	8.9	1282	2722	8536	3.14	2921	5629
		800	301	0.144	0.0513	5869	5842	36.9	8.9	1282	2722	8564	3.15	2934	5643
		825	303	0.149	0.0516	5877	5849	37.0	9.0	1296	2707	8556	3.16	2938	5632
		850	306	0.153	0.0518	5904	5875	37.0	9.0	1296	2707	8582	3.17	2952	5645
		875	307	0.158	0.0521	5891	5862	37.0	9.0	1296	2707	8569	3.17	2946	5638
		900	309	0.162	0.0524	5898	5868	37.0	9.0	1296	2707	8575	3.17	2949	5641

Reviewed By: H Benny

Corporate ~ 777 Chrysler Drive • Burlington, WA 98233 • Phone (360) 755-1990 • Fax (360) 755-1980

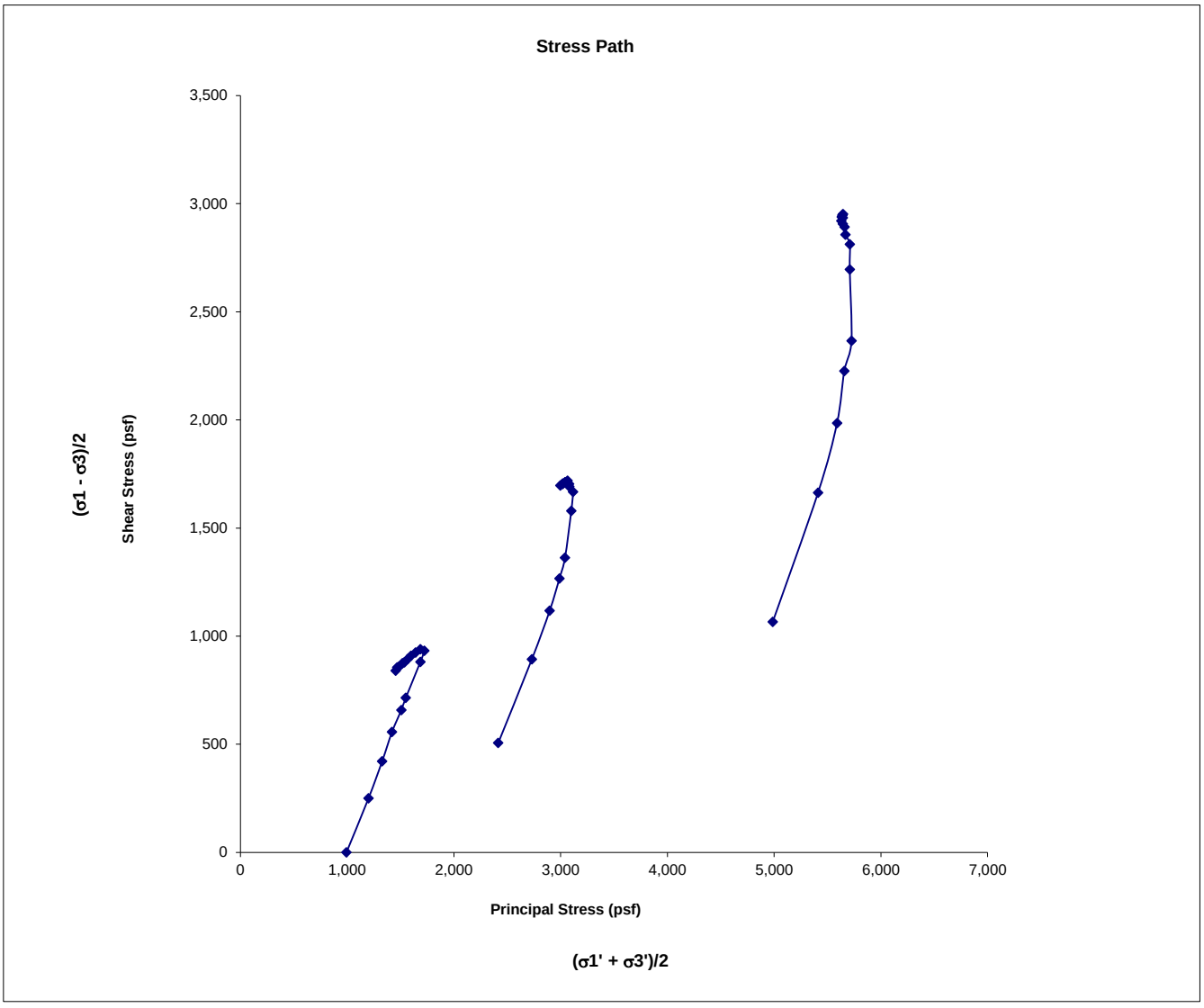
Regional Offices: Olympia ~ 360.534.9777 Bellingham ~ 360.647.6111 Silverdale ~ 360.698.6787 Tukwila ~ 206.241.1974

Visit our website: www.mtc-inc.net

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project:	Pasco Landfill	Date Sampled:	NA
Project #:	15T010	Sampled By:	Client
Client:	Clearcreek Contractors	Date Tested:	7/12/2015
Sample #:	EB-1	Tested by:	H Benny



Reviewed By: HBenny

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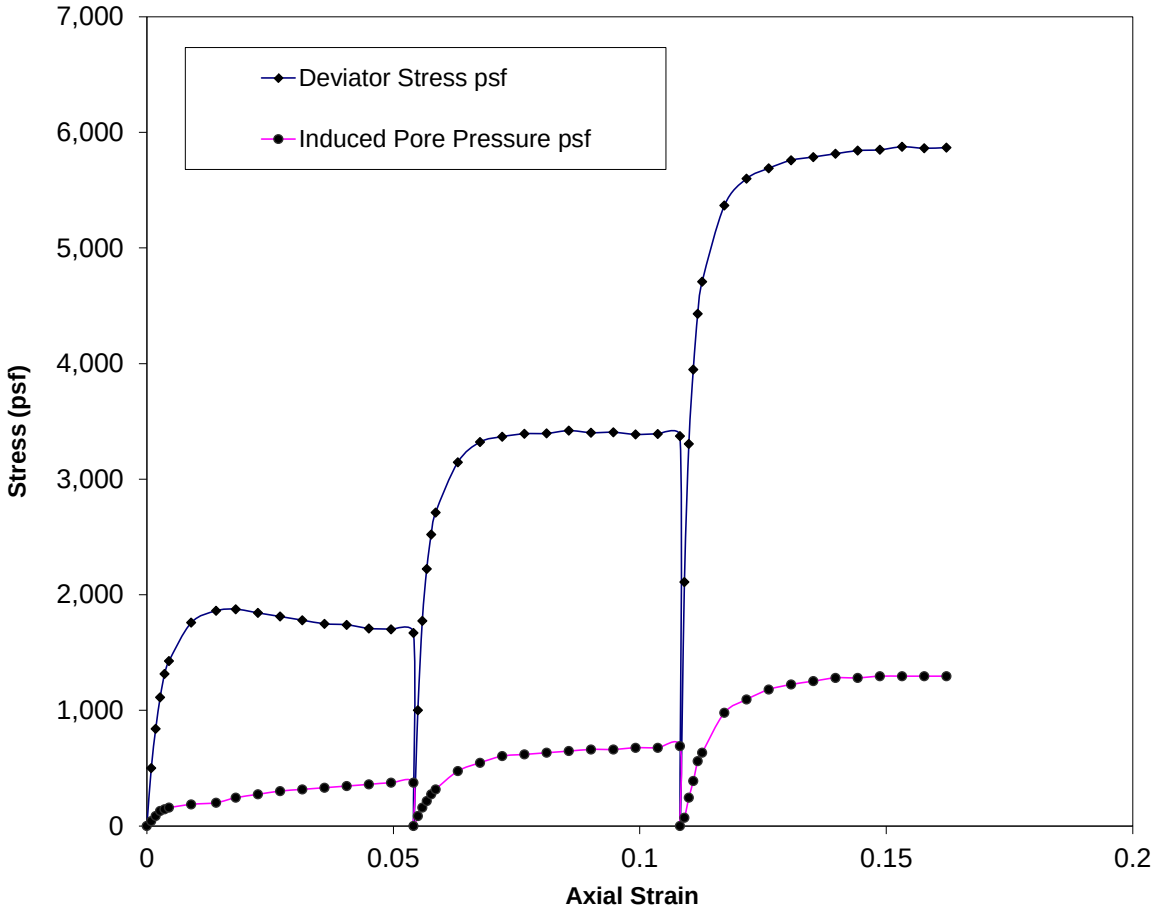
Project:	Pasco Landfill	Date Sampled:	NA
Project #:	15T010	Sampled By:	Client
Client:	Clearcreek Contractors	Date Tested:	7/12/2015
Sample #:	EB-1	Tested by:	H Benny

Consolidated, Undrained Triaxial Compression



Sample	Depth	Water Content		Void Ratio			Saturation		Unit Weight		Pressure (psi)	
Number	feet	Initial	Final	Initial	Final		Initial	Final	Initial Wet	Initial Dry	Consol	Back
1	26.5	8.0	20.5	0.627	0.580		0.339	0.935	109.9	91.2	6.9, 13.9, 27.8	0.0

Reviewed By: HBenny

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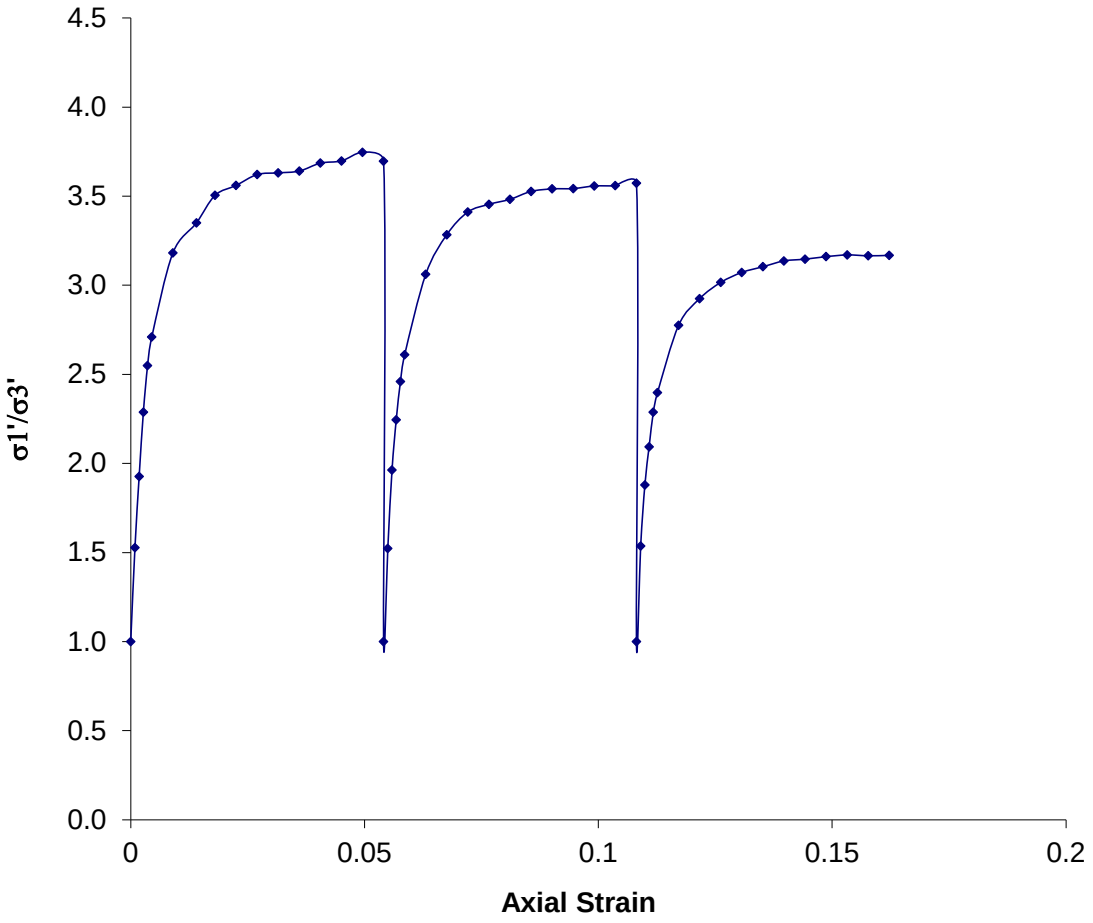
Project:	Pasco Landfill	Date Sampled:	NA
Project #:	15T010	Sampled By:	Client
Client:	Clearcreek Contractors	Date Tested:	7/12/2015
Sample #:	EB-1	Tested by:	H Benny

Consolidated, Undrained Triaxial Compression



Sample	Depth	Water Content		Void Ratio			Saturation		Unit Weight		Pressure	
Number	Feet	Initial	Final	Initial	Final		Initial	Final	Initial Wet	Initial Dry	Consol	Back
1.0	26.5	8.0	20.5	0.627	0.580		0.339	0.935	109.9	91.2	6.9, 13.9, 27.8	28.0

Reviewed By: H Benny

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Visit our website: www.mtc-inc.net

Project: Pasco Landfill
Project #: 15T010
Date Received: June 25, 2015
Date Tested: July 1, 2015

Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: A. Urban, B. Goble

Percent Finer Than Indicated Size, By ASTM D422

Sample ID	Moisture Content (%)	5"	3"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#10	#20	#40	#60	#100	#200
EB-2A-30	32.02	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	93.9	80.0	69.4	60.0	48.1	36.4	20.1
EB-2B-40	11.12	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.5	99.1	98.5	95.9	56.0
EB-4-40	12.60	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.7	99.4	98.6	96.0	65.0
EB-6-5	1.91	100.0	100.0	100.0	100.0	100.0	100.0	98.5	97.0	94.7	90.6	84.3	80.6	76.5	66.5	26.6
EB-8-11.5	7.61	100.0	100.0	100.0	100.0	100.0	100.0	99.5	99.3	97.3	95.2	92.8	88.9	81.4	69.7	36.8
EB-9-16.5	6.90	100.0	100.0	100.0	100.0	99.8	99.8	99.5	99.2	97.5	94.9	91.6	85.9	76.7	64.8	34.9
EB-7-20	6.70	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.7	97.1	93.3	89.4	84.4	76.0	44.2
EB-11B-25	8.08	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.6	98.8	97.7	96.9	95.6	90.2	32.7
EB-12-20	4.47	100.0	100.0	100.0	100.0	100.0	100.0	99.8	99.8	97.6	92.9	86.0	78.4	68.0	54.5	23.2

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

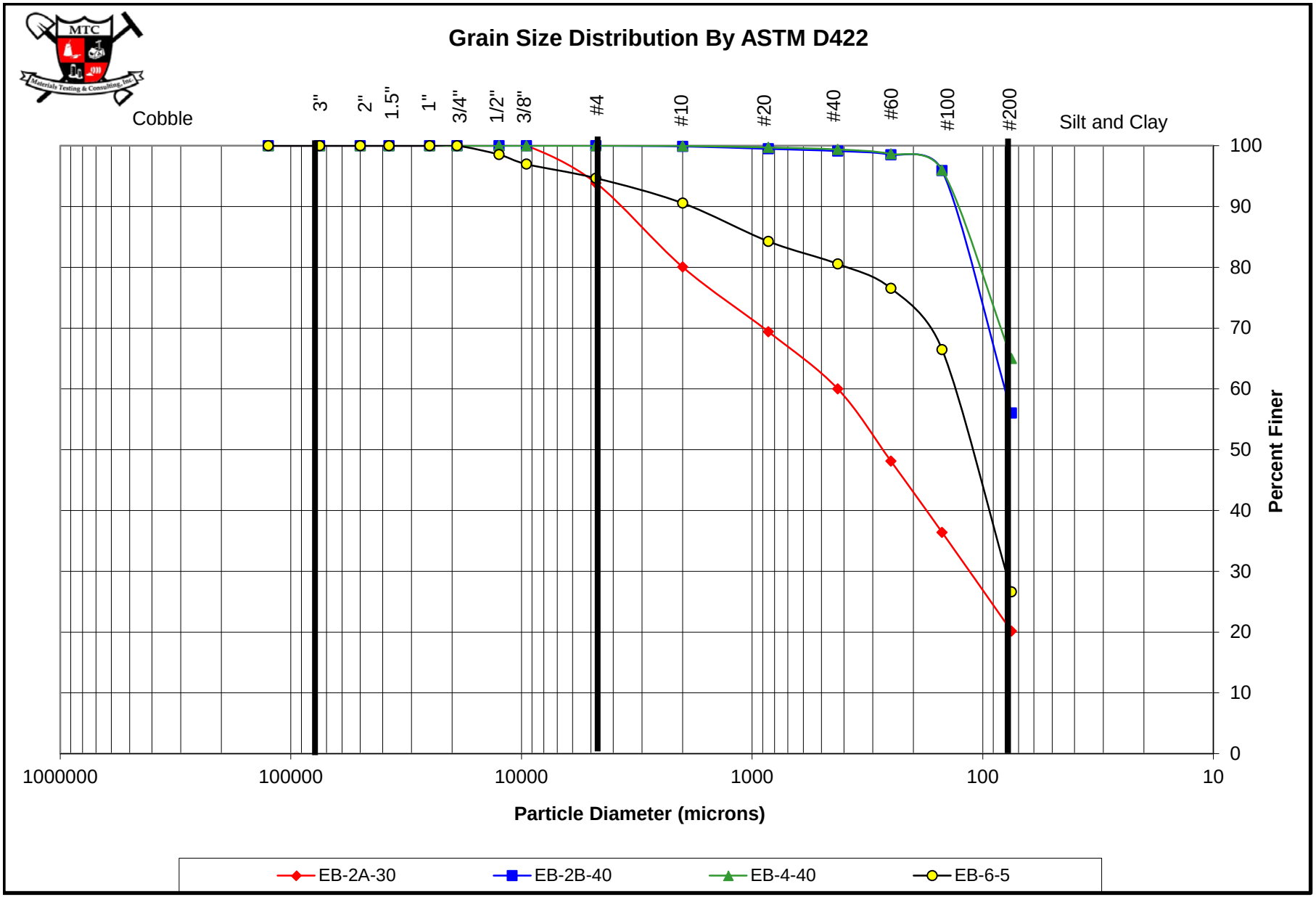
Project: Pasco Landfill
Project #: 15T010
Date Received: June 25, 2015
Date Tested: July 1, 2015

