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TANK 4 AND LEACHATE TRANSMISSION SYSTEM REPORT CONSTRUCTION QUALITY ASSURANCE (CQA)

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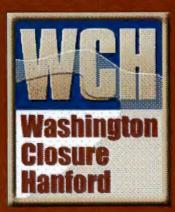
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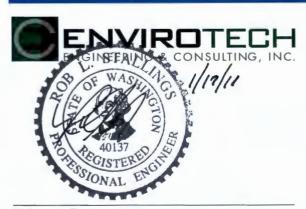
TANK 4 AND LEACHATE TRANSMISSION SYSTEM REPORT **CONSTRUCTION QUALITY ASSURANCE (CQA)**

ENVIRONMENTAL RESTORATION DISPOSAL FACILITY (ERDF)

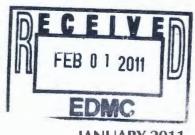
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SUBCONTRACT NO. S013213A00





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1. INTRODUCTION

ENVIROTECH ENGINEERING & CONSULTING, INC. (ENVIROTECH) was retained by Washington Closure Hanford, LLC (WCH) to provide Construction Quality Assurance (CQA) observation and testing services during construction of Super Cells 9 and 10 at the Environmental Restoration Disposal Facility (ERDF). The ERDF is located approximately 30-mi. north of Richland, WA, in the 200 West Area of the Hanford Nuclear Reservation. The U.S. Department of Energy (DOE) administers the Hanford Nuclear Reservation and ERDF. The construction of two (2) leachate storage tanks (Tanks 3 and 4) and the associated leachate transmission pipeline system were individual components of the Super Cells 9 and 10 construction project. WCH is under contract to the DOE for construction of ERDF Super Cells 9 and 10, and Environmental Restoration was retained by Washington Closure Hanford, LLC (WCH) to be surrounded to the supervision of the Super Cells 9 and 10 construction project. WCH is under contract to the DOE for construction of ERDF Super Cells 9 and 10, and Environmental Restoration was retained by Washington Closure Hanford, LLC (WCH) to be surrounded to be supervised by Washington Closure Hanford, LLC (WCH) to be surrounded to the supervised by Washington Closure Hanford, LLC (WCH) to be supervised by Washington Closure Hanford, LLC (WCH) to be surrounded by Washington Closure Hanford, LLC (WCH) to be surrounded by Washington Closure Hanford, LLC (WCH) to be surrounded by Washington Closure Hanford, LLC (WCH) to be surrounded by Washington Closure Hanford, LLC (WCH) to be surrounded by Washington Closure Hanford, LLC (WCH) to be surrounded by Washington Closure Hanford, LLC (WCH) to be surrounded by Washington Closure Hanford, LLC (WCH) to be surrounded by Washington Closure Hanford, LLC (WCH) to be surrounded by Washington Closure Hanford, LLC (WCH) to be surrounded by Washington Closure Hanford, LLC (WCH) to be surrounded by Washington Closure Hanford Han

This report documents the construction of Tank 4 and the associated leachate transmission pipeline system. This document represents the third of four (4) certifying reports that document CQA activities during construction of Super Cells 9 and 10 as follows:

- 1. Super Cell 9 Final Report;
- 2. Super Cell 10 Final Report;
- 3. Tank 4 and Leachate Transmission System Report; and
- 4. Tank 3 Report.

The three (3) individual components comprising this report are as follows:

- ① Leachate Transmission Piping;
- ② Tank 4 Construction; and
- 3 Acceptance Test Procedures.
- **Scope of Work.** The scope of ENVIROTECH'S services for this project segment is outlined in *Exhibit D Scope of Work* and encompasses the following:
 - **A.** Mobilization Activities.
 - Training requirements and certifications, as outlined in Submittal 5-09 -Training Matrix.





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- Procurement and mobilization of testing equipment, supplies, and consumables.
- Development, review, and approval of submittals.
- Delivery and set-up of construction testing equipment to include calibration of laboratory and field testing equipment and associated documentation.

B. Inspection Activities.

- All inspection activities, as defined in the Construction Quality Assurance Plan.
- Verification of construction activities to ensure that Construction Quality Control (CQC) testing was completed to include:
 - Leachate transmission pipeline system, leachate storage tank system, and associated appurtenances;
 - Electrical conduit and concrete-encased duct banks;
 - Crest pad building concrete and rebar; and
 - Crest pad building electrical testing.

C. Acceptance Testing.

- Observe and record the results of the dry-run verification of the acceptance tests conducted by TWS.
- Observe and record the results of the acceptance tests procedures (ATP) conducted by TWS.

D. Documentation.

- Preparation of a final certification report to document each construction component monitored by CQA, as required by the CQAP.
- Preparation and submittal of preliminary reports in order to expedite the final report review process.





TANK 4 AND LEACHATE TRANSMISSION SYSTEM REPORT CONSTRUCTION QUALITY ASSURANCE (CQA) ENVIRONMENTAL RESTORATION DISPOSAL FACILITY (ERDF)

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- **E.** CQA Subcontractor Submittals.
 - Submit the subcontract documents listed in Exhibit "I" and in accordance with the requirements and procedures set forth in Exhibit "I".
- **F.** Receiving Inspections.
 - Conduct receipt inspections to include transportation and handling of geosynthetic materials.
 - Conduct receipt inspections to include transportation and handling of bentonite materials.
- **G.** Review Construction Subcontractor's Submittals.
 - Review the Construction Subcontractor's (TWS) engineering submittals listed in Attachment C of the specifications.
 - Review calibration data for the Construction Subcontractor's testing equipment to include pugmill scales.
- **H.** Progress "As-Built" Drawings and Specifications.
 - Maintain an up-to-date set of Construction Subcontract drawings and technical specifications.
- **I.** "As-Built" Surveys.
 - Conduct "As-Built" surveys to demonstrate that the cell's subgrade; lysimeter
 and liner system layer thicknesses (top of admix, secondary drainage,
 primary drainage and operations layers); leachate collection; and pipeline
 alignments meet the requirements specified in the Construction Subcontract
 drawings and technical specifications.
 - Incorporate the "As-Built" survey on the "As-Built" drawings and summarize in table format to include survey points in a 50-ft. grid corresponding to the Washington State Plane coordinate system Northing, Easting, and Elevation.
 - Prepare drawings in accordance with SC 4.3 Subcontractor-Furnished Drawings, Data, and Samples (Exhibit "B").





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- **J.** Meetings.
 - Attend and participate in weekly progress meetings administrated by WCH.
 - Plan supplemental meetings, as necessary, to coordinate activities with the ERDF Operations Subcontractor, WCH, and others.
- **K.** Work Excluded. Work specifically excluded from the scope of work included:
 - CQA support trailers and utilities;
 - Construction work associated with Exhibits "E" and "F";
 - Cultural/ecological assessments or reviews;
 - Radiological control support/personnel monitoring; and
 - Supplying radiological postings (signs and labels).
- **1.2 Project Specifications.** The work was conducted in accordance with the following documents:
 - Construction Specifications and Drawings for Environmental Restoration Disposal Facility (ERDF), Super Cells 9 and 10, Hanford Site, Richland, Washington, prepared for WCH by Weaver Boos, Inc., and dated November 13, 2009.
 - Construction Quality Assurance Plan (CQAP) for Environmental Restoration Disposal Facility (ERDF), Super Cells 9 and 10, prepared for the U.S. Department of Energy by Weaver Boos, Inc., and issued for construction on November 13, 2009.

In addition, all work described in this report was conducted in conformance with all issued design clarifications and modifications as well as supplier deviation disposition requests (SDDRs) and approved contractor submittals.

1.3 Key Project Operational Organizations.

• Tradewind Industries, Inc. (TWS) of Kennewick, WA, served as the construction subcontractor for Super Cell 9.



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- DelHur Industries, Inc. (DHI) of Port Angeles, WA, served as the primary construction subcontractor to TWS for the construction of Super Cell 9.
- Gundle/SLT Environmental, Inc. (GSE) of Houston, TX, provided the 40-mil. LLDPE geomembrane material.
- Environmental Specialties International Inc. (ESI) of Baton Rouge, Louisiana, served as the liner installer/subcontractor under TWS.
- SKAPS Industries of Athens, Georgia, supplied the 8-oz. geocomposite geotextile materials (Type A and Type B, respectively) and geocomposite materials.
- ISCO Industries of Louisville, Kentucky, supplied the leachate collection and riser piping.
- American Electric of Richland, WA, served as the electrical subcontractor to TWS for construction of Super Cell 9.
- Total Energy of Richland, WA, served as a subcontractor to American Electric for the logic controls associated with the leachate transmission system.
- Leak Location Services (LLS) Inc. of San Antonio, Texas, performed the electronic leak detection surveys on the Tank 4 liner systems.
- Baker, McHenry and Welch Constructors (BMWC) of Indianapolis, Indiana, served as the piping installer/subcontractor under TWS.
- Columbia TecTank of Kansas City, MO, provided the Tank 4 design and tank materials.
- Thompson Tank of Downey, CA, subcontracted to Columbia TecTank to provide on-site tank component assembly.
- Stratton Surveying Inc., of Kennewick, WA, served as the CQA surveyor for Super Cell 9 and provided the CQA "As-Built" drawings.
- Precision Geosynthetic Laboratories (PGL) of Anaheim, California, and Texas Research Institute, Inc. (TRI) of Austin, Texas, served as the CQA testing laboratories for geosynthetic materials.





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1.4 Project Overview. This report documents the construction of Tank 4 and the associated leachate transmission pipeline system.

The leachate transmission piping conveys wastewater from the crest pad buildings to the leachate storage tanks. Commencing on March 18, 2010, TWS conducted excavation activities and installed seven (7) new manholes between the new storage tanks and Crest Pad Buildings 9 and 10. TWS installed MH-32 north of Crest Pad Building 9 and MH-33 north of Crest Pad Building 10. BMWC installed the transmission piping between Crest Pad Buildings 9 and 10 to their respective manholes located north of the buildings. The remaining five (5) manholes were spaced approximately 500-ft. apart in the north berm from MH-33 to the tank storage area, and BMWC installed the double-walled leachate transmission piping between the manholes.

An existing leachate transmission piping system is located in both the south and north berms. The new transmission system was connected to the existing transmission system in the tank storage area. New pipe was installed between MH-38 and MH-9, and from MH-21 to a tie-in point between MH-20 and MH-21.

Subsequent to installation of the leachate transmission piping, the pipe section was pressure-tested. Following acceptance of the pressure testing results, the pipe trenches were backfilled and tested, according to the requirements set forth in the specifications. On August 31, 2010, pressure testing was conducted on the entire leachate transmission system.

On September 14, 2010, TWS commenced construction of Tank 4. TWS utilized structural fill to raise the tank's foundation to the design elevation, and BMWC installed the leachate detection piping and tank drain. After the foundation was raised, TWS excavated a 100-ft.-dia. trench in the foundation and poured a concrete ring wall foundation.

TWS retained Columbia TecTank to supply the tank components and in turn, Columbia TecTank contracted with Thompson Tank, Inc. to erect Tank 4's structural walls. After the anchor bolts were drilled into the concrete ring wall, Thompson Tank, Inc. bolted the walls together before attaching them to the anchor bolts. TWS then placed grout into the airspace between the bottom of the tank walls and the top of the concrete slab.

ESI purchased geosynthetic material from Gundel/SLT Environmental (GSE) and SKAPS Industries. GSE produced the geomembrane material while SKAPS supplied the geotextile and geocomposite materials. ESI commenced installation of the geosynthetic liner into Tank 4 on November 6, 2010. A 40-mil. LLDPE secondary geomembrane was installed on the sidewalls and floor of the tank. ESI then installed a layer of geocomposite on the floor of Tank 4 over the secondary geomembrane, followed by installation of the primary 40-mil.



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LLDPE geomembrane over the secondary geomembrane on the walls and geocomposite on the floor of Tank 4.

It should be noted that due to inclement weather conditions, completion of the liner system was delayed. Following completion of the liner system, BMWC installed motor-operated valves (MOVs) in the manholes located in the tank storage area, followed by installation of the control systems by American Electric. Total Energy (subcontractor to American Electric) and CQA personnel completed the Tank 4 and leachate transmission Acceptance Test Procedures (ATPs) on January 12, 2011.

Following completion of each construction phase, Stratton Surveying of Kennewick, WA, conducted a CQA "As-Built" survey. The "As-Built" survey drawings were progressively compiled from the initial level of cell construction forward. The 11-in. x 17-in. "As-Built" drawings are included in *Appendix A*. For ease of review, please refer to the full-size (24-in. x 36-in.) drawings in CQA *Submittal 5-22 - CQA Surveys*.

2. LEACHATE TRANSMISSION SYSTEM PIPING

Installation of the leachate transmission pipeline and associated manholes (between Crest Pads 9 and 10 and the leachate storage area) will be discussed in the following paragraphs.

- **2.1 Construction Activities.** Construction of the leachate transmission pipeline encompassed the following five (5) steps:
 - (1) Manhole installation in the north berm;
 - (2) Welding the double-containment pipe;
 - (3) Installation of the double-containment pipe between the manholes;
 - (4) Backfilling the leachate transmission pipeline trench; and
 - (5) Installation of the motor-operated valves and associated control systems.

TWS excavated the location for each manhole in the leachate transmission system to include the north berm and tank storage area. TWS procured sectioned, pre-fabricated concrete manholes and placed the sections into the excavations. The manhole sections were then assembled in the excavations utilizing neoprene rubber gaskets.



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BMWC procured the piping from both J-M Eagle and PolyPipe, and welded the double-containment leachate transmission piping together on the north berm and in BMWC's lay-down area.

TWS excavated the leachate transmission system trenches between the manhole locations and their surveyor set the slope grade of the gravity drain lines from the excavated pipe bed. With the aid of BMWC, TWS set the leachate transmission system piping into the tranches. Following placement of the referenced piping, BMWC installed gaskets on either end of the pipes and connected the piping system to the manholes.

Following completion of CQA and CQC activities, TWS backfilled the leachate transmission system trenches with structural fill. Aided by American Electric, BMWC then installed the motor-operated valves (MOVs) and associated control systems in the manholes, as graphically depicted on the project's design drawings.

During backfilling operations, one (1) soil lift failed to meet construction specifications. CQA collected a soil sample and TWS resumed compaction activities. The laboratory analytical results indicated that the soil failed to meet construction specification requirements. TWS prepared, and WCH accepted, Construction Subcontractor Supplier Deviation Disposition Request (SDDR) 23. Pursuant to the SDDR-3, the material was accepted in a use-as-is condition. A copy of SDDR-23 is included in *Appendix I*.

- **2.2 CQA and CQC Activities.** Construction Quality Assurance (CQA) and Construction Quality Control (CQC) conducted all testing associated with installation of the leachate transmission piping system.
 - 2.2.1 Manholes. TWS procured the manholes from H2 Precast, Inc. and prior to delivery, TWS submitted (and WCH approved) manhole design requirements and associated materials. CQA verified that the design requirements submitted corresponded with the manholes delivered to the site. In addition, CQA observed the installation activities to verify that the manholes were correctly assembled during the installation process.
 - 2.2.2 HDPE Pipe. BMWC procured the HDPE pipe from both JM Eagle, Inc. and PolyPipe, Inc. Each company conducted quality control (QC) testing on their respective product to ensure that the piping properties met the requirements set forth in the construction specifications. The Manufacturer Quality Control (MQC) certifications were reviewed by WCH engineers and CQA to verify consistency with the requirements set forth in the construction specifications, and approved.



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Following delivery to the site, the materials were placed in holding areas for CQC receipt and verification that the piping corresponded to the requirements set forth in the referenced submittal and construction specifications. Manufacturer Quality Control (MQC) certifications are included in *Appendix B*.

2.2.3 Earthwork Backfill. The backfill utilized for the leachate transmission system piping trenches consisted of the excavated structural fill material from the north berm. Eleven (11) structural fill samples were collected during the course of the project. The testing conducted by CQA personnel on the collected samples included the following:

| Modified Proctor pursuant to ASTM D1557; |
|---|
| Grain-size distribution (mechanical sieve) tests pursuant to ASTM D2487 (Classification of Soils for Engineering Purposes); |
| Atterberg Limits pursuant to ASTM D4318; and |
| Sieve Analysis pursuant to ASTM D422. |

The laboratory analytical results from this testing event were utilized to analyze the field test measurements.

All fill associated with earthwork backfilling activities associated with installation of the leachate transmission system piping is considered to be utility backfill, as specified in the site work section of the project specifications. Therefore, the compaction requirement is 90% of the maximum dry density, as determined by the modified proctor (ASTM D1557) analytical results. The CQA Plan specifies that one (1) in-place moisture density test (ASTM D6938) be conducted every 300-ft. per trench lift. CQA conducted 205 in-place moisture density tests on the leachate transmission pipeline system to meet the testing frequency requirements set forth in the CQA plan. The laboratory analytical results are included in *Appendix C*.

2.2.4 Pipe Testing. After the pipes were welded together and installed between the manholes, CQC personnel conducted pressure testing on all pipes and associated welds. The inner pipes were hydrostatically tested while the outer annular spaces were pneumatically tested, in accordance with the requirements set forth in the testing specifications. In addition, CQA personnel verified and independently inspected each weld, in accordance with the requirements set forth in the testing specifications. The laboratory analytical results are included in *Appendix C*.



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2.2.5 "As-Built" Drawings. Following completion of pressure testing activities on the piping, Stratton Surveying of Kennewick, WA, conducted a survey to document the piping location and verify the minimum 0.5% slope grade of the referenced piping. The "As-Built" drawings for the leachate transmission system piping are included in Appendix A.

3. TANK 4 CONSTRUCTION

Tank 4 construction activities, to include the tank's foundation and erection as well as installation of the geosynthetic liner material, will be discussed in the following paragraphs.

- **3.1 Scope of Services.** The scope of ENVIROTECH'S services outlined in the Construction Quality Assurance Plan (CQAP) included the following:
 - Subcontractor submittal review;
 - Oversight of subgrade and foundation preparation;
 - Oversight of concrete placement;
 - Oversight of anchor bolts and shop-fabricated tank parts;
 - Oversight of field-erected tank parts;
 - Oversight of piping, pumping, and other ancillary equipment; and
 - Oversight of tank liner system.

ENVIROTECH provided full-time monitoring services for the above-referenced activities from September 1, 2010 to December 20, 2010.

- 3.2 Construction Activities. Tank construction activities encompassed the following six (6) steps:
 - (1) Demolition of Tank 1;
 - (2) Construction of the earthwork foundation and associated piping;
 - (3) Formation of the concrete ring wall;
 - (4) Tank shell erection;





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- (5) Installation of the geosynthetic liner material; and
- (6) Tank cover assembly.

TWS commenced Tank 1 demolition activities on September 1, 2010. Following completion of the demolition activities, TWS removed Tank 1 for transport to the ERDF active cell. On September 14, 2010, TWS commenced with construction of Tank 4. TWS excavated trenches in the Tank 4 footprint for the leachate transmission system drain and leak detection pipelines. The piping was welded, installed, and the trenches were backfilled.

In addition, TWS tied into the existing leachate transmission system at MH-17. TWS removed and replaced Tank 1's inflow line originating from MH-17, and reset the new line as the Tank 4 inlet. Following completion of tie-in activities, the piping trench was backfilled and TWS utilized structural fill to raise Tank 4's foundation to the design elevation.

TWS excavated a 100-ft.-dia. x 4-ft.-wide trench in the Tank 4 foundation and placed rebar supports in between the concrete forms, pursuant to the requirements set forth in the contract specifications. TWS then poured the ring wall in-place in one continuous pour and after the concrete reached minimum break strength, the ring wall was backfilled with structural fill.

TWS retained Columbia TecTank to design and furnish the structural portion of Tank 4, and the design submitted by Columbia TecTank was subsequently reviewed and approved by CQA and WCH. Columbia TecTank furnished the tank materials and retained Thompson Tank, Inc. to erect and install the tank on-site. Thompson Tank, Inc. initiated tank installation activities by drilling anchor bolts into the ring wall slab, as graphically depicted on TWS's tank submittal drawings. The tank wall panels were attached to the anchor bolts utilizing a torque gun. Following wall panel placement activities, leveling bolts were installed pursuant to the requirements set forth in the construction specifications. In addition, TWS placed grout into the space between the bottom of the tank wall panels and concrete slab pursuant to the requirements set forth in the construction specifications.

ESI procured geosynthetic liner material for Tank 4 from both Gundel/SLT Environmental (GSE) and SKAPS Industries. GSE produced the geomembrane liner material while SKAPS supplied the geotextile and geocomposite materials. On November 6, 2010, ESI initiated installation of the geosynthetic liner material in Tank 4. ESI attached the 40-mil. LLDPE secondary liner to the sidewalls of Tank 4 utilizing anchor bolts at the top of the walls. The secondary liner was continuously welded to the drain component inside the tank.



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During tank testing activities, minor tears occurred in the secondary 40-mil. LLDPE geomembrane at the anchor bolt penetration locations. Following completion of liner repair activities, ESI installed a layer of geocomposite over the secondary geomembrane liner material on the floor of Tank 4. On December 9, 2010, ESI installed the primary 40-mil. LLDPE geomembrane liner material over the geocomposite on the floor and secondary geomembrane liner material on the walls of Tank 4. ESI continuously welded the primary geomembrane on the walls to the primary geomembrane on the floor of Tank 4.

It should be noted that due to inclement weather conditions, installation of the primary geomembrane liner material in Tank 4 was delayed. Thompson Tank shall assemble the tank cover on at a later date following this report.

- 3.3 CQA and CQC Activities. Construction Quality Assurance (CQA) conducted the following activities associated with Tank 4 construction.
 - **3.3.1 Subcontractor Submittals.** TWS retained Columbia TecTank to design and furnish the structural portion of Tank 4, and the design submitted by Columbia TecTank was subsequently reviewed and approved by CQA and WCH.
 - **3.3.2 Earthwork Foundation.** The earthwork associated with Tank 4 construction includes both structural and utility fill. The specifications for both fill types are located in the *Site Work Section* of the construction specifications document.

As previously discussed in Section 2.2.3 of this report, eleven (11) structural fill samples were collected for laboratory analysis. The fill supporting (and in contact with) the ring wall is considered to be structural fill, as specified in the Site Work Section of the construction specifications document. CQA conducted twelve (12) in-place moisture density tests on the subgrade and subsequent lifts of fill around the perimeter of the ring wall. CQA conducted two (2) tests per lift to meet the specification requirement of one (1) test per 300-ft. of excavated trench, as summarized in the soil testing documentation in Appendix C. In addition, the CQA Plan specifies that one (1) in-place moisture density test (ASTM D6938) be conducted every 300-ft. per trench lift. CQA conducted 205 in-place moisture density tests on the leachate transmission pipeline system to meet the testing frequency requirements set forth in the CQA plan, as summarized in the soil testing documentation in Appendix C.

3.3.3 Ring Wall Concrete and Anchor Bolt Placement. CQA observed concrete testing activities on the ring wall conducted by Intermountain Material Testing, and the results are included in *Appendix D*. TWS drilled and installed the anchor bolts in the tank ring wall, and CQA verified that the anchor bolts were installed pursuant to the



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design specifications. A copy of the Acceptance Certificate for Tank 4 is included in *Appendix E*.

- 3.3.4 Tank Erection. The shop tank parts shipped from Columbia TecTank were received on-site and inspected by CQA personnel who verified that the items arrived undamaged. The field-erected tank parts were installed by Thompson Tank, Inc., and CQA verified that the tank design specification requirements were followed. In addition, CQA met with Thompson Tank employees and verified the calibration and proper function of all torque wrenches to ensure that the correct torque was being applied on all bolts. CQA verified that the grout in the air void between the bottom of the tank walls was properly placed and cured. Documentation of CQA's final inspection of all field-erected tank parts is included in *Appendix E*.
- **3.3.5 HDPE Pipe.** BMWC acquired the HDPE pipe from both JM Eagle, Inc. and PolyPipe, Inc., pursuant to the specification requirements outlined in *Section 2.2.2*.
- 3.3.6 **Pipe Testing.** Subsequent to the pipes being welded together and installed under Tank 4, BMWC conducted pressure testing on all pipes and pipe welds. The inner pipes were hydrostatically tested while the outer annular spaces were pneumatically tested, pursuant to the testing specification requirements. CQA independently inspected and verified each weld, pursuant to the requirements set forth in the testing specification. A record of all CQC testing of the leachate transmission piping is included in *Appendix B*.

3.3.7 LLDPE Geomembrane.

3.3.7.1 LLDPE Geomembrane Manufacturing Observations and Conformance Testing. Approximately 11,150-sf of black, 40-mil.-thick GSE (smooth) LLDPE geomembrane liner material was delivered on-site for Tanks 3 and 4 construction. PGL personnel collected samples of selected rolls at the GSE plant according to the specified frequency outlined in the CQA Plan. Documentation associated with the factory inspection visit is included in *Appendix F*. The samples were shipped to Precision Geosynthetics Laboratory in Anaheim, CA, for conformance testing.

As part of the CQA testing program, samples collected from a total of one (1) roll of 40-mil. LLDPE geomembrane liner were tested to ensure conformance with the project specifications. The CQA conformance testing frequency exceeded the CQA testing requirement of one (1) conformance test for every 50,000-sf of geomembrane liner delivered to the site. The test results were reviewed by ENVIROTECH personnel and determined to be in compliance with



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the project specifications. The conformance test results are summarized in *Appendix F.*

In addition to the conformance tests, the geosynthetic (GSE) manufacturer provided a quality control documentation summary for each roll of HDPE geomembrane. The quality control documents and test results were reviewed by Environmental and determined to be in compliance with the project specifications.

3.3.7.2 Liner Deployment. ESI submitted a proposed panel layout drawing graphically depicting the number and orientation of the geomembrane panels prior to deployment of the geomembrane. During deployment activities, Environment recorded the approximate location of the panels deployed. The secondary geomembrane liner panel layout is graphically depicted on the drawing included in *Appendix A*.

During deployment of the geomembrane liner panels, ENVIROTECH personnel provided the following services:

- Confirmation of panel overlap;
- Visual observation of overall sheet quality; and
- Assignment of a unique identification number to each panel deployed.
- 3.3.7.3 LLDPE Geomembrane Liner Seaming. All LLDPE geomembrane seaming was conducted by ESI personnel and observed by ENVIROTECH personnel. Trial seams were made by each welding technician at the beginning of the shift and at mid-shift utilizing the type of welder to be operated. In addition, trial seams were required in the event the type(s) of material being welded changed. Sample coupons were cut from each trial seam and tested in the peel-and-shear test modes using a calibrated tensiometer provided by ESI. If a trial seam failed during field testing, the welder and welding technician associated with the failing trial seam were not allowed to weld on the geomembrane liner until they completed a trial seam that passed the field testing requirements set forth in the specifications. A summary of the trial seam testing results is presented in *Appendix G*.

All seaming operations were observed and documented by ENVIROTECH personnel. The entire length of all seams, patches, or other repairs were



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observed and documented either during or shortly after completion. Approximately 760-If of welding was required to join the secondary geomembrane liner panels. A summary of CQA seaming observations is presented in *Appendix G*. The approximate locations of the secondary geomembrane liner seams are graphically depicted on the drawing included in *Appendix A*.

- **3.3.7.4 Non-Destructive Seam Continuity Testing.** The non-destructive seam continuity testing was conducted by ESI personnel and observed by ENVIROTECH personnel. All seams between panels as well as repairs made to the geomembrane liner system were non-destructively tested. The three (3) types of non-destructive tests used for this project are as follows:
 - Vacuum box testing on extrusion welds;
 - Air pressure testing on double hot-wedge fusion welds; and
 - Spark testing on pipe boots and skirts.

Vacuum box, air pressure, and spark testing were conducted in accordance with the requirements outlined in the project specifications.

All leaks or discontinuities detected in the seams were marked and subsequently repaired in accordance with project specification requirements. Documentation summarizing the observations made during non-destructive testing of the seams and repairs is presented in *Appendix G*.

- **3.3.7.5 Secondary Geomembrane Liner Repairs.** Defects observed in the secondary geomembrane liner were assigned a unique identification number by ENVIROTECH who located and marked the defects in the field for repair. The defects were repaired and non-destructively tested by ESI in accordance with the project specification requirements. A summary of the defects and associated repairs is presented in *Appendix G*. The approximate defect repair locations are graphically depicted on the drawing included in *Appendix A*.
- **3.3.7.6 Destructive Testing.** A total of six (6) initial destructive test samples were collected (1 fusion-weld sample, secondary; 1 fusion-weld sample, primary; 2 extrusion-weld samples, secondary; and 2 extrusion-weld samples, primary) and tested using a calibrated tensiometer in ENVIROTECH'S on-site laboratory. The destructive testing frequency requires at least two (2) destructive test samples for factory panel or one (1) test per 500-lf/welder. The six (6) fusion-



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weld destructs exceed the number of destructs required by the specification. The test sample locations were selected by ENVIROTECH personnel based either on observations of the welded seams or random placement. ESI personnel cut the destructive seam samples and delivered them to ENVIROTECH for testing.

In the event of a destructive test failure, additional samples were removed from the seam at minimum 10-ft. intervals on either side of the failing test location and tested until passing retests bounded the original test, or until the extent of the welding performed by the apparatus in question had been exhausted. The seam between the passing tests (or to the extent of welding in question) was then capped. The approximate destructive test sites may be located by first referring to the specific destructive test in the Secondary Geomembrane Seam Destructive Log included in *Appendix G*. From this log, the assigned Repair Number is graphically depicted on the drawing included in *Appendix A*. The destructive test and repair location are the same.

Destructive samples were cut into three (3) sections and distributed as follows:

- One (1) section was forwarded to ENVIROTECH'S on-site geosynthetic laboratory for CQA destructive seam testing;
- One (1) section was forwarded to the geomembrane installer for testing; and
- ③ One (1) section was retained as an archive sample and submitted to WCH at project completion.

For CQA destructive seam testing, ten (10) test coupons were cut from each destructive test sample. Five (5) coupons were tested for adhesion (peel test mode) and five (5) coupons were tested for bonded seam strength (shear test mode). The specified acceptance criteria for destructive testing is summarized in *Table 3.1*, and a summary of the destructive test results is presented in *Appendix D*.



TANK 4 AND LEACHATE TRANSMISSION SYSTEM REPORT

CONSTRUCTION QUALITY ASSURANCE (CQA)
ENVIRONMENTAL RESTORATION DISPOSAL FACILITY (ERDF)

SUPER CELL 9

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| TABLE 3.1 SUMMARY OF DESTRUCTIVE TEST CRITERIA | | | | | | | | | |
|--|--|--|----|--|--|--|--|--|--|
| Welding Method | | Peel Test Mode | | Shear Test Mode | | | | | |
| Extrusion Welding | 1. | Five (5) of the five (5) test coupons per track must have a minimum peel strength of 34-lb/in. | 1. | Five (5) of the five (5) test coupons must have a minimum yield strength of 45-lb/in. width. | | | | | |
| Excusion recains | 2. Five (5) of the five (5) test coupons per track must not fail in the weld (FTB*). | | | Five (5) of the five (5) test coupons must not fail in the weld (FTB*). | | | | | |
| Fusion Welding | 1. | Five (5) of the five (5) test coupons per track must have a minimum peel strength of 38-lb/in. | 1. | Five (5) of the five (5) test coupons must have a minimum yield strength of 45-lb/in. width. | | | | | |
| rasion relaing | 2. | Five (5) of the five (5) test coupons per track must not fail in the weld (FTB*). | 2. | Five (5) of the five (5) test coupons must not fail in the weld (FTB*). | | | | | |
| FTB = Film Tear Bond | | | | | | | | | |

- **3.3.7.7 Electronic Leak Detection Survey.** Leak Location Services (LLS), Inc. conducted the leak location survey for both secondary and primary geomembranes in four (4) steps as follows:
 - The tank floor was flooded with approximately 18-in. of water and electronically surveyed. LLS placed markers on the liner where holes were indicated by the survey results.
 - The water was removed from the tank floor and ESI repaired the holes in the geomembrane. The tank was then re-flooded with 18-in. of water and retested.
 - 3 After LLS verified that the geomembrane on the floor of Tank 4 was leak-free, 7-ft. of water was pumped into the tank.
 - 4 LLS tested the geomembrane on the tank walls and no leaks were detected.

Upon completion of testing activities, LLS summarized the results in the two (2) separate reports included in *Appendix G*.

3.3.7.8 Tank Tightness Testing. Tank tightness testing was conducted in conjunction with the electronic leak detection survey. In order to conduct



TANK 4 AND LEACHATE TRANSMISSION SYSTEM REPORT

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the electronic leak detection survey, water was introduced between the secondary and primary geomembrane layers. Subsequent to LLS testing activities, TWS dyed the water in Tank 4. The dyed water was held at the 7-ft. mark for three (3) days between December 17 and 20, 2010. At the end of the testing period, clear water was discharged from the leak detection vault. It is understood that water shall continue to discharge from between the secondary and primary geomembranes, but this water is considered construction water as no dye was detected during testing procedures. The tank tightness testing record is located in *Appendix G*.

- **3.3.7.9** "As-Built" Survey. Stratton Surveying, Inc., of Kennewick, WA, conducted a geomembrane seam survey of the Tank 4 secondary and primary liners. A seam survey drawing was prepared that graphically depicts the location of each secondary geomembrane panel and repair location. The 11-in. x 17-in. "As-Built" drawings are included in *Appendix A*. For ease of review, please refer to the full-size (24-in. x 36-in.) drawings in CQA *Submittal 5-22 CQA Surveys*.
- **3.3.8 Ancillary Equipment.** CQA observed the installation of the transducers and other electrical equipment, and verified the calibration of each system prior to final approval. The calibration of the transducers and other equipment are included with the Acceptance Test Procedures Dry-Run documentation in *Appendix H*.
- 3.4 Conclusion. Tank construction commenced on September 1, 2010, and completed on December 20, 2010, following tank tightness testing activities. The tank was constructed by various subcontractors working on independent systems to complete the construction. The tank's structural, mechanical, electronic, and geosynthetic components were all tested and verified that each component met construction specification requirements.

4. ACCEPTANCE TEST PROCEDURES (ATPs)

This section provides a summary of the CQA observations and testing associated with placement of the Acceptance Test Procedures (ATPs) for Tank 4.

- **4.1 Scope of Services.** The scope of ENVIROTECH'S services outlined in the Construction Quality Assurance Plan (CQAP) consisted of the following:
 - Review subcontractor's acceptance testing of the system;
 - Verify tagging, labeling, and marking of system components;





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- Review system performance checks; and
- Review complete leachate removal system performance.

ENVIROTECH provided full-time monitoring of these activities from January 10 - 12, 2011.

4.2 Acceptance Test Procedures (ATPs). WCH ERDF Engineer, Mr. Tim Wintle, authored the ERDF Tank 4 and Leachate Transmission Pipeline Acceptance Test Procedures (ATPs) with input from Mr. Dave Sterley (TWS CQC), Mr. Bill Borloug (WCH Engineer), Mr. Ryan Harris (Test Director with Total Energy), and Mr. Joseph Voss (ENVIROTECH CQA). Mr. Jake Laws (WCH Electrical Subject Matter Expert (SME) and National Electrical Code (NEC) Inspector), Mr. Ryan Harris, and Mr. Dave Sterley aided CQA with inspection and confirmation of construction specifications and electrical code requirements, as documented in the prerequisites section of the ATP - Test Execution Form.

Prior to commencing with Acceptance Test Procedures (ATPs), TWS (assisted by Total Energy, American Electric, and CQC) conducted a "dry-run" test on Tank 4 and the leachate transmission system on January 10, 2011. The "dry-run" team tested and examined the motor-operated valves, alarms, and control logic associated with the leachate transmission system. In addition, the "dry-run" team tested the alarms and control logic associated with operation of Leachate Storage Tank 4. Although several minor imperfections were discovered in the system during "dry-run" testing, all deficiencies were corrected prior to the end of testing. The "dry-run" was documented on the ATP forms included in *Appendix J*.

TWS conducted acceptance testing of Tank 4 and the leachate transmission system on January 11, 2010, in accordance with the *ERDF Leachate Storage Tank 4 and Leachate Transmission System Acceptance Test Procedures (ATPs) - Revision 0.* ATP activities were directed by Mr. Ryan Harris (Total Energy); Mr. Bill Melvin (WCH Project Manager); Mr. Jack Howard (STR); Mr. Dave Sterley (TWS - Subcontractor QC); and Mr. Joseph Voss (CQA Recorder). In addition, Mr. Dave Einan (EPA); Mr. Owen Robertson (DOE); and Ms. Deanna McCrainie provided observation services during testing activities.

While conducting the ATP on the leachate transmission system in manhole MH-17, the motor-operated valve (MOV) failed to close. At that time, testing of MOVs in manholes MH-17 and MH-18 were skipped. The ATPs were completed, with the exception of retesting the MOVs in manholes MH-17 and MH-18. While troubleshooting the MOV failure, American Electric discovered that the existing electrical disconnect terminal in MH-17 was corroded. American Electric moved the MOV electrical connection to a non-corroded terminal in the electrical disconnect.



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On Wednesday, January 12, 2011, following repair of the MOV electrical disconnect, CQA participated in the continuation of ATP testing on Tank 4 and the leachate transmission line which was successfully completed and documented on the ERDF Leachate Storage Tank 4 and Leachate Transmission System Acceptance Test Procedures (ATPs) – Test Execution Forms in Appendix J. The continuing testing was documented as Exception 1 to the ATP testing procedures.

4.3 Leachate Removal System Performance Testing. The leachate removal system performance testing was removed from the CQA Plan by the supplier deviation disposition report (SDDR) 08. However, this testing shall be conducted by the ERDF operations subcontractor as part of start-up procedures. The SDDR-08 is included in *Appendix I*.

5. DOCUMENTATION

- **Daily Reports.** Daily reports compiled from the field books maintained by each on-site CQA staff member included the following:
 - Reference to the field books utilized that day by CQA staff;
 - Meteorological information;
 - A summary of the day's activity; and
 - Highlights of unresolved issues, if any.

A compilation of the daily reports is included in *Appendix H*.

- **Inspection Data Sheets.** All previously-referenced field and laboratory test data was recorded on Inspection Data Sheets and included in their respective Appendices.
- **CQA Progress Reports.** CQA Progress Reports were prepared weekly to summarize work activities, observations, and testing conducted by CQA. In addition, the reports provided a summary of construction activity and associated problems, if any. All CQA Progress Reports are included in *Appendix H*.
- **Photograph Log.** Daily photographs were taken to provide photo documentation of the work progression, CQA-identified issues requiring special notice, and other items of interest. The Photograph Log is included in *Appendix H*.
- **Supplier/Contractor Deviation Disposition Request (SDDR/CDDR) Documentation.**ENVIROTECH issued eight (8) SDDRs during the course of the project. The CQA and





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contractor SDDR documentation affecting Super Cell 9 construction is included in Appendix I.

Non-Conformance Reporting. One (1) non-conformance report was issued during the course of Tank 4 and Leachate Transmission System Installation, and is included in *Appendix I*.

6. CONCLUSIONS

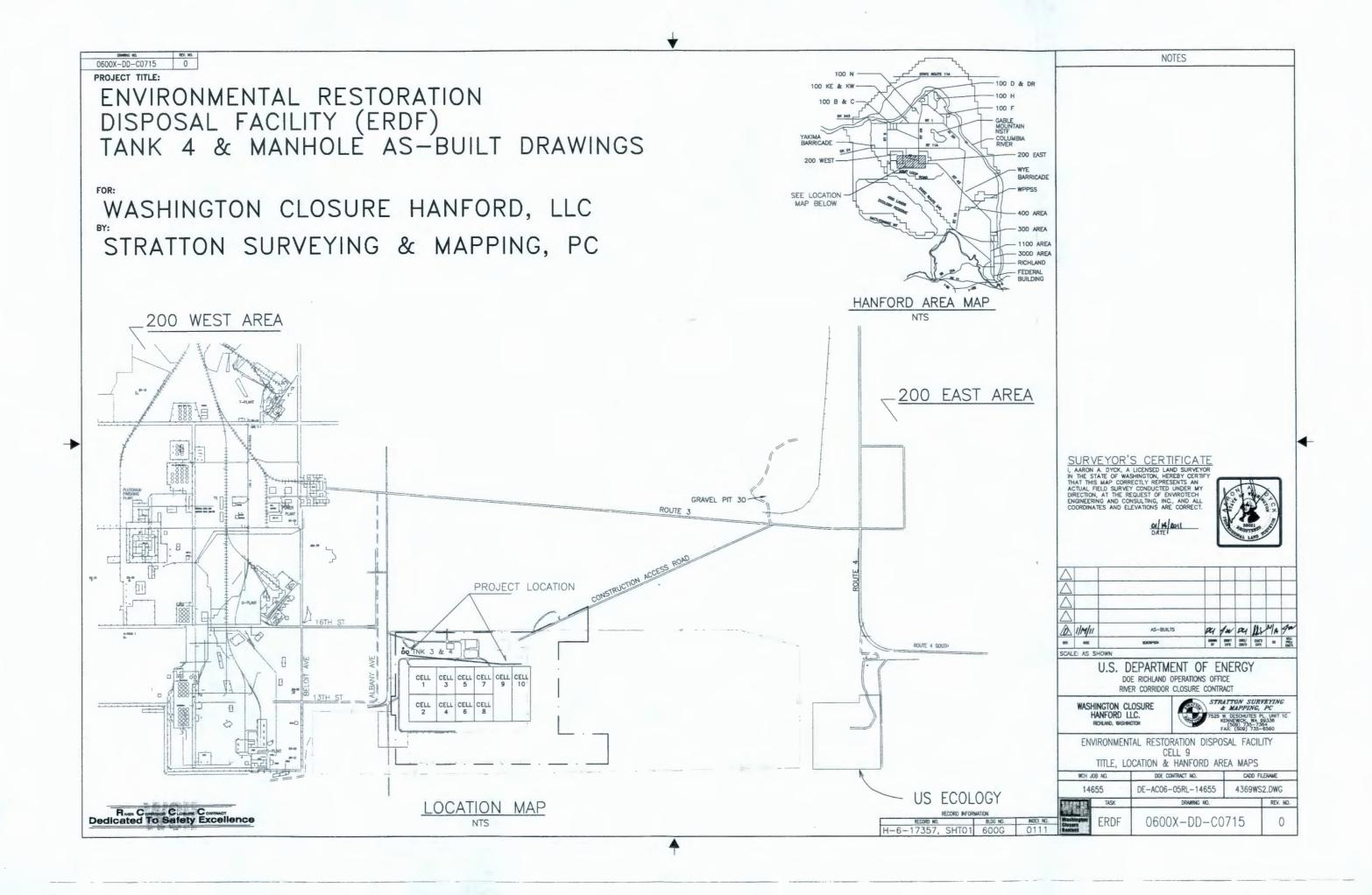
The activities summarized in this report are associated with construction of Super Cell 9 at the Environmental Restoration Disposal Facility (ERDF) located approximately 30-mi. north of Richland, WA, in the 200 West Area of the Hanford Nuclear Reservation. Envirotech Engineering & Consulting, Inc.'s personnel observed all activities associated with facility construction. Based on these observations and the results of the testing conducted, it is Envirotech's opinion that Super Cell 9 has been constructed in compliance with the design drawings and project specification requirements, including the Design Change Notices (DCNs) documented in this report.



APPENDIX A.

"As-Built" Drawings





REV. NO. 0600X-DD-C0716

BEGINNING BREAK CREST PAD BUILDING CENTERLINE EARTHWORK
FINISHED FLOOR ELEVATION
FLOOR
FENCE
LYSIMETER
OPERATIONS
ROAD
SUBGRADE
TOP OF BANK
TOP CENTERLINE
TERMINATION BERMS
TANK

TRENCH
TRADEWIND SERVICES, LLC
VERTICAL ANGLE POINT PRIMARY LEACHATE COLLECTION PIPE
PIPE TRANSMISSION LINE #1
PIPE TRANSMISSION LINE #2
PIPING
SECONDARY RISER PIPE
PRIMARY RISER PIPE
PRIMARY RISER PIPE
PRIMARY TRANSDUCER PIPE
LEACHATE COLLECTION PIPING
ELECTRICAL
ELECTRICAL
BOX
MANHOLE

TANK TOP SHOULDER OF SLOPE

LINER ABBREVIATIONS

SECONDARY LINER
SR SECONDARY REPAIR
SP SECONDARY PANEL

PRIMARY LINER
PR PRIMARY REPAIR
PP PRIMARY PANEL

DRAWING LIST — AS—BUILTS

0600X-DD-C0715
0600X-DD-C0716
0600X-DD-C0717
0600X-DD-C0718
0600X-DD-C0718
0600X-DD-C0719
0600X-DD-C0720
1000X-DD-C0720
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DETAIL IDENTIFICATION

(1) DETAIL IDENTIFICATION SHOWN ON DRAWING AS: THE DETAIL NAME IS DETAIL DESIGNATION OPTIONAL AND LOCATED HERE, FOLLOWING DETAIL 1 CALLOUT 0600X-DD-CO###

> - DRAWING NUMBER WHERE THE STANDARD DETAIL DRAWING IS LOCATED.

> > RECORD INFORMATION

RECORD NO. BLDG NO. H-6-17358, SHT01 600G

(2) ON DRAWING NUMBER OGOOX-DD-- THIS DETAIL IDENTIFIED AS:

-DETAIL DESIGNATION DETAIL NAME SCALE: AS DESIGNATED,

- DRAWING ON WHICH THE SECTION CUT

NOTES

1. ALL COORDINATES LISTED HEREIN ENDING WITH A * WERE SUPPLIED BY TRADEWIND SERVICES, LLC AND NOT VERIFIED BY THE

SURVEYOR'S CERTIFICATE
I, AARON A. DYCK, A LICENSED LAND SURVEYOR
IN THE STATE OF WASHINGTON, HEREBY CERTIFY
THAT THIS MAP CORRECTLY REPRESENTS AN
ACTUAL FIELD SURVEY CONDUCTED UNDER MY
DIRECTION, AT THE REQUEST OF ENVIROTECH
ENGINEERING AND CONSULTING, INC., AND ALL
COORDINATES AND ELEVATIONS ARE CORRECT.





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U.S. DEPARTMENT OF ENERGY DOE RICHLAND OPERATIONS OFFICE

RIVER CORRIDOR CLOSURE CONTRACT WASHINGTON CLOSURE

HANFORD LLC.

STRATTON SURREYING
MAPPING, PC
7525 W. DESCHUTES PL. UNIT 1C
KENNEMOK, WA 93336
(S09) 735-7364
FAX: (S09) 735-6560

ENVIRONMENTAL RESTORATION DISPOSAL FACILITY CELL 9 SYMBOLS. ABBREVIATIONS & DRAWING LIST

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| WCH JOB NO. | DOE CONTRACT NO. | CADD FILENAME |
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REV. NO. **ERDF** 0600X-DD-C0716 0

Res Common Common Common Dedicated To Safety Excellence

REV. NO. NOTES 0600X-DD-C0717 L SURVEY DATUM
VERTICAL: NAVD 88
HORIZONTAL: NAD 83 (91) 2. SEE DRAWING NO. 0600X-DD-C0718, FOR SECONDARY & PRIMARY REPAIR 3. ALL COORDINATES LISTED HEREIN ENDING WITH " WERE LOCATED UTILIZING THE SEAM TRACKING THE CQA GEOSYNTHETICS LEAD, AS PROVIDED FOR IN CQA NCR-03. 1. TANK LINER AS-BUILT REFERENCE; EDGE OF TANK PANEL BREAK LINE SR197 SR200 M SR10 GROUT TANK SECTION VIEW SR29 PR67 SR150 PANEL ARC PR35 \$k69/ \$R63/5/ PR33C Pio FLOOR DRAIN DSR35 PR32 PR30 DSR36 PRO5 SR75 SR08 PR74* PR26 PR25 * PR28 • PR29 SURVEYOR'S CERTIFICATE SR38 PR75* I, AARON A DYCK, A LICENSED LAND SURVEYOR IN THE STATE OF WASHINGTON, HEREBY CERTIFY THAT THIS MAP CORRECTLY REPRESENTS AN ACTUAL FIELD SURVEY CONDUCTED UNDER MY DIRECTION, AT THE REQUEST OF ENVIRONMENT AND ALL COORDINATES AND ELEVATIONS ARE CORRECT. SR59 PR76* PR23 CF PR22 (0) 20 PANEL BREAK PANEL ARC EDGE OF TANK as for as In Me for AS-BUILTS WALL (TYPICAL) BRINGS DISK DISK DE MICH BY DISK BETE DISK DE MICH BETE WALL (TYPICAL) NEX. INCE SCALE: AS SHOWN U.S. DEPARTMENT OF ENERGY DOE RICHLAND OPERATIONS OFFICE RIVER CORRIDOR CLOSURE CONTRACT **STRATTON SURVEYING & MAPPING, PC ***

**TS25 %. DESCHUTES PL. UNIT 1C **

**ENNEWCK, WA, 99336 (506) 735—736-7660 783: (509) 735—5560 TANK 4 SECONDARY LINER TANK 4 PRIMARY LINER WASHINGTON CLOSURE HANFORD LLC. ENVIRONMENTAL RESTORATION DISPOSAL FACILITY CELL 9 TANK 4 LINER AS-BUILT WCH JOB NO. DOE CONTRACT NO. CADD FILENAME 14655 DE-AC06-05RL-14655 4369WS2.DWG REV. NO. DRAWING NO. RNIR Company Closume Contract
Dedicated To Safety Excellence 0600X-DD-C0717 RECORD NO. BLDG NO. NOEX NO. H-6-17359, SHT01 600G 0111 0