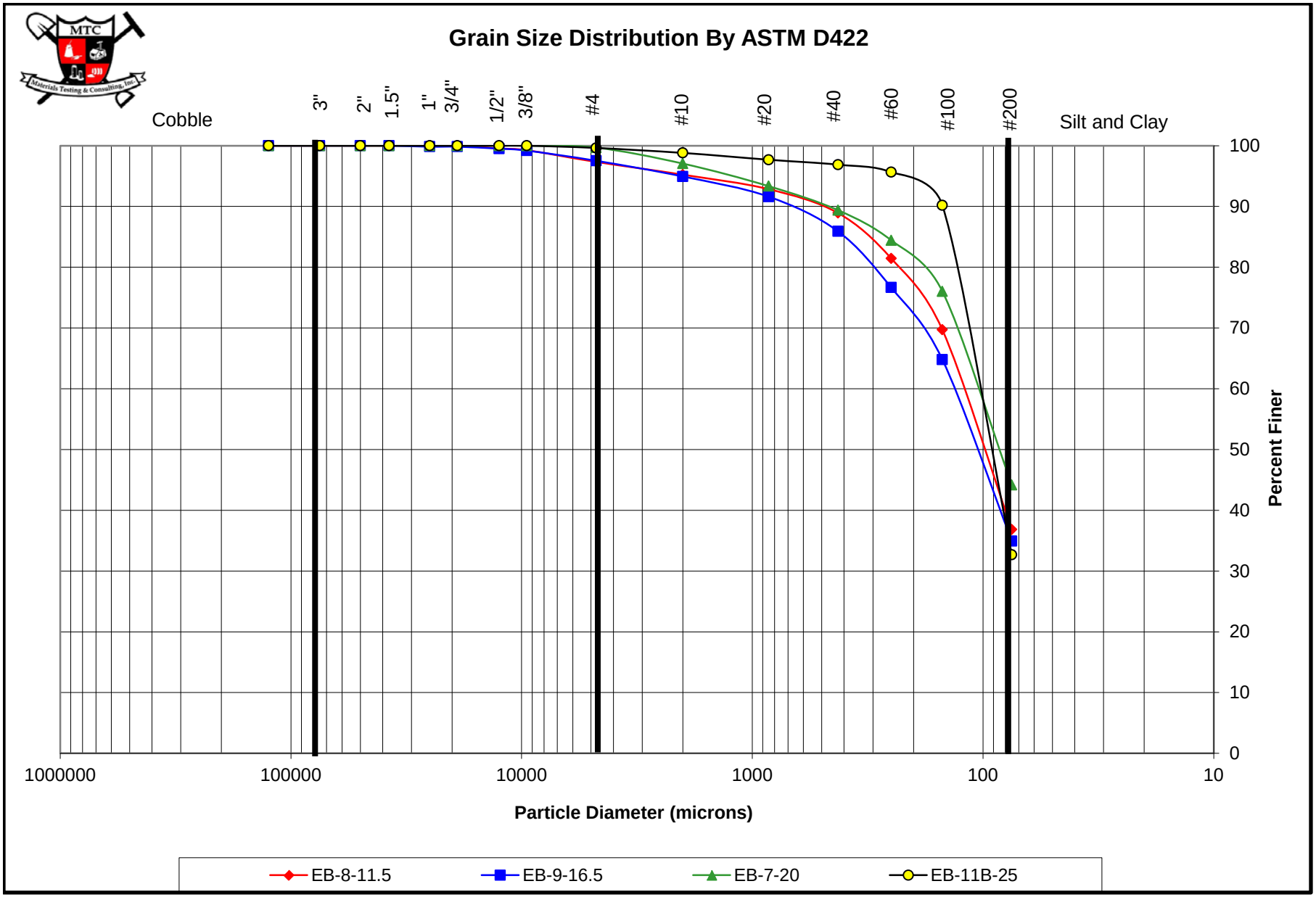
Client: Analytical Resources, Inc.
Sampled by: Others
Tested by: A. Urban, B. Goble

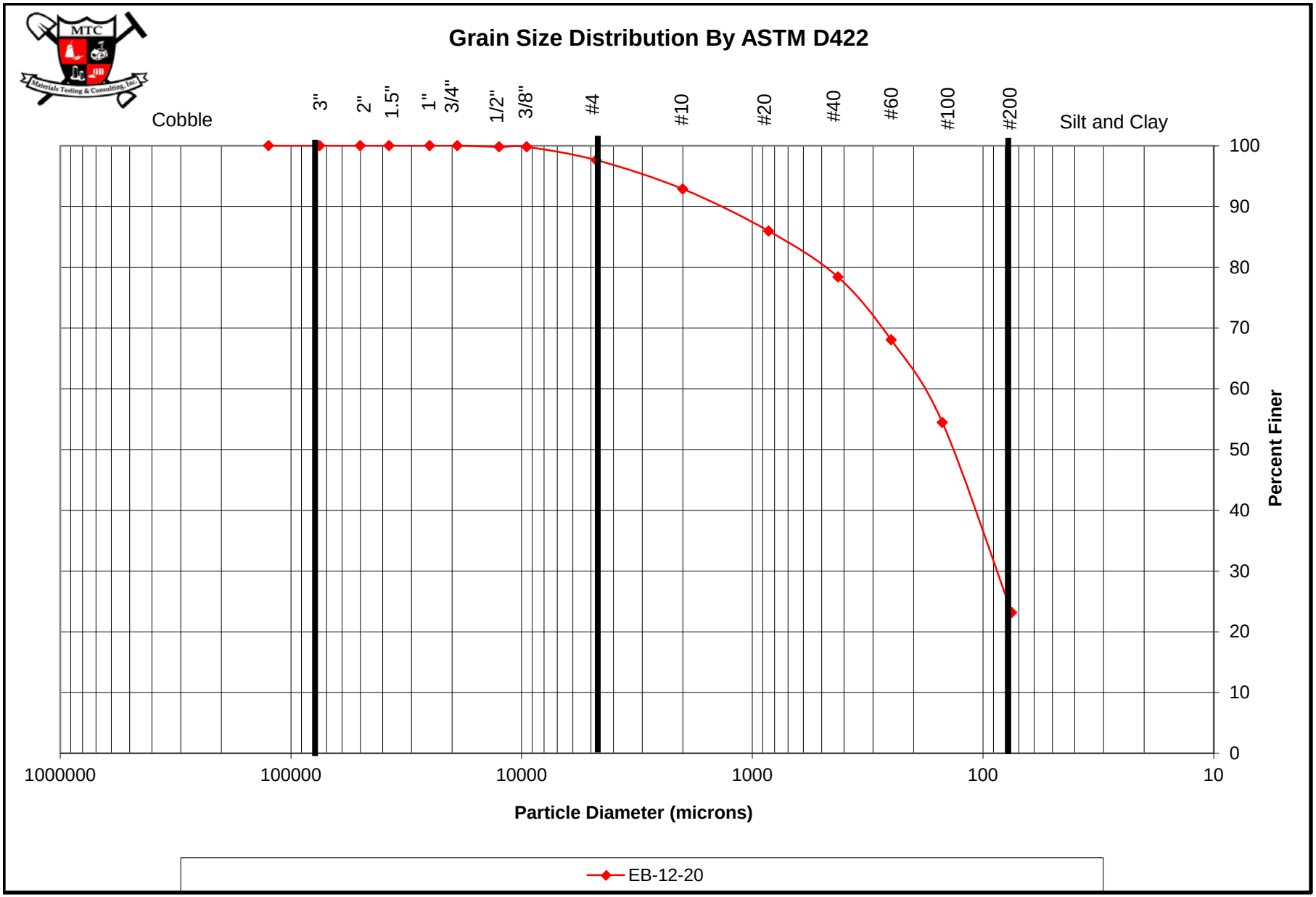
Percent Retained in Each Size Fraction, By ASTM D422

Sieve Size (microns)	5"-3"	3-2"	2-1.5"	1.5-1"	1-3/4"	3/4-1/2"	1/2-3/8"	3/8-#4	4750-2000	2000-850	850-425	425-250	250-150	150-75	< 75
EB-2A-30	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.1	13.8	10.6	9.4	11.9	11.7	16.3	20.1
EB-2B-40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	0.4	0.6	2.6	39.9	56.0
EB-4-40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.7	2.7	31.0	65.0
EB-6-5	0.0	0.0	0.0	0.0	0.0	1.5	1.6	2.3	4.1	6.3	3.7	4.0	10.1	39.9	26.6
EB-8-11.5	0.0	0.0	0.0	0.0	0.0	0.5	0.3	1.9	2.1	2.4	3.9	7.5	11.7	32.9	36.8
EB-9-16.5	0.0	0.0	0.0	0.2	0.0	0.3	0.3	1.7	2.6	3.3	5.7	9.2	11.9	29.9	34.9
EB-7-20	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.6	3.7	4.0	5.0	8.4	31.9	44.2
EB-11B-25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.8	1.1	0.8	1.2	5.4	57.5	32.7
EB-12-20	0.0	0.0	0.0	0.0	0.0	0.2	0.0	2.2	4.8	6.9	7.6	10.3	13.6	31.3	23.2

Reviewed by:


Grain Size Distribution By ASTM D422
Cobble
3"
2"
1.5"
1"
3/4"
1/2"
3/8"
#4
#10
#20
#40
#60
#100
#200
Silt and Clay
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
1000000
100000
10000
1000
100
10
Particle Diameter (microns)
EB-2A-30
EB-2B-40
EB-4-40
EB-6-5


Grain Size Distribution By ASTM D422
Cobble
3"
2"
1.5"
1"
3/4"
1/2"
3/8"
#4
#10
#20
#40
#60
#100
#200
Silt and Clay
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
1000000
100000
10000
1000
100
10
Particle Diameter (microns)
EB-8-11.5
EB-9-16.5
EB-7-20
EB-11B-25


Grain Size Distribution By ASTM D422
Cobble
3"
2"
1.5"
1"
3/4"
1/2"
3/8"
#4
#10
#20
#40
#60
#100
#200
Silt and Clay
100
90
80
70
60
50
40
30
20
10
0
Percent Finer
1000000
100000
10000
1000
100
10
Particle Diameter (microns)
EB-12-20

HWA GEOSCIENCES INC.
Geotechnical Engineering • Hydrogeology • Geoenvironmental • Inspection and Testing

July 21, 2015
HWA Project No. 2012-002-23 Task 28

Materials Testing & Consulting, Inc.
5451 NW Newberry Hill Road
Silverdale, WA 98233

Attention: Mr. Harold Benny

Subject: **MATERIALS LABORATORY REPORT**
Direct Shear Testing
Pasco Landfill

Dear Mr. Benny,

As requested, HWA GeoSciences Inc. (HWA) performed laboratory testing for the subject project. Herein we present the results of our laboratory analyses, which are summarized on the attached Figures. The laboratory testing program was performed in general accordance with your instructions and appropriate ASTM Standards as outlined below.

SAMPLE INFORMATION: Three samples were delivered to our laboratory on July 13, 2015 by MTC personnel. The samples were designated "EB-2B @ 11.5", "EB-2B @ 26.5" and "EB-10 @ 16.5". "EB-2B @ 11.5" and "EB-2B @ 26.5" were delivered in brass rings and "EB-10 @ 26.5" was delivered in a Shelby Tube. Based on visual methods, the soil descriptions for the samples are as follows:

EB-2B @ 11.5	Grayish brown, silty SAND (SM)
EB-2B @ 26.5	Olive brown, poorly graded SAND with silt (SP-SM)
EB-10 @ 16.5	Olive brown, poorly graded SAND with silt (SP-SM)

MOISTURE CONTENT OF SOIL: The moisture content of the soil samples (percent by dry mass) were determined in general accordance with **ASTM D2216**. The results are shown on Figures 1 through 3, Direct Shear Test of Soils report.

SHEAR STRENGTH PARAMETERS OF SOIL: Direct shear tests were conducted on the samples in general accordance with **ASTM D3080**. Three test specimens were trimmed from each sample, maintaining the as-delivered density of the soil. The three specimens from each sample were sheared with normal stress increments of approximately 1.0, 2.0 and 3.0 ksf as requested by the client. The results of these tests are reported on Figures 1 through 3, Direct Shear Test of Soils report. The indicated shear stress at each point represents the maximum value obtained. The apparent cohesion and friction angle of the soil for the peak and residual conditions are inferred from a least-squares linear regression of the three test points, as indicated in Figures 1 through 3.

21312 30th Drive SE
Suite 110
Bothell, WA 98021-7010
Tel: 425.774.0106
Fax: 425.774.2714
www.hwageo.com

CLOSURE: Experience has shown that laboratory test values for soil and other natural materials vary with each representative sample. As such, HWA has no knowledge as to the extent and quantity of material the tested sample may represent. HWA also makes no warranty as to how representative either the sample tested or the test results obtained are to actual field conditions. It is a well established fact that sampling methods present varying degrees of disturbance or variance that affect sample representativeness.

No copy should be made of this report except in its entirety.

We appreciate the opportunity to provide laboratory testing services on this project. Should you have any questions or comments, or if we may be of further service, please call.

Sincerely,

HWA GEOSCIENCES INC.

Jessica Herrera
Laboratory Manager

Steven E. Greene, L.G., L.E.G.
Principal Engineering Geologist

Attachments:

Figure 1-3 Direct Shear Test of Soils

HWA GeoSciences Inc. Materials Testing Laboratory

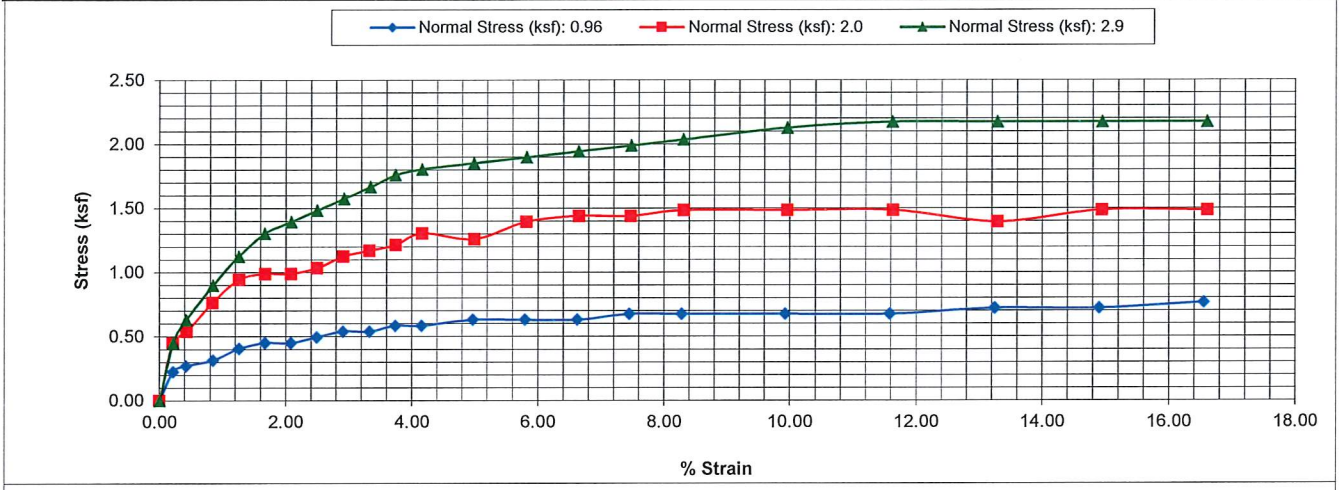
Direct Shear Test of Soils Under Consolidated Drained Conditions (ASTM D 3080)