REV. NO. 0600X-DD-C0718

| | | AIRS (WA | | PLANE, FT) | - | DARY REP | | | PLANE, FT |
|-------|-----------|------------|--------|-------------|-------|-----------|------------|--------|-----------|
| POINT | NORTHING | EASTING | ELEV | DESC | POINT | NORTHING | EASTING | ELEV | DESC |
| 40000 | 442162.23 | 1865378.10 | 701.41 | SR ARC SEAM | 40060 | 442180.50 | 1865329.64 | 700.40 | SR009 PO |
| 40001 | 442165.09 | 1865379.21 | 701.37 | SR ARC SEAM | 40061 | 442181.22 | 1865331.34 | 700.38 | SR009 P0 |
| 40002 | 442168.66 | 1865380.43 | 701.34 | SR ARC SEAM | 40062 | 442179.16 | | 700.40 | SR009 P0 |
| 40003 | 442176.98 | 1865381.99 | 701.36 | SR ARC SEAM | 40063 | 442222.52 | 1865312.33 | 701.26 | SR010 C0 |
| 40004 | 442171.42 | 1865381.10 | 701.33 | SR ARC SEAM | 40064 | 442223.46 | 1865313.44 | | SR010 C0 |
| 40005 | 442181.71 | 1865381.73 | 701.32 | SR ARC SEAM | 40065 | 142219.96 | 1865315.99 | 701.13 | SR010 C0 |
| | | | | SR ARC SEAM | 40066 | 442219.13 | 1865314.85 | 701.12 | SR010 CO |
| 40006 | 442185.94 | 1865381,09 | 701.31 | SR ARC SEAM | 40067 | 442175.89 | | 700.71 | SROTO CO |
| 40007 | 442194.97 | 1865378.70 | 701.28 | | | | | | |
| 40008 | 442202.22 | 1865377.03 | 701.34 | SR ARC SEAM | 40068 | 442197.53 | | 700.85 | SR01 |
| 40009 | 442207.06 | 1865374.47 | 701.32 | SR ARC SEAM | 40069 | 442184.20 | 1865284.00 | 707.15 | SR01 |
| 40010 | 442214.40 | 1865368.85 | 701.18 | SR ARC SEAM | 40070 | 442133.58 | | | SR01 |
| 40011 | 442217.57 | 1865365.31 | 701.20 | SR ARC SEAM | 40071 | 442133.49 | 1865320.23 | 100000 | SR01 |
| 40012 | 442224.96 | 1865353.72 | 701.27 | SR ARC SEAM | 40072 | 442208.14 | 1865292.31 | 701.34 | SR01 |
| 40013 | 442227.05 | 1865348.77 | 701.25 | SR ARC SEAM | 40073 | 442211.24 | 1865294.36 | 701.44 | SR01 |
| 40014 | 442228.75 | 1865342.95 | 701.33 | SR ARC SEAM | 40074 | 442216.45 | | 701.42 | SR01 |
| 40015 | 442229.45 | 1865333.50 | 701.27 | SR ARC SEAM | 40075 | 442221.16 | 1865303.80 | 701.40 | SR01 |
| 40016 | 442229.40 | 1865327.54 | 701.28 | SR ARC SEAM | 40076 | 442224.83 | 1865309.51 | 701.38 | SR01 |
| 40017 | 442228.18 | 1865322.43 | 701.31 | SR ARC SEAM | 40077 | 442227.01 | 1865314.63 | 701.36 | SR02 |
| 40018 | 442225.66 | 1865315.16 | 701.34 | SR ARC SEAM | 40078 | 442229.24 | 1865321.99 | 701.34 | SRO |
| 40019 | 442223.52 | 1865310.10 | 701.38 | SR ARC SEAM | 40079 | 442230.73 | 1865326.96 | 701.34 | SR02 |
| 40020 | 442224.21 | 1865311.96 | 701.33 | SR ARC SEAM | 40080 | 442229.25 | 1865327.42 | 701.29 | SR02 |
| 40021 | 442220.29 | 1865305.11 | 701.36 | SR ARC SEAM | 40081 | 442230.78 | 1865333.45 | 701.38 | SR02 |
| 40022 | 442215.43 | 1865299.36 | 701.40 | SR ARC SEAM | 40082 | 442229.44 | | 701.36 | SR024 CC |
| 40023 | 442210.53 | 1865295.28 | 701.40 | SR ARC SEAM | 40083 | 442231.29 | | | SR024 CC |
| | | | 701.39 | SR ARC SEAM | 40084 | 442231.50 | 1865337.92 | 702.38 | SR024 CC |
| 40024 | 442207.73 | 1865293.35 | 701.43 | SR ARC SEAM | 40085 | | 1865337.69 | 701.35 | |
| 10025 | 442158.54 | 1865375.99 | | | - | | | | |
| 40026 | 442154.19 | 1865373.20 | 701.48 | SR ARC SEAM | 40086 | | 1865342.93 | 701.40 | SR02 |
| 40027 | 442150.74 | 1865370.80 | 701.43 | SR ARC SEAM | 40087 | 442228.78 | | 701.38 | SR02 |
| 40028 | 442147.38 | 1865367.38 | 701.39 | SR ARC SEAM | 40088 | | 1865354.22 | | SR02 |
| 40029 | 442138.53 | 1865354.10 | 701.39 | SR ARC SEAM | 40089 | 442218.70 | 1865366.11 | 701.26 | SR02 |
| 40030 | 442136.92 | 1865350.47 | 701.35 | SR ARC SEAM | 40090 | 442213.06 | 1865304.05 | 701.21 | SR02 |
| 40031 | 442135.53 | 1865347.08 | 701.46 | SR ARC SEAM | 40091 | 442215.49 | 1865369.62 | 701.29 | SR03 |
| 40032 | 442134.51 | 1865340.57 | 701.45 | SR ARC SEAM | 40092 | 442211.86 | 1865371.08 | 701.24 | SR031 C0 |
| 40033 | 442134.07 | 1865334.56 | 701.37 | SR ARC SEAM | 40093 | 442213.46 | 1865372.22 | 702.10 | SR031 C0 |
| 40034 | 442134.53 | 1865326.21 | 701.35 | SR ARC SEAM | 40094 | 442214.98 | 1865371.54 | 701.97 | SR031 C0 |
| 40035 | 442137.49 | 1865316.76 | 701.39 | SR ARC SEAM | 40095 | 442213.28 | 1865369.96 | 701.19 | SR031 CC |
| 40036 | 442138.70 | 1865313.57 | 701.37 | SR ARC SEAM | 40096 | 442207.93 | 1865376.00 | 701.39 | SR03 |
| 40037 | 442141.29 | 1865309.02 | 701.38 | SR ARC SEAM | 40097 | 442199.36 | 1865377.22 | 701.30 | SR033 C0 |
| 40037 | 442143.59 | 1865305.78 | 701.39 | SR ARC SEAM | 40098 | 442200.69 | 1865379.46 | 701.36 | SR033 CC |
| | | | | | 40098 | 442202.49 | 1865379.46 | 701.47 | |
| 40039 | 442148.84 | 1865299.41 | 701.42 | | | | | - | SR033 CC |
| 40040 | 442154.09 | 1865294.61 | 701.46 | SR ARC SEAM | 40100 | 442201.66 | 1865376.13 | | SR033 CO |
| 40041 | 442161.62 | 1865290.27 | 701.48 | SR ARC SEAM | 40101 | 442196.50 | 1865378.34 | 701.28 | SR034 CC |
| 40042 | 442170.95 | 1865287.53 | 701.47 | SR ARC SEAM | 40102 | 442193.49 | 1865379.18 | 701.30 | SR034 CC |
| 10043 | 442178.33 | 1865286.43 | 701.41 | SR ARC SEAM | 40103 | 442194.77 | 1865381.67 | 701.38 | SR034 CC |
| 10044 | 442185.48 | 1865286.55 | 701.42 | SR ARC SEAM | 40104 | 442196.93 | 1865380.89 | 701.40 | SR034 CC |
| 10045 | 442195.29 | 1865288.13 | 701.37 | SR ARC SEAM | 40105 | 442186.07 | 1865382.79 | 701.32 | SR03 |
| 40046 | 442131.84 | 1865332.24 | 705.13 | SR001 | 40106 | 442182.10 | 1865383.13 | 701.41 | SR03 |
| 10047 | 442132.35 | 1865331.77 | 705.10 | SR001 | 40107 | 442177.20 | 1865382.75 | 701.39 | SRO |
| 40048 | 442214.70 | 1865372.02 | 702.47 | SR003 | 40108 | 442171.50 | 1865381.85 | 701.35 | SR03 |
| 10049 | 442141.63 | 1865359.06 | 701.37 | SROO4 COR | 40109 | 442165.72 | 1865379.99 | 701.38 | SRO. |
| 10050 | 442140.78 | 1865357.99 | 701.38 | SR004 COR | 40110 | 442162.13 | 1865379.12 | 701.41 | SR04 |
| 40051 | 442138.95 | 1865359.18 | 701.41 | SR004 COR | 40111 | 442158.13 | 1865377.22 | 701.43 | SRO |
| 0052 | 442139.49 | 1865360.13 | 701.42 | SR004 COR | 40112 | 442153.95 | 1865374.27 | 701.43 | SR04 |
| 10053 | 442154.15 | 1865363.06 | 701.42 | SR005 | 40113 | 442150.20 | 1865371.75 | 701.42 | SR04 |
| _ | | | _ | | | | | _ | |
| 40054 | 442163.42 | 1865356.22 | 700.92 | SR006 | 40114 | 442146.72 | 1865368.27 | 701.39 | SR04 |
| 40055 | 442162.00 | 1865357.31 | 701.00 | SR006 | 40115 | 442143.73 | 1865364.71 | 701.38 | SR04 |
| 40056 | 442151.22 | 1865310.81 | 701.23 | SR007 | 40116 | 442137.45 | 1865355.57 | 701.40 | SR04 |
| 40057 | 442182.50 | 1865332.65 | 700.37 | SROOB POC | 40117 | 442135.91 | 1865351.06 | 701.36 | SR04 |
| 40058 | 442182.92 | 1865334.57 | 700.37 | SR008 POC | 40118 | 442134.50 | 1865347.52 | 701.45 | SR04 |
| 40059 | | 1865333.95 | 700 17 | SROOB POC | 40119 | 442133.36 | 1865341.21 | 701.47 | SR04 |

| SECON | IDARY REP | AIRS (WA | STATE | PLANE, FT) |
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| POINT | NORTHING | EASTING | ELEV | DESC |
| 40120 | 442132.22 | 1865335.10 | 701.39 | SR050 |
| 40121 | 442133.23 | 1865325.88 | 701.36 | SR05 |
| 40122 | 442135.72 | 1865316.59 | 701.42 | SR052 |
| 40123 | 442137.19 | 1865313.15 | 701.40 | SR053 |
| 40124 | 442139.66 | 1865308.28 | 701.39 | SR054 |
| 40125 | 442141.86 | 1865305.01 | 701.43 | SR055 |
| 40126 | 442144.52 | 1865301.92 | 701.41 | SR056 |
| 40127 | 442147.20 | 1865298.60 | 701.43 | SR057 |
| 40128 | 442153.08 | 1865293.60 | 701.45 | SR058 |
| 40129 | 442170.44 | 1865285.59 | 701.43 | SR059 |
| 40130 | 442178.08 | 1865284.73 | 701.44 | SR060 |
| 40131 | 442185.32 | 1865284.77 | 701.42 | SR06 |
| 40132 | 442188.27 | 1865286.65 | 701.41 | SR062 COF |
| 40133 | 442190.22 | 1865286.91 | 701.39 | SR062 COR |
| 40134 | 442190.39 | 1865284.69 | 701.44 | SR062 COF |
| 40135 | 442188.74 | 1865284.38 | 701.49 | SR062 COF |
| 40136 | 442196.32 | 1865286.87 | 701.44 | SR053 |
| 40137 | 442212.38 | 1865348.86 | 700.89 | SR064 |
| 40138 | 442166.18 | 1865369.13 | 701.09 | SR065 |
| 40139 | 442183.72 | 1865373.38 | 701.16 | SR066 P00 |
| 40140 | 442182.08 | 1865372.82 | 701.19 | SR066 P00 |
| 40141 | 442182.39 | 1865375.14 | 701.14 | SR066 P00 |
| 40142 | 442149.58 | 1865364.99 | 701.30 | SR067 |
| 40143 | 442221.72 | 1865309.02 | 701.33 | SR068 COR |
| 40144 | 442223.13 | 1865308.09 | 701.41 | SROSS COR |
| 40145 | 442220.60 | 1865304.71 | 701.41 | SR068 COR |
| 40146 | 442219.34 | 1865305.54 | 701.32 | SR068 COR |
| 40147 | 442195.37 | 1865288.83 | 701.37 | SRO69 COR |
| 40148 | 442195.87 | 1865287.61 | 701.40 | SR069 COR |
| 40149 | 442199.94 | 1865289.04 | 701.35 | SRO69 COR |
| 40150 | 442199.40 | 1865290.41 | 701.34 | SR069 COF |
| 40151 | 442161.25 | 1865289.44 | 701.43 | SR070 |
| 40152 | 442165.72 | 1865379.99 | 701.38 | SR07 |
| 40153 | 442144.50 | 1865363.42 | 701.39 | SR072 |
| 40154 | 442138.57 | 1865354.46 | 701.41 | SR073 |
| 40155 | 442145.37 | 1865349.57 | 0.00 | SR074 |
| 40156 | 442181.15 | 1865330.01 | 700.46 | SR075 |
| 40157 | 442138.70 | 1865354.36 | 701.41 | SR076 |
| 40158 | 442134.46 | 1865326.17 | 701.43 | SR077 |
| 40159 | 442146.54 | 1865298.24 | 701.56 | SR078 |

| POINT | NORTHING | EASTING | ELEV | DESC | POINT | NORTHING | EASTING | ELEV | DESC |
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| 42000 | 442178.33 | | 701.48 | | 42060 | 442175.71 | 1865333.66 | 700.54 | PR29 |
| 42001 | 442166.44 | 1865288.35 | 701.56 | PR ARC SEAM | 42061 | 442180.18 | 1865334.84 | 700.45 | PR30 |
| 42002 | 442155.63 | 1865293.72 | 701.52 | PR ARC SEAM | 42062 | 442183.14 | 1865335.43 | | PR3 |
| 42003 | 442146.B1 | 1865300.90 | 701.52 | PR ARC SEAM | 42063 | 442183.94 | 1865332.72 | 700.40 | PR3 |
| 42004 | 442140.03 | 1865309.51 | 701.46 | PR ARC SEAM | 42064 | 442180.42 | 1865332.30 | 700.41 | PR36 |
| 42005 | 442135.42 | 1865319.56 | 701.49 | PR ARC SEAM | 42065 | 442140.47 | 1865361.15 | 0.00 | PR31 |
| 42006 | 442133.12 | 1865332.19 | 701.46 | PR ARC SEAM | 42066 | 442185.75 | 1865285.52 | 701.47 | PR3 |
| 42007 | 442134.36 | 1865343.96 | 701.57 | PR ARC SEAM | 42067 | 442196.14 | 1865287.47 | 701.47 | PR3 |
| 42008 | 442139.35 | 1865357.48 | 701.53 | PR ARC SEAM | 42068 | 442199.62 | 1865288.85 | 701.40 | PR34 |
| 42009 | 442144.07 | 1865364.51 | 701.42 | PR ARC SEAM | 42069 | 442203.63 | 1865290.68 | 701.40 | PR3 |
| 42010 | 442144.70 | 1865365.85 | 701.40 | PR ARC SEAM | 42070 | 442206.30 | 1865292.25 | 701.43 | PR3 |
| 42011 | 442146.30 | 1865366.77 | 701.41 | PR ARC SEAM | 42071 | 442209.34 | 1865294.04 | 701.37 | PR3 |
| 42012 | 442149.23 | 1865369.77 | 701.39 | PR ARC SEAM | 42072 | 442213.76 | 1865297.41 | 701,40 | PR3 |
| 42013 | 442158.55 | 1865376.58 | 701.49 | PR ARC SEAM | 42073 | 442216.86 | 1865300.23 | 701.45 | PR3 |
| 42014 | 442169.24 | 1865380.73 | 701.39 | PR ARC SEAM | 42074 | 442223.27 | 1865308.33 | 701.42 | PR4 |
| 42015 | 442179.10 | 1865382.70 | 701.42 | PR ARC SEAM | 42075 | 442224.54 | 1865310.75 | 701.41 | PR4 |
| 42016 | 442203.01 | 1865377.62 | 701.35 | PR ARC SEAM | 42076 | 442225.66 | 1865317.97 | 701.30 | PR4 |
| 42017 | 442221.45 | 1865360.58 | 701.25 | PR ARC SEAM | 42077 | 442227.04 | 1865317.32 | 701.39 | PR4 |
| 42018 | 442226.47 | 1865350.82 | 701.31 | PR ARC SEAM | 42078 | 442227.60 | 1865319.22 | 701.36 | PR4 |
| 42019 | 442228.69 | 1865343.22 | 701.33 | PR ARC SEAM | 42079 | 442226.28 | 1865319.55 | 701.28 | PR4 |
| 42020 | 442229.61 | 1865333.39 | 701.32 | PR ARC SEAM | 42080 | 442228.98 | 1865321.82 | 701.41 | PR4 |
| 42021 | 442227.93 | 1865321.50 | 701.35 | PR ARC SEAM | 42081 | 442229.96 | 1865326.39 | 701.40 | PR4 |
| 42022 | 442224.28 | 1865312.19 | 701.39 | PR ARC SEAM | 42082 | 442230.56 | 1865332.19 | 701.37 | PR4 |
| 42023 | 442217.70 | 1865302.33 | 701.42 | PR ARC SEAM | 42083 | 442230.33 | 1865335.18 | 701.45 | PR4 |
| 42024 | 442207.97 | 1865294.27 | 701.38 | PR ARC SEAM | 42084 | 442229.78 | 1865342.01 | 701.43 | PR4 |
| 42025 | 442197.97 | 1865289.10 | 701.38 | PR ARC SEAM | 42085 | 442229.41 | 1865344.73 | 701.40 | PR4 |
| 42026 | 442184.50 | 1865286.16 | 701.45 | PR ARC SEAM | 42086 | 442228.19 | 1865348.76 | 701.41 | PR4 |
| 42027 | 442157.68 | 1865289.74 | 702.22 | PR001 | 42087 | 442226.45 | 1865353.36 | 701.42 | PR5 |
| 42028 | 442209.94 | 1865354.71 | 700.95 | PR002 | 42088 | 442224.90 | 1865355.84 | 701.34 | PR5 |
| 42029 | 442188.99 | 1865370.00 | 701.05 | PR003 | 42089 | 442223.44 | 1865358.72 | 701.36 | PR5 |
| 42030 | 442225.63 | 1865315.99 | 701.36 | PR004 | 42090 | 442219.06 | 1865364.94 | 701.31 | PR5 |
| 42031 | 442183.09 | 1865372.91 | 701.17 | PR005 | 42091 | 442217.07 | 1865367.82 | 701.37 | PR5 |
| 42032 | 442183.55 | 1865374.60 | 701.10 | PR005 | 42092 | 442208.01 | 1865375.48 | 701.47 | PR5 |
| 42033 | 442181.76 | 1865374.69 | 701.12 | PR005 | 42093 | 442202.17 | 1865378.73 | 701.51 | PR5 |
| 42034 | 442181.63 | 1865373.44 | 701.17 | PR005 | 42094 | 442196.32 | 1865380.94 | 701.50 | PR5 |
| 42035 | 442177.17 | 1865352.64 | 700.79 | PR007 | 42095 | 442188.72 | 1865382.76 | 701.50 | PR5 |
| 42036 | 442176.25 | 1865351.35 | 700.79 | PR007 | 42096 | 442182.28 | 1865383.03 | 701.48 | PR5 |
| 42037 | 442173.02 | 1865353.81 | 700.90 | PR007 | 42097 | 442175.32 | 1865382.64 | 701.47 | PR6 |
| 42038 | 442173.80 | 1865354.98 | 700.84 | PR007 | 42098 | 442160.41 | 1865378.16 | 701.49 | PRE |
| 42039 | 442138.61 | 1865357.33 | 701.57 | PR008 | 42099 | 442155.70 | 1865375.54 | 701.46 | PR6 |
| 42040 | 442136.40 | 1865352.15 | 701.43 | PR009 | 42100 | 442151.97 | 1865372.89 | 701.49 | PR6 |
| 42041 | 442134.36 | 1865347.30 | 701.57 | PR10 | 42101 | 442149.47 | 1865370.60 | 701.44 | PR6 |
| 42042 | 442132.94 | 1865339.66 | 701.50 | PR11 | 42102 | 442143.01 | 1865364.10 | 701.48 | PR6 |
| 42043 | 442132.41 | 1865334.69 | 701.46 | PR12 | 42103 | 442204.60 | 1865292.40 | 701.40 | PR6 |
| 42044 | 442133.27 | 1865329.25 | 701.40 | PR13 | 42104 | 442209.07 | 1865352.54 | 700.89 | PR6 |
| 42045 | 442135.41 | 1865317.82 | 701.47 | PR14 | 42105 | 442228.64 | 1865331.18 | 701.25 | PR6 |
| 42046 | 442136.98 | 1865314.17 | 701.55 | PR15 | 42106 | 442230.38 | 1865331.04 | 701.35 | PR6 |
| 42047 | 442139.60 | 1865309.19 | 701.46 | PR16 | 42107 | 442229.81 | 1865327.41 | 701.33 | PR6 |
| 42048 | 442141.47 | 1865305.72 | 701.49 | PR17 | 42108 | 442228.25 | 1865327.50 | 701.26 | PR6 |
| 42049 | 442144.18 | 1865302.86 | 701.48 | PR18 | 42109 | 442135.85 | 1865346.66 | 701.48 | PR6 |
| 42050 | 442147.43 | 1865299.18 | 701.53 | PR19 | 42110 | 442134.82 | 1865342.74 | 701.50 | PR6 |
| 42051 | 442151.34 | 1865295.70 | 701.47 | PR20 | 42111 | 442133.36 | 1865343.11 | 701.53 | PR6 |
| 42052 | 442154.91 | 1865293.21 | 701.49 | PR21 | 42112 | 442134.20 | 1865346.64 | 701.54 | PR6 |
| 42053 | 442160.15 | 1865290.09 | 701.49 | PR22 | 42113 | 442224.90 | 1865353.84 | 0.00 | PR71 |
| 42054 | 442162.53 | 1865288.86 | 701.55 | PR23 | 42114 | 442195.08 | 1865310.86 | 0.00 | PR72 |
| 42055 | 442169.07 | 1865286.72 | 701.50 | PR24 | 42115 | 442189.97 | 1865287.46 | 0.00 | PR73 |
| 42056 | 442174.32 | 1865285.51 | 701.49 | PR25 | 42116 | 442177.57 | 1865285.21 | 0.00 | PR74 |
| 42057 | 442177.57 | 1865285.21 | 701.50 | PR26 | 42117 | 442170.37 | 1865287.21 | 0.00 | PR75 |
| 42058 | 442179.36 | 1865375.09 | 701.23 | PR27 | 42118 | 442152.98 | 1865288.66 | 0.00 | PR76 |
| 42059 | 442176 43 | 1865287.96 | 701.42 | PR28 | 42119 | 442142.76 | 100576767 | 0.00 | PR77 |

NOTES

1. SURVEY DATUM
VERTICAL: NAVD 88
HORIZONTAL: NAD 83 (91)

2. SEE DRAWING NO. 0600X-DD-C0717, FOR SECONDARY & PRIMARY REPAIR LOCATIONS.

3. ALL COORDINATES LISTED HEREIN ENDING WITH * WERE LOCATED UTILIZING THE SEAM TRACKING THE CQA GEOSYNTHERICS LEAD, AS PROVIDED FOR IN CQA NCR-03.

SURVEYOR'S CERTIFICATE

1, AARON A. DYCK, A LICENSED LAND SURVEYOR
IN THE STATE OF WASHINGTON, HEREBY CERTIFY
THAT THIS MAP CORRECTLY REPRESENTS AN
ACTUAL FIELD SURVEY CONDUCTED UNDER MY
DIRECTION, AT THE REQUEST OF ENVIROTECH
ENGINEERING AND CONSULTING, INC., AND ALL
COORDINATES AND ELEVATIONS ARE CORRECT.

01 M 2010





U.S. DEPARTMENT OF ENERGY

DOE RICHLAND OPERATIONS OFFICE RIVER CORRIDOR CLOSURE CONTRACT

WASHINGTON CLOSURE HANFORD LLC. RICHARD, WASHINGTON



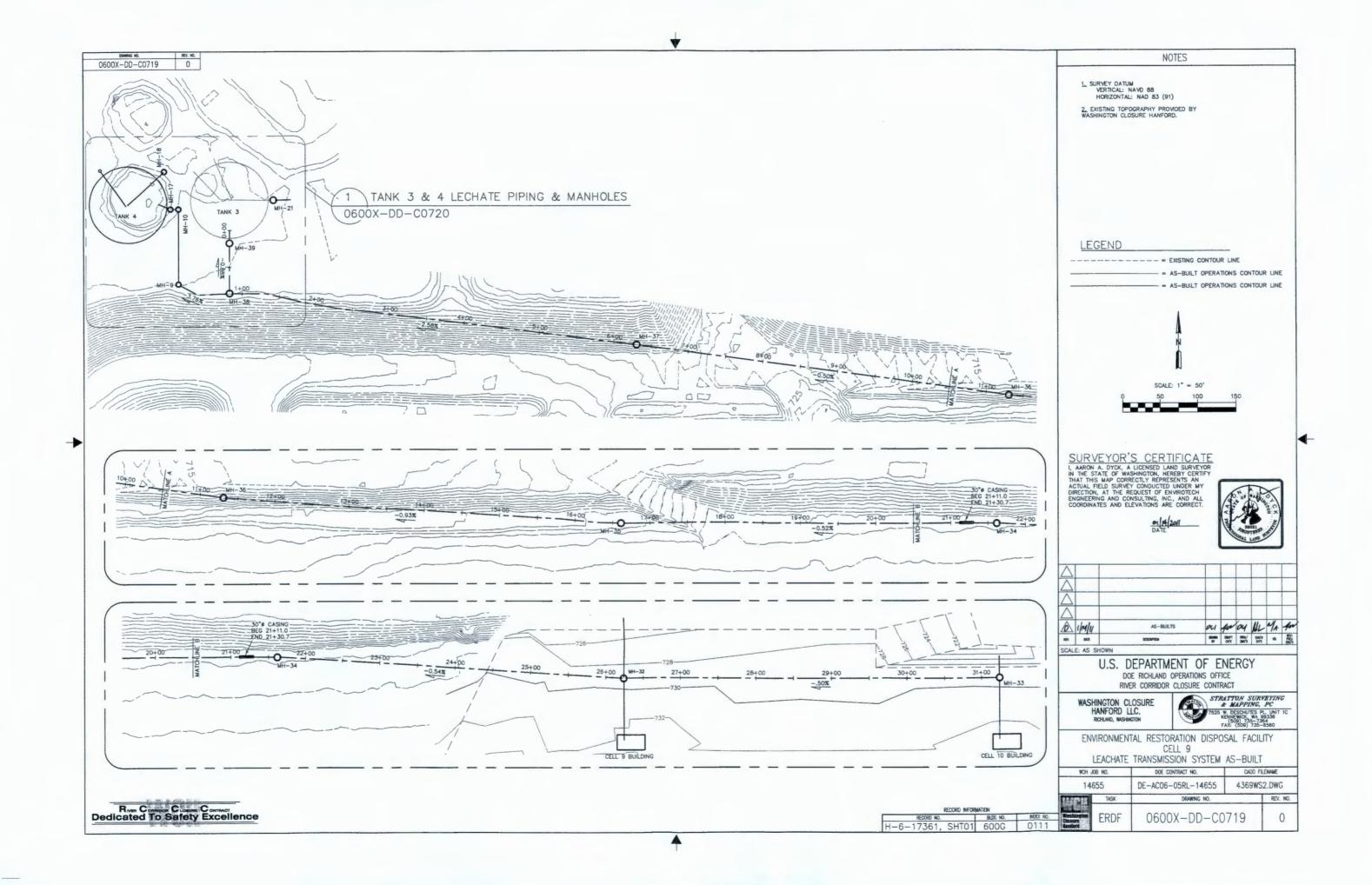
ENVIRONMENTAL RESTORATION DISPOSAL FACILITY CELL 9

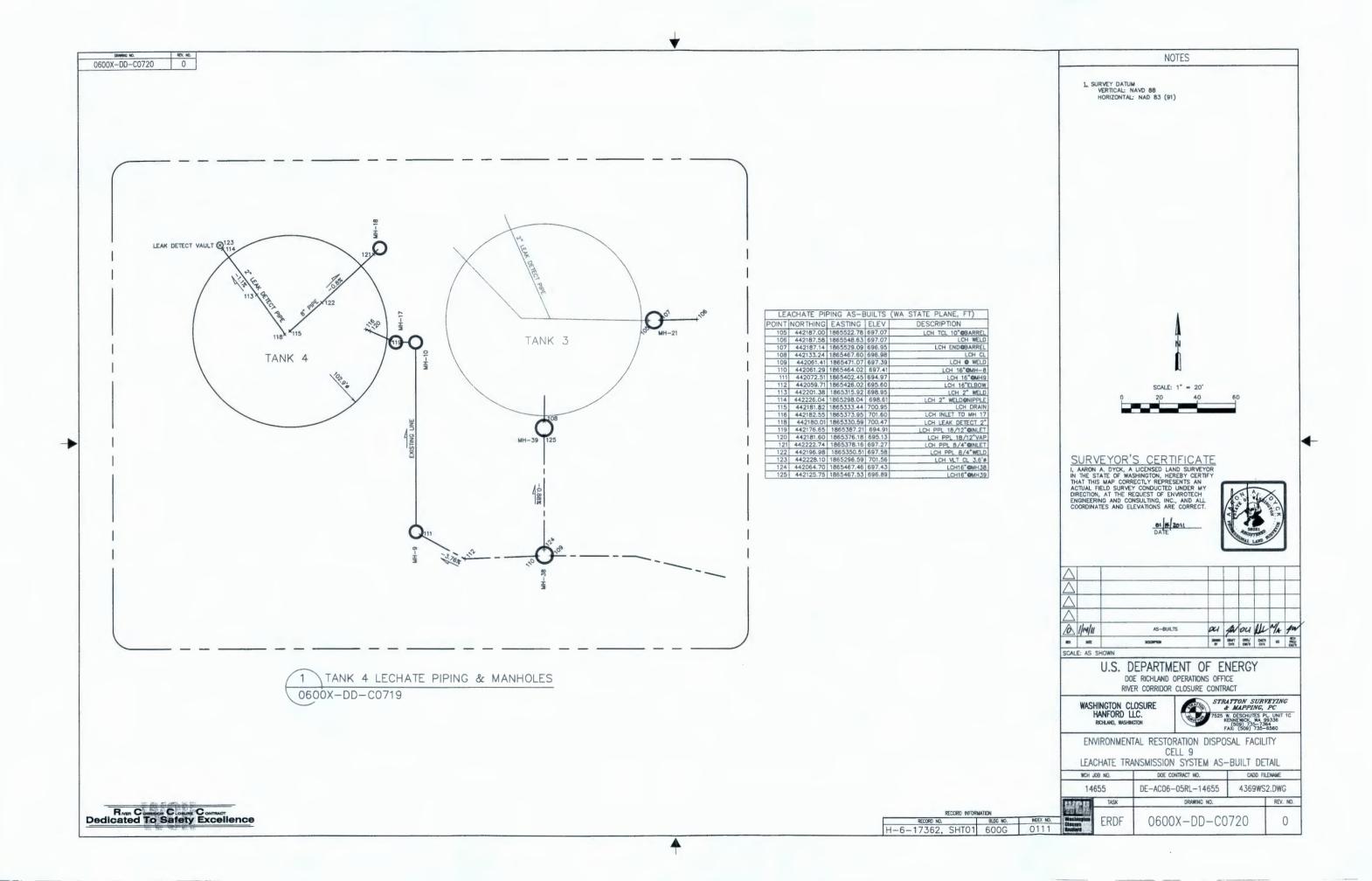
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| Weshington Chasers | ERDF | 0600X-DD-C0 | 718 | 0 | | | |

River Common Comme Contract
Dedicated To Safety Excellence

RECORD NO. SHOOK NO. HOOK NO.







APPENDIX B.

PIPE PRESSURE TESTING



5-97-001

LEACHATE COLLECTION PIPE SYSTEM CQC REPORT

The contents of this CQC are presented to demonstrate TradeWind Services, LLC is in conformance with specification 0600X-SP-M0032, 3.5, PIPE, VALVES & SPECIALS. Itemized in this reports are segments showing verification of receipt of materials, conformance of materials to the requirements, equipment & device inspection upon installation, and field testing data for installed pipe. Pipe was placed in approximately 500 ft. lengths between newly installed manholes on the north side of the disposal facility. Testing was conducted for the inside and outside of the dual contained pipe using hydrostatic and pneumatic methods, respectively.

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| 12.8 | 12.8 3. Revise and resubmit. Work may proceed prior to resubmission subject to resolution of indicated comments by C. Revise and resubmit. Work may not proceed. | | | | | | | | | | | OLINIA INCHES | 1 | | |
| · | 5. Permission to proceed not required. | | | | | | | | | | | i | | | |
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Cells 9 & 10

Material Receipts

HYDRO TEST REPORT FORM

MCF-9

BMWC Constructors Inc.

| | Gauge Tested in accordance to ASME B31.3 |
|--|--|
| Job Number: 402738 | Unit: Sequence # |
| Equipment Line No.: MH-17 PENETRAT | W, |
| Service: | Test Medium: Water |
| Equipment/System Being Tested: Boiler | Exchanger Furnace |
| Piping [] | Vessel Other |
| Piping System: 12 × 18 CARRIER | For Test Pressures on which system: |
| Test Pressure: 30 - 40 psi | See Specification: 0600X-SP-M0032, Rev 1, 3.5.1 |
| Reason For Test: New Piping Installation | |
| Gauge Manufacturer: NOSHOK Calibration Date: 8-1 | Time: 3.10 Pass/Fail: |
| Mak Erlan | Date CTOR, QA'QC Date CTOR, QA'QC Date CTOR Date D |

| ITEM | QUANITY | SPEC | ACCEPTED | STORED LOCATION |
|--------------------------------|---------|---|------------|-----------------|
| MANHOLE 21 MONDLITHIC 13ASE | 1 EA | 0600x-DD-M0059 | 9/3-22-10 | N/A |
| MH 39 MONO. 1345E | 1 EA | 0600x-DD-M0059 | JU 3-22-10 | / / . |
| 17H 32 MCMO. BASÉ | 1 EA | 6660 x - DD - MOO ST | FW 3-30-10 | NA |
| THH 33 MONO BASE | IEA | 0600x-170-10057 | Th 3-30-10 | NA |
| MH 34 MONO BASE | 1 EA | 0600x-1710-190058 DETAIL 2 | AU 4-9-10 | |
| MH 35 MONO ZASE | 1 EA | | AN 4-9-10 | |
| MH 36 MONO | 1 EA | | PW 4-22-10 | |
| MH 37 MONO 1345E | 1 EA | ₩ | PN 4-22-10 | |
| MH 38 MONO BASE | IEA | 0600x-DD-MOUS9 DETAIL I | 92 6-3-10 | |
| 2' RISERS | | 06CUX-010-17CUST CLCOX-010-17CUSB | 91 9-20-10 | |
| LIDS (21, 33, 38, 31) | | + | Th 9-20-10 | |
| RISERS | 2 EA | | JU 9-23-10 | NIA |
| LIDS | 5 EA | | 74 9-29-10 | |
| RISERS | 2 EA | | 769-29-K | |
| 3' RISEX | 1 EA | D | GW 10-12-X | • |
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| | | R: Page 4 of 1 | | |

| ITEM | YTIMAUD | SPEC | ACCEPTED | STORED LOCATION |
|--------------------------|---------|----------------|--------------------------|-----------------|
| FUSION CAMPUG | 1 EA | CECOX-SP-MODEZ | 1 - | |
| LEAK DETECTION PLACER | 1 EA | | As 9-30-10 | BMLC |
| FUSION COLY-LING | 2 EA | | FL 10-5-10 FL 10-5-10 | BMUC |
| 4" ELBOW | 1 EA | | 962 10-5-10 | BMUC |
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| ITEM | QUANITY | SPEC | ACCEPTED | STORED LOCATION |
|---------------------|---------|-------------------|-----------|-----------------|
| 1/2" TEE | 2 EA | 0600x-512 10032 | 9128-2310 | BMUC |
| 12" RECLYCER TEE | YEA | | | |
| PRIMER | 109 | | | |
| METAL CAN | 6 EA | | | |
| 1'2" CAP | 12 139 | | | |
| 3/4" BALL VALLE | 3 EA | | | |
| 3/4" FLANGE | BEA | | | |
| 1/2" BALL VALLE | 6 EA | | | |
| 3" × 4" REDUCER TEE | 2 EA | | | |
| 4" PIPE PL | 20 FT | | | |
| 3" PIRE PX | 40 FT | | | |
| 1'2" PIPE PKC | 80 FT | | | |
| I" PIPE ACC | 40 FT | | | |
| 5"PIPE PUC | 20 FT | | | |
| GAL. CEMENT | 1 EM | → | 4 | 4 |
| 4" GATE VALVE | IEA | CHANGE NUTICE 34) | 709-14-10 | N/A |
| 12" CATE VALVE | IEA | | | |
| 4' × 31" VALLET | 1 EA | | | |
| 36"×18" VALIT | I EA | | | |
| 13 × 18" % | I EA | | | |
| 4 × 8 TERMINATION |) EA | | | |
| 12 ×18 TERMINATION | IEA | - | | |
| 4×8 PIFE | 40 FT | | | |
| i | 10 FT | B: Page 6 o | 105 | |

| ITEM | QUANITY | SPEC | ACCEPTED | STORED LOCATION |
|---------------------|---------|---------------|-----------|-----------------|
| 4" PLIND FLANCE | 2 EA | OLCOX-SP-MO37 | 907-14-10 | Brac CONEX |
| 3" 90° 5CH. 80 | 17 EA | | A38-23.10 | |
| 3" TEE SCH. 80 | 2 EA | | | |
| 3"x2" BUSHING | 2 EA | | | |
| 2" PLUC | 2 EA | | | |
| 3" FLANGE RWG | 8 EA | | | |
| 11/2 BALL VALLE | 10 EA | | | |
| 1'3" BALL CHECK VAL | 4 EA | | | |
| 13" TEE | 4 EA | | | |
| 4" FLANGE RING | 2 EA | | | |
| 4"x13" TEE | "I EA | | | |
| 4"×3" TEE | 2 EA | | | |
| 4"x3" 13VSHING | 2 EA | | | |
| 3" PLIC | 2 EA | | | |
| 4" 90" | 4 EA | | | |
| 3" BALL VALLE | 4 EA | | | |
| 3" BALL CHECK | 2 EA | | | |
| 12" PLUG | 4 EA | | | |
| 13" 400 | 44 EA | | | |
| 14"×1" BUSHING | 8 EA | | | |
| 1生" FLANGE | 24 EA | | | |
| 14" CASKET | 12 EH | | | |
| BOLT PAGRAGE | 12 84 | 1 | | → |

7

| ITEM | QUANITY | SPEC | ACCEPTED | STORED LOCATION |
|----------------------------|---------|--------------------|------------|-----------------|
| 18" DR 11 | 700 FT. | Obiox-SP-MC032 | 925-100 | BIMUC CONEX |
| 1'4" PIPE | | | | |
| 1 HP PLUMP | 4 EA | c600x - 59 - 10032 | AS 5-24-10 | Breve CONEX |
| 7.5 HP PUMP | 2 EA | + | + | + |
| 1/2" DRII PIPE | 1340 FT | + | 4 | 4 |
| 6" DR 11 PIPE | 600 FT | 0600 X-SP-14032 | 96-1-10 | BMWC CONEX |
| 6" PERF. PIPE | 40 FT. | + | * | V |
| 11 × 3/4 FLANGE ADAPTER | 12 EA | | | |
| 34, BALL VALVE | 6 EA | 4 | V | D |
| 13" POLY GREAT | 4 EA | | 906-10-10 | |
| 3" POLY GROWE | 2 EA | | + | \Diamond |
| STEEL THREAD FITTINGS | YEA | 7 | AU 6-10-1 | 3 BMLK COHEX |
| BOLT KITS | 32 EA | | AU6-22-10 | BMUC CONEX |
| TERMINATION | 3 EA | 1 | TW 6-24-10 | + |
| 6"CAP | 1 EA | 1 | A 6-30-10 | + |
| ELECTRO FUSE COUPLINGS | 6EA | 4 | 227-1-10 | + |
| 4" FITTINGS | 8 EA | | JW 7-6-10 | |
| 6" CAP | IEA | | | |
| 6" DR 11 | 60 FT | | + | . 🛨 |
| 10" CLAMP | 9 EA | 1 | 7W 7-13-K | |
| 3/4" BALL VALVE | IEA | | | |
| RISER CLAMP | IEA | | | |
| 10" GATE VALLE | 1EA | 7 | 7 | 7 |

| ITEM | QUANITY | SPEC | ACCEPTED | STORED LOCATION |
|----------------------------------|---------|---------------------|------------|-----------------|
| 10" BLIND FLANGE | 7 EA | okox-SP-mod32 | QU 4.27-10 | BIMUC CONEX |
| 3" DRH | 40 FT | | | |
| 10"x4" DR 11 REDUCING FEE | 2 EA | | | |
| D''SDR II FABBED TEE | 5 EA | | | |
| 8" DR H | bec FT | 1 | 1 | ∇ |
| Y" DK 17 X Y" END CONTRACIZER | 6 EA | Obcox-SP. Mc032 | AS 4-28-10 | BMWC CONEX |
| 4" CATE VALVE | 4 EA | | 1 | |
| 8" GATE VALVE | 1 EA | | | |
| 10" GATE VALLE |) EA | + | 1 | → |
| 34," PVC FLANGE | 34 EA | OECOX-SP-MOO32 | 9U5-3-K | BMUC CONEX |
| 10 × 16 JOINTS | 80 EA | Obcox-SP-MC032 | 9W 5-4-10 | BriWC CONEX |
| 10 × 16 JUINTS | 1100 FT | | | 1 |
| 8×12 PIPE | 20 FT | | | |
| 12" PERF PIPE | 320 FT | | | |
| 12" DR 11 PIPE | 2240 FT | 4 | 4 | 4 |
| 1" FITTINGS | 4 EA | | |) |
| 3" FITTINGS | 2 EA | 4 | 1 | 4 |
| FLOW MONITOR | 2 EA | CLCOX - \$12-176032 | 9W 5-5-12 | BYTHUC CONEX |
| L'' PERF. PIFE (LEACHATE) | 1380 FT | 06:0x-35-M6032 | AU 5-10-10 | BMUK CONEX |
| 12" PERF. PIPE (SEUM) | 240 FT | | | |
| 18" PEF. PIFE | 50 FT | | | |
| 8" PEUT. PIPE | 60 FT. | | | |
| 12" OK 11 | 920 FT. | 7 | + | 4 |

| ITEM | QUANITY | SPEC | ACCEPTED | STORED LOCATION |
|---------------------------------|-----------|----------------------|-------------|-------------------|
| 10"x 16" TANK | | 0600x-5P-M0032 | Q1 4-20-10 | C.1.1 1. 2 -11/2/ |
| PENETRATIONS |) EA | 2.4 0600x-SP-M032 | 10 | |
| 8"X12" TANK | IEA | 2.4 | AN 4-20-10 | BMUC CONEX |
| PENETRATION 2"DRII X 6"DR 17 | 121 | 06 COX - SP - MCO 32 | 7/1. | |
| TERMINATION | 2 EA | 2.4 | 40 4-20-10 | BYILL CONEX |
| 8" DR 17 x 4" | 11,50 | 0600x-512-10032 | 01.14-20-0 | BMWC CONEX |
| CENTRALIZER | 14 EA | 11 | 700 1201 | BI WE CEMEN |
| 6"OR 17 × 2" | YEA | 0600x-SP-m0032 | FW 4-20-10 | BMAC CONEX |
| CENTRALIZER 12" DR 17 × 8" | 141 | OECOX-SP-MO032 | | |
| CENTRALIZER | 4 EA | | 40 4-20-10 | BMLC CONEX |
| 11 ×3/4 FLANGE | 22 - | 0600x-5P-M0032 | A61 4-22.4 | BMWC CONEX |
| ADAPTER | 32 EA | | 1- 7-22 6 | DI INC CENER |
| 2" DR 11 1PS 900 | 2 EA | 0600x-5P-M0032 | AU4-22-10 | BMUC CONEX |
| ELISON HIPPE | 7 41 | | | |
| 10" DR 11 1PS BACKUP RING | 4 EA | | 90 4-22-10 | BMUX CONEX |
| 8" DR 11 1195 TEE | IEA | | Dill. 22 10 | DWIN CANDO |
| | 10 | 10 | -10 4-22-10 | BMUC CONEX |
| 2" OR 11 × 6" OR 17 | 2 EA | Olcox-SP-Moo32 | 96 4-23-K | BYLL CONEX |
| TERMINATION 2" DK 11 1PS | |) | 1 | |
| FLANGE ADAPTER | 2 EA | | | |
| 2" DR 11 1PS | | | | + |
| BACKUP RING | 2 EA | V | V | ν |
| 10" DR 11 x 16" DR 17 | 14 EA | 0600x-5p-m0032 | C/134-71.V | BMWC CONEX |
| TERMINATION | 1101 | | 100.20 % | DI WE CENEX |
| 10" DR 11 1PS FLANGE ADAPTER | 6 EA | | 1 | |
| ואס ייטא וואס | Δ | | | |
| FLANCE ADAPTER | 8 EA | | | |
| 10" OR 11 iPS | 111-11 | | | |
| BACKUP RING (IRUN) | 14 6/-1 | | | |
| PENF PIPE | | | | |
| B" DR 11 × 12" DR 17 | 0 -1 | | | |
| TERMINATION | 2 EA | | | |
| 10" DR 11 x 16" DR17 | 1200 FT | | | |
| | 1,200 1 . | | | |
| 8" 1122 BLIND | 1 EA | 1 | 77 | 1 |
| FLANGE 8" LYSIMETER WYE | | 1400× 513-140032 | 714 | 7 |
| C LISTICIEN WYC | 2 EA | | FLJ 4-27-10 | BMUC CONEX |
| 4" BLIND FLANGE | 2 EA | i | | } |
| | 701 | + | 45 | + |

| ITEM | QUANITY | SPE | | ACCE | PTED | | RED LOCA | |
|--|---------|--------------------|-------|------|---------|------|----------|----------------|
| 3"DR 11 x 12" DR 17 | 20 FT | 2,9 | Mou32 | 401 | 1.15.10 | BMUC | CCNEX | (EAST SIDE) |
| 4"DR 11 × 8" DR 17 | 260 FT | | | | | | | |
| 2"DR11 × 6" DR 17 | 80 FT | | | | | | | |
| 10"DR 11 × 16" DR 17 | 900 FT | - | | | | | | |
| 2" DRH X 6" DR 17 | 2 EA | 0600x -5P | -m032 | | | | | |
| 10" OR 11 × 16" OR 17 | 1 EA | | | | | | | |
| 8"DR11 × 12" DR 17 | IEA | | | | | | | |
| 4"DR11 ×8"DR17 | 3 EA | | | | | | | |
| 4"DR11 ×8"DK 17 22.5° | I EA | | | | | | | |
| 16" DR 17 x 10" END CENTRALIZER | 14 EA | | | | | | | |
| DID CENTRALIZER | 4 EA | . 💠 | | - | 7 | | 4 | |
| 4" OR 11 × 8" OR 17 | 4 EA | 01.60×-517- 2.4 | | - | 1-19-10 | | CONEX | |
| 2"DR 11 IPS FLANCE ADAPTER | 2 EA | 0600x · Si2 · 1 | mc032 | 90 | 1-19-10 | BMUC | CONE | × |
| 2" LEAK DETECTION PENETRATION | I EA | 2.3 | | | | | | |
| 2" OR 11 × 6" DR 17 END TERMINATION | I EA | 2.4 | | | | | | |
| 4" DR 11 1PS 900 HDPE 3408 | 4 EA | 2.3 | | | | | | |
| 4" DR 11 11-3 PIPE HOPE 3403 ALXVA F714 | 120 FT | 2.3 | | | | | | |
| HI'OR II IPS TEE | 2 EA | 2.3 | | | | | | |
| B" DR 11 1P3 FLANGE ADAPTER 3408 | 2 EA | 2.3 | | | | | | |
| NO" DK 11 INS FLANCE ADAPTER 3408 | 4 EA | 2.3 | | | | | | |
| 4" DR 11 123 FLANGE ADAIPTER | 10 EA | 2,3 | | | | | | |
| 4" DR 11 IPS BACKUP RING DUCTILE IRON | IU EA | 2.3 | 7 | 7 | 7 | | 7 | |
| Y" X 8" TANK PENETRATION | | 060x-5P. | M2032 | qu | 4-20-6 | BILL | CONE | X |

Cells 9 & 10

Hydrostatic & Pneumatic Pressure Tests



Certificate of Calibration

Certification Number: 28750

Customer Name BMWC CONSTRUCTORS, INC

Address:

200 WEST AREA OF HANFORD

RICHLAND, WA 99354

Certification Date:

09-Apr-10

P O #:

402738-1016

Seattle, WA 98108

Re-certification Due:

09-Apr-11

Branom Order #: 428736

Lab Temperature:

72.43° F

Technician:

MIKE MCCARTY

Lab Humidity:

30.93%

Branom Instrument company certifies that the following instrument meets or exceeds all published specifications and has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology. The following certificate applies only to the instrument listed below.

Calibration Procedure:

Calibrated to manufacturer's specifications.

Instrument

Description:

MCDANIEL 4" 0-30PSI 1/2"LM

Serial Number: N/A

Customer ID#: 101121

Tolerance:

± 0.5% F.S.

Condition Found: INTOLERANCE

Condition Left: IN TOLERANCE

service@branom.com

Calibration Standard(s)

Standard Model

Standard Serial

Standard Due

WIKA 65-2000

0511292

05/08/2010

Calibration Readings

| Calibration Standard Reading | Customer Instrument Reading | Acceptance Low | Acceptance High | Units of Measure |
|--|---------------------------------|----------------|---|------------------|
| 0.00 | 0.0 | -0.15 | 0.15 | PSI |
| 15.00 | 15.0 | 14.85 | 15.15 | PSI |
| 30.00 | 30.0 | 29.85 | 30.15 | PSI |
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| | Q.A. Manager | | 4 | 4/9/10 |
| | | (COREY | PORTER | Date of Issue |

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Certificate Revised 12/26/2006

Printed: 12-Apr-10

Page: 1

Instrument Co. Since 1947

RECEIVED

MAY 13 2010

800-767-6051 BRANDM 5500 4th Ave. So. WSTRUMENTATION Seattle, WA 98108

FAX 206-763-4165 service@branom.com

WCH - DOCUMENT

Certificate of Calibration

5012308A00 05.110 000

Certification Number: 28846

Customer Name BMWC CONSTRUCTORS, INC

Service Dept.

Address:

20638 84TH AVE S

KENT, WA 98032

Certification Date:

28-Apr-10

PO#:

Re-certification Due:

28-Apr-11

402738

Lab Temperature:

72.04° F

Branom Order #: 430371 Technician:

COREY PORTER

Lab Humidity:

36.90%

Branom instrument company certifies that the following instrument meets or exceeds all published specifications and has been calibrated using standards whose accuracles are traceable to the National Institute of Standards and Technology. The following certificate applies only to the instrument listed below.

Calibration Procedure:

Calibrated to manufacturer's specifications.

Instrument

Description:

NOSHOK 40.901-60PSI/KPA

Serial Number: 430371

Customer ID#: N/A

Tolerance: ± 1% F.S. Condition Found: IN TOLERANCE

Condition Left:

IN TOLERANCE

Calibration Standard(s)

Standard Model

Standard Serial

Standard Due

WIKA 65-2000

0511292

05/08/2010

Calibration Readings

| alibration Standard Reading | Customer Instrument Reading | Acceptance Low | Acceptance High | Units of Measure |
|--|---------------------------------------|----------------|-----------------|------------------|
| 0.00 | 0.0 | -0.6 | 0.6 | PSI |
| 30.00 | 30.0 | 29.4 | 30.6 | PSI |
| 60.00 | 59.8 | 59.4 | 60.6 | PSI |
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COREY PORTER

Date of Issue

Submitted as 5-110-cog

Branom Instrument Co.

Service Dept. 5500 4th Ave. So. Seattle, WA 98108



800-767-6051 FAX 206-763-4165 service@branom.com

Certificate of Calibration

Certification Number: 29607

Customer Name BMWC CONSTRUCTORS

Address:

20638 84TH AVE S

KENT. WA 98032

Certification Date:

12-Aug-10

P 0 #:

CASH SALE

Re-certification Due:

12-Aug-11

Branom Order #: 438570

Lab Temperature:

73.1° F

Technician:

JESSE LABBE

Lab Humidity:

50.5%

Branom Instrument company certifies that the following instrument meets or exceeds all published specifications and has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology. The following certificate applies only to the instrument listed below.

Calibration Procedure:

Calibrated to manufacturer's specifications.

Instrument

Description:

NOSHOK 40,901-60PSI/KPA

Serial Number: 438570-A

Customer ID#: N/A

Tolerance: ± 1% F.S. Condition Found: IN TOLERANCE

Condition Left:

IN TOLERANCE

Calibration Standard(s)

Standard Model

Standard Serial

Standard Due

WIKA 65-2000

0511292

05/26/2011

Calibration Readings

| Calibration Standard Reading | Customer Instrument Reading | Acceptance Low | Acceptance High | Units of Measure |
|---|---|--|---|---|
| 0.00 | 0.0 | -0.6 | 0.6 | PSI |
| 30.00 | 30.0 | 29.4 | 30.6 | PSI |
| 60.00 | 60.0 | 59.4 | 60.6 | PSI |
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| *************************************** | Q.A. Manager | | 4 | 8/12/10 |

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COREY PORTER

Date of Issue



Service Dapt. 5500 4th Ave. So. Seattle, WA 98108



800-767-6051 FAX 206-763-4165 service@branom.com

Certificate of Calibration

Certification Number: 28531

Customer Name BMWC CONSTRUCTORS

Address:

PO BOX 1316

KENT, WA 98035-1316

Certification Date:

09-Mar-10

P 0 #:

402738-1001

Re-certification Due:

09-Mar-11

Branom Order #: 424942

Lab Temperature:

72.58° F

Technician:

JESSE LABBE

± 0.25% F.S.

Lab Humidity:

30.79%

Branom instrument company certifies that the following instrument meets or exceeds all published specifications and has been calibrated using standards whose accuracies are traceable to the National Institute of Standards and Technology. The following certificate applies only to the instrument listed below.

Calibration Procedure:

Calibrated to manufacturer's specifications.

Instrument

Description:

WIKA 332.54 SERIES P/N 4220081 0-300PSI

Serial Number: 369562

Customer ID#: N/A

Tolerance:

Condition Found: OUT OF TOLERANCE

Condition Left: IN TOLERANCE

Calibration Standard(s)

Standard Model

Standard Serial

Standard Due

DM-T-150

11825

11/19/2011

Calibration Readings

| Calibration Standard Reading | Customer Instrument Reading | Acceptance Low | Acceptance High | Units of Measure |
|---|--|--|-----------------|------------------|
| 0 | 0 | 0.75 | 0.75 | PSI |
| 150 | 150 | 149.25 | 150.75 | PSI |
| 300 | 300 | 299.25 | 300.75 | PSI |
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| *************************************** | Q.A. Manager | 0 | 4 | 2/9/10 |
| | | COREY | | Date of Issue |

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Certificate Revised 12/26/2006

Printed: 15-Mar-10

Page: 1



Service Dept. 5500 4th Ave. So. Seattle, WA 98108



800-767-6051 FAX 206-763-4165 service@branom.com

Certificate of Calibration

Certification Number: 28532

Customer Name BMWC CONSTRUCTORS

Address:

PO BOX 1316

KENT, WA 98035-1316

Certification Date:

09-Mar-10

P O #:

402738-1001

Re-certification Due:

09-Mar-11

Branom Order #: 424942

Lab Temperature:

72.58° F

Technician:

JESSE LABBE

Lab Humidity:

30.79%

Branom Instrument company cartifies that the following instrument meets or exceeds all published specifications and has been calibrated using standards whose accuracles are traceable to the National Institute of Standards and Technology. The following certificate applies only to the instrument listed below.

Calibration Procedure:

Calibrated to manufacturer's specifications.

Instrument

Description:

WIKA 332,54 SERIES P/N 4220081 0-300PSI

Serial Number: 400519-A

Customer ID#: N/A

Tolerance:

± 0.25% F.S.