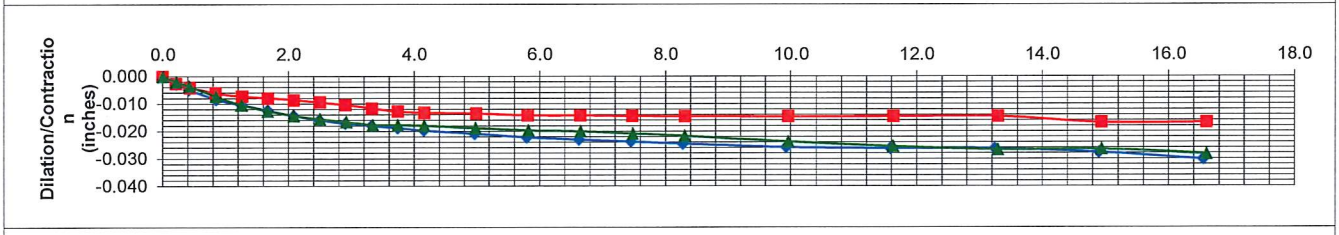
Project Name:	MLT for MTC - Pasco Landfill	**Project Number:**	2012-002 T28
Sample Point:	N/A	**Sample No.:** EB-2B	**Sample Depth:** 11.5 feet
Soil Description:	silty SAND		
Soil Color:	Grayish brown	Strain rate:	0.6 % per min.
Soil Group Symbol:	SM	Soil Specific Gravity:	2.65 (assumed)

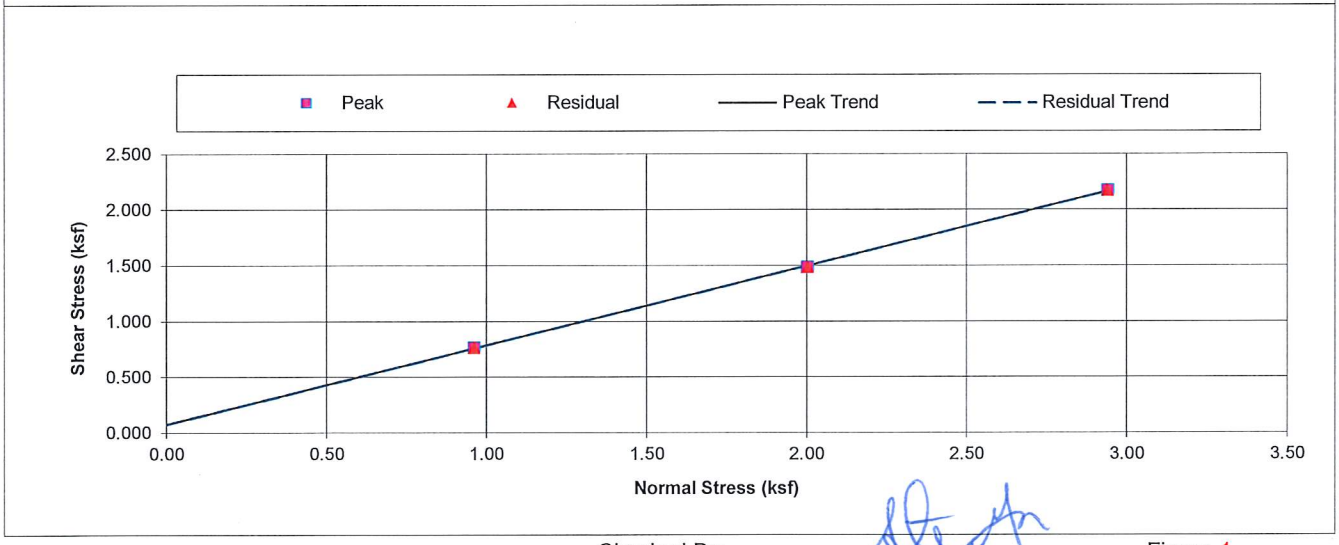
Normal Stress (ksf)	0.96	2.00	2.94	**Average**
Peak Stress (ksf)	0.764	1.484	2.172	
Residual Stress (ksf)	0.764	1.484	2.172	
Initial Moisture Content (%):	3.5	3.5	3.5	3.5
Wet Unit Weight (pcf):	109.4	104.8	106.2	106.8
Dry Unit Weight (pcf):	105.7	101.2	102.7	103.2
Calculated Void Ratio	0.564	0.634	0.611	0.603
Calculated Porosity	0.360	0.388	0.379	0.376
Calculated Saturation (%)	16.4	14.6	15.1	15.3
Final Moisture Content (%)	16.2	15.9	14.2	15.4

Indicated Strength Parameters

	Cohesion (ksf)	phi Angle (degrees)
Peak	0.1	35.4
Residual	0.1	35.4







Checked By: _____ Figure 1

HWA GeoSciences Inc. Materials Testing Laboratory

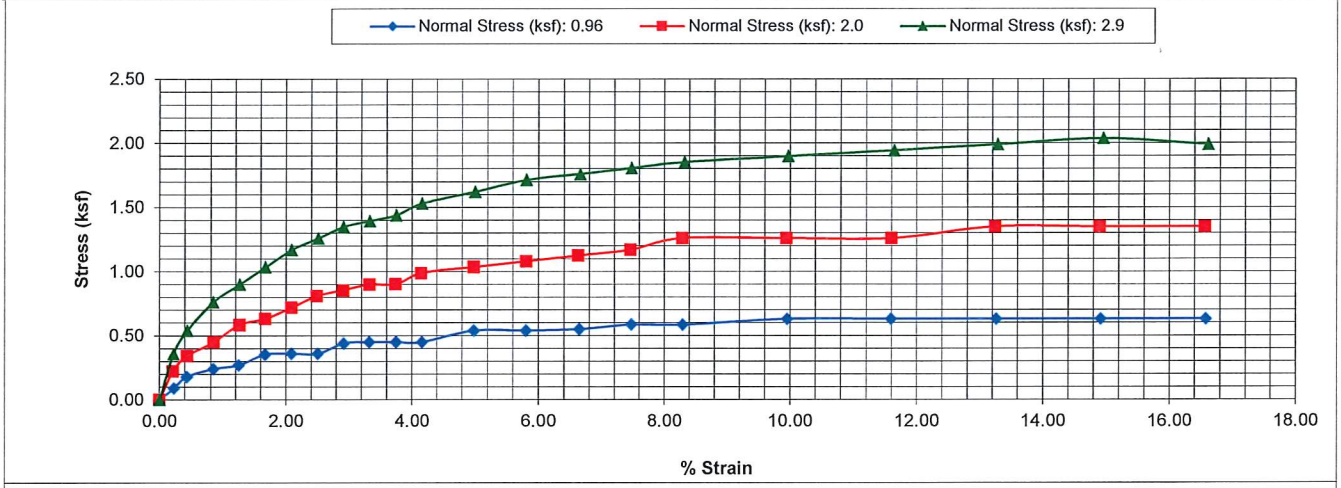
Direct Shear Test of Soils Under Consolidated Drained Conditions (ASTM D 3080)

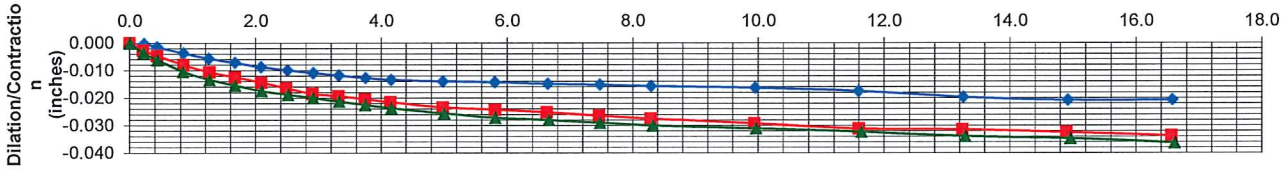
Project Name:	MLT for MTC - Pasco Landfill	**Project Number:**	2012-002 T28
Sample Point:	N/A **Sample No.:** EB-2B	**Sample Depth:**	26.5 feet
Soil Description:	poorly graded SAND with silt		
Soil Color:	Olive brown	Strain rate:	0.6 % per min.
Soil Group Symbol:	SP-SM	Soil Specific Gravity:	2.65 (assumed)

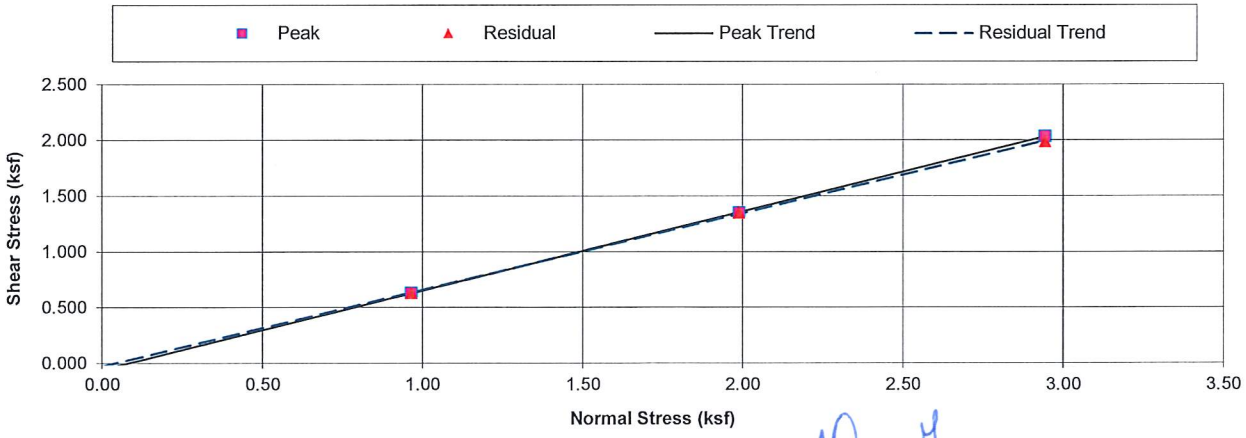
Normal Stress (ksf)	0.96	1.99	2.94	**Average**
Peak Stress (ksf)	0.630	1.349	2.035	
Residual Stress (ksf)	0.630	1.349	1.989	
Initial Moisture Content (%):	9.0	9.0	9.0	9.0
Wet Unit Weight (pcf):	85.8	87.5	87.2	86.9
Dry Unit Weight (pcf):	78.7	80.3	80.0	79.7
Calculated Void Ratio	1.101	1.061	1.067	1.076
Calculated Porosity	0.524	0.515	0.516	0.518
Calculated Saturation (%)	21.8	22.6	22.5	22.3
Final Moisture Content (%)	28.2	26.1	26.5	26.9

Indicated Strength Parameters

	Cohesion (ksf)	phi Angle (degrees)
Peak	-0.1	35.4
Residual	0.0	34.5







Checked By:

Figure 2

HWA GeoSciences Inc. Materials Testing Laboratory

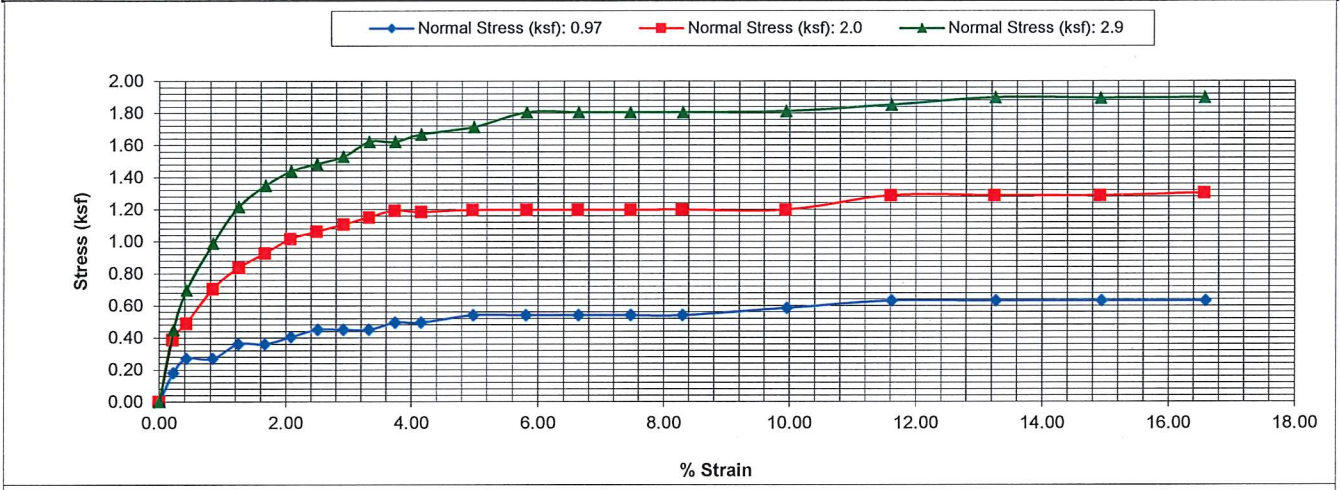
Direct Shear Test of Soils Under Consolidated Drained Conditions (ASTM D 3080)

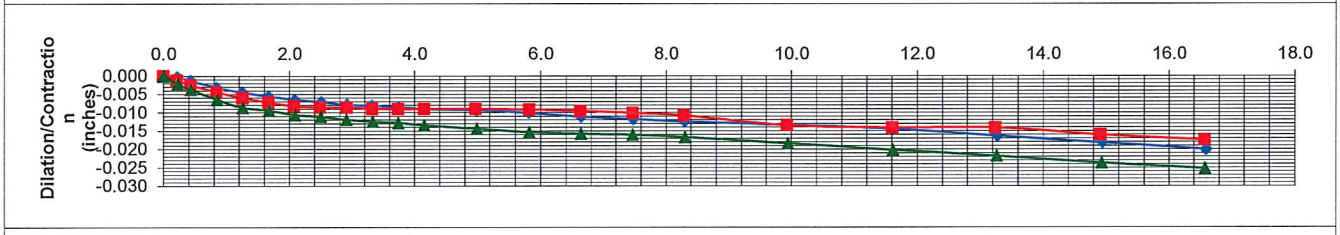
Project Name:	MLT for MTC - Pasco Landfill	**Project Number:**	2012-002 T28
Sample Point:	N/A **Sample No.:** EB-10	**Sample Depth:**	16.5 feet
Soil Description:	poorly graded SAND with silt		
Soil Color:	Olive brown	Strain rate:	0.6 % per min.
Soil Group Symbol:	SP-SM	Soil Specific Gravity:	2.65 (assumed)

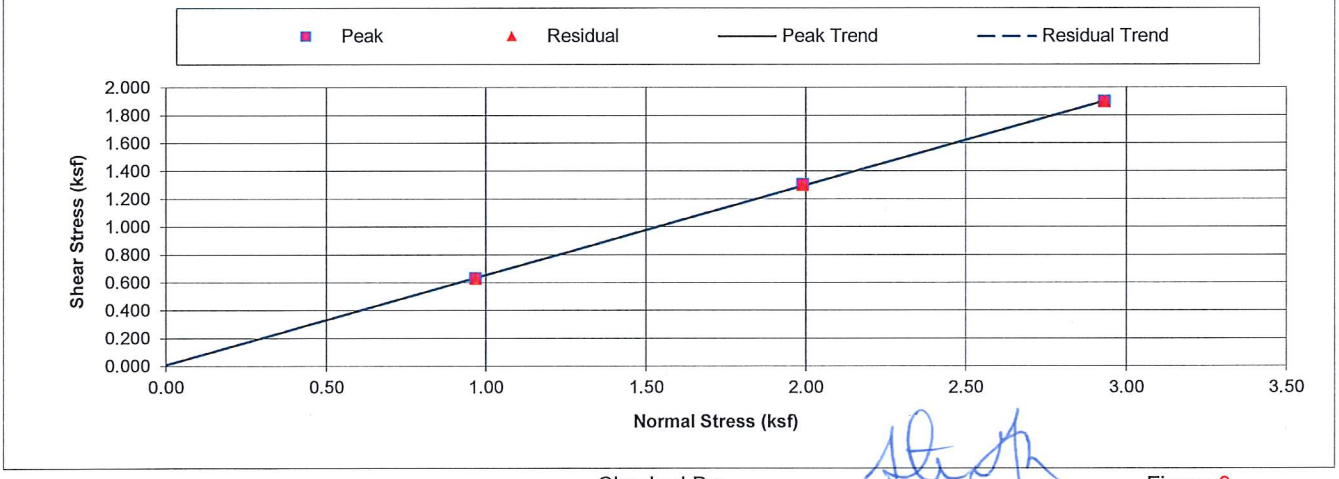
Normal Stress (ksf)	0.97	1.99	2.93	**Average**
Peak Stress (ksf)	0.630	1.302	1.897	
Residual Stress (ksf)	0.630	1.302	1.897	
Initial Moisture Content (%):	5.3	5.3	5.3	5.3
Wet Unit Weight (pcf):	93.8	92.4	91.7	92.6
Dry Unit Weight (pcf):	89.1	87.8	87.1	88.0
Calculated Void Ratio	0.856	0.884	0.899	0.880
Calculated Porosity	0.461	0.469	0.473	0.468
Calculated Saturation (%)	16.4	15.9	15.6	15.9
Final Moisture Content (%)	28.7	26.3	26.1	27.1

Indicated Strength Parameters

	Cohesion (ksf)	phi Angle (degrees)
Peak	0.0	32.9
Residual	0.0	32.8







Checked By:

Figure 3

ATTACHMENT E

Contractor's Spill Control Plan

Clearcreek
CONTRACTORS
Environmental/Civil

Date: 7/29/15

Site Spill Control Plan

This Spill Control Plan (Plan) has been established to detail procedures, methods, equipment, and other measures that will collectively be used to prevent the discharge of oil, bentonite or cement slurry and chemical substances on land and into water storage and conveyance systems. A discharge includes, but is not limited to, spilling, leaking, pumping, pouring, emitting, emptying, or dumping of oil or other non-potable liquids. In the unlikely event of an unwanted discharge, this Plan will provide guidance to address spills and perform safe, efficient, and timely response to discharges. (Referred to as "spills" herein). Slurry materials described in this plan are inert and do not require reporting unless they encroach on a water body or drainage. Small spills will be considered incidental; however, large spills will be properly contained and mixed with inert drying agents such as soil and reused in the work or properly disposed.