Condition Found: OUT OF TOLERANCE

Condition Left:

IN TOLERANCE

Calibration Standard(s)

Standard Model

Standard Serial

Standard Due

DM-T-150

11825

11/19/2011

Calibration Readings

| Calibration Standard Reading | Customer Instrument Reading | Acceptance Low | Acceptance High | Units of Measure |
|---|-----------------------------|----------------|-----------------|------------------|
| 0 | 0 | -0.75 | 0.75 | PSI |
| 150 | 150 | 149.25 | 150.75 | PSI |
| 300 | 300 | 299.25 | 300.75 | PSI |
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| *************************************** | Q.A. Manager | 0 | 1 | 3/9/10 |

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COREY PORTER

Date of Issue

MCF-9

| 一十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二十二 | सन्दर्भके देशके देशके का स्थापन स | Gauge Tested in accordance | | WARRY HAC |
|---|--|-------------------------------------|---------------|-----------|
| Job Number: 40-2738 | | Unit: | Sequence # | |
| Equipment/Line No.: 21x6 Fo | LOOR DRAIN (C | ARRIER PIPE) Area: | Test # | |
| Service: | | Test Medium: Water | | |
| Equipment/System Being Tested: | Boiler 🔲 | Exchanger [| Furnace | |
| | Piping 🗸 | Vessel [| Other | |
| Piping System: 2"x6" CP 9 FLC | UR DRAIN | For Test Pressures on which | system: | |
| Test Pressure: 30 | psi | See Specification: 0600X- | SP-M0032, 3.5 | |
| Starting Test Pressure: 33 Finish Test Pressure: 30 Pass Criteria: (0) -Zero Lea Gauge Manufacturer: 11KA Gauge Serial# 400519-A Calibr | psi Time | e: 10:05 A.Pl. Pass/Fa pressure. | | |
| Comments: Pressure Relief Valve | is installed on test pur | mp | | |
| est Witnessed and Accepted By: | | | | - |
| | BMWC Represent | itive | Date | |
| Delh | ur - SUBCONTRACT | OR, QA/QC | Date | |
| | WCH - CONTRAC | TOR | Date | |
| | COA | | DATE | |

MCF-9

| 一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一一 | ttigenium antwestrations | Gauge Tested in accord | | · · · · · · · · · · · · · · · · · · · |
|--|--------------------------------|---|----------------------|---------------------------------------|
| Job Number: 40 - 2738 | | Unit: | Sequence # | |
| Equipment/Line No.: | | Area: | Test # | 1-A |
| Service: | | Test Medium: Wa | ter | |
| Equipment/System Being Tested: | Boiler | Exchanger | Furnace [|] |
| | Piping 🗾 | Vessel [| Other_ | |
| Piping System: 2"×6" CP 9 FL | COR DRAIN | For Test Pressures on w | which system: | |
| *** | psi | See Specification: 060 | | |
| | | | | |
| Reason For Test: New Piping | Installation | | | |
| | | | | |
| Starting Test Pressure: 34 | psi Ti | me: 10:25 A.M. | | |
| Finish Test Pressure: 34 | psi Ti | me: 11:25 A.M. Pa | ss/Fail: 19ASS | |
| Pass Criteria: (0) -Zero Lea | | | | |
| Gauge Manufacturer: L)KA Gauge Serial# 400519 - A Calibr | Calibrati ation Date: _3/10 | on Certificate Number: 22 Calibration Expiration | 532 on Date: 3/11 | |
| Comments: Pressure Relief Valve | is installed on test p | oump , ('ORRECTIVE | ACTION: DRAIN | I PIPE WAS |
| LYATER COOLED | TO MAINTAIN | Y CONSISTENT TE | MPERATURES CA | THE LENGTH |
| Test Witnessed and Accepted By:) | OF PIPE IN OR | PDER TO CONTROL E | XPANSION DUE | TO WARM WEATHER |
| land | . 00 | | M-7= | 1-10 |
| Thin | BMWC Represe | ntitive | Da | |
| /// | 1.11. | | 4-12- | 10 |
| Delh | ur - SUBCONTRAC | CTOR, QA/QC | Da | ite |
| 30 | Jack Howa | el STR | 4-22 | -10 |
| 1, | WCH - CONTRA | CTOR | Da | te |
| o h | The way | k | 4-22 | 1-10 |
| | COA | | DF | ITE |

PNUEMATIC TEST REPORT FORM

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| | and the second | -1-1-1 VIV | auge Tested in accordan | ce to ASME B31.3 |
|------------------|----------------------------------|----------------------|---|--|
| Job Number: | 402738 | | Unit: | Sequence # |
| Equipment/L | ine No.: Crest P | #9 2"XC" F | Floor DrainArea: | Test # 1A - P |
| | Service &" Flore Conta | innent Pipe | Test Medium: Co | mpressed AIR |
| System Being To | ested: | Boiler | Exchanger | Furnace |
| | | Piping 🔽 | Vessel | Other |
| Test F | Pressure: 18 Pressure: psi | - | In Service Test [(on | ly checked, if in service test was perforated) |
| Reason F | For Test: New Piping Ins | tallation | | |
| Final Test P | of Test: 4-22-1 Pressure: 11 psi | red BMWC " | Calibration Expiration I Duration of Test: 121 Pass Sneep "The 19 | mins. |
| | Check For 1 | eaks. Tw | | |
| Test Witnessed a | and Accepted By: | BNIWC Representitive | | 4-22-10 Date |
| | Pelhur | SUBCONTRACTOR, | | <u>4 - 22 - 18</u> Date |
| | <u> </u> | WCH-CONTRACTOR | STR | 4-22-10 Date |
| | o by | Chydr 200 | | 4-22-10 Provematic Test Report Form, xla |
| | | B: Page 2 | 0 of 105 | |

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| | | cordance to ASME B31.3 | San |
|--|--|---|---|
| Job Number: 402738 | | Sequence # | |
| Equipment/Line No.: 4x8 CARRIER CPB | 9 Area: | Test # | 2 |
| Service: | Test Medium: | Water | |
| Equipment/System Being Tested: Boiler | Exchanger | ☐ Furnace | |
| Piping [7] | Vessel | Other | |
| Piping System: 4"x8" CARRIER Test Pressure: 30 psi | For Test Pressures of See Specification: | on which system: 0600X-SP-M0032, 3.5 | |
| Reason For Test: New Piping Installation | | | |
| Finish Test Pressure: 33 psi Time: Pass Criteria: (0) Zero Leakage at specified test pro Gauge Manufacturer: [1] KA Calibration Date: 3/10 | Certificate Number: Calibration Expir | | |
| Comments: Pressure Relief Valve is installed on test pum | p | | |
| Test Witnessed and Accepted By: BMWC Representit Delhur - SUBCONTRACTO WCH - CONTRACT CCA | OR, QA/QC | 4-27 | Date 2-10 Date 0-16 Date |

PNUEMATIC TEST REPORT FORM

MCF-10

| and the second of the second second second second | and action of Spain and Spain and Atlanta of the | Gauge Tested in accordance | to ASME B31.3 |
|---|--|----------------------------|---|
| Job Number: 402738 | | | Sequence # |
| Equipment/Line No.: CPB*9 | 4"xB" CONTAINM | ENT PIPE Area: | Test # 2 - P |
| Service: | | Test Medium: Com | pressed AIR |
| System Being Tested: | Boiler | Exchanger [| Furnace |
| | Piping 🗹 | Vessel | Other |
| Test Pressure: | _ psi | In Service Test [(only d | secked, if is service test was performed) |
| Reason For Test: New Pipir | g Installation | | |
| | | | |
| Gauge Serial# 511292 Cal | ibration Date: 04/09/10 | Calibration Expiration Da | te: 04/09/11 |
| Date of Test: 4/- 27 | -10 2:40 P.M. | Duration of Test: 120 | mins. |
| Final Test Pressure: | _psi | Pass | Fail |
| Comments: <u>CGA</u> obs | erved BMWC | "Snoop" the Joi | nts and |
| observere | 1' no visible | lcaks. Th | |
| Test Witnessed and Accepted By: | BMWC Representitiv | by | #/27 / FO Date |
| De | Thur - SUBCONTRACTOR | R, QA/QC | 27-10 Date |
| By | WCH-CONTRACTO | DR DR | C4-18-10 Date |
| 1 | The Mon | | 4-27-10 |
| | A A A B: Page | 22 of 105 | Pruematic Test Report Formula |

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| · · · · · · · · · · · · · · · · · · · | Gauge Tested in accordance | |
|--|--|---|
| Job Number: 402738 | | Sequence # |
| Equipment/Line No.: CPB*XV 4"x8" CARRIE | R PIPE Area: | Test # 3 |
| Service: | Test Medium: Water | |
| Equipment/System Being Tested: Boiler | Exchanger | Furnace |
| Piping ☑ | Vessel | Other |
| | For Test Pressures on which See Specification: 0600X-S | • |
| total residue. | oce operineation. | |
| Reason For Test: New Piping Installation | | |
| Starting Test Pressure: 36 psi Time: Finish Test Pressure: 35 psi Time: Pass Criteria: (0) - Zero Leakage at specified test pre Gauge Manufacturer: 101KA Calibration Comments: Pressure Relief Valve is installed on test pump | 2:05 Pass/Fa Pass/Fa Pass/Fa Pass/Fa Pass/Fa Pass/Fa Pass/Fa Pass/Fa | ?-10 |
| Test Witnessed and Accepted By: BMWC Representitive Belhur - SUBCONTRACTOR WCH - CONTRACTOR COA | R QA/QC | 4-28-10 Date 4-28-10 Date 4-29-10 Date 4-28-10 Date |

PNUEMATIC TEST REPORT FORM

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| Some on the arrangement of the property control control of | Gauge Tested in accordance | e to ASME B31.3 |
|--|---|--|
| | | Sequence # |
| *10 4"×8" ("CNTAINE | MENT PIPEArea: | Test #3 - P |
| | Test Medium: Con | npressed AIR |
| Boiler 🗀 | Exchanger | Furnace |
| Piping 🖸 | Vessel | Other |
| psi | In Service Test [(only | checked, if in service test was performed) |
| oing Installation | | |
| 18-10 2:30 P.M. | Calibration Expiration D Duration of Test: 120 Pass | |
| | | |
| BMWC Representition Delhur - SUBCONTRACTOR | R, QA/QC | 4/28/10 Date 4-28-10 Date 4-28-10 Pruematic Test Report Form als |
| | Boiler Deliver Delhur - SUBCONTRACTO | Unit: Containment April Containment Containment |

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| - gers hoppin (Jorga), successful distributed by the confidence of | in with the common water the second was | Gauge Tested in accordance | |
|--|--|-----------------------------|----------|
| Job Number: 402738 | • | Unit: | |
| Equipment/Line No.: CP3 */ | 0 2×6 CAR | RIER Area: | Test # 4 |
| Service: | | Test Medium: Water | |
| Equipment/System Being Tested: | Boiler | Exchanger [| Furnace |
| | Piping 🗸 | Vessel | Other |
| Piping System: 2 x 6 CAR | RIEIR | For Test Pressures on which | system: |
| Test Pressure: 30-40 | | See Specification: 0600X-S | |
| Finish Test Pressure: 36 Finish Test Pressure: 33 Pass Criteria: (0) -Zero Lea Gauge Manufacturer: NOSHOK Gauge Serial# 43037 Calibr | osi Tim skage at specified test Calibratio | pressure. Pass/Fa | 6 |
| Comments: Pressure Relief Valve | is installed on test pu | imp | |
| Test Witnessed and Accepted By: | | | |
| | BMWC Represen | titive | Date |
| Deth | ur - SUBCONTRACT | FOR, QA/QC | Date |
| | WCH - CONTRAC | CTOR | Date |

HYDRO TEST REPORT FORM MCF-9

| The return of the constitution of the same | | | ordance to Asive By 1.3 | |
|--|---|------------------------------|-------------------------------------|---------------|
| Job Number: 402738 | , | Unit: | Sequence # | |
| Equipment/Line No.: CPB*10 | 2x6 CARBIER | Area: | Test # | 414 |
| Service: | | Test Medium: | Water | - |
| Equipment/System Being Tested: | Boiler | Exchanger | Furnace | |
| | Piping 🔽 | Vessel | Other | · |
| Piping System: 2 ×6" CARR | RIER I | For Test Pressures o | on which system: | |
| Test Pressure: 30 - 40 ps | i s | See Specification: (| 0600X-SP-M0032, 3.5 | |
| Starting Test Pressure: 36 ps Finish Test Pressure: 36 ps Pass Criteria: (0)-Zero Leak | | 11:45 12:45 554765 % L | Pass/Fail: <u>PASS</u> EAKAGE JL | -) 5-5-10 |
| Gauge Manufacturer: NOSHOK Gauge Serial# 130.371 Calibrat | · | | 28846 ation Date: 4/11 | - |
| Comments: Pressure Relief Valve is | installed on test pump | | | |
| Test Witnessed and Accepted By: James Delhur | BMWC Representitive - SUBCONTRACTOR WCH - CONTRACTO | | 5-5 5-5- | Date Date |
| fl | WHAT OF | | J-3 | - 10 |
| - Izl | Who. | | 5-5 | |

PNUEMATIC TEST REPORT FORM

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| and the service of th | or advancer of the the the temperature of | Gauge Tested in accordance | to ASME B31.3 |
|--|---|---|--|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: | 10 2"x6" CCNTAINI | BENT PIPE Area: | Test # <u>4A-P</u> |
| Service: | | Test Medium: Con | pressed AIR |
| ystem Being Tested: | Boiler | Exchanger | Furnace |
| | Piping 🕗 | Vessel | Other |
| Test Pressure: | psi | In Service Test [(only | checked, if is service test was performed) |
| Reason For Test: New Pip | ing Installation | | |
| Final Test Pressure: | psi | Duration of Test: 130 Pass V Oap Test all Welco | Fail |
| est Witnessed and Accepted By: | BMWC Representit | (ive | 5-5-10 |
| 15. | Delhur - SUBCONTRACTO J. J. J. L. (WCH - CONTRACT | OR, QA/QC OR | Date 5-5-10 Date |
| | CAA B: Pag | e 27 of 105 | Pruematic Test Report Form.xls |

HYDRO TEST REPORT FORM MCF-9

| | | Cauge resieu in accordance | C.I Cd SIMICA OF |
|---|---|---|------------------------------------|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: 111-1-33 | TRANSMISSION LIN | HE Area: | Test #5 |
| Service: | | Test Medium: Water | |
| Equipment/System Being Tested: | Boiler | Exchanger | Furnace |
| | Piping 🗸 | Vessel [| Other. |
| Piping System: 10 × 16 CARA Test Pressure: 30 - 40 | | For Test Pressures on which See Specification: 0600X-8 | |
| Reason For Test: New Piping | Installation | | |
| | psi + 5% allowed acceptable if the measured noughout the specified test | loss is not greater than 5 % duration. | of the test beginning |
| Comments: Pressure Relief Valv | ve is installed on test pump | and set at no more than 5% | 6 of the maxium test pressure |
| Test Witnessed and Accepted By: | BMWC Representation BMWC Representation BMWC Representation | | 5-17-10 Date 5-17-10 Date |
| • | WCH - CONTRACTO | OR | Date |
| - | CQA - SUBCONTRAC | TOR | Date |

HYDRO TEST REPORT FORM MCF-9

| | Ga | ige rested in accordance | W ASME BS1.5 |
|--|---|---|--|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: 1914-33 | TRANYMISSION L | INE Area: | Test # 5A |
| Service: | | Test Medium: Water | |
| Equipment/System Being Tested: | Boiler | Exchanger | Furnace |
| | Piping 🗸 | Vessel | Other |
| Piping System: 10 × 16 CARRETE Test Pressure: 30-40 p | | Test Pressures on which e Specification: 0600X- | h system: SP-M0032, Rev 1, 3.5.1 |
| Reason For Test: New Piping I | nstallation | | |
| Gauge Manufacturer: NOSHOK | si + 5% allowed Tir ceptable if the measured lose sughout the specified test do | ne: 9:05 Pass/F ss is not greater than 5 % uration. tificate Number: 288 | of the test beginning |
| Comments: Pressure Relief Valve | is installed on test pump as | nd set at no more than 59 | % of the maxium test pressure |
| Buy | BMWC Representative Lur - SUBCONTRACTOR, WCH - CONTRACTOR CQA - SUBCONTRACTOR | QA/QC | 5-19-10 Date 5-19-10 Date 05-19-10 Date |

PNEUMATIC TEST REPORT FORM MCF-10

| | | Gauge Tested in acc | cordance to ASME B31.3 | |
|--|-------------------------|-------------------------------------|------------------------------------|-----------------------------------|
| Job Number: 402738 | | Unit: | Sequence # | |
| Equipment/Line No.: 1911-33 | TRANGMISSION | LINE Area: | Test # | 5A-12 |
| Service: | | Test Medium: | Compressed AIR | |
| System Being Tested: | Boiler [| Exchanger | ☐ Furnace | |
| 10x16 CONTAINMEN | Piping ✓ | Vessel | ☐ Other | |
| Test Pressure: 10.5 | psi - | In Service Test Joints Snoop Tested | (only checked, if Joints Snooped (| |
| Reason For Test: New Piping | Installation | | | |
| es de la companya de | | | | |
| Gauge Serial# 511292 Calib | oration Date: 4-9- | Calibration Expi | ration Date: 4-9-1/ | |
| Date of Test: 5-19-1 | 0 9:55 | 4.M. Duration of Test: | mins. | |
| Final Test Pressure: 10.5 | psi | Pass | Fail | |
| pressure thoughout t | he specified test durat | | of the test beginning | test pressure |
| Test Witnessed and Accepted By? | 4. D. Ille | ntative CTOR, QA/QC LLL CTOR | 5-, | 9 -10 Date 19-10 Date -19-16 Date |
| | CQA - CONTRA | CTOR | 5-19 | ー/ 心 Date |

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| | Gauge Tested in accordance | |
|--|---|---|
| Job Number: 402738 | Unit: | Sequence # |
| Equipment/Line No.: MH-21 TANK PENETRATIO | Area: | Test # 6 |
| Service: | Test Medium: Water | |
| Equipment/System Being Tested: Boiler | Exchanger | Furnace |
| Piping [7] | Vessel | Other |
| | For Test Pressures on which See Specification: 0600X-S | · |
| Reason For Test: New Piping Installation | | |
| Starting Test Pressure: 39 psi + 5% allowed Finish Test Pressure: 39 psi + 5% allowed Pass Criteria: The test is acceptable if the measured pressure thoughout the specified test Gauge Manufacturer: NOSION Calibration Date: 4/10 | Time: 7:55 Pass/Fai loss is not greater than 5 % of t duration. | of the test beginning |
| Comments: Pressure Relief Valve is installed on test pump | and set at no more than 5% | of the maxium test pressure |
| Test Witnessed and Accepted By: And Accepted By: BMWC Representation Delhur - SUBCONTRACTO WCH - CONTRACTO CQA - SUBCONTRACTO | R, QA/QC OR | 5-21-10 Date 5-21-10 Date 05-21-10 Date 5-21-10 |

PNEUMATIC TEST REPORT FORM

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| | | Gauge Tested in acco | ordance to ASME B31.3 |
|---|--|--------------------------------------|--|
| Job Number: 402738 | | Unit: _ | Sequence # |
| Equipment/Line No.: M11-21 T | ANK PENETRA | IICM Area: | Test # 6 P |
| Service: | | Test Medium: | Compressed AIR |
| System Being Tested: | Boiler | Exchanger [| Furnace |
| 8 × 12 CONTAINMENT | Piping 🗸 | Vessel [| Other |
| Test Pressure: | psi | In Service Test Joints Snoop Tested | (only checked, if Joints Smooped (Soap Tested) (only checked, if Joints (Soap Tested) |
| Reason For Test: New Piping Ins | tallation | | |
| Gauge Serial# 511292 Calibrat Date of Test: 5-21-10 Final Test Pressure: 10 psi | 8:40 A.M. | | 10 mins. Fail |
| Comments: The test is acceptable if pressure thoughout the s Pressure Relief Valve | pecified test duration | 1. | f the test beginning than 5% of the maxium test pressure |
| Test Witnessed and Accepted By: Delhur | BMWC Representa - SUBCONTRACTO WCH - CONTRACTO CQA - CONTRACTO | OR, QA/QC | 5-21-10 Date 5-21-10 Date 5-21-10 Date |

PNEUMATIC TEST REPORT FORM

MCF-10

| | Gauge Tested in accordance to ASME B31.3 |
|---|--|
| Job Number: 402738 | Unit: Sequence # |
| Equipment/Line No.: MH - 21 TANK PENETR | 2ATTCN Area: Test # 6-19-1 |
| Service: VALVE TEST | Test Medium: Compressed AIR |
| System Being Tested: Boiler | Exchanger Furnace |
| 8×12 CCNTAINMENT Piping 1 | Vessel Other |
| Test Pressure: 10.5 psi | In Service Test (only checked, if Joints Scooped (Saap Tested) Joints Snoop Tested (anly checked, if Joints (Soap Tested) |
| Reason For Test: New Piping Installation, VERIF | Y VALUE TIGHTNESS IN MH-21. TEST |
| 6-P VERIFIED WELDS. | · · · · · · · · · · · · · · · · · · · |
| Gauge Serial# 5/1292 Calibration Date: 4-9- | 10 Calibration Expiration Date: 4-9-11 |
| Date of Test: 5-21-10 2:20 P.1 | n. Duration of Test: 10 mins. |
| Final Test Pressure: 10.5 psi | Pass Fail |
| pressure thoughout the specified test durat | is not greater than 5 % of the test beginning ion. pump and set at no more than 5% of the maxium test pressure |
| Test Witnessed and Accepted By: Walton BMWC Representation | _5-21-10 |
| WCH-CONTRA WCH-CONTRA CQA-CONTRA | 5-21-10 |

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| | | Gauge Tested in acc | cordance to A | ASME B31.3 |
|--|--|--|---------------------------|--|
| Job Number: 402738 | | Unit: | | Sequence # |
| Equipment/Line No.: MH - 39 | TANK PENE | TRATION Area: | | Test # |
| Service: | | Test Medium: | Water | · |
| Equipment/System Being Tested: | Boiler | Exchanger | | Furnace |
| | Piping 🔽 | Vessel | | Other |
| Piping System: 10 x 16 CARI | RIEK | For Test Pressures | on which syst | tem: |
| Test Pressure: 30-40 p | si | See Specification: | 0600X-SP-M | 10032, Rev 1, 3.5.1 |
| Reason For Test: New Piping I | nstallation | · · · · · · · · · · · · · · · · · · · | | |
| Gauge Manufacturer: NOSHOK | si + 5% allowed septable if the measur ughout the specified Calibration | Time: 10:24 red loss is not greater thest duration. | Pass/Fail: _han 5 % of th | ne test beginning |
| Comments: Pressure Relief Valve | is installed on test pu | mp and set at no more | than 5% of t | he maxium test pressure |
| Test Witnessed and Accepted By: Dothu | BMWC Represent | FOR, QA/QC CTOR | - | 5-21-10 Date 5-21-10 Date 05-21-10 Date |

PNEUMATIC TEST REPORT FORM

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| | Gauge Tested in accorda | ince to ASME B31.3 |
|--|---|---|
| Job Number: 402738 | Unit: | Sequence # |
| Equipment/Line No.: MH - 39 TANK | PENETRATION Area: | Test # 7-P |
| Service: | Test Medium: | Compressed AIR |
| System Being Tested: Boiler 10 × 16 CONTAINMENT Piping | Exchanger Vessel | Furnace Other |
| Test Pressure: 10 psi | In Service Test Joints Snoop Tested | (only checked, if Joints Snooped (Soap Tested) (only checked, if Joints (Soap Tested) |
| Reason For Test: New Piping Installation | | |
| Gauge Serial# 5/1/292 Calibration Date: Date of Test: 5-21-10 10:4 Final Test Pressure: 10 psi | | |
| pressure thoughout the specified | sured loss is not greater than 5 % of the test duration. Ed on test pump and set at no more that | |
| Delhur - SUBCO | Representative ONTRACTOR, QA/QC CONTRACTOR ALL ALL ALL ALL ALL ALL ALL A | |
| CQA - C | CONTRACTOR | Date |

PNEUMATIC TEST REPORT FORM

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| | Gaug | e Tested in accordance to | ASME B31.3 |
|---------------------------------|--|----------------------------|---|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: 1914-39 | TANK PENETRATION | Area: | Test # 7-P-1 |
| Service: <u>VALVE</u> | TEST | Test Medium: Compre | essed AIR |
| System Being Tested: | Boiler | Exchanger | Furnace |
| | Piping 🖸 | Vessel | Other |
| Test Pressure: 10.5 | psi In S Joints | Service Test (only check | ted, if Joints Smooped (Scap Tested) ted, if Joints (Scap Tested) |
| Reason For Test: New Piping | Installation, VERIFY V | ALVE TYGHTSIESS | IN MH-39. TEST |
| 7-P VERIFI | ED WEUDS. | | |
| Gauge Serial# 51/292 Calibr | ation Date: 4-9-10 Ca | libration Expiration Date: | 4-9-11 |
| Date of Test: 5-21- | 10 2:00 P.M. Dur | ration of Test: 10 | mins. |
| Final Test Pressure: 10.5 | osi | Pass | Fail |
| pressure thoughout th | if the measured loss is not gre e specified test duration. e is installed on test pump and | | |
| Test Witnessed and Accepted By: | BMWC Representative | . · | 5-21-10 Date |
| Delfi | ur-SUBCONTRACTOR, QA | VQC | Date 05 · 21 · / O |
| | WCH - CONTRACTOR CQA - CONTRACTOR | | Date 5-21-10 Date |

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| | Gauge Tested in accordance | e to ASME B31.3 | | | |
|---|---|--|--|--|--|
| Job Number: 402738 | Unit: | Sequence # | | | |
| Equipment/Line No.: 2" LEAK DETECTION | / Area: | Test # | | | |
| Service: | Test Medium: Water | | | | |
| Equipment/System Being Tested: Boiler | Exchanger | Furnace | | | |
| Piping 🖸 | Vessel | Other. | | | |
| Piping System: 2" SINGLE WALL Test Pressure: 30 - 4/6 psi | For Test Pressures on which See Specification: 0600X- | • | | | |
| Reason For Test: New Piping Installation | | | | | |
| Starting Test Pressure: 35 psi + 5% allowed Time: 1:00 Finish Test Pressure: 34 psi + 5% allowed Time: 2:00 Pass/Fail: PASS Pass Criteria: The test is acceptable if the measured loss is not greater than 5 % of the test beginning pressure thoughout the specified test duration. Gauge Manufacturer: NOSHOK Calibration Certificate Number: 28846 Gauge Serial# 43037/ Calibration Date: 4/10 Calibration Expiration Date: 4/11 | | | | | |
| Comments: Pressure Relief Valve is installed on test p | oump and set at no more than 5% | of the maxium test pressure | | | |
| Test Witnessed and Accepted By: BMWC Representation Delhur - SUBCONTRACT WCH - CONTRACT CQA - SUBCONTRACT | CTOR, QA/QC CTOR | Date 5-24-10 Date 05-24-10 Date 5-24-2010 Date | | | |

HYDRO TEST REPORT FORM MCF-9

| | Gauge T | ested in accordance to A | ASME B31.3 |
|---|---|--------------------------|-------------------------|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: MH - 22 TAN | K PENETRATION | Area: | Test # 9 |
| Service: | Tes | t Medium: Water | |
| Equipment/System Being Tested: Bo | oiler 🗌 | Exchanger | Furnace |
| Pi | ping 🗸 | Vessel | Other. |
| Piping System: 4 × 8 CARRIER | For Test | Pressures on which syst | em: |
| Test Pressure: 30 - 40 psi | See Spec | cification: 0600X-SP-M | 10032, Rev 1, 3.5.1 |
| Reason For Test: New Piping Installat | tion | | |
| Starting Test Pressure: 36 psi + 5% Finish Test Pressure: 36 psi + 5% | | | PASS |
| Pass Criteria: The test is acceptable | e if the measured loss is no t the specified test duration | | e test beginning |
| Gauge Manufacturer: NO SHOK | Calibration Certificate Pate: 4/10 Calibrate | e Number: <u>28846</u> | 4/11 |
| Comments: Pressure Relief Vaive is insta | alled on test pump and set | at no more than 5% of t | he maxium test pressure |
| Test Witnessed and Accepted By: | A Hatto WC Representative | M | 5-25-10 |
| Delhur - SU | BCONTRACTOR, QA/Q | . | Date 5-25-10 Date |
| 15 m/wci | J. Jehlel H-CONTRACTOR | | Ø5 - 25 - 10 Date |
| 21 | With | - | 5-25-2010 |
| COA- | SUBCONTRACTOR | | Date |

PNEUMATIC TEST REPORT FORM MCF-10

| | Gauge Tested in accordance | to ASME B31.3 |
|--|----------------------------|---|
| Job Number: 402738 | Unit: | Sequence # |
| Equipment/Line No.: MH - 22 TANK PENE | TRATICN Area: | Test # 9-P |
| Service: | Test Medium: Com | pressed AIR |
| System Being Tested: Boiler | Exchanger | Furnace |
| 4 x8 CONTAINMENT Piping 1 | Vessel | Other |
| Test Pressure: 10.5 psi | In Service Test (only | checked, if Joints Sacoped (Soap Tested) checked, if Joints (Soap Tested) |
| Reason For Test: New Piping Installation | | |
| Gauge Serial# 5/1292 Calibration Date: 4-9- Date of Test: 5-25-10 2:28 15 Final Test Pressure: 10.5 psi | | |
| Comments: The test is acceptable if the measured loss pressure thoughout the specified test durat Pressure Relief Valve is installed on test | ion. | |
| Delhur - SUBCONTRAC | TOR, QA/QC | 5-25-10 Date 5-25-10 Date 5-25-10 Date 5-25-2010 Date |

MCF-9

| | | Gauge Tested III accordance | |
|--|---------------------------|---|-----------------------------|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: MH - 32 7 | RANGINISSION I | UNE Area: | Test # 10 |
| Service: | | Test Medium: Water | |
| Equipment/System Being Tested: | Boiler | Exchanger | Furnace |
| | Piping 🔽 | Vessel [| Other |
| Piping System: 10 x 16 CARR, Test Pressure: 30 - 40 psi | IER | For Test Pressures on which See Specification: 0600X-3 | • |
| 1301.13034.01 July 10 par | | specification observe | |
| Reason For Test: New Piping Ins | tallation | | |
| | | | |
| Starting Test Pressure: 34 psi Finish Test Pressure: 35 psi | | | ail: <i>PAS</i> S |
| Pass Criteria: The test is accept | | | |
| pressure thous | thout the specified te | st duration. | |
| Gauge Manufacturer: NOSHCK Gauge Serial# 430371 Calibratic | Calibration on Date: 4/16 | Certificate Number: 2885 Calibration Expiration D | 16 ate: 4/1/ |
| <u></u> | | | |
| Comments: Pressure Relief Valve is | installed on test pum | p and set at no more than 5% | of the maxium test pressure |
| | | | , |
| Test Witnessed and Accepted By: | | | |
| lest williessed and Accepted by. | 1 8/8/ | 1 | 5-27 10 |
| 1 pame | BMWC Representati | we | Date |
| | / / / / / / / / | | |
| Delhur | SUBCONTRACTO | OR. OA/OC | <u>5-27-10</u> Date |
| · | il o | | Elization |
| $\frac{\mathcal{D}^{\times}}{\mathcal{D}^{\times}}$ | WCH - CONTRACT | OR | Date |
| | 1/1/ | | 5.77 204 |
| - 3 _{CC} | A - SUBCONTRAC | CTOR | 5- 27- 20/0 Date |

PNEUMATIC TEST REPORT FORM

MCF-10

| | Gauge | Tested in accordance to | ASME B31.3 |
|---|-------------------|-------------------------|---|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: MH-32 7 | TRANSMISSION LINE | Area: | Test # 10 -10 |
| Service: | T | est Medium: Comp | ressed AIR |
| System Being Tested: 10 × 16 CONTAINMENT | Boiler Piping | Exchanger Vessel | Furnace Other |
| Test Pressure: | | ervice Test (only du | ecked, if Joints Snooped (Sasp Tested) ecked, if Joints (Sasp Tested) |
| Reason For Test: New Piping Ins | stallation | | |
| Gauge Serial# 5/1292 Calibrat Date of Test: 5-27-/ Final Test Pressure: // ps | 0 11:45 Am Dur | | |
| Pressure thoughout the Pressure Relief Valve. Test Witnessed and Accepted By: | | set at no more than 5% | to beginning of the maxium test pressure Date 5-27-10 Date 5727/10 Date |
| | CQA - CONTRACTOR | | <u>5-27-2010</u> Date |

MCF-9

| | | Gauge Tested in accorda | ince to ASME B31.3 |
|---|--|--|---|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: 1914-35 7 | RANSMISSION | LINE Area: | Test # |
| Service: | | Test Medium: Water | er |
| Equipment/System Being Tested: | Boiler | Exchanger | Furnace |
| | Piping 🗸 | Vessel | Other |
| Piping System: 10 × 16 CAR | IER | For Test Pressures on wi | nich system: |
| Test Pressure: 30-40 ps | i | See Specification: 0600 | X-SP-M0032, Rev 1, 3.5.1 |
| Reason For Test: New Piping In | stallation | | · |
| Starting Test Pressure: 38.5 ps Finish Test Pressure: 37.5 ps Pass Criteria: The test is according to the pressure that Gauge Manufacturer: NOSHOK Gauge Serial# 430371 Calibra | ii + 5% allowed eptable if the measur ughout the specified | Time: 1:45 Pas red loss is not greater than 5 test duration. | 5 % of the test beginning |
| Comments: Pressure Relief Valve | s installed on test pu | imp and set at no more than | 5% of the maxium test pressure |
| -15- 11/4.00 | BMWC Represent | TOR, QA/QC | $ \begin{array}{c} 6-7-10 \\ \hline Date \\ 6-7-10 \\ \hline Date \\ 06.08.10 \\ \hline Date \\ 68-19 \\ Date $ |

PNEUMATIC TEST REPORT FORM

MCF-10

| | Caug | ge Tested in accordance | O ASME BS1.5 |
|--------------------------------|---|-------------------------|---|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: 141-35 | TRANSMISSION LIN | E Area: | Test # 11-12 |
| Service: | | Test Medium: Cor | npressed AIR |
| ystem Being Tested: | Boiler | Exchanger | Furnace |
| 10 × 16 CONTAINMENT | Piping 🗸 | Vessel | Other |
| Test Pressure: | | Service Test God; | y checked, if Joints Sacoped (Scap Tested) y checked, 'I Joints (Scap Tested) |
| Reason For Test: New Piping | Installation | | |
| Final Test Pressure: | psi . e if the measured loss is not gr | Pass Pass | Fail est beginning |
| pressure thoughout t | he specified test duration. | | % of the maxium test pressure |
| est Witnessed and Accepted By: | BMWC Representative hur - SUBCONTRACTOR, O WCH - CONTRACTOR EQA - CONTRACTOR | Andrew Services | Date 6-8-10 Date 06.08.10 Date 6-9-19 Date |
| | | | |

| BMWC Constructors Inc. | Gauge Tested in accordance to | ASME B31.3 | | |
|--|--------------------------------|--|--|--|
| Job Number: 402738 | Unit: | Sequence # | | |
| Equipment/Line No.: MH 37-38 CARRIER | Area: | Test # 12 | | |
| Service: | Test Medium: Water | | | |
| Equipment/System Being Tested: Boiler | Exchanger | Furnace | | |
| Piping 🗸 | Vessel | Other. | | |
| Piping System: 10 × 1/5 | For Test Pressures on which sy | stem: | | |
| Test Pressure: psi | See Specification: 0600X-SP- | M0032, Rev 1, 3.5.1 | | |
| Reason For Test: New Piping Installation Starting Test Pressure: 36 psi + 5% allowed Time: 10:55 Finish Test Pressure: 35, 5 psi + 5% allowed Time: 11:55 Pass/Fail: PASS Pass Criteria: The test is acceptable if the measured loss is not greater than 5 % of the test beginning pressure thoughout the specified test duration. Gauge Manufacturer: NOSHOK Calibration Certificate Number: 28846. | | | | |
| Gauge Serial# 43037 i Calibration Date: 4/10 Comments: Pressure Relief Valve is installed on test po | | | | |
| Test Witnessed and Accepted By: BMWC Representation Belhur - SUBCONTRACT WCH - CONTRACT CQA - SÜBCONTR | TOR, QA/QC CTOR | 6-17-10 Date 6-17-10 Date 06:17-16 Date 6-17-10 Date | | |

PNEUMATIC TEST REPORT FORM MCF-10

| 33 CONTAU | | | | 12-12 |
|----------------------|---|---|---|---|
| | | | Test #_ | 12-12 |
| , | Test Medium: | C | | |
| , | | Compresse | d AIR | |
| Boiler | Exchanger | | Furnace [| _ |
| Piping 🗹 | Vessel | | Other_ | |
| psi | In Service Test Joints Snoop Tested | (anly checked, if | Jaints Snooped (So: Jaints (Sosp Tested | ap Tested) |
| stallation | | | | |
| • | | | | |
| , | | | | / |
| specified test durat | tion. | | | est pressure |
| 6/11/ | 1. | · | 6-1 | 7-10 Date 17-10 |
| | ion Date: 4/-6/2 ion Date: 4/-6/2 i 1:37 ithe measured loss specified test durate is installed on test | psi In Service Test Joints Snoop Tested stallation ion Date: 4/-6/-/O Calibration Expi 2 1:37 Duration of Test: Pass the measured loss is not greater than 5 % specified test duration. is installed on test pump and set at no more BMWC Representative | In Service Test Joints Snoop Tested Stallation Stallation Calibration Expiration Date: 4 Duration of Test: 10 mi Pass The measured loss is not greater than 5 % of the test beging specified test duration. Is installed on test pump and set at no more than 5% of the BMWC Representative | In Service Test Only checked, if Joints Socoped (So Joints Snoop Tested Only checked, if Joints (Soap Tested Stallation Stallation Calibration Expiration Date: 4/-9-// Duration of Test: 10 mins. Pass Fail The measured loss is not greater than 5 % of the test beginning specified test duration. Is installed on test pump and set at no more than 5% of the maxium test. BMWC Representative Duration of Test: 10 mins. |

| | | Gauge Tested in accordance | ID ASME B31.3 |
|---|---|---|--|
| Job Number: 402738 | | Unit: | Sequence # 13 |
| Equipment/Line No.: 13/H - 20 | 2 | Area: | Test # 13 |
| Service: | | Test Medium: Water | |
| Equipment/System Being Tested: | Boiler [| Exchanger | Furnace |
| | Piping 🔽 | Vessel | Other. |
| Piping System: <u>CONTAINME</u> Test Pressure: 30-40 p | | For Test Pressures on which See Specification: 0600X- | |
| Reason For Test: New Piping I | nstallation | | |
| | osi + 5% allowed ceptable if the measure oughout the specified to | Time: 11: 34 Pass/F ed loss is not greater than 5 % est duration. | of the test beginning |
| Comments: Pressure Relief Valve | is installed on test pur | mp and set at no more than 59 | 6 of the maxium test pressure |
| Test Witnessed and Accepted By: | BMWC Representation - SUBCONTRACT WCH - GONTRACT CQA - SUBCONTRACT | TOR, QA/QC | 7-15-10 Date 7-15-10 Date 7-15-16 Date 7/15/10 Date |

PNEUMATIC TEST REPORT FORM

MCF-10

| | | Gauge Tested in accordance | e to ASME B31.3 |
|---|----------------------------|-------------------------------|---|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: MH - 20 | B CARRIER | Area: | Test # 13-P |
| Service: | | Test Medium: Con | mpressed AIR |
| System Being Tested: | Boiler | Exchanger | Furnace |
| | Piping 🗸 | Vessel | Other |
| Test Pressure: | psi | In Service Test (onl | y checked, if Joints Snooped (Soup Tested) y checked, if Joints (Soup Tested) |
| Reason For Test: New Piping In | stallation | | |
| Final Test Pressure: | | Pass Pass Pass Pass of the to | Fail |
| pressure thoughout the | specified test duration | on. | % of the maxium test pressure |
| Test Witnessed and Accepted By: Ame Delhu | BMWC Represented | | 7-15-10 Date |
| - Bay | r-SUBCONTRACT WGH-CONTRAC | 2l | 7-15-10 Date 7-15-10 Date |

MCF-9

| | | Gauge Tested in acc | cordance to F | ASME BJIJ |
|--|--|---|---------------|--|
| Job Number: 402738 | | Unit: | | Sequence # |
| Equipment/Line No.: MH-32 | DAYLIGHT | Area: | | Test # |
| Service: | | Test Medium: | Water | |
| Equipment/System Being Tested: | Boiler | Exchanger | | Furnace |
| | Piping 🗸 | Vessel | | Other. |
| Piping System: | HT psi | For Test Pressures See Specification: | | tem: v10032, Rev 1, 3.5.1 |
| Reason For Test: New Piping | Installation | | | |
| Starting Test Pressure: 39 Finish Test Pressure: 58 Pass Criteria: The test is a pressure if Gauge Manufacturer: NOSHOK Gauge Serial# 430371 Calib | psi + 5% allowed eceptable if the measur loughout the specified t | Time: 8-38 ed loss is not greater to test duration. | han 5 % of t | he test beginning |
| Comments: Pressure Relief Valv | e is installed on test pu | mp and set at no more | than 5% of | the maxium test pressure |
| Test Witnessed and Accepted By: Amle Deli Baye | BMWC Represent BMWC Represent BMWC Represent BMWC Represent COA - SUBCONTRACT COA - SUBCONTRACT | TOR, QA/QC TOR | | Dy - 19 - 10 Date 7-19-16 Date 2-19-10 Date 07-19-2010 Date |

MCF-9

| | Gauge Tested in accorda | nce to ASME B31.3 |
|--|-------------------------------------|---------------------------------|
| Job Number: 402738 | Unit: | Sequence # |
| Equipment/Line No.: 1714 - 33 DAYL | 16/1T Area: | Test # |
| Service: 4" HDPE Clean | | x . |
| Equipment/System Being Tested: Boiler | Exchanger | Furnace |
| Piping D | Vessel [| Other |
| Piping System: 4" DAYLIGHT | For Test Pressures on w | nich system: |
| Test Pressure: psi | See Specification: 0600 | X-SP-M0032, Rev 1, 3.5.1 |
| Reason For Test: New Piping Installation | | |
| | | |
| Starting Test Pressure: 37 1/2 psi + 5% allow | | |
| Finish Test Pressure: 37 psi + 5% allow | | |
| Pass Criteria: The test is acceptable if the pressure thoughout the st | pecified test duration. | |
| Gauge Manufacturer: <u>NOSHOK</u> Ca Gauge Serial# <u>43637</u> Calibration Date: | alibration Certificate Number: 28 | 1 <u>846</u> n Date: 4/1/ |
| Comments: Pressure Relief Valve is installed o | n test pump and set at no more than | 15% of the maxium test pressure |
| | | , |
| Test Witnessed and Accepted By: | <u></u> | |
| - James X. IX | - flor | 7-20-10 |
| BMWCK | epresentative | Date |
| Delhur - SUBCON | TRACTOR, QA/QC | 7-20-10 Date |
| Bur A.T | Khirland | 7.20.10 |
| / WCH-CO | ONTRACTOR | Date |
| Jac SUBO | CONTRACTOR | 07-20-10 |

| Unit: | Sequence # |
|---|--|
| Area: | Test # |
| Test Medium: Water | |
| Exchanger | Furnace |
| Vessel | Other |
| For Test Pressures on which | system: |
| See Specification: 0600X-S | P-M0032, Rev 1, 3.5.1 |
| | |
| | J. Co. |
| Time: 11:52 Time: 12:52 Pass/Fai | il: _ <i>PASS</i> |
| ured loss is not greater than 5 % of test duration. on Certificate Number: 2884 Calibration Expiration Da | |
| oump and set at no more than 5% | of the maxium test pressure |
| | |
| Antanye | -8-3-10 Date |
| CTOR, QA/QC | 8-3-10 Date |
| ACTOR | 08-03-10 Date |
| RACTOR | 3.3 10 Date |
| | Test Medium: Water Exchanger Vessel Vessel For Test Pressures on which See Specification: 0600X-S Time: 11:52 Time: 12:52 Pass/Faured loss is not greater than 5 % of test duration. On Certificate Number: 2884/20 Calibration Expiration Date of test duration. On Certificate Number: 2884/20 Calibration Expiration Date of test duration. On Certificate Number: 2884/20 Calibration Expiration Date of test duration. On Certificate Number: 2884/20 Calibration Expiration Date of test duration. On Certificate Number: 2884/20 Calibration Expiration Date of the test duration. On Certificate Number: 2884/20 Calibration Expiration Date of the test duration. On Certificate Number: 2884/20 Calibration Expiration Date of the test duration. On Certificate Number: 2884/20 Calibration Expiration Date of the test duration. On Certificate Number: 2884/20 Calibration Expiration Date of the test duration. On Certificate Number: 2884/20 Calibration Expiration Date of the test duration. On Certificate Number: 2884/20 Calibration Expiration Date of the test duration. On Certificate Number: 2884/20 Calibration Expiration Date of the test duration. On Certificate Number: 2884/20 Calibration Expiration Date of the test duration. On Certificate Number: 2884/20 Calibration Expiration Date of the test duration. On Certificate Number: 2884/20 Calibration Expiration Date of the test duration. |

PNEUMATIC TEST REPORT FORM MCF-10

| | | Gauge Tested in accordance | to ASME B31.3 |
|---------------------------------|-------------------------|--|---|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: 1111-38 | .70 39 CON | TAINMENT Area: | Test # 16-19 |
| Service: | | Test Medium: Com | pressed AIR |
| System Being Tested: | Boiler | Exchanger | Furnace |
| CONTAINMENT | Piping 🖸 | Vessel | Other |
| Test Pressure: | psi | In Service Test (only | checked, if Joints Snowped (Sosp Tested) checked, if Joints (Sosp Tested) |
| Reason For Test: New Piping | Installation | | |
| Final Test Pressure: | - <u>10 2:05</u> psi | Calibration Expiration De Pass Pass s is not greater than 5 % of the ter | mins. |
| pressure thoughout t | ne specified test dura | | |
| Test Witnessed and Accepted By: | A. Han | CTOR, QA/QC ACTOR ACTOR | 8-3-10 Date 8-3-10 Date 8-3-10 Date |

MCF-9

| | <u> </u> | auge rested in accordance to | ASME BILS | |
|--|---|-------------------------------|--|--|
| Job Number: 402738 | | Unit: | Sequence # | |
| Equipment/Line No.: 114-34 To | 35 CARRIER | Area: | Test # 17 | |
| Service: | | Test Medium: Water | | |
| Equipment/System Being Tested: | Boiler [| Exchanger | Furnace | |
| | Piping 🔽 | Vessel | Other | |
| Piping System: 10 × 16 Test Pressure: 30-40 psi | | or Test Pressures on which sy | | |
| Reason For Test: New Piping Ins | tallation | | | |
| Starting Test Pressure: 35,5 psi + 5% allowed Time: 6:30 Finish Test Pressure: 35 psi + 5% allowed Time: 7:30 Pass/Fail: PASS Pass Criteria: The test is acceptable if the measured loss is not greater than 5 % of the test beginning pressure thoughout the specified test duration. Gauge Manufacturer: NOSHOK Calibration Certificate Number: 2846 Gauge Serial# 43037/ Calibration Date: 4/10 Calibration Expiration Date: 4/11 Comments: Pressure Relief Valve is installed on test pump and set at no more than 5% of the maxium test pressure | | | | |
| B. e. 35-35 | BMWC Representative SUBCONTRACTOR WCH - CONTRACTOR PSI - Z.9% BA QA - SUBCONTRACT | QA/QC R R R HOUR | 8-5-10 Date 8-5-10 Date 08-05-10 Date 3-5-10 Date | |

PNEUMATIC TEST REPORT FORM MCF-10

| | | Gauge Tested in accordance | to ASME B31.3 |
|---|-----------------------------|---------------------------------|-------------------------------|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: MH - 34 Service: | TO 35 CONTA | WINDUT Area: | Test # |
| Service: | 34 1/10 | Test Medium: Com | pressed AIR |
| System Being Tested: | Boiler | Exchanger | Furnace |
| CONTAINMENT (precumatic lest) | Piping 🗹 | Vessel | Other |
| Test Pressure: | psi | In Service Test (only | |
| Reason For Test: New Piping | Installation | | |
| All joint o | bserved (Snooped |) For visible times . | Fleaks - None Observed. |
| Gauge Serial# 51/292 Calib | ration Date: 4-9-1 | Calibration Expiration D | ate: 4-9-11 |
| Date of Test: 8-5- | 10 Start 12:5 end 1:0 | Duration of Test: 10 5 pm Pass | mins. |
| | e if the measured loss is | not greater than 5 % of the te | st beginning |
| | | | % of the maxium test pressure |
| Test Witnessed and Accepted By: | BMWC Representa | | 8-5-10 Date |
| Delh | W NU STRACT | OR, QA/QC | 8-5-10 Date |
| 15- | WCH CONTRAC | TOR | 08.05.10 Date |
| | CQA - CONTRAC | TOR | <u> </u> |

| | | Cauge Tested in accordan | ICE ID ASMLE B31.3 | |
|--|--|---|--------------------|-------|
| Job Number: 402738 | | Unit: | Sequence # | |
| Equipment Line No.: MH - 38 | TO 9 CARRIES | Area: | Test # | 18 |
| Service: | | Test Medium: Water | r | |
| Equipment/System Being Tested: | Boiler | Exchanger | Furnace [|] |
| | Piping 🔽 | Vessel | Other | |
| Piping System: 10 × 16 CA. Test Pressure: 30 - 401 | | For Test Pressures on wh See Specification: 0600 | | 3.5.1 |
| Reason For Test: New Piping I | Installation | | | |
| | | | .7 -1 | |
| Starting Test Pressure: 31 psi + 5% allowed Time: 7:00 Finish Test Pressure: 31 psi + 5% allowed Time: 8:00 Pass/Fail: PASS Pass Criteria: The test is acceptable if the measured loss is not greater than 5 % of the test beginning pressure thoughout the specified test duration. Gauge Manufacturer: NOSHOK Calibration Certificate Number: 28846 Gauge Serial# 430371 Calibration Date: 4/10 Calibration Expiration Date: 4/11 | | | | |
| Comments: Pressure Relief Valve is installed on test pump and set at no more than 5% of the maxium test pressure | | | | |
| Test Witnessed and Accepted By: Della State of the Agency | BMIWC Représenta BMIWC Représenta BMIWC Représenta AUGUSTACT WCH - CONTRACT WCH - CONTRACT CQA - SUBCONTRA | OR, QA/QC TOR | 8-9- 08.0 | Date |

PNEUMATIC TEST REPORT FORM MCF-10

| | Gauge Tested in acco | rdance to ASME B31.3 |
|--|--|--|
| Job Number: 402738 | Unit: | Sequence # |
| Equipment/Line No.: MH'S 38-9 | CONTAINMENT Area: | Test # 18-12 |
| Service: | Test Medium: | Compressed AIR |
| | Boiler | ☐ Furnace ☐ |
| 10×16 CONTAINMENT P | Piping Vessel [| Other |
| Test Pressure: | _ | (only checked, if Joints Sacoped (Scap Tested) (only checked, if Joints (Scap Tested) |
| Reason For Test: New Piping Install | ation | |
| Pate of Test: 8-12-10 Final Test Pressure:psi | 12:50 Duration of Test: | 10 mins. |
| pressure thoughout the spec | measured loss is not greater than 5 % or ciffed test duration. Istalled on test pump and set at no more | |
| Test Witnessed and Accepted By: | MWC Representative | 8-12-16 Date |
| Delhur - Si | UBCONTRACTOR, QA/QC | 8-12-18 Date |
| Beg & | CH, CONTRACTOR | 98.12.10 Date |
| Sal | 121/- | 8/12/10 |
| / (0 | A - CONTRACTOR | Date |

MCF-9

BMWC Constructors Inc.