Spill Prevention

1. All hazardous materials shall be properly maintained and disposed of in accordance with all local, state, and federal regulations.
2. Secondary containment shall be provided for all liquid waste to maintain any possible spillage.
3. Oil transfers shall be monitored to see that hose connections are in good repair and not leaking.
4. Equipment that uses hydraulic or lube oils shall be maintained in a manner which prevents leaks.
5. Any equipment that leaks shall be repaired or removed from service.

Spill Response

1. **The Project Construction Manager (Charlie Flowers (912) 313-3004) or Project Health and Safety Manager (Dave Schooley 971-717-4837)** will act as the emergency coordinator in the event of a spill of waste material. The emergency coordinator will make the appropriate site management team aware of the event and will cooperate with the project environmental manager to ensure that the condition is resolved.
2. The emergency coordinator's phone number, location of the fire extinguishers and spill response material, and the phone number of the fire department shall be posted in the site assembly area.
3. A 20 pound ABC fire extinguisher, and spill response materials shall be kept near waste accumulation areas.
4. Spill response materials shall consist of:
    a. Absorbents.
    b. Containers to place spill material.
    c. Water

Clearcreek
CONTRACTORS
Environmental/Civil

Date: 7/29/15

Vehicle / Equipment Fueling and Lubricant Dispensing

This vehicle and equipment fueling practice is designed to minimize or eliminate the discharge of fuel spills and leaks into the storm drain systems or into drainage streams and river systems.

Engines and cell phones are turned off before refueling ALL equipment.

All fuel tanks must have all required labels, warnings and air permit placards present.

- Care will be taken not to spill product during transfer of the fill nozzle from its hook position to insertion into a fuel tank fill spout. Nozzles will not be removed from fuel tanks for 5 seconds following completion of fueling to allow the nozzle to completely empty. Nozzles will be held in a vertical position while transferring back to its storage position on the fuel truck.
    - The fueling attendant will keep his/her hand on the fuel nozzle at all times during fueling operations and monitor fuel level in the equipment tank to assure overfill does not occur.
    - Absorbent spill clean-up materials and spill kits shall be available in fueling areas and on fueling trucks and shall be disposed of properly after use.
- Labeled drip pans or absorbent pads shall be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Dedicated fueling areas shall be protected from storm water run-on and runoff, and shall be located at least 200 Ft. from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Nozzles used in vehicle and equipment fueling shall be equipped to control drips. Fueling operations shall not be left unattended.
- Fuel tanks shall not be “topped-off.”
- Vehicles and equipment shall be inspected on each day of use for leaks. Leaks shall be repaired immediately or problem vehicles or equipment shall be removed from the project site.
- Absorbent spill clean-up materials shall be available in areas where fueling and maintenance take place. These shall be used on all spills instead of hosing down or burying techniques. The used absorbent material shall be removed promptly and disposed of properly.
- Main fuel and lube valves on delivery trucks will be shut off when material is not being dispensed.

Date: 7/29/15

Material Handling And Storage

Clearcreek Contractors does not anticipate that any petroleum products will be stored on-site throughout the duration of the project. If a need should occur, the Project Construction Manager will notify the project safety manager (Dave Schooley) and will maintain an accurate account of on-site accumulation totals throughout duration of work activity.

Lube / Grease Truck

Clearcreek will have Rental Company's onsite periodically to service equipment. Prior to performing their intended service, they will be made aware of the requirements of this plan.

Drum Storage

Clearcreek does not anticipate the need to have drummed petroleum products stored on-site. Should this condition change, the site safety and environmental manager will be notified and a proper storage facility identified, prior to receipt of products.

Slurry Mixing And Transfer

Berms will be installed and placed around the slurry mixing area and along the slurry transfer piping. The berms will control and contain the slurry product. If a leak is observed, the contractor will immediately stop pumping or close valves, as appropriate, to stop the leak. Leaks will be reported to the site Construction manager and repairs/cleanup will be done on a daily basis as needed.

Incidental spreading of small quantities of slurry is expected as part of the slurry trench operations; such spreading will not be considered a spill and will be cleaned up when appropriate. All spilled slurry will be cleaned up at the end of slurry operations.

Silt Fencing

Silt fence or hay bales and/or wattles will be placed in erosional areas for sediment control.

Training

Clearcreek Contractors employees will participate in a site safety and orientation program prior to the start of work on this project. During this training session, the site spill protection program will be discussed and emergency contact information made available.

Date: 7/29/15

Spill and Response Contacts

Washington State Emergency Management Division	**Department of Ecology**	**1-800-258-5990** **1-800-OILS-911** **24 Hour's**
National Response Center	**EPA**	**1-800-424-8802**
Eastern Regional Office	**Franklin County**	**(509) 329-3400**
Pasco Fire Department	**Fire Station # 83**	**(509) 545-3426**

DRAWINGS

NO.	DATE	BY	REVISION DESCRIPTION

PASCO LANDFILL
PASCO, WASHINGTON

LOCATION MAP

INDEX OF DRAWINGS

SHEET NUMBER	DISCIPLINE DWG. NO.		SHEET TITLE
1	D1		LOCATION PLAN AND INDEX OF DRAWINGS
2	D2		SITE PLAN AND CONSTRUCTION STAGING
3	D3		GENERAL CONSTRUCTION NOTES
4	D4		PROPOSED CEMENT - BENTONITE BOX ENCLOSURE AND SCB PROTECTION BARRIER LOCATION
5	D5		CEMENT / BENTONITE WALL SECTIONS
6	D6		CEMENT / BENTONITE BOX LAYOUT AND WORK PAD
7	D7		SUBMERGED QUENCH STAGING AND SEQUENCING PLANS
8	D8		SCB PROTECTION BARRIER PLAN AND PROFILE
9	D9		ZONE A COVER REPLACEMENT DETAILS SHEET 1
10	D10		ZONE A COVER REPLACEMENT DETAILS SHEET 2
11	D11		AIR INTAKE DETAILS
12.1	D12.1		SCB PROTECTION BARRIER PLAN AND PROFILE
12.2	D12.2		SCB PROTECTION BARRIER PLAN AND PROFILE
12.3	D12.3		SCB PROTECTION BARRIER PLAN AND PROFILE
12.4	D12.4		SCB PROTECTION BARRIER PLAN AND PROFILE

VICINITY MAP

SITE MAP

SITE LOCATION:
Dietrich Road Pasco Washington approximately 1.5 miles northeast of the City of Pasco, Washington, in the southwest quarter of section 15,and the northwest quarter of Section 22, Township 9 North, Range 30 East, Willamette Meridian, in Franklin County, Washington.

DANIEL J. KAMP
STATE OF WASHINGTON
3627
REGISTERED PROFESSIONAL ENGINEER
8/6/15 8/6/15

ISSUED FOR CONSTRUCTION

PASCO LANDFILL
PASCO, WASHINGTON

LOCATION PLAN AND INDEX OF DRAWINGS

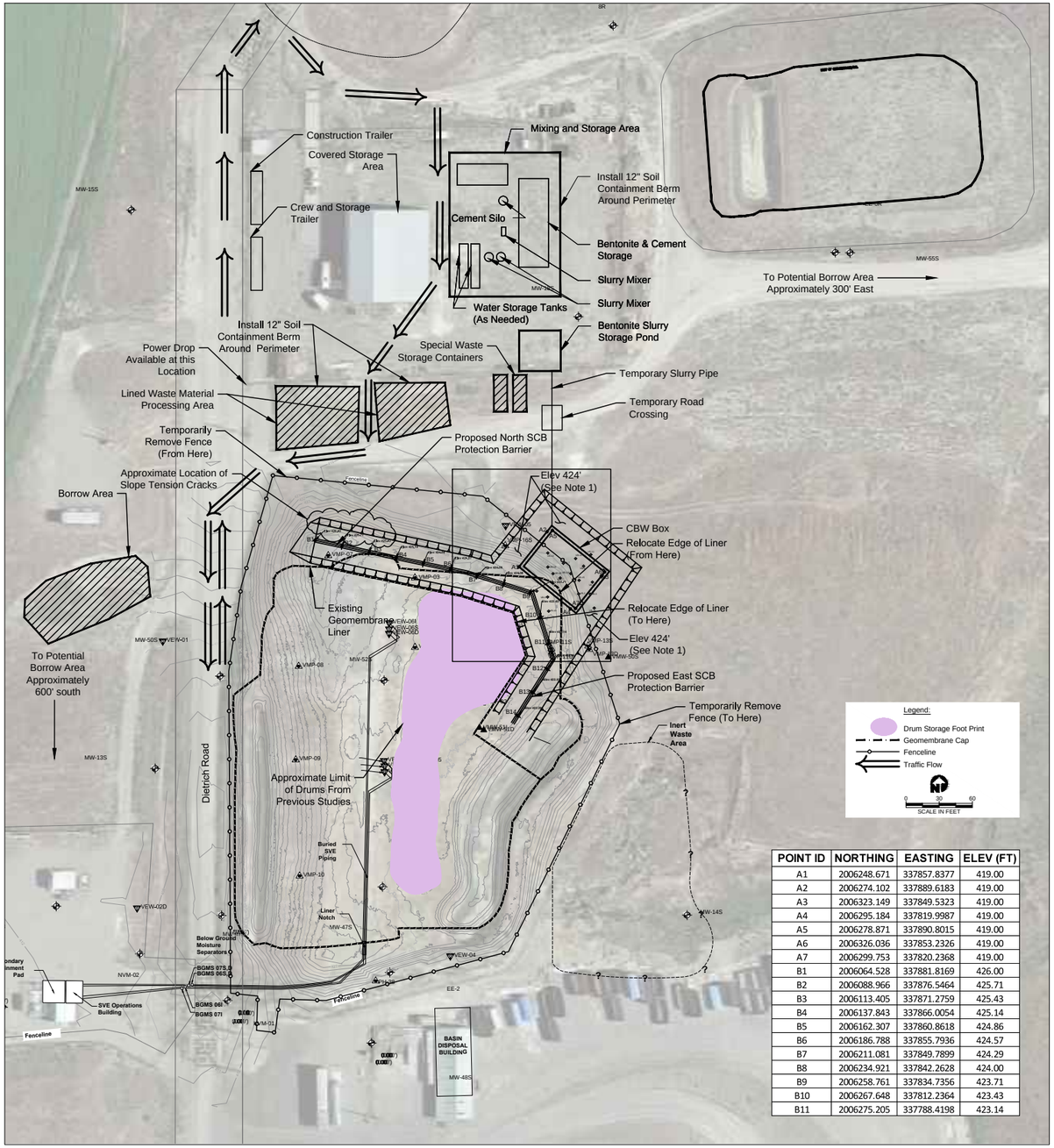
DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:
REVISION: 08/06/15
DATE: 06/01/15

AECOM
1501 4TH AVENUE, SUITE 1400
SEATTLE, WA 98101-1616
(206) 438-2700

SHEET 1 OF 15
DRAWING NO. D1

Mod: 08/06/2015, 12:31 | Plotted: 08/06/2015, 14:40 | chad_stickel J:\GIS\Projects\Pasco Landfill\Extinguish AOC\Design\Rev1\D1 Rev1 (Location Plan and Index).dwg

NO.	DATE	BY	REVISION DESCRIPTION



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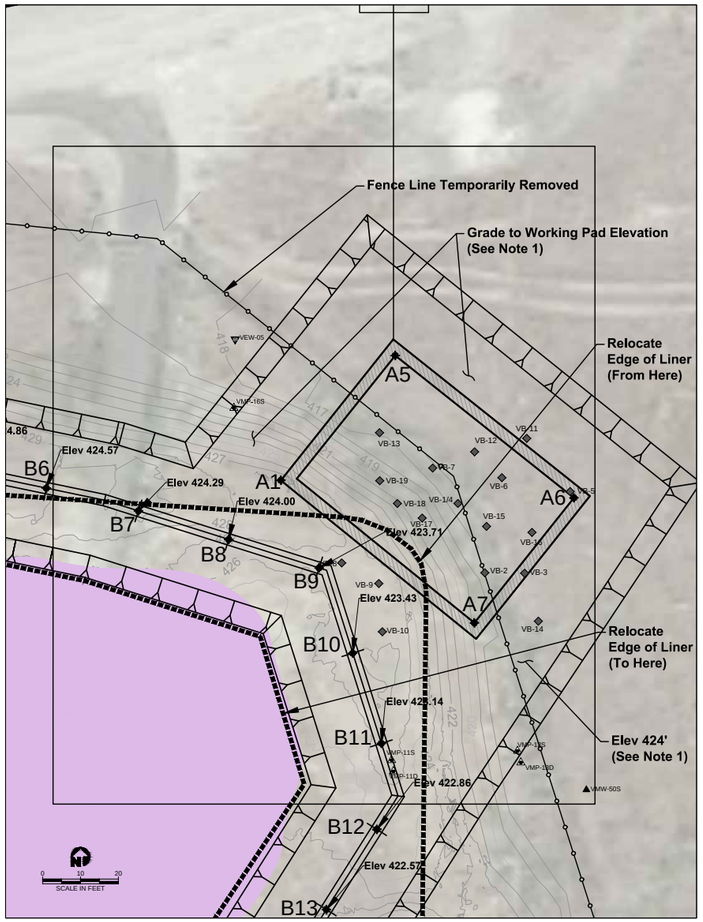
A3	2006323.149	337849.5323	419.00
A4	2006295.184	337819.9987	419.00
A5	2006278.871	337890.8015	419.00
A6	2006326.036	337853.2326	419.00
A7	2006299.753	337820.2368	419.00
B1	2006064.528	337881.8169	426.00
B2	2006088.966	337876.5464	425.71
B3	2006113.405	337871.2759	425.43
B4	2006137.843	337866.0054	425.14
B5	2006162.307	337860.8618	424.86
B6	2006186.788	337855.7936	424.57
B7	2006211.081	337849.7899	424.29
B8	2006234.921	337842.2628	424.00
B9	2006258.761	337834.7356	423.71
B10	2006267.648	337812.2364	423.43
B11	2006275.205	337788.4198	423.14

CONSTRUCTION STAGING



SITE MAP

Note:
Elevation of work pad for construction of CBW Box shall be 419' msl. After construction of the CBW Box, the elevationof the work pad shall be raised to 424' msl as required for the construction of the SCB Barrier.

ISSUED FOR CONSTRUCTION

PASCO LANDFILL
PASCO, WASHINGTON

SITE PLAN AND CONSTRUCTION STAGING

DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:
REVISION: 08/06/15
DATE: 06/01/15

AECOM
1501 4TH AVENUE, SUITE 1400
SEATTLE, WA 98101-1616
(206) 438-2700

SHEET 2 OF 15
DRAWING NO. D2

Mod: 08/06/2015, 14:34 | Plotted: 08/06/2015, 14:40 | chad_sickel J:\GIS\Projects\Pasco Landfill\Exinguish AOC\Design\Rev1\D2 Rev1 (Site Plan & Construction Staging).dwg

NO.	DATE	BY	REVISION DESCRIPTION

GENERAL NOTES:

LANDFILL EXCAVATION:

1. ACTUAL EXTENT AND DEPTH OF LANDFILL MATERIAL AND DEBRIS TO BE REMOVED AS PART OF GRADING OPERATIONS TO BE DETERMINED BY THE SUPERINTENDENT.
2. OVERSIZED DEBRIS MAY BE PRESENT IN LANDFILL EXCAVATION THAT WILL NEED TO BE REMOVED AND SIZE REDUCED AS REQUIRED FOR LOADING AND OFF-SITE DISPOSAL.
3. ITEMS IDENTIFIED DURING EXCAVATION ACTIVITIES THAT POTENTIALLY CONTAIN HAZARDOUS MATERIALS (IE. REFRIGERATORS, HYDRAULIC COMPONENTS, BATTERIES, INSULATION MATERIALS, ETC.) TO BE SEPARATED AND HANDLED IN ACCORDANCE WITH THE WASTE MANAGEMENT PLAN.
4. MATERIAL TO MEET PAINT FILTER TEST PRIOR TO OFF-SITE DISPOSAL. WET SOIL AND DEBRIS EXCAVATED AND TRANSFERRED TO WASTE CONTAINMENT AREA WILL BE ALLOWED TO DRAIN OF EXCESS LIQUID PRIOR TO LOADING FOR OFFSITE DISPOSAL. WETTER MATERIAL MAY BE MIXED WITH DRIER MATERIALS TO CONDITION FOR OFF-SITE DISPOSAL.
5. ENGINEERED FILL REMOVED FROM LANDFILL COVER MAY BE STOCKPILED AND REUSED IN RECONSTRUCTION OF THE LANDFILL CAP OR GENERAL SITE GRADING. ENGINEERED FILL MIXED WITH WASTE OR DEBRIS IS TO BE REPLACED IN THE LANDFILL ZONE OR STOCKPILED AND TRANSPORTED OFF-SITE FOR DISPOSAL AT DIRECTION OF SUPERINTENDENT.