Gauge Tested in accordance to ASME B31.3

| Job Number: 402738 | Unit: | Sequence # | | |
|--|----------------------------------|---|--|--|
| Equipment/Line No.: ('ELL 9 - 18' PRIMAR) | Area: | Test # <u>j</u> 9 | | |
| Service: | Test Medium: Water | | | |
| | | | | |
| Equipment/System Being Tested: Boiler | Exchanger | Furnace | | |
| Piping 🔽 | Vessel | Other_ | | |
| Piping System: 3" DISCHARGE | For Test Pressures on which | ch system: | | |
| | | | | |
| Test Pressure: 70 psi | See Specification: 0000A | -SP-M0032, Rev 1, 3.5.1 | | |
| | | | | |
| Reason For Test: New Piping Installation | | | | |
| | | : | | |
| | | | | |
| Starting Test Pressure: 85 psi + 5% allowed | Time: 6:29 | | | |
| | • | 21. | | |
| Finish Test Pressure: 84 psi + 5% allowed Time: 7:29 Pass/Fail: PASS | | | | |
| Pass Criteria: The test is acceptable if the measured loss is not greater than 5 % of the test beginning | | | | |
| pressure thoughout the specified | test duration. | | | |
| Gauge Manufacturer: [,)) (A Calibration | n Certificate Number: <u>285</u> | <u>31 </u> | | |
| Gauge Serial# 349562 Calibration Date: 3/10 | Calibration Expiration | Date: 3/11 | | |
| | | | | |
| Comments: Pressure Relief Valve is installed on test pump and set at no more than 5% of the maxium test pressure | | | | |
| | | | | |
| | | | | |
| Test Witnessed and Accepted By | | | | |
| Test witnessed and Accepted by | 1-11 | | | |
| Vame, X. X/ | Mon | 8-16-10 | | |
| BMWC Represent | ative | Date | | |
| | | | | |
| (hob 1).lli 8.16-16 | | | | |
| Deihur - SUBCONTRACTOR, QA/QC Date | | | | |
| K AND S | | 08.16.10 | | |
| WCH - CONTRACTOR Date | | | | |
| 1 1-11 | | | | |
| 2/12/1- | | 8/16/10 | | |
| CQA - SUBCONTRA | ACTOR | Date | | |

MCF-9

| | Gauge Tested in accordance | to ASME B31.3 |
|--|-------------------------------|---|
| Job Number: 402738 | Unit: | Sequence # |
| Equipment/Line No.: CELL 4-12" PRIMARY | Area: | Test # <u>20</u> ; |
| Service: | Test Medium: Water | |
| Equipment/System Being Tested: Boiler | Exchanger | Furnace |
| Piping 🔽 | Vessel | Other |
| Piping System: 11/2 1DISCHARCE | For Test Pressures on which | system: |
| Test Pressure: 70 psi | See Specification: 0600X-S | P-M0032, Rev 1, 3.5.1 |
| Reason For Test: New Piping Installation | | |
| | | |
| Starting Test Pressure: <u>85</u> psi + 5% allowed Finish Test Pressure: <u>84</u> psi + 5% allowed | | ii: _ <i>PA</i> SS |
| Pass Criteria: The test is acceptable if the measure pressure thoughout the specified te Gauge Manufacturer: DIKA Calibration Gauge Serial# 400619-A Calibration Date: 3/10. | st duration. | |
| Comments: Pressure Relief Valve is installed on test pun | np and set at no more than 5% | of the maxium test pressure |
| Test Witnessed and Accepted By: BMWC Representation Delhur - SUBCONTRACT WCH - CONTRACT CQA - SUBCONTRACT | OR, QA/QC COR | 8-16-10 Date 8-16-10 Date 08-16-10 Date 8/16/00 Date |

| | | Gauge Tested in accordance | e to ASME B31.3 |
|---|--|--|---|
| Job Number: 402738 | | Unit: | Sequence # |
| Equipment/Line No.: (ELL 10 | - 18" PRIMARY | Area: | Test #21 |
| Service: | | Test Medium: Water | |
| Equipment/System Being Tested: | Boiler [| Exchanger | Furnace |
| | Piping 🗸 | Vessel | Other |
| Piping System: 3" DISCHARGE Test Pressure: 70 ps | si | For Test Pressures on whice See Specification: 0600X | • |
| Reason For Test: New Piping In | stallation | | |
| Gauge Manufacturer: <u>UIKA</u> Gauge Serial# <u>363662</u> Calibra | si + 5% allowed eptable if the measured ughout the specified test Calibration of tion Date: 3/10 | Time: 7:30 A, 44 Pass/A loss is not greater than 5 % at duration. Certificate Number: 28.53 Calibration Expiration I | 6 of the test beginning |
| Delhu Say | BMWC Representation Why Digital Contract Contract WCH - CONTRACT EL/- CQA - SUBCONTRACT CQA - SUBCONTRACT | DR, QA/QC COR | 8/17/16 Date 8/17/15 Date 08.23.10 Date 8/17/10 Date |

MCF-9

| | Gauge Tested in accordance to ASME B11.3 |
|--|--|
| Job Number: 402738 | Unit: Sequence # |
| Equipment/Line No.: Cell 10 12" Cr | swary Area: Test # 22 |
| Service: | Test Medium: Water |
| Equipment/System Being Tested: Boiler | Exchanger Furnace |
| Piping 🗾 | Vessel Other |
| Piping System: 1/2 discharge | For Test Pressures on which system: |
| Test Pressure: 70 psi | See Specification: 0600X-SP-M0032, Rev 1, 3.5.1 |
| 1- | |
| Reason For Test: New Piping Installation | |
| | |
| Gauge Manufacturer: WKA Calibration Date: 3/16 | Time: 7:15 Apg. Pass/Fail: Fass easured loss is not greater than 5 % of the test beginning fied test duration. |
| Baya N. Khu | 8-18-10 Date 8-18-10 Date 8-18-10 Date 8/18/10 |

| | Gauge Tested in accordance | to ASME B31.3 | | |
|--|--|---|--|--|
| Job Number: 402738 | Unit: | Sequence # | | |
| Equipment/Line No.: (ELL 9-12" SECUNDARS | Area: | Test #24 | | |
| Service: | Test Medium: Water | | | |
| Equipment/System Being Tested: Boiler | Exchanger | Furnace | | |
| Piping 🗸 | Vessel | Other | | |
| Piping System: 1½" DISCHARGE Test Pressure: 70 psi | For Test Pressures on which See Specification: 0600X- | | | |
| Reason For Test: New Piping Installation | | | | |
| Starting Test Pressure: 89 psi + 5% allowed Time: 6:10 Am. Finish Test Pressure: 87 psi + 5% allowed Time: 7:10 Am Pass/Fail: 915 Pass Criteria: The test is acceptable if the measured loss is not greater than 5 % of the test beginning pressure thoughout the specified test duration. Gauge Manufacturer: 11XA Calibration Certificate Number: 28632 Gauge Serial# 10069-A Calibration Date: 3/10 Calibration Expiration Date: 3/11 | | | | |
| Comments: Pressure Relief Valve is installed on test pu | mp and set at no more than 59 | 6 of the maxium test pressure | | |
| Test Witnessed and Accepted By: BMWCRepresent Belhur - SUBCONTRACT WCH - CONTRACT CQA - SUBCONTRACT | TOR, QA/QC Cochel CTOR | 8-19-10 Date 8-19-10 Date 08-23-16 Date 8/19/10 Date | | |

| | Gauge Tested in acc | cordance to ASME B31.3 | |
|--|--|-------------------------|---------------|
| Job Number: 402738 | Unit: | Sequence # | |
| Equipment/Line No.: CELL 10 - 12 | SECONDARY Area: | Test # | 2.3 |
| Service: | Test Medium: | Water | |
| Equipment/System Being Tested: Boil | er | Furnace | |
| Pipir | vessel Vessel | Other | |
| Piping System: 1'2" DISCHARGE | For Test Pressures | on which system: | |
| Test Pressure: 70 psi | See Specification: | 0600X-SP-M0032, Rev | 1, 3.5.1 |
| Reason For Test: New Piping Installation | n | | |
| Starting Test Pressure: 88 psi + 5% Finish Test Pressure: 84 psi + 5% | | Pass/Fail: Paff | |
| Gauge Manufacturer: LIKA Gauge Serial# 400519 A Calibration Dat 36962 AD 8-23-10 | he specified test duration. Calibration Certificate Number: e: 3/10 Calibration Exp | 28532 28531 | 9W 8-23-10 |
| | ed on test pump and set at no mor | e than 5% of the maxium | test pressure |
| Delhur - SUB WCH | CONTRACTOR, QA/QC CONTRACTOR CONTRACTOR CONTRACTOR CONTRACTOR UBCONTRACTOR | 8-19 8-19 08.2 | Date |

MCF-9

| Sequence # Test # | | | | |
|--|--|--|--|--|
| Test # | | | | |
| | | | | |
| | | | | |
| Furnace | | | | |
| Other | | | | |
| stem: | | | | |
| M0032, Rev 1, 3.5.1 | | | | |
| | | | | |
| | | | | |
| | | | | |
| PASS | | | | |
| Pass Criteria: The test is acceptable if the measured loss is not greater than 5 % of the test beginning pressure thoughout the specified test duration. | | | | |
| 8.12-11 | | | | |
| of the maxium test pressure | | | | |
| الإ | | | | |
| 8-25-10 | | | | |
| Date | | | | |
| <u>8-25-16</u> Date | | | | |
| 08.22.10 | | | | |
| Date | | | | |
| 08-25-2010 Date | | | | |
| | | | | |

PNEUMATIC TEST REPORT FORM

MCF-10

| | Gauge Tested in accordan | nce to Asivic D31.3 |
|--|--------------------------------------|--|
| Job Number: 402738 | Unit: | Sequence # |
| Equipment/Line No.: 1914 36 - 37 | | Test # 25 - 19 |
| Service: | Test Medium: C | Compressed AIR |
| System Being Tested: Boiler | Exchanger | Furnace |
| 10 × 16 CONTAINMENT Piping [| Vessel | Other |
| Test Pressure: psi | In Service Test Joints Snoop Tested | (oply checked, if Joints Storoped (Sosp Tested) (only checked, if Joints (Sosp Tested) |
| Reason For Test: New Piping Installation | | |
| Gauge Serial# 511292 Calibration Date: 4-9- Date of Test: <u>B-25-10 8:28</u> Final Test Pressure:psi | | |
| Comments: The test is acceptable if the measured loss pressure thoughout the specified test durat Pressure Relief Valve is installed on test | ion. | |
| Test Witnessed and Accepted By: BMWC Represer Delhur - SUBCONTRAC WCH - CONTRA | CTOR, QA/QC | 8-25-10 Date 8-25-10 Date 08:25:10 Date 8-25-10 Date |

MCF-9

| | Gauge Tested in accordance | e to ASME B31.3 |
|---|--|----------------------|
| Job Number: 402738 | Unit: | Sequence # |
| Equipment/Line No.: M1/5 32 - 39 FUL | L Area: | Test # 26 |
| Service: TRANSMISSION LINE | Test Medium: Water | |
| Equipment/System Being Tested: Boiler | Exchanger | Furnace |
| Piping 🔽 | Vessel | Other |
| Piping System: 10 × 16 CARRIER Test Pressure: 36-40 psi | For Test Pressures on which See Specification: 0600X | |
| Reason For Test: New Piping Installation | | |
| Starting Test Pressure: 36 psi + 5% allowed Finish Test Pressure: 25 psi + 5% allowed Pass Criteria: The test is acceptable if the measure street thoughout the specified Gauge Manufacturer: NESHOK Calibration Gauge Serial# 488576 - A Calibration Date: 8 - 12 - 12 - 12 - 12 - 12 - 12 - 13 - 13 | Time: 7:43 Pass/ ured loss is not greater than 5 to 1 test duration. on Certificate Number: 23/ Calibration Expiration | 後でフ Date: 8・12・11 |
| Test Witnessed and Accepted By: BMWC Represe | | 5-31-(O Date |
| July lie | CTOR, QA/QC | 8'-31-10 Date |
| By. J. Hele WCH-CONTR | actor . | 08-31-10 Date |
| CQA - SUBCONT | RACTOR | 08-31-10 Date |
| -2 53365111 | | |

PNEUMATIC TEST REPORT FORM

MCF-10

| | Gauge Tested in accordance to ASME B31.3 |
|---|---|
| Job Number: 402738 | Unit: Sequence # |
| Equipment/Line No.: | tion Tanky Area: Test# 27 |
| Service: | Test Medium: Compressed AIR |
| System Being Tested: Zin, lenk Boiler | Exchanger Furnace |
| Detection Piping | Vessel Other |
| Test Pressure: 34 psi | In Service Test (only checked, if Joints Snooped (Soap Tested) Joints Snoop Tested (only checked, if Joints (Soap Tested) |
| Reason For Test: New Piping Installation | |
| Gauge Serial# 438570 A Calibration Date: 438570-A Date of Test: 9-1616 | B-12-10 Calibration Expiration Date: 8-12-11 Duration of Test: 60 mins. |
| Final Test Pressure: 33 psi | Pass × Fail |
| pressure thoughout the specified to | red loss is not greater than 5 % of the test beginning est duration. on test pump and set at no more than 5% of the maxium test pressure |
| Test Witnessed and Accepted By: BMWC I | Halton a/16/10 Representative Date |
| Delhur - SUBCO | NTRACTOR, QA/QC Date |
| Benja W. | TELLE 09.16.10 Date |
| CQA - CC | ONTRACTOR Date |

| | Gauge Tested in acc | cordance to ASME B31.3 |
|--|--|-------------------------------------|
| | | 1944 |
| Job Number: 402738 | Unit: | Sequence # |
| Equipment Line No.: MH-18 PENE | TRATION Area: | TANK #4 Test # 28 |
| Service: | Test Medium: | Water |
| Equipment/System Being Tested: Boiler | Exchanger | Furnace |
| Piping | Vessel | Other_ |
| Piping System: 4×8 CARRIER | For Test Pressures | on which system: |
| Test Pressure: 30-40 psi | See Specification: | 0600X-SP-M0032, Ray 1, 3.5.1 |
| | | |
| Reason For Test: New Piping Installation | | |
| | | |
| | | |
| Starting Test Pressure: 34.5 psi + 5% al | lowed Time: 7:17 | |
| Finish Test Pressure: 33.5 psi + 5% al | lowed Time: 8:17 | Pass/Fail: Pass |
| Pass Criteria: The test is acceptable if pressure thoughout the | the measured loss is not greater to specified test duration. | han 5 % of the test beginning |
| Gauge Manufacturer: <u>NOSHOK</u> Gauge Serial# <u>13887</u> 0-A Calibration Date: | Calibration Certificate Number: 8-12-16 Calibration Expi | 29607 tration Date: 8 -12-11 |
| Comments: Pressure Relief Valve is installed | d on test pump and set at no more | than 5% of the maxium test pressure |
| | | |
| Tree Witnessed and Americal Phys | 2 / 1 | |
| Test Witnessed and Accepted By: | MA | |
| -Janus SY- | Marlon | 9-16-10 |
| BMWC | Representative | Date |
| 1-11.5 | 24/4 | 9-16-10 |
| Delhur - SUBC | ONTRACTOR QU'QC | Date |
| 11.15.11 | | 9/16/10 |
| ZWCH- | CONTRACTOR COLA | Date |
| \mathcal{M} | 1100 | 00.10.10 |
| Low In IV. | PCONTRACTOR— | . <u>09.16.10</u> Date |
| 4.75.1 | · (041,23ctor | Parê |
| W CH | | |
| | 1341 | |

PNEUMATIC TEST REPORT FORM

MCF-10

| | Gauge Tested in accordance to ASME 651.5 |
|--|--|
| Job Number: 402738 | Unit: Sequence # |
| Equipment/Line No.: MH-18 PENETRATION | Test # 28-P |
| Service: | Test Medium: Compressed AIR |
| System Being Tested: Boiler | Exchanger |
| CONTAINMENT Piping 4 × 8 7 v ¹ 4 v ¹ b Test Pressure: Pressu | Vessel Other |
| Tool 11 July 1 | In Service Test (only checked, if Joints Sacoped (Soap Tested) Joints Snoop Tested (only checked, if Joints (Soap Tested) |
| Reason For Test: New Piping Installation | |
| Gauge Serial# 5/1/292 Calibration Date: 4/-9// Date of Test: 9-16-10 Final Test Pressure: 11 psi | · · · · · · · · · · · · · · · · · · · |
| Comments: The test is acceptable if the measured loss is pressure thoughout the specified test duration Pressure Relief Valve is installed on test put | |
| Test Witnessed and Accepted By: BMWC Representa Delhur - SUBCONTRACT WCH - CONTRACT CQA - CONTRACT | 7.16.10 OR, QAQC Date 09.16.10 Date 7/16/10 |

PNEUMATIC TEST REPORT FORM

MCF-10

| | | Gauge rested in accord | IANCE TO ASIME BS 1.3 | |
|---|---------------------|--------------------------------------|---|-------|
| Job Number: 402738 | | Unit: | Sequence # | |
| Equipment/Line No.: MH - 17 | Table 4 PENETRATION | | Test # 29. | P |
| Service: | | | Compressed AIR | |
| | | | | |
| System Being Tested: | Boiler | Exchanger [| Furnace | |
| CONTAINMENT 12 × 18 | Piping 🗹 | Vessel | Other | |
| Test Pressure: | psi | In Service Test Joints Snoop Tested | (only checked, if Joints Snooped (Soup Tested) (anly checked, if Joints (Soup Tested) | |
| Reason For Test: New Piping In | estallation | | | |
| | | | | |
| Gauge Serial# 5/1292 Calibra Date of Test: 9-16- | | | , | |
| Final Test Pressure: 10 p | ši | Pass | Fail | |
| | | is not greater than 5 % of | the test beginning | |
| pressure thoughout the Pressure Relief Valve | | | nan 5% of the maxium test pres | ssure |
| Test Witnessed and Accepted By: | BNIWC Represen | etton. | 5/16/10 Date | |
| Delhu | r-SUBCONTRAC | | 9/16/10 Date | |
| Bago. | D. Klenle | e | 09.16.10 | ····· |
| | WCH - CONTRAC | CTOR | 9-16-10 | |
| | CQA - CONTRAC | CTOR | Date | |

| | Gauge Tested in accordance to ASME B31.3 |
|---|--|
| Job Number: 402738 | Unit: Sequence # |
| Equipment/Line No.: CREST PAD 9 F | Area: CP 9 Test # 30 |
| Service: | Test Medium: Water |
| Equipment/System Being Tested: Boiler | Exchanger |
| Piping [7] | Vessel Other |
| Piping System: PVC Test Pressure: 70 psi | For Test Pressures on which system: See Specification: 0600X-SP-M0032, Rev 1, 3.5.1 |
| Reason For Test: New Piping Installation | |
| | |
| Starting Test Pressure:psi + 5% allowe | d Time: 1:50 |
| Finish Test Pressure: 72 psi + 5% allowe | d Time: 2:50 Pass/Fail: PASS |
| Pass Criteria: The test is acceptable if the pressure thoughout the spe | measured loss is not greater than 5 % of the test beginning |
| Gauge Manufacturer: 1) IVA Calibration Date: | ibration Certificate Number: 28532 |
| | test pump and set at no more than 5% of the maxium test pressure |
| | |
| Test Witnessed and Accepted By: | Mox 11-2-10 |
| BMWC Re | presentative Date |
| Delhur - SUBCON | TRACTOR, QA/QC Date |
| Ben B. | While 11.02.1/2 |
| WCH-CO | VTRACTOR Date |
| | 11-2-10 |
| CQA-SUBCO | ONTRACTOR Date |

MCF-9

| | Gauge Tested in accordance | to ASME B31.3 |
|--|--------------------------------------|-----------------------------|
| Job Number: 402738 | Unit: | Sequence # |
| Equipment/Line No.: CREST PAD 10 | PVC Area: CP) | O Test # 31 |
| Service: | Test Medium: Water | |
| Equipment/System Being Tested: Boiler | Exchanger | Furnace |
| Piping [7] | Vessel [| Other |
| Piping System: PVC | For Test Pressures on which | system: |
| Test Pressure: 70 psi | See Specification: 0600X-S | P-M0032, Rev 1, 3.5.1 |
| Reason For Test: New Piping Installation | | |
| | | J .:. |
| Starting Test Pressure: 76 psi + 5% allower | d Time: 7:30 | |
| Finish Test Pressure: 71/ psi + 5% allowed | d Time: 5:36 Pass/Fa | il: <u>PASS</u> |
| Pass Criteria: The test is acceptable if the n pressure thoughout the spec | | of the test beginning |
| Gauge Manufacturer: 1.) IVA Cali Gauge Serial# 400519-A Calibration Date: 3 | | 32 ate: 3/11 |
| Comments: Pressure Relief Valve is installed on | test pump and set at no more than 5% | of the maxium test pressure |
| | | در |
| Test Witnessed and Accepted By: | 1-1611 | |
| Jaines V. | Nation | 11-9-10 |
| BMWC Rep | presentative | Date |
| Delhur - SUBCONT | CRACTOR, OA/OC | 11-9-16 Date |
| Bud Ille | led | 11.09.10 |
| WCH - CON | TRACTOR | Date |
| 44/ 8 | lin | 11/9/10 |
| / CQA - SUBCO | NTRACTOR | Date |

Cells 9 & 10

Torque Reports

TORQUE WITNESS REPORT FORM MCF-12

| BMWC Constru | | | Chapter of the state of the chapter of the state of the s | t deposits a compression description of the | San | ""。一个一个 | ক্রিভ |
|--|----------|-------------------------------|--|---|---|---------|-------|
| Job Number: 40273 | 8 | | | Area: SC#9 & SC#1 | 0 | | |
| Equipment/Line No.: | | | | Man-Hole # 38 | | | |
| Service: 1 | eachate | | | Test: Torque | | , | |
| System Being Tested: | | Во | iler 🗌 | Exchanger | Furnace | | |
| | Flange | d Connecti | ons 🗹 | Vessel 🗌 | Other | • | |
| Torque Requirements: | 105 | ft-lbs | 12" Flanges [| 12" Flange x Valve_ | 75 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 10" Flanges | 10" Flange x Valve | 58 | ft-lbs | V |
| Torque Requirements: | 80 | ft-lbs | 8" Flanges | 8" Flange x Valve | 58 | ft-lbs | |
| Torque Requirements: | 50 | ft-lbs | 6" Flanges | 6" Flange x Valve | 44 | ft-lbs | |
| Torque Requirements: | 33 | ft-lbs | 4" Flanges | 4" Flange x Valve | 30 | ft-lbs | |
| Reason For Test: 1 Wrench Serial# 5981138958 | | ibration Day | | ration Due: /30/2011 | | | |
| Date of Torque: | bepter | nber: | 2 <u>nd</u> , 2010 | | | | |
| Comments: (3) (2) Test Witnessed and Accept | o" ed B | Flange Flange Wls BM | to Flange to Valve | 9 | 7-2-1 Da | (O) | |

GLOBAL CALIBRATION SERVICES

502 S LUCILE ST SEATTLE, WA 98108-2507

CERTIFICATE OF CALIBRATION #128566

Issued To:

BMWC CONSTRUCTORS, INC 20638 84TH AVE S KENT, WA 98032 SO 9001 ASSITUTE ASSI

Quality Management System Certificate No. 11495

Item ID: 5981138958

Item Description: TORQUE WRENCH

item Size: 250 ft-lb CW

Manufacturer: ARMSTRONG

Model Number: 64-086

Serial Number: 5981138958

Assigned Department: N/A

Item Location: N/A

Calibration Location: INHOUSE LAB

Purchase Order Number: 4027380105

Calibration Date: 03/30/2010

Calibration Due: 03/30/2011

Temperature (Deg F): 87

Humidity (%): 37

Procedure: GCS-8002

lan Torres, Technical Specialist

Date Certificate Issued: 03/30/2010

Global Calibration Services' quality management system conforms to ISO 9001:2000, ANSVNCSL Z540-1, ISO/IEC 17025-2005, ISO 10012:2003, and the technical requirements of the customer's order. All calibrations are performed using internationally recognized standards traceable to the SI Units. Traceability is achieved through the National Institute of Standards and Technology (NIST), other National Measurement Institutes (NMIs), or by using natural physical constraints, Intrinsic standards or ratio calibration techniques. Unless otherwise indicated, the combined estimated uncertainty of the measurement has a coverage factor of k-2 at a conlidence level of 95%. Any number of factors may cause the instrument to drift out of specification before the recommended recalibration date contained in this certificate. The Information shown on this certificate applies only to the Instrument identified above and may not be reproduced, except in fulf, without prior written consent from Global Calibration Services.

TABLE 2

EXAMPLES OF ESTIMATED BOLT TORQUE TO "SEAT" HOPE FLANGE FACES:

The engineer of record is usually responsible for establishing each flange joint criteria, and performing the required calculations to determine the initial and residual torque values.

These estimated values are based on non-plated bolts and studs, using a nut factor of K=0.16 for lightly greased bolts and nuts. The calculations uses a HDPE flange face seating stress of 1200-psi as a minimum and 1800-psi as a maximum, and assumes the flanged joint is between two HDPE flange adapters (in which the contact area is largest), without a rubber gasket.

NOTE: For boiling to ductile-iron pipe, steel flanges or butterfly valves, the flange face contact area is about half, so boil torque for that flange pair will be measurably less (refer to Table #3).

| IPS | LJF | Initi | ial Minimum | Initial Maximum | Flange |
|------------------|----------|-------------|---------------|-----------------|---------------|
| Nominal | Bolt | Number | Lubed | Lubed | OD/ ID |
| Pipe Size | Diameter | of Bolts | Torque (Ft-L) | Torque (Ft-Lb | |
| 2" | 0.625 | 4 | 23 | 35 | 3.9 / 1.94 |
| 3" | 0.625 | 4 | 33 | 50 | 5.0 / 2.86 |
| 4" | 0.625 | 8 | 331 | 50 | 6.6 / 3.68 |
| 5" | 0.75 | 8 | 44 | 68 | 7.5 / 4.40 |
| 6" | 0.75 | 8 8 8 | 50 V | 75 | 8.5 / 5.42 |
| 8" | 0.75 | 8 | 80 | 120 | 10.63 / 6.76 |
| 10" | 0.875 | 12 | 80 | . 120 | 12.75 / 8.79 |
| 12" | 0.875 | 12 | 105 | 160 | 15.00/ 10.43 |
| 14 ^{ss} | 1.000 | 12 | 180 | 270 | 17.50 / 11.45 |
| 16" | 1.000 | 16 | 180 | 270 | 20.00 / 13.09 |
| 18" | 1.125 | 16 | 200 | 300 | 21,12 / 14.73 |
| 20° | 1.125 | 20 | 200 | 300 | 23.50 / 16.36 |
| 22° | 1.25 | 20 | 260 | 390 | 25.60 / 18.00 |
| 24" | 1.25 | 20 | 290 | 435 | 28.00 / 19.64 |
| 26" | 1.25 | 24 | 290- | 435 | 30.00 / 21.27 |
| 28** | 1.25 | 28 | 290 | 435 | 32.30 / 22.91 |
| 30° | 1.25 | 28 | 325 | 488 | 34.30 / 24.54 |
| 32 ⁿ | 1.50 | 28 | 425 | 640 | 36.50 / 26.18 |
| 34" | 1.50 | 32 | 425 | 640 | 38.50 / 27.82 |
| 36" | 1.50 | 32 | 460 | 690 | 40.80 / 29.45 |
| 40" | 1.50 | 36 | 460 | 690 | 46.00 / 35.29 |
| 42" | 1.50 | 36 | 460 | 690 | 47.50 / 37.08 |
| 48" | 1.50 | 44 | 460 | 690 | 54.00 / 43.43 |
| 54" | 1.75 | 44 | 560 | 840 | 80.00 / 48.86 |

NOTE: Uniform bolt pre-load (torque), without large "scatter", is as useful as the target pre-load. Within the limits of the HDPE flange adapter, gasket, or metal LJF, higher pre-load is desirable. The higher the pre-load safely achievable, the more closely the assembly will behave like the theoretical model and seal well. Higher pre-load means that a given internal pressure will result in the least possible change in contact sealing pressure. Be consistent (avoid changes) with materials and tools when following written assembly procedures.

Train and supervise the boiting personnel. Tell the crew what is to be accomplished, why, and explain that good results are not automatically achieved. Skill and care are essential. Boited Joint assembly is a technical skill that is not common in the construction and maintenance profession, being considered more like a specialty. There is no universally accepted testing, nor certification, of boited-joint assembly mechanics. With no common training, certification, nor standards, it is no surprise there is +/- 25% variability in assembly torque. Specifications and instructions by the engineer, followed by trained mechanics, help to solve the dilemma.

TABLE 3

Examples of Estimated Bolt Torque to "Seat" the HDPE Flange Face To A Butterfly-Valve, Steel Pipe Flange, or Ductile Iron Flange.

The engineer of record is usually responsible for establishing each flange joint criteria, and performing the required calculations to determine the initial and residual torque values.

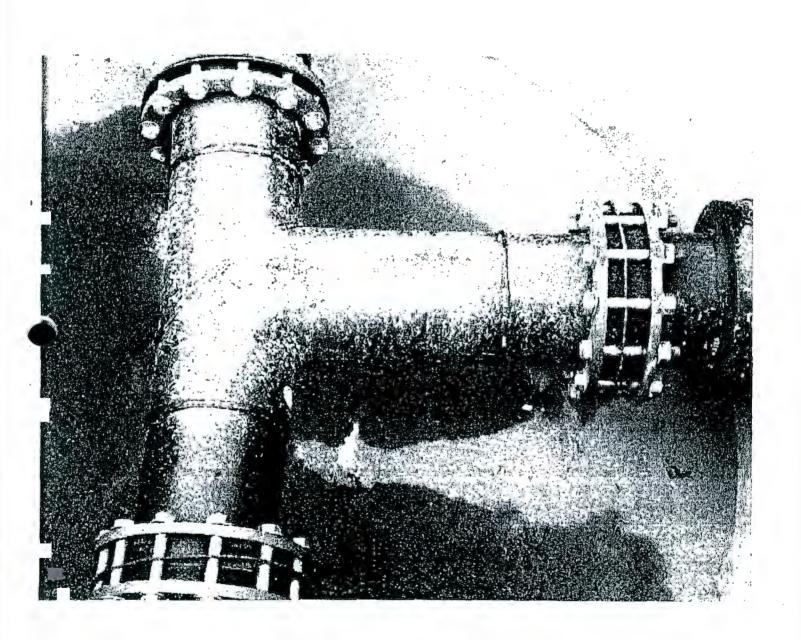
These estimated lightly lubricated torque values assume the flanged joint connects one HDPE flange-adapter to a Butterfly-Valve or Steel Pipe flange of Schedule 40 ID, or a Ductile-iron flange. For bolting to steel flanges or butterfly valves, the flange face contact area is just over half that of HDPE to HDPE flanges, so calculated bolt torque for this flange pair will be measurably less than the values listed in Table #2.

Dimensional flange data should be obtained for each case from the pipe flange suppliers, so as to be able to calculate the face contact area.

These <u>estimated values</u> are based on non-plated bolts and studs, using a K=0.16 for lightly greased bolts and nuts. These calculations use an HDPE material minimum and maximum compressive seating stress of 1200-psi to 1800-psi.

| IPS | LJF | Initia | al/Minimum \ | Initial Maximum | HDPE |
|-----------------|----------------|----------------|-----------------|-----------------|---------------|
| Nominal | Boit Dia. | Number | Lubed \ | Lubed | Flange OD |
| Pipe Size | (inches) | of Bolts | Torque (Ft-Lbs) | Torque (Ft-l | |
| , .p | () | | | 1919-111 | (inches) |
| | | | | | (1101100) |
| 2" | 0.625 | 4 | 22 | 32 | 3.90 / 2.087 |
| 3" | 0.525 | 4 | 30 | 45 | 5.00 / 3.088 |
| 4" | 0.625 | 8 | 30 | 45 | 6.80 / 4.026 |
| 5" | 0. 75 . | 8 | 44 | 66 | 7.50 / 4.40 |
| 6" | 0.75 | 8 | سما 44 | 68 · | 8.50 / 6.06 |
| 8" | 0.75 | 8 | 58 | 88 | 10.63 / 7,98 |
| 10" | 0.875 | 12 | 58 | 88 | 12.75 / 10.02 |
| 12" | 0.875 | 12 | 75 6 | 114 | 15.00 / 11.94 |
| 14 ^v | 1.000 | 12 | 140 | 210 | 17.50 / 13.13 |
| 16" | 1.000 | 16 | 140 | 210 | 20.00 / 15.00 |
| 18" | 1.125 | 16 | 140 | 210 | 21.12 / 16.88 |
| 20" | 1.125 | 20 | 140 | 210 | 23.50 / 18.81 |
| 22" | 1.25 | 20 | 160 | 240 | 25.60 / 21.25 |
| 24" | 1.25 | 20 | 180 | 270 | 28.00 / 23.25 |
| 26" | 1.25 | 24 | 180 | 270 | 30.00 / 25.25 |
| 28" | 1.25 | 28 | 180 | 270 | 32.30 / 27.25 |
| 30" | 1.25 | 28 | 180 | 270 | 34.30 / 29.25 |
| 32" | 1.50 | 28 | 240 | 360 | 36.50 / 31.00 |
| 34" | 1.50 | 32 | 240 | 360 | 38.50 / 33.00 |
| 36" | 1.50 | 32 | 260 | 390 | 40.80 / 35.00 |
| 40" | 1.50 | 36 | 310 | 465 | 46.00 / 39.00 |
| 42" | 1,50 | 3 6 | 310 | 465 | 47.50 / 41.00 |
| 48" | 1.50 | 44 | 310 | 465 | 54.00 / 47.00 |
| 54 ⁿ | 1.75 | 44 | 365 | 550 | 60.00 / 53.00 |

Train and supervise the bolting personnel. Tell the crew what is to be accomplished, why, and explain that good results are not automatically achieved. Skill and care are essential. Bolted Joint assembly is a technical skill that is not common in the construction and maintenance profession, being considered more like a specialty. There is no universally accepted testing, nor certification, of bolted-joint assembly mechanics. With no common training, certification, nor standards, it is no surprise there is +/- 25% variability in assembly torque. Specifications and instructions by the engineer, followed by trained mechanics, help to solve the dilemma.



| BMWC Constru | | | e i gla i stespoj pretist st. di die de | the second of actions are the second of | STATE OF MAN | ded that spin | nues site in | 以此 |
|---------------------------|---------|--------------|---|---|--------------|---------------|---------------|----|
| Job Number: 40273 | 8 | | | Area: SC# | 9 & SC#10 | 0 | | |
| Equipment/Line No.: | | | | Man-Hole # 3 | 9 | | | |
| Service: I | eachate | | | Test: Toro | ue | | | |
| System Being Tested: | | Bo | iler 🔲 | Exchanger [| | Furna | ce 🗀 | |
| | Flange | d Connection | ons 🗹 | Vessel | | Oth | er | |
| Torque Requirements: | 105 | ft-lbs | 12" Flanges 🗌 | 12" Flange | x Valve_ | 75 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 10" Flanges 🔽 | 10" Flange: | v Valve | 58 | ft-lbs | V |
| Torque Requirements: | 80 | ft-lbs | 8" Flanges | 8" Flange | v Valve | 58 | ft-lbs | |
| Torque Requirements: | 50 | ft-lbs | 6" Flanges | 6" Flange | x Valve | 44 | ft-lbs | |
| Torque Requirements: | 33 | ft-lbs | 4" Flanges | 4" Flange | x Valve | 30 | ft-lbs | |
| Wrench Serial# 5981138958 | | libration Da | | ration Due: /30/2011 | | - | | |
| Date of Torque: | Tuesday | ay Dieg | st 10th 2010 extender 2nd 2 | 0 10 | | | | |
| Comments: 2 (10 | ") Fla | | Flange, 2 | | ge to | Val | ve | |
| Test Witnessed and Accept | | ILLO S | WC Representative | | _ | 9- | 2 -/C Date |) |



| BMWC Constru | | | न्द्रित्त । केल्क्नित्वाद्वराध्यक्तिक | 和 是是的1.40%。 | इ.स.स्टब्स्ट्रीट प्रमुख्ये क्रम्ब्स्ट्री (१००६) | क्ला होते की देखा है। इस्तार की की देखा है। | Carrena de la composición dela composición de la composición dela composición dela composición dela composición de la composición de la composición dela composición de la composición dela composición del | Tanger |
|--|---------|----------------------|---------------------------------------|--------------------|---|--|--|--------|
| Job Number: 40273 | 3 | | | | Area: SC#9 & SC#1 | 0 | | |
| Equipment/Line No.: | | | · · · · · · · · · · · · · · · · · · · | Ma | un-Hole # 35 | | | |
| Service: I | eachate | | | | Test : Torque | | | |
| System Being Tested: | | Во | iler 🗌 | Е | xchanger [| Furna | се 🗌 | |
| | Flange | d Connection | ons 🗹 | | Vessel | Oth | er | |
| Torque Requirements: | 105 | ft-lbs | 12" Flanges | | 12" Flange x Valve | 75 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 10" Flanges | 4 | 10" Flange x Valve | 58 | ft-lbs | |
| Torque Requirements: | 80 | ft-Ibs | 8" Flanges | | 8" Flange x Valve | 58 | ft-lbs | |
| Torque Requirements: | 50 | ft-lbs | 6" Flanges | | 6 ⁿ Flange x Valve | 44 | ft-lbs | |
| Torque Requirements: | 33 | ft-lbs | 4" Flanges | | 4" Flange x Valve | 30 | ft-lbs | |
| Reason For Test: N Wrench Serial# 5981138958 | | libration Da 3/30/20 | ite: (| Calibration 3/30/ | | | | |
| Date of Torque: | Monda | ay Aug | ust 16, 20 | olo | | | | |
| r | | , | | | | | | |
| Comments: 3(10 | ") F | lange y | to Flange | . 1 | Flange | | | _ |
| Test Witnessed and Accept | ed By: | anne BMV | VC Representativ | 1/10 | ** - | 9- | 2 - / (Date | 2_ |

GLOBAL CALIBRATION SERVICES

502 S LUCILE ST SEATTLE, WA 98108-2507

CERTIFICATE OF CALIBRATION #128566

Issued To:

BMWC CONSTRUCTORS, INC 20638 84TH AVE S KENT, WA 98032



Quality Management System Certificate No. 11495

Item ID: 5981138958

Item Description: TORQUE WRENCH

Item Size: 250 It-Ib CW

Manufacturer: ARMSTRONG

Model Number: 64-086

Serial Number: 5981138958

Assigned Department: N/A

Item Location: N/A

Calibration Location: INHOUSE LAB

Purchase Order Number: 4027380105

Calibration Date: 03/30/2010

Calibration Due: 03/30/2011

Temperature (Deg F): 67

Humidity (%): 37

Procedure: GCS-8002

lan Torres, Technical Specialist

Date Certificate Issued: 03/30/2010

Global Calibration Services' quality management system conforms to ISO 9001:2000, ANSI/NCSL Z540-1, ISO/IEC 17025-2005, ISO 10012:2003, and the technical requirements of the customer's order. All calibrations are performed using internationally recognized standards traceable to the SI Units. Traceability is achieved through the National Institute of Standards and Technology (NIST), other National Measurement Institutes (NMIs), or by using natural physical constraints, intrinsic standards or ratio calibration techniques. Unless otherwise Indicated, the combined estimated uncertainty of the measurement has a coverage factor of k-2 at a confidence level of 95%. Any number of factors may cause the instrument to drift out of specification before the recommended recalibration date contained in this certificate applies only to the instrument Identified above and may not be reproduced, except in full, without prior written consent from Global Calibration Services.

EXAMPLES OF ESTIMATED BOLT TORQUE TO "SEAT" HDPE FLANGE FACES:

The engineer of record is usually responsible for establishing each flange joint criteria, and performing the required calculations to determine the initial and residual torque values.

These estimated values are based on non-plated bolts and studs, using a nut factor of K=0.16 for lightly greased bolts and nuts. The calculations uses a HDPE flange face seating stress of 1200-psi as a minimum and 1800-psi as a maximum, and assumes the flanged joint is between two HDPE flange adapters (in which the contact area is largest), without a rubber gasket.

NOTE: For bolting to ductile-iron pipe, steel flanges or butterfly valves, the flange face contact area is about half, so bolt torque for that flange pair will be measurably less (refer to Table #3).

| IPS | LJF | Init | ial Minimum | Initial Maximum | Flange |
|-----------------|----------|----------|-------------|---------------------|---------------|
| Nominal | Bolt | Number | / Lubed | Lubed | OD/ ID |
| Pipe Size | Diameter | of Bolts | Torque (Ft- | Lbs) Torque (Ft-Lbs | (Inches) |
| 2" | 0.625 | 4 | 23 | 35 | 3.9 / 1.94 |
| 3" | 0.625 | 4 | 33 | 50 | 5.0 / 2.86 |
| 411 | 0.625 | 8 | 33 V | 50 | 6.8 / 3.88 |
| 5" | 0.75 | 8 | 44 | 66 | 7.5 / 4.40 |
| 6" | 0.75 | 8 | 50 V | 75 | 8.5 / 5.42 |
| 8" | 0.75 | 8 | 80 | 120 | 10.83 / 6.76 |
| 10" | 0.875 | 12 | 801 | 120 | 12.75 / 8.79 |
| 12" | 0.875 | 12 | 1052 | 160 | 15.00/ 10.43 |
| 14" | 1.000 | 12 | 180 | 270 | 17.50 / 11.45 |
| 16" | 1.000 | 16 | 180 | 270 | 20.00 / 13.09 |
| 18" | 1.125 | 16 | 200 | 300 | 21.12 / 14.73 |
| 20" | 1.125 | 20 | 200 | 300 | 23.50 / 16.36 |
| 22" | 1.25 | 20 | 260 | 390 | 25.60 / 18.00 |
| 24" | 1.25 | 20 | 290 | 435 | 28.00 / 19.64 |
| 26" | 1.25 | 24 | 290- | 435 | 30.00 / 21.27 |
| 28" | 1.25 | 28 | 290 | 435 | 32.30 / 22.91 |
| 30" | 1.25 | 28 | 325 | 488 | 34.30 / 24.54 |
| 32" | 1.50 | 28 | 425 | 640 | 36.50 / 26.18 |
| 34" | 1.50 | 32 | 425 | 640 | 38.50 / 27.82 |
| 36" | 1.50 | 32 | 460 | 690 | 40.80 / 29.45 |
| 40" | 1.50 | 36 | 460 | 690 | 46.00 / 35.29 |
| 42 ⁿ | 1.50 | 36 | 460 | 690 | 47.50 / 37.06 |
| 48" | 1.50 | 44 | 460 | 690 | 64.00 / 43.43 |
| 54" | 1.75 | 44 | 560 | 840 | 60.00 / 48.86 |

NOTE: Uniform bolt pre-load (torque), without large "scatter", is as useful as the target pre-load. Within the limits of the HDPE flange adapter, gasket, or metal LJF, higher pre-load is desirable. The higher the pre-load safely achievable, the more closely the assembly will behave like the theoretical model and seal well. Higher pre-load means that a given internal pressure will result in the least possible change in contact sealing pressure. Be consistent (avoid changes) with materials and tools when following written assembly procedures.

Train and supervise the boiting personnel. Tell the crew what is to be accomplished, why, and explain that good results are not automatically achieved. Skill and care are essential. Boited Joint assembly is a technical skill that is not common in the construction and maintenance profession, being considered more like a specialty. There is no universally accepted testing, nor certification, of bolted-joint assembly mechanics. With no common training, certification, nor standards, it is no surprise there is +/- 25% variability in assembly torque. Specifications and instructions by the engineer, followed by trained mechanics, help to solve the dilemma.

Examples of Estimated Boit Torque to "Seat" the HDPE Flange Face To

A Butterfly-Valve, Steel Pipe Flange, or Ductile Iron Flange.

The engineer of record is usually responsible for establishing each flange joint criteria, and performing the regulred calculations to determine the initial and residual torque values.

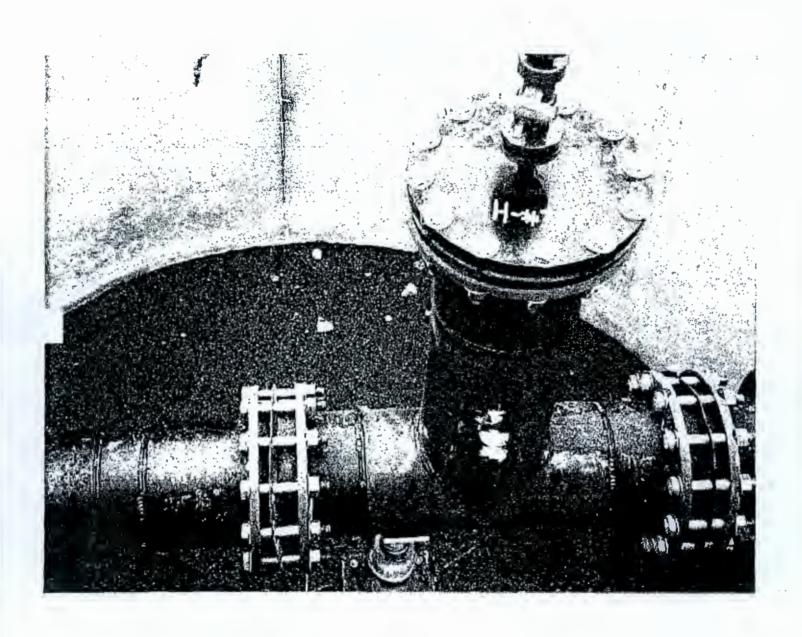
These estimated lightly lubricated torque values assume the flanged joint connects one HDPE flange-adapter to a Butterfly-Valve or Steel Pipe flange of Schedule 40 ID, or a Ductile-Iron flange. For boiling to steel flanges or butterfly valves, the flange face contact area is just over half that of HDPE to HDPE flanges, so calculated boil torque for this flange pair will be measurably less than the values listed in Table #2.

Dimensional flange data should be obtained for each case from the pipe flange suppliers, so as to be able to calculate the face contact area.

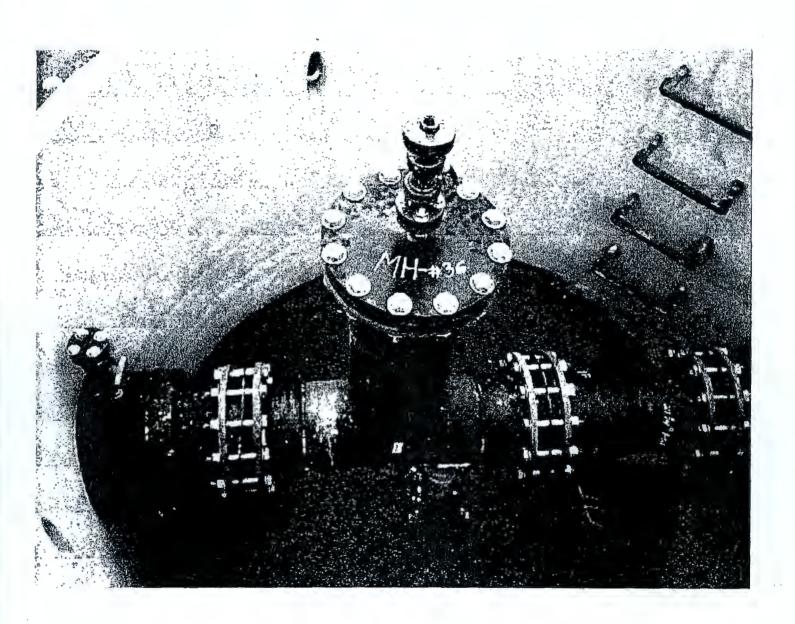
These estimated values are based on non-plated bolts and stude, using a K=0.16 for lightly greased bolts and nuts. These calculations use an HDPE material minimum and maximum compressive seating stress of 1200-psi to 1800-psi.

| IPS | LJF | Initia | Minimum | Initial Maximum H | DPE |
|-----------------|-----------|-------------|-----------------|-------------------|---------------|
| Nominal | Bolt Dia. | Number | Lubed | Lubed | Flange OD |
| Pipe Size | (inches) | of Bolts | Torque (Ft-Lbs) | Torque (Ft-Lbs) | _ |
| 2" | 0.625 | 4 | 22 | 32 | 3.90 / 2.087 |
| 3" | 0.625 | 4 | 30 | 45 | 5.00 / 3.068 |
| 4 ^M | 0.625 | 8 | 301 | 45 | 6.60 / 4.026 |
| 5" | 0.75 | 8 | 44 | 66 | 7.50 / 4.40 |
| 6" | 0.75 | 8 8 8 | 44 | 66 | B.50 / 6.06 |
| 8" | 0.75 | 8 | 88 | 88 | 10.63 / 7.98 |
| 10" | 0.875 | 12 | 58 | 88 | 12.75 / 10.02 |
| 12" | 0.875 | 12 | 75 | 114 | 15.00 / 11.94 |
| 14" | 1.000 | 12 | 140 | 210 | 17.50 / 13.13 |
| 18" | 1.000 | 16 | 140 | 210 | 20.00 / 15.00 |
| 18" | 1.125 | 16 | 140 | 210 | 21.12 / 16.88 |
| 20" | 1.125 | 20 | 140 | 210 | 23.50 / 18.81 |
| 22" | 1.25 | 20 | 160 | 240 | 25.80 / 21.25 |
| 24" | 1.25 | 20 | 180 | 270 | 28.00 / 23.25 |
| 26" | 1.25 | 24 | 180 | 270 | 30.00 / 25.25 |
| 28" | 1.25 | 28 | 180 | 270 | 32.30 / 27.25 |
| 30* | 1.25 | 28 | 180 | 270 | 34.30 / 29.25 |
| 32" | 1.50 | 28 | 240 | 360 | 36,50 / 31.00 |
| 34" | 1.50 | 32 | 240 | 360 | 38.50 / 33.00 |
| 36" | 1.50 | 32 | 260 | 390 | 40.80 / 35.00 |
| 40" | 1.50 | 36 | 310 | 465 | 46.00 / 39.00 |
| 42 ⁿ | 1.50 | 36 | 310 | 465 | 47.50 / 41.00 |
| 48" | 1.50 | 44 | 310 | 465 | 54.00 / 47.00 |
| 54" | 1.75 | 44 | 365 | 550 | 60.00 / 53.00 |

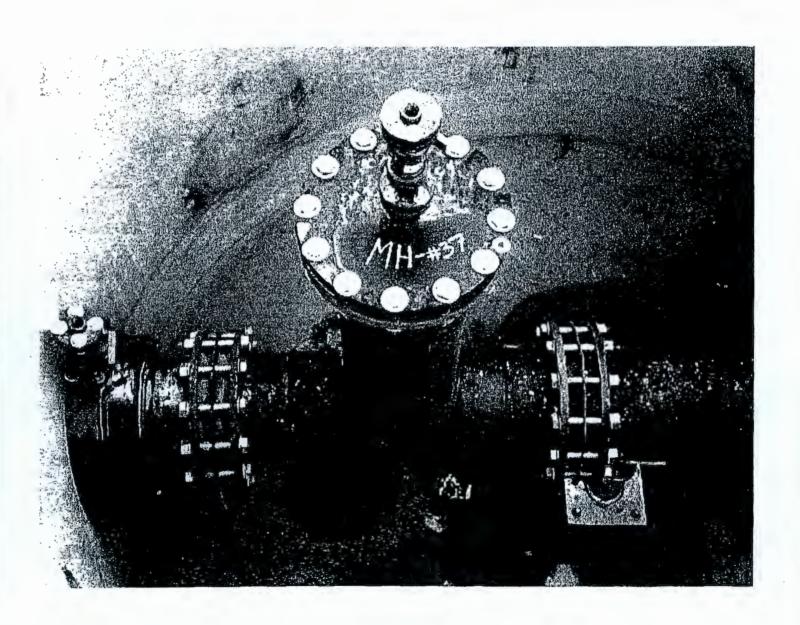
Train and supervise the bolting personnel. Tell the crew what is to be accomplished, why, and explain that good results are not automatically achieved. Skill and care are essential. Bolted Joint assembly is a technical skill that is not common in the construction and maintenance profession, being considered more like a specialty. There is no universally accepted testing, nor certification, of bolted-joint assembly mechanics. With no common training, certification, nor standards, it is no surprise there is +/- 25% variability in assembly torque. Specifications and instructions by the engineer, followed by trained mechanics, help to solve the dilemma.



| Job Number: 402738 | 3 | - | | | Area: SC#9 & SC#1 | 10 | | |
|--|----------|--------------------------|----------------|------------|--------------------|---------|--------|--|
| Equipment/Line No.: | | | | Ma | n-Hole # 2/2 | | | |
| Service: <u>I</u> | .eachate | | | | Test: Torque | | | |
| System Being Tested: | | Boile | r 🗆 | E: | xchanger | Furnace | | |
| | Flange | d Connections | · 🗹 | | Vessel [| Other | | |
| Torque Requirements: | 105 | ft-lbs | 12" Flanges | 0/ | 12" Flange x Valve | 75 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 10" Flanges | | 10" Flange x Valve | 58 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 8" Flanges | | 8" Flange x Valve_ | 58 | ft-lbs | |
| Torque Requirements: | 50 | ft-lbs | 6" Flanges | | 6" Flange x Valve_ | 44 | ft-lbs | |
| Torque Requirements: | 33 | ft-lbs | 4" Flanges | | 4" Flange x Valve | 30 | ft-lbs | |
| Reason For Test: N | lew Leac | hate Transmis | ssion Line Ins | tallation | | | | |
| Reason For Test: N Wrench Serial# 5981138958 | | hate Transmis | : | Calibratio | | | | |
| Wrench Serial# | Cal | libration Date 3/30/2010 | : | Ca)ibratio | | | | |
| Wrench Serial# 5981138958 | Cal | libration Date 3/30/2010 | : | Ca)ibratio | | | | |
| Wrench Serial# 5981138958 Date of Torque: | Cal | libration Date 3/30/2010 | ,2010 ge to | Ca)ibratio | 2011 | | | |



| BMWC Constru | ctors Inc | · · | | n est | taring a taging tigg are | and the second | gerta tiko | Sec. 14 |
|---------------------------|------------|------------------|-----------------------|-----------|--------------------------|----------------|------------|---------|
| Job Number: 402738 | 3 | | | | Area: SC#9 & SC#1 | 0 | | |
| Equipment/Line No.: | | | | | Man-Hole # 37 | | | |
| Service: <u>L</u> | eachate | | | | Test: Torque | | _ | |
| System Being Tested: | | Boiler | | | Exchanger | Furnac | :е 🔲 | |
| | Flange | d Connections | Ø. | | Vessel . | Othe | :f | |
| Torque Requirements: | 105 | ft-lbs | 12" Flanges | | 12" Flange x Valve_ | 75 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 10" Flanges | V | 10" Flange x Valve | 58 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 8" Flanges | | 8" Flange x Valve | 58 | ft-lbs | |
| Torque Requirements: | 50 | ft-lbs | 6" Flanges | | 6" Flange x Valve | 44 | ft-lbs | |
| Torque Requirements: | 33 | ft-lbs | 4" Flanges | | 4" Flange x Valve | 30 | ft-lbs | |
| Reason For Test: N | | libration Date: | | Calib | oration Due: | | | |
| 5981138958 | | 3/30/2010 | | 3 | 3/30/2011 | | | |
| Date of Torque: | Sept | ember 2 | nl , 201 | 0 | | | | |
| I | • | | | | | | | |
| Comments: (3) | 10" 10" | Flange Flange | 1 1 | Fla | inge nd | | | |
| Test Witnessed and Accept | yed By: | NL H | Hallo. Representat | 7/ ive | | 9-1 | 2 - 11 | 2_ |
| // | / | | | | | | | |



| BMWC Constru | | | Contract of the form | and the last | entre