CONTAINMENT:

1. PROVIDE MINIMUM 1 FOOT CONTAINMENT BERM AROUND WASTE STORAGE, PROCESSING AND SLURRY MIXING AREAS.
2. PROVIDE MINIMUM 20 MIL PE LINER UNDER AREAS USED FOR STORAGE AND HANDLING OF LANDFILL WASTE.
3. STOCKPILES TO BE COVERED WITH MINIMUM 6-MIL REINFORCED PLASTIC AT THE END OF FINAL WORKING SHIFT EACH DAY AND DURING WINDY CONDITIONS TO MITIGATE EXCESSIVE DUST GENERATION.

PROTECTION:

1. VERIFY WITH THE SUPERINTENDENT THAT WELLS AND OTHER INSTRUMENTATION DESIGNATED FOR DECOMMISSIONING IN THE WORK AREA ARE DECOMMISSIONED PRIOR TO EXCAVATION ACTIVITIES.
2. PROTECT THOSE REMAINING EXISTING WELLS AND INSTRUMENTATION FROM DAMAGE DURING EXCAVATION AND BACKFILLING ACTIVITIES. DAMAGED/DESTROYED WELLS TO BE REPAIRED OR REPLACED AT DIRECTION OF SUPERINTENDENT.

GENERAL BACKFILL:

1. GENERAL BACKFILL WILL BE PLACED IN MAXIMUM 12-INCH LOOSE LIFTS AND COMPACTED TO A MINIMUM OF 90% OF MAXIMUM DENSITY DETERMINED IN ACCORDANCE WITH ASTM D698 UNLESS OTHERWISE SPECIFIED.
2. GENERAL BACKFILL TO BE OBTAINED FROM THE LOCAL BORROW SOURCE LOCATED ON THE WEST SIDE OF DIETRICH ROAD ACROSS FROM THE LANDFILL. GENERAL BACKFILL MAY ALSO CONSIST OF OTHER SITE SOILS OR STABILIZED SLURRY WITH APPROVAL OF SUPERINTENDENT.

TEMPORARY EROSION AND SEDIMENT CONTROL (TESC):

1. SILT FENCING TO BE PROVIDED AND INSTALLED IN ACCORDANCE WITH ECOLOGY'S BMP C233.
2. HIGH VISIBILITY (SAFETY) FENCING TO BE PROVIDED NEAR THE TOP OF SLOPE AND INSTALLED IN ACCORDANCE WITH ECOLOGY'S BMP C103.
3. CATCH BASIN INLET PROTECTION TO BE PROVIDED IN CATCH BASINS WITHIN IMMEDIATE DRAINAGE AREA AND WITHIN 200 FEET OF TRUCK ENTRANCE TO THE LANDFILL. INLET PROTECTION TO BE INSTALLED IN ACCORDANCE WITH ECOLOGY'S BMP C220.
4. CLEAN APPLICABLE STORM CATCH BASIN/STRUCTURES AND REMOVE SEDIMENTS PRIOR TO ANY EARTH DISTURBING ACTIVITIES.
5. PROVIDE CONSTRUCTION ROADS AND PARKING AREA STABILIZATION IN ACCORDANCE WITH ECOLOGY'S BMP C107.
6. PROVIDE/UPGRADE CONSTRUCTION ENTRANCE/EXIT IN ACCORDANCE WITH ECOLOGY'S BMP C105.
7. PROVIDE DUST CONTROL AS APPLICABLE IN ACCORDANCE WITH ECOLOGY'S BMP C140.
8. HAVE APPROPRIATE EROSION CONTROL MATERIALS ON HAND AND LOCATED IN THE CONTRACTOR'S AREA IN ACCORDANCE WITH ECOLOGY'S BMP C150.
9. PROVIDE MATERIAL DELIVERY, STORAGE, AND CONTAINMENT IN THE CONTRACTOR'S AREA AND SLURRY MIXING AREA IN ACCORDANCE WITH ECOLOGY'S BMP C153.
10. THE CONTRACTOR WILL NOT ALLOW SEDIMENT TO BE TRACKED ONTO PAVED STREETS OR ROADWAYS. IN THE EVENT OF FAILURE OF THE TESC SYSTEMS RESULTING IN SEDIMENT TRACKING ONTO PAVEMENTS, CONTRACTOR WILL IMMEDIATELY EMPLOY STREET SWEEPING MEASURES TO CORRECT THE SITUATION. SEDIMENT TRACKED ONTO PAVED SURFACES WILL NOT BE WASHED INTO STORM DRAIN OR OTHER UTILITY INLETS.

SURVEY:

1. LOCAL SURVEY CONTROL WILL BE ESTABLISHED BY THE SUPERINTENDENT FOR USE BY THE CONTRACTOR. ELEVATIONS AND HORIZONTAL POSITIONS FOR THE CONSTRUCTION WILL BE MARKED IN THE FIELD AND RECORDED IN RELATION TO THE ESTABLISHED LOCAL SURVEY CONTROL.
2. ALIGNMENTS FOR CBW WALL AND SCB PROTECTION BARRIER WILL BE SET BASED ON THE ESTABLISHED SURVEY CONTROL WITH TOLERANCES OF 0.3 FEET IN THE VERTICAL AND 1.0 FEET IN THE HORIZONTAL. LAYOUT AND AS-BUILT MEASUREMENTS WILL BE RECORDED. REFER TO SPECIFICATIONS FOR ALIGNMENT ADJUSTMENTS.

RESTORATION:

1. GRADE FINAL SURFACES TO PROMOTE STORMWATER RUNOFF TO EXISTING DRAINAGES.
2. CLEAN SITE OF ALL CONSTRUCTION DEBRIS AND LEAVE SITE IN AN ORDERLY CONDITION.
3. REMOVE TEMPORARY FENCING AND TESC MEASURES AT COMPLETION OF CONSTRUCTION.
4. RESTORE AREAS OF THE LANDFILL COVER DISTURBED BY CONTRACTOR OPERATIONS TO PRE-CONSTRUCTION GRADES AND CONDITIONS.
5. RESTORATION WILL BE ACCOMPLISHED WITH LIKE MATERIALS.
6. UPGRADES TO ACCESS ROADS MAY REMAIN IN PLACE, UNLESS DIRECTED TO BE REMOVED BY THE SUPERINTENDENT.

ISSUED FOR CONSTRUCTION

PASCO LANDFILL
PASCO, WASHINGTON

GENERAL CONSTRUCTION NOTES

DANIEL J. KAMPA — STATE OF WASHINGTON — 36271 — REGISTERED PROFESSIONAL ENGINEER
8/6/15

DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:
REVISION: 08/06/15
DATE: 06/01/15

AECOM
1501 4TH AVENUE, SUITE 1400
SEATTLE, WA 98101-1616
(206) 438-2700

SHEET 3 OF 15
DRAWING NO. D3

Mod: 08/06/2015, 12:08 | Plotted: 08/06/2015, 14:45 | chad_slick4 J:\GIS\Projects\Pasco Landfill\Extinguish AOC\Design\Rev1\D3 Rev1 (General ConstructionNotes).dwg

NO.	DATE	BY	REVISION DESCRIPTION

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A4	2006295.184	337819.9987	419.00
A5	2006278.871	337890.8015	419.00
A6	2006326.036	337853.2326	419.00
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B7	2006211.081	337849.7899	424.29
B8	2006234.921	337842.2628	424.00
B9	2006258.761	337834.7356	423.71
B10	2006267.648	337812.2364	423.43
B11	2006275.205	337788.4198	423.14
B12	2006274.022	337765.7139	422.86
B13	2006260.682	337744.5703	422.57
B14	2006247.342	337723.4267	422.29

Notes:

1. Elevation of work pad for construction of CBW Box shall be 419' msl. After construction of the CBW Box, the elevation of the work pad shall be raised to 424' msl as required for the construction of the SCB Barrier.
2. Pull back landfill cap and liner to beyond excavation limits.

ISSUED FOR CONSTRUCTION

PASCO LANDFILL
PASCO, WASHINGTON

PROPOSED CEMENT-BENTONITE BOX ENCLOSURE AND SCB PROTECTION BARRIER LOCATION

DESIGNED BY:
DRAWN BY:
CHECKED BY:
APPROVED BY:
REVISION: 08/06/15
DATE: 06/01/15

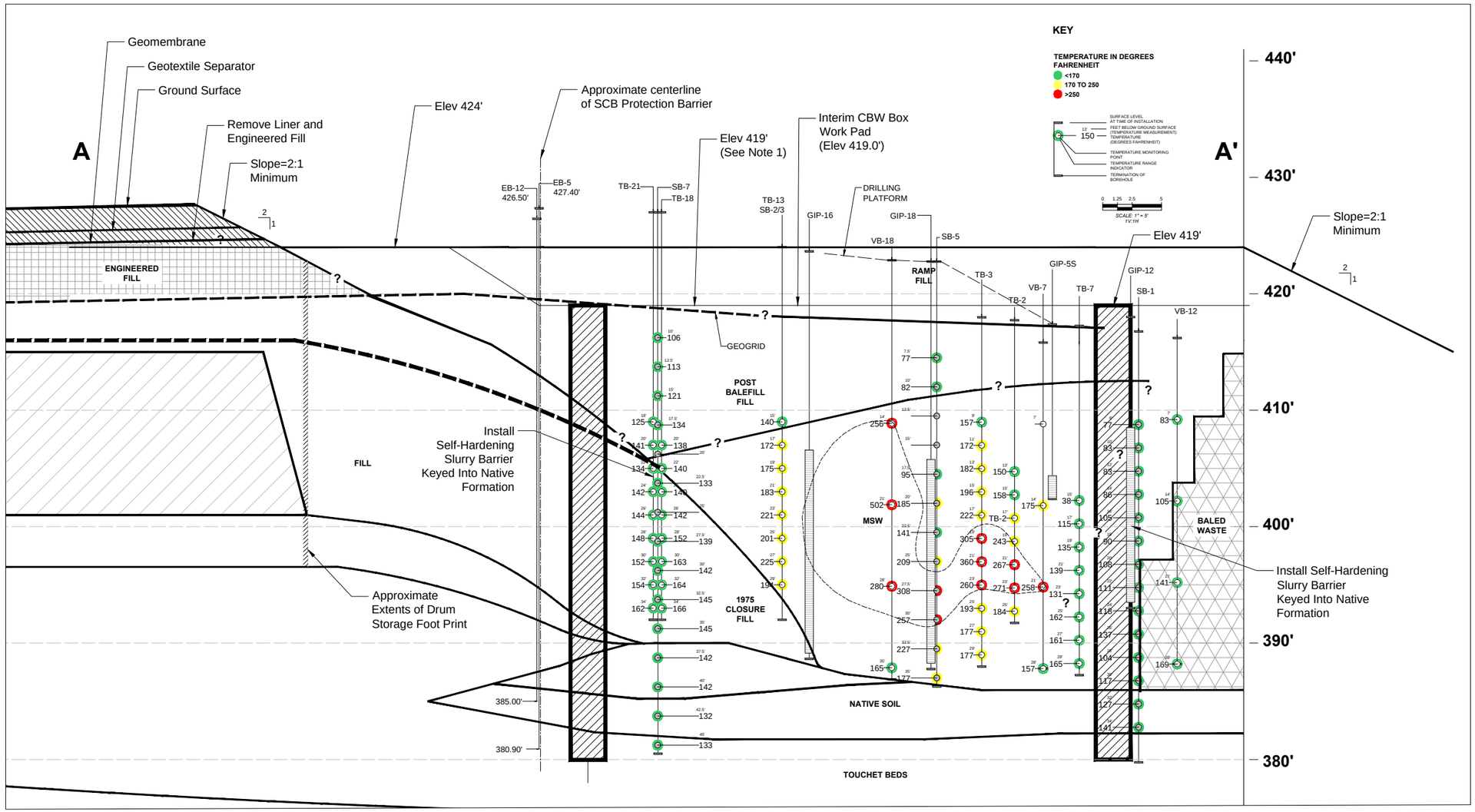
AECOM
1501 4TH AVENUE, SUITE 1400
SEATTLE, WA 98101-1616
(206) 438-2700

SHEET 4 OF 15
DRAWING NO. D4

5/2/16 8/6/15

Mod: 08/05/2015, 21:06 | Plotted: 08/06/2015, 14:45 | chad_stickel J:\GIS\Projects\Pasco Landfill\Extinguish AOC\Design\Rev1\D4 Rev1 (Proposed Cement-Bentonite Box Enclosure & SCB Protection Barrier Location).dwg

NO.	DATE	BY	REVISION DESCRIPTION



SECTION C D5,D6

Notes:

1. Elevation of work pad for construction of CBW Box shall be 419' msl. After construction of the CBW Box, the elevation of the work pad shall be raised to 424' msl as required for the construction of the SCB Barrier.
2. Adjusted depth in field to extend 2-feet into Native Materials.

ISSUED FOR CONSTRUCTION

PASCO LANDFILL
PASCO, WASHINGTON

CEMENT-BENTONITE WALL SECTIONS

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SHEET 5 OF 15

DRAWING NO. D5

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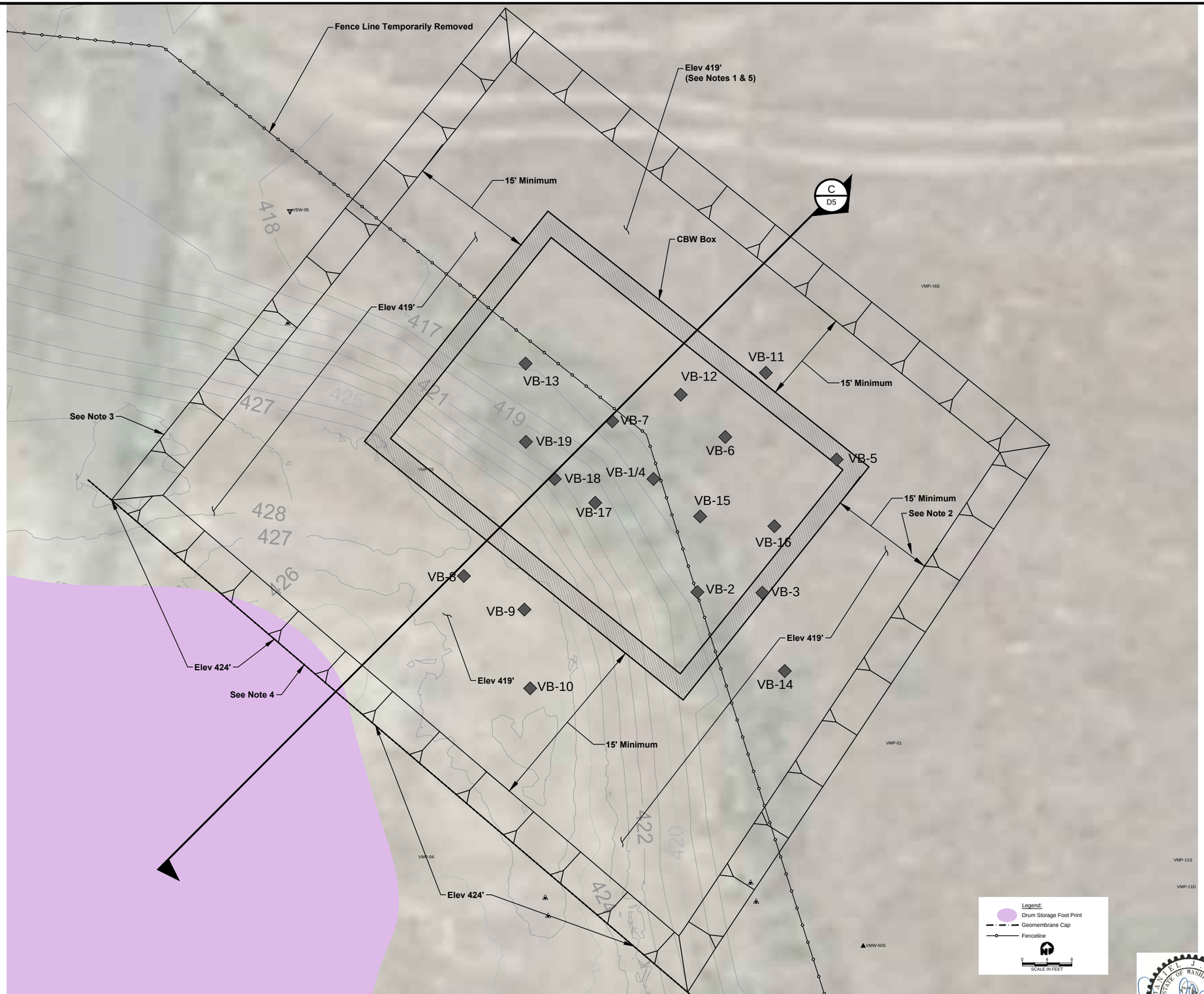

CEMENT-BENTONITE BOX

Notes:

1. Elevation of work pad for construction of CBW Box shall be 419' msl.
2. The work pad shall be constructed with sufficient room to allow equipment to access the entire perimeter of the CBW Box.
3. The work pad limits will be graded to meet existing ground surface using maximum 1:1 slopes in both cut and fill situations.
4. Pull back landfill cap and liner to beyond excavation limits.
5. After completion of quench operations, the CBW Box work pad shall be regraded as required to elevation 424.0' to facilitate the construction of the SCB Protection Barrier.

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PASCO LANDFILL
PASCO, WASHINGTON

CEMENT-BENTONITE BOX LAYOUT AND WORK PAD

DANIEL J. KAMP
STATE OF WASHINGTON
3627
REGISTERED PROFESSIONAL ENGINEER
8/6/15

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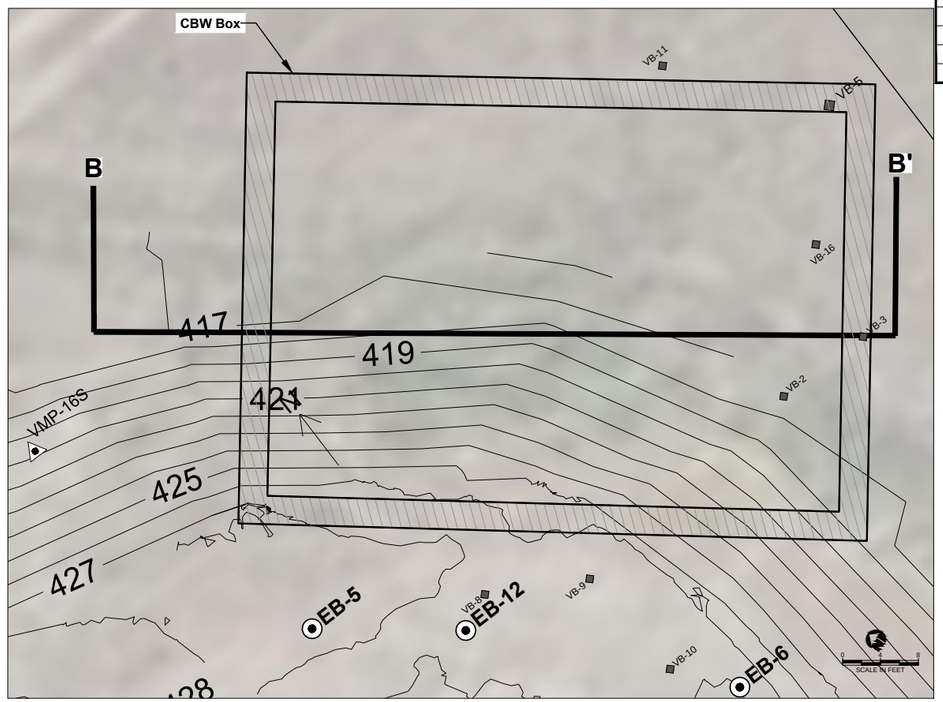
SHEET 6 OF 15

DRAWING NO. D-6

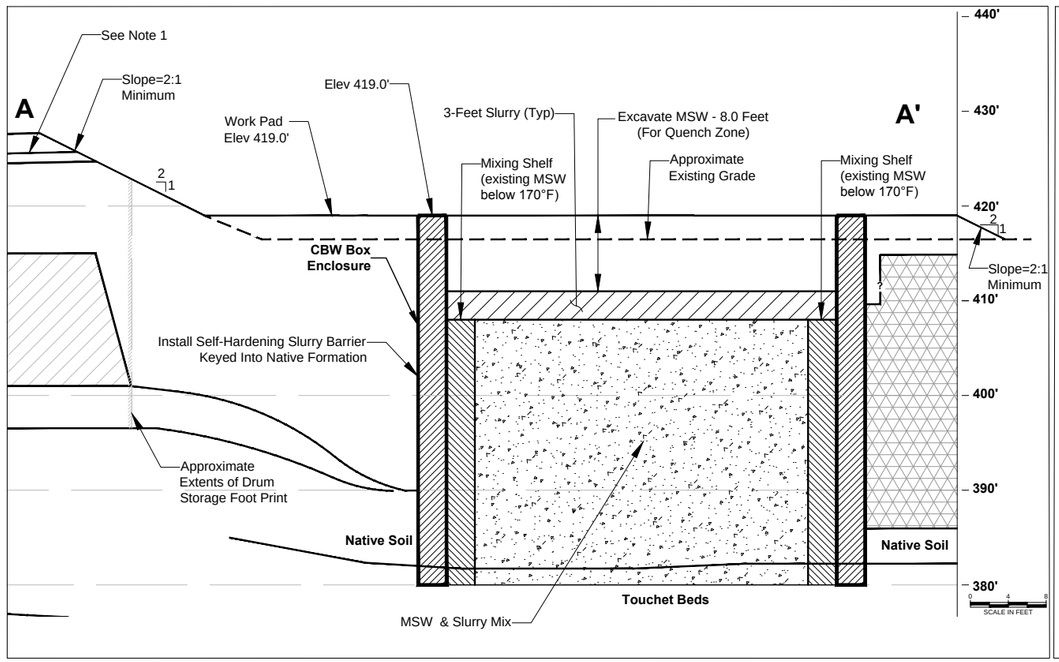
Mod: 08/06/2015, 14:33 | Plotted: 08/06/2015, 14:40 | chad_sickel J:\GIS\Projects\Pasco Landfill\Extinguish AOC\Design\Rev1\D6 Rev1 (Proposed Cement-Bentonite Box Layoout and Work Pad).dwg

NO.	DATE	BY	REVISION DESCRIPTION

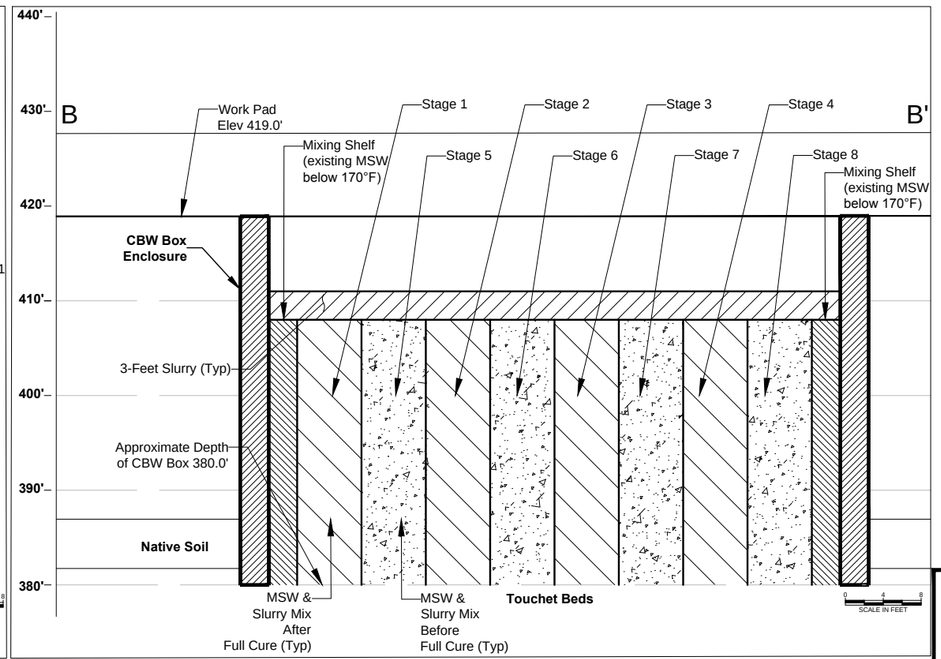
PLAN VIEW OF CBW BOX



PLAN VIEW OF CBW BOX



SECTION A - A' LOOKING NORTHWEST



SECTION B - B' LOOKING NORTHEAST

Notes:

1. Landfill cap and liner to be removed beyond CBW Box excavation limits.
2. After construction of the CBW Box, the associated work pad, constructed to elevation 419.0' msl will be filled in as required to elevation 424.0' msl to facilitate construction of the SCB Protection Barrier.

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PASCO LANDFILL
PASCO, WASHINGTON

SUBMERGED QUENCH STAGING AND SEQUENCING PLANS

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SHEET 7 OF 15

DRAWING NO. D7

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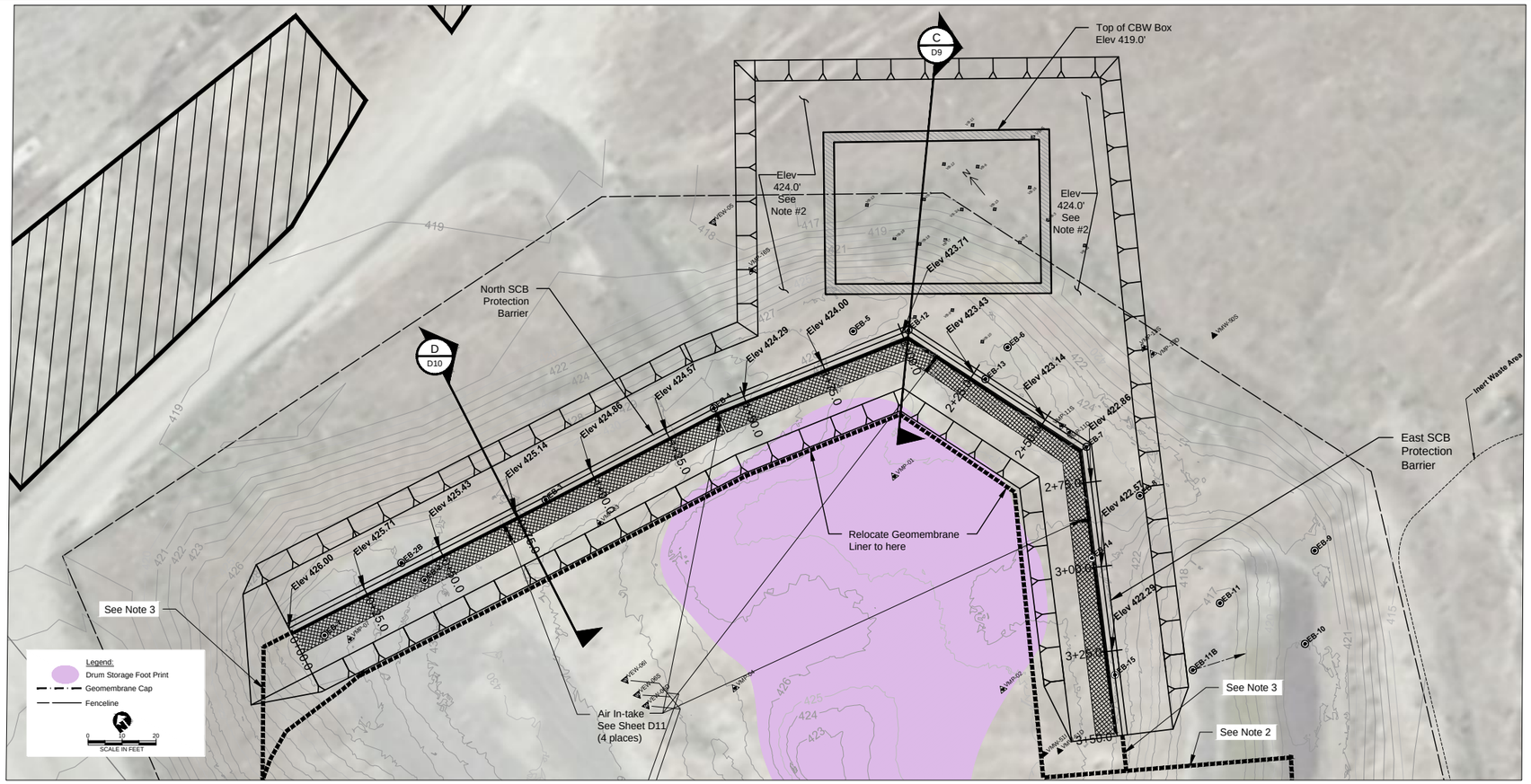
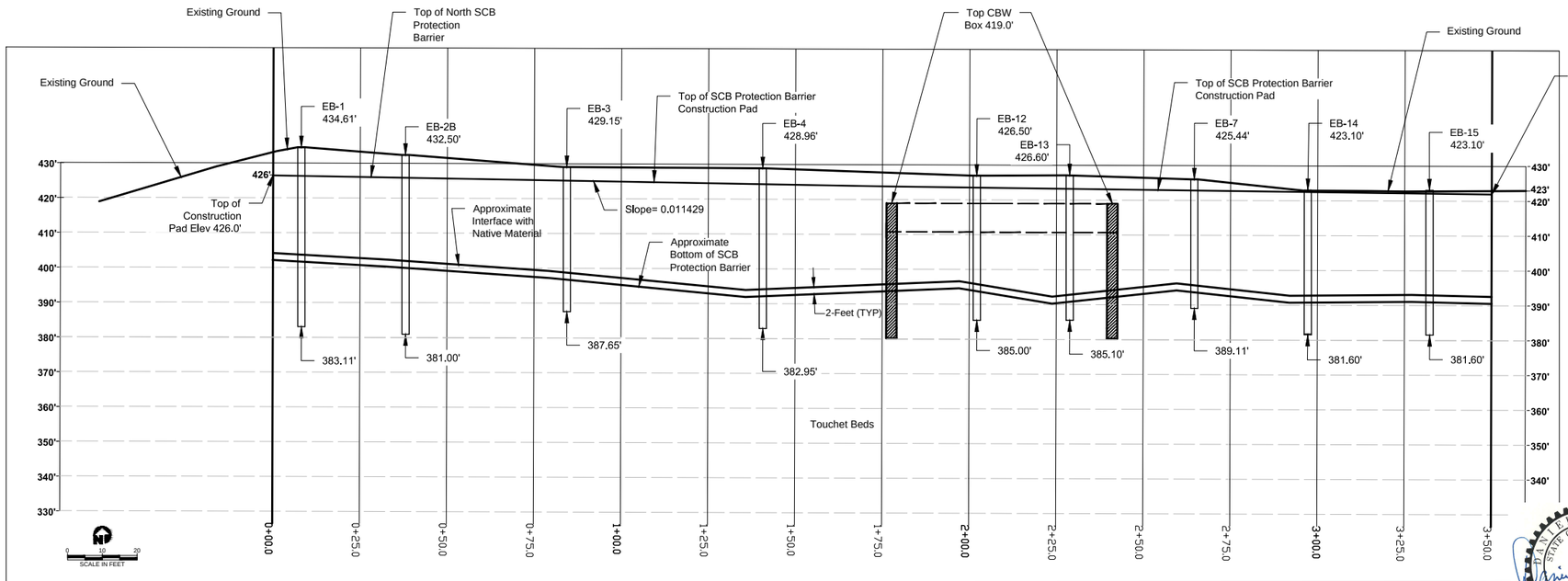


PLAN VIEW OF SCB PROTECTIVE BARRIER



PROFILE VIEW OF SCB PROTECTIVE BARRIER

Note:

1. Pull back landfill cap and HDPE liner to beyond excavation limits. HDPE shall be field cut to provide a smooth and straight line to which new HDPE liner shall be welded during landfill cap refurbishment.
2. After completion of the quench operations, the CBW Box work pad shall be regraded as required to elevation 424.0' to facilitate the construction of the SCB Protection Barrier.
3. Extent of Geomembrane Liner repair and cover restoration shall be from the limits of the relocated Geomembrane to the anchor trench in the top of the SCB Protection Barrier.

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PASCO LANDFILL
PASCO, WASHINGTON

SCB PROTECTION BARRIER
PLAN AND PROFILE

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SHEET
8 OF 15

DRAWING NO.
D8

DANIEL J. KAPP
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3627
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8/6/15

Mod: 08/06/2015, 14:34 | Plotted: 08/06/2015, 14:40 | chad_stickel J:\GIS\Projects\Pasco Landfill\Existing\sh AOC\Design\Rev1\D8 Rev1 (SCB Protection Barrier Plan & Profile).dwg

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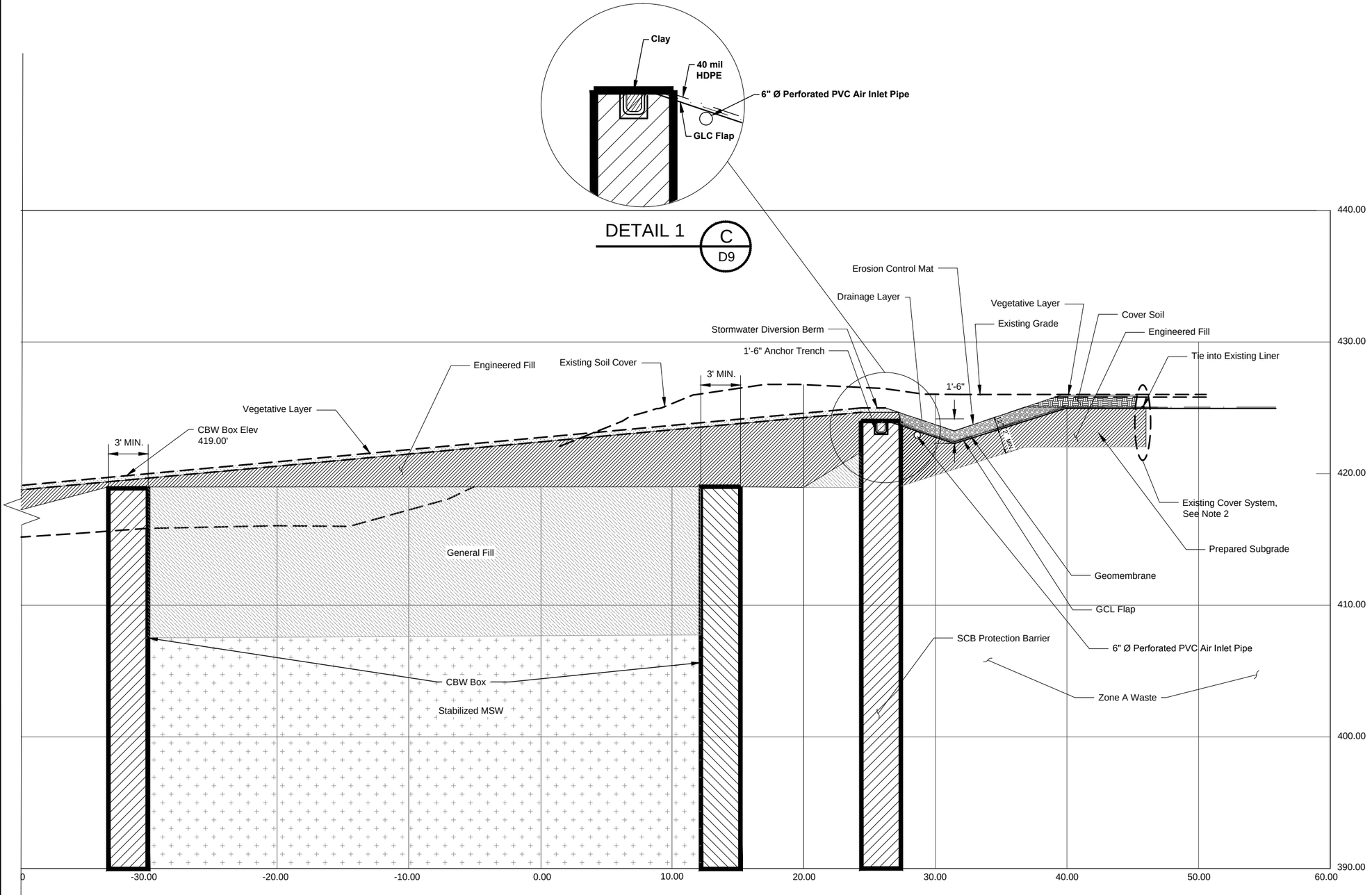

NOTES:

1. SECTION PORTRAYS TYPICAL DETAIL CONSTRUCTION FOR THE LANDFILL CAP/BARRIER TIE-IN. ACTUAL ALIGNMENT, GRADES AND THE ELEVATION OF THE BASE OF BOTH THE CBW BOX AND SCB PROTECTION BARRIER WILL BE ADJUSTED BASED ON GEOTECHNICAL INVESTIGATIONS AND FIELD CONDITIONS.
2. TIE NEW LINER INTO EXISTING ZONE A COVER SYSTEM.

0 4 8
SCALE IN FEET

CBW BOX & SCB PROTECTION BARRIER SECTION C / D8

ISSUED FOR CONSTRUCTION

PASCO LANDFILL
PASCO, WASHINGTON

ZONE A COVER REPLACEMENT DETAILS SHEET 1

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DRAWING NO. D9

DANIEL J. ADAMS — STATE OF WASHINGTON — 36277 — REGISTERED PROFESSIONAL ENGINEER
8/6/15

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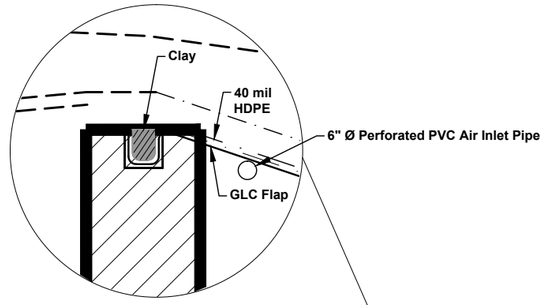
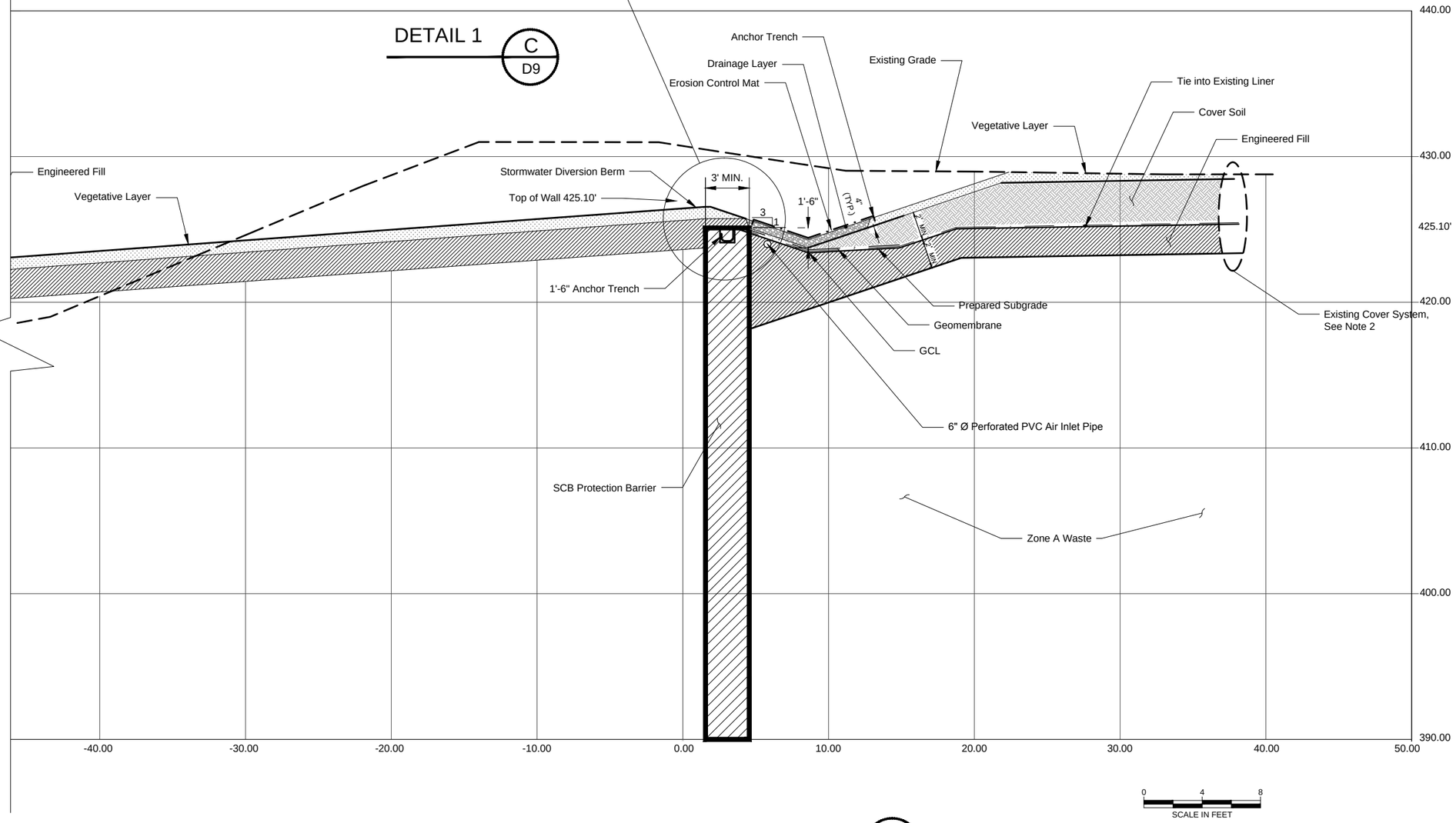


DETAIL 1 C / D9



0 4 8
SCALE IN FEET

NORTH SCB PROTECTION BARRIER SECTION D / D6

NOTES:

1. SECTION PORTRAYS TYPICAL DETAIL CONSTRUCTION FOR THE LANDFILL CAP/BARRIER TIE-IN. ACTUAL ALIGNMENT, GRADES AND THE ELEVATION OF THE BASE OF THE SCB PROTECTION BARRIER WILL BE ADJUSTED BASED ON GEOTECHNICAL INVESTIGATIONS AND FIELD CONDITIONS.
2. TIE NEW LINER INTO EXISTING ZONE A COVER SYSTEM.

ISSUED FOR CONSTRUCTION

PASCO LANDFILL
PASCO, WASHINGTON

ZONE A COVER REPLACEMENT DETAILS SHEET 2

DANIEL J. KAY — STATE OF WASHINGTON — 36271 — REGISTERED PROFESSIONAL ENGINEER — 8/6/15

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SHEET 10 OF 15
DRAWING NO. D10

Mod: 08/06/2015, 14:35 | Plotted: 08/06/2015, 14:47 | chad_stickel J:\GIS\Projects\Pasco Landfill\Extinguish AOC\Design\Rev1\D9 & D10 Rev1 (Zone A Cover Replacement Details.dwg

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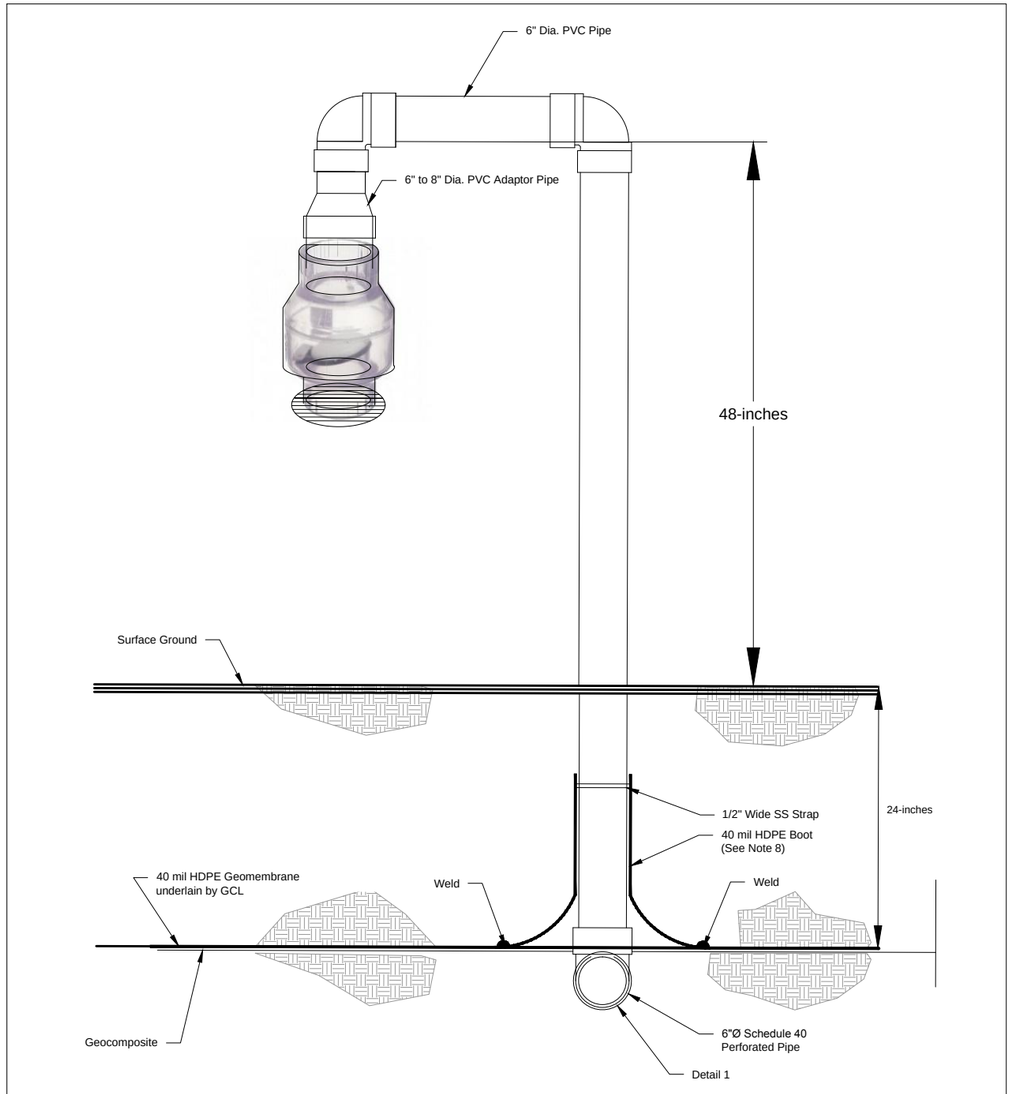
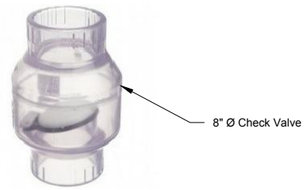
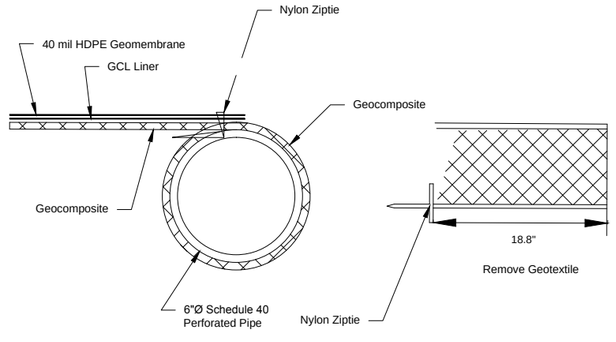


NTS

PROFILE VIEW



NTS



NTS

DETAIL 1

AIR INTAKE SYSTEM NOTES:

1. The 6-inch diameter perforated schedule 40 PVC Pipe shall be installed parallel to and at a distance of 12-inches from the SCB Protection Barrier on the Zone "A" side. The perforated PVC Pipe shall be installed at a depth of 24- inches below final ground surface.
2. Four 6-inch diameter schedule 40 PVC Pipe "Tees" shall be installed at the approximate locations shown in Drawing D-8, "Soil Bentonite SCB Protection Barrier & Cover Details." The four "Tees" will divide the perforated PVC Pipe into three sections of approximately equal lengths.
3. Prior to the installation of each section of perforated PVC Pipe, the pipe will be covered with one wrap of geocomposite drainage layer with 6-ounce geotextile heat fused to both sides. After wrapping around the perforated PVC Pipe, the loose end of the geocomposite drainage layer shall extend a distance of 5-feet into the Zone "A" area (away from the SCB Protection Barrier at a depth of 24-inches. Approximately 18.8-inches of the 6-ounce geotextile shall be pealed from the side of the geocomposite drainage layer which wraps around the perforated PVC Pipe. The geocomposite drainage layer shall be attached to the perforated PVC Pipe with nylon zip ties placed a maximum of 12-inches on centers. The geocomposite drainage layer shall not be wrapped around the PVC Pipe "Tees."
4. A 6-inch diameter section of solid schedule 40 PVC riser pipe will be attached at each of the "Tees." The PVC riser pipe shall extend out of the ground approximately 4-feet. Two 90-degree 6-inch diameter schedule 40 PVC elbows separated by approximately 12-inches of 6-inch diameter schedule 40 PVC pipe shall be attached to the upper end of the PVC riser pipe (forming a "Goose Neck").
5. A 6"to 8" schedule 40 PVC pipe adaptor shall be installed at the bottom of the "Goose Neck."
6. An 8-inch diameter Clear PVC Utility Swing Check Valve, Socket, EPDM, S1520C80, or equal, shall be installed in to the bottom 8" diameter opening of the 6"to 8" schedule 40 PVC pipe adaptor. The check valve shall be installed so that the Flapper side of the valve is down allowing air to be drawn into the pipe but preventing air from leaving the pipe.
7. An 8-inch diameter plastic Grate will be attached to the underside of the Clear PVC Utility Swing Check Valve so as to keep out air born objects and animals.
8. A 40 mil HDPE boot shall be installed at the point where each Air Intake penetrates the 40 mil HDPE Geomembrane. Each boot will be fastened to the 40 mil HDPE Geomembrane Liner by means of an HDPE extrusion weld. The top of each boot will be clamped to the air intake pipe with 1/2" wide stainless steel screw clamp.

ISSUED FOR CONSTRUCTION

PASCO LANDFILL
PASCO, WASHINGTON

AIR INTAKE DETAILS

DANIEL J. ADAMS — STATE OF WASHINGTON — 36271 — REGISTERED PROFESSIONAL ENGINEER — 8/6/15

DESIGNED BY:	
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SHEET 11 OF 15

DRAWING NO. D11

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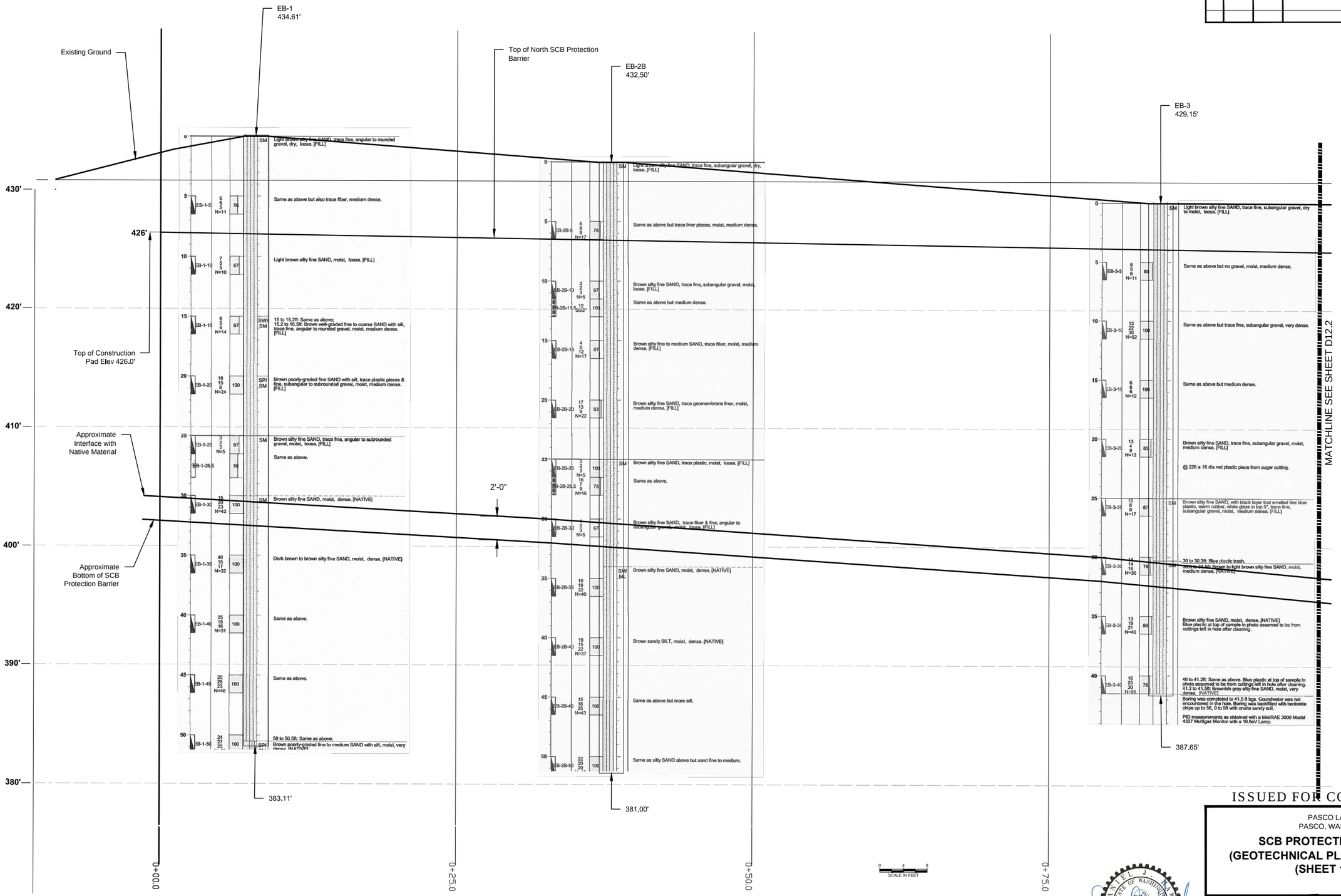

PROFILE VIEW OF SCB PROTECTIVE BARRIER

ISSUED FOR CONSTRUCTION

PASCO LANDFILL
PASCO, WASHINGTON

SCB PROTECTION BARRIER (GEOTECHNICAL PLAN AND PROFILE) (SHEET 1 OF 4)

DANIEL J. ARMSTRONG — STATE OF WASHINGTON — 38277 — REGISTERED PROFESSIONAL ENGINEER — 8/6/15

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SHEET 12 OF 15

DRAWING NO. D-12.1

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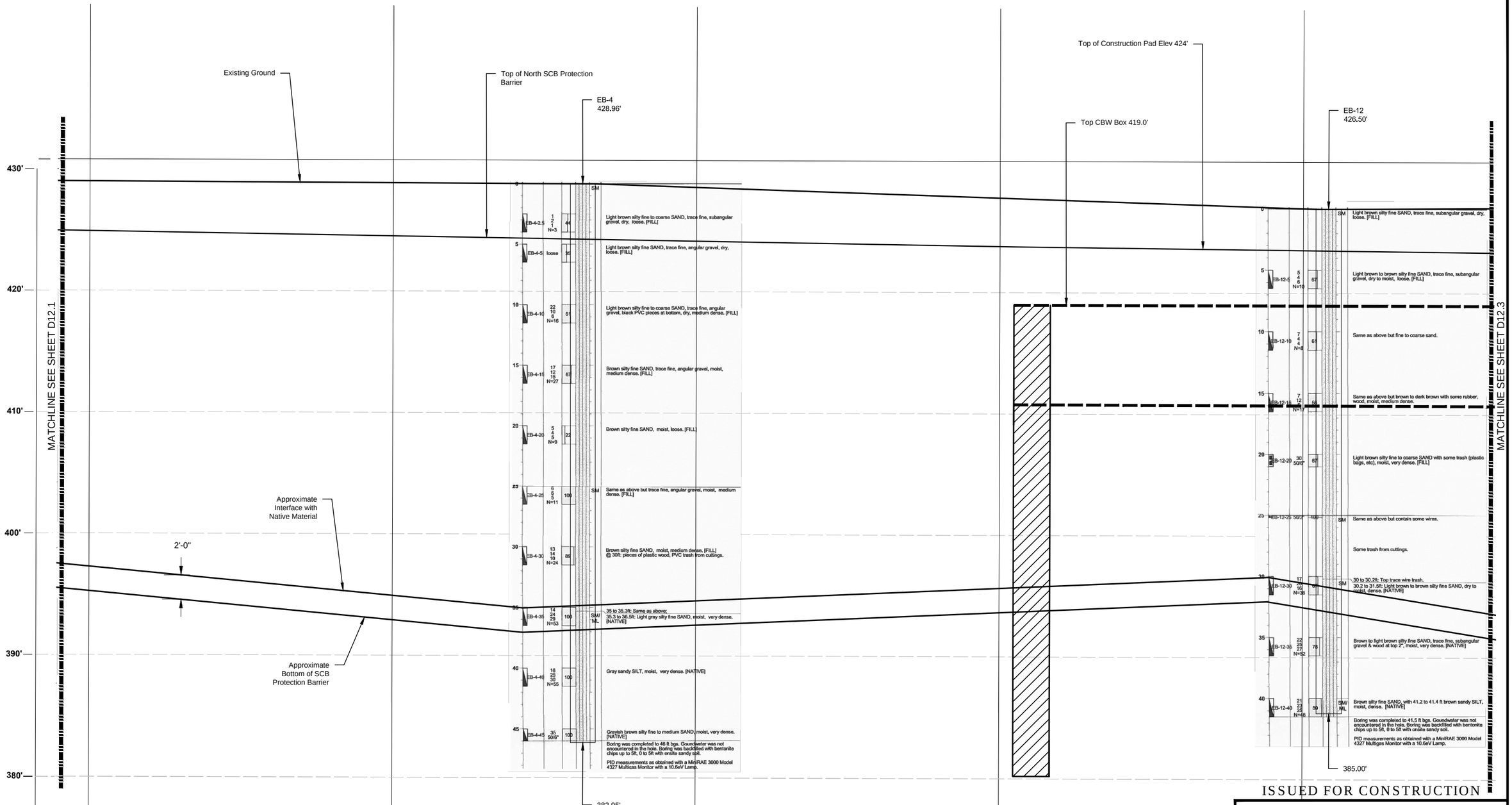

PROFILE VIEW OF SCB PROTECTIVE BARRIER

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PASCO LANDFILL
PASCO, WASHINGTON

SCB PROTECTION BARRIER
(GEOTECHNICAL PLAN AND PROFILE)
(SHEET 2 OF 4)

DESIGNED BY:
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SHEET 13 OF 15
DRAWING NO. D-12.2

DANIEL J. STEPHENSON — STATE OF WASHINGTON — 3627 — REGISTERED PROFESSIONAL ENGINEER — 8/6/15

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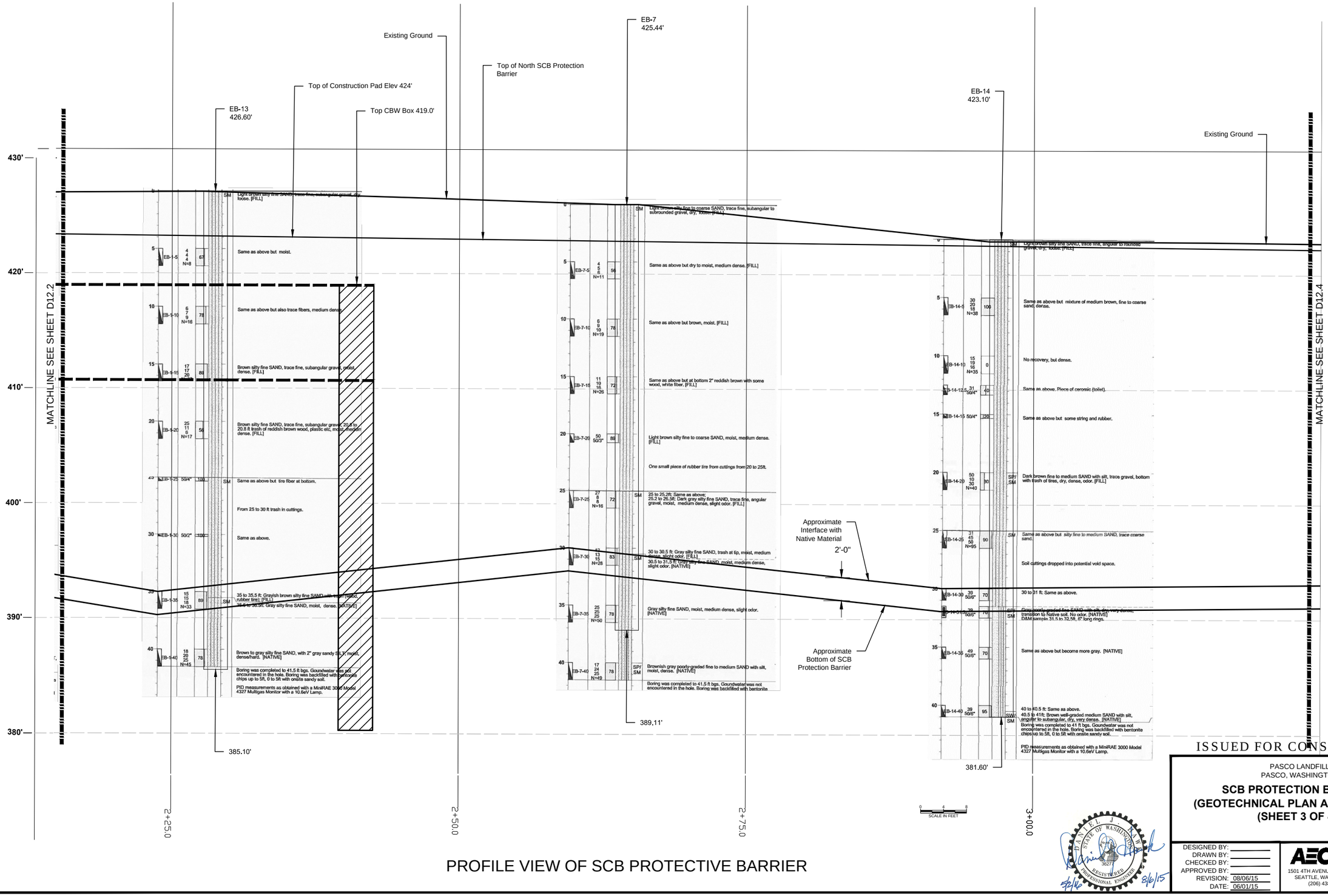

PROFILE VIEW OF SCB PROTECTIVE BARRIER

ISSUED FOR CONSTRUCTION

PASCO LANDFILL
PASCO, WASHINGTON

SCB PROTECTION BARRIER (GEOTECHNICAL PLAN AND PROFILE) (SHEET 3 OF 4)

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SHEET 14 OF 15

DRAWING NO. D-12.3

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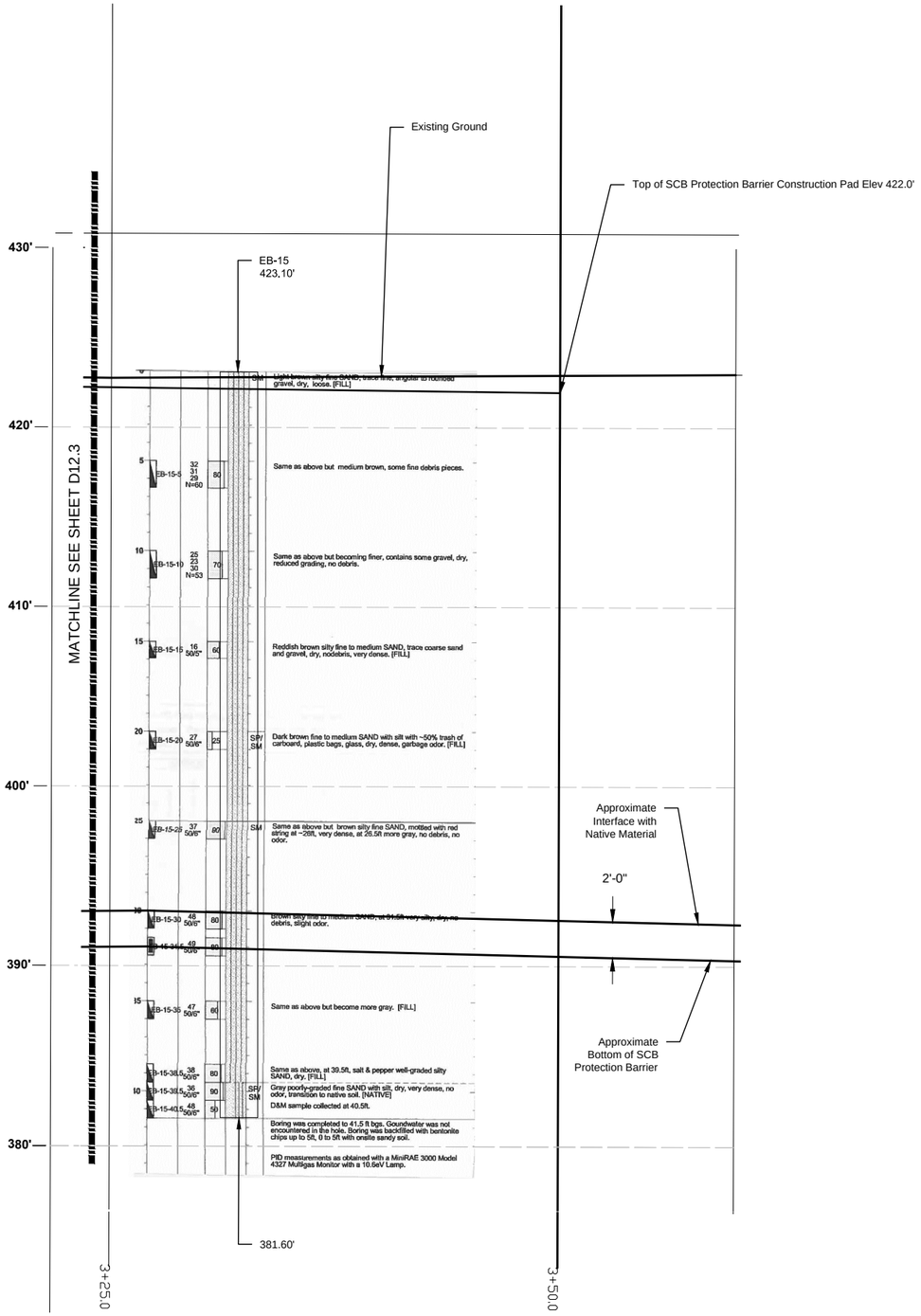

PROFILE VIEW OF SCB PROTECTIVE BARRIER

SCALE IN FEET

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PASCO LANDFILL
PASCO, WASHINGTON

SCB PROTECTION BARRIER (GEOTECHNICAL PLAN AND PROFILE) (SHEET 4 OF 4)

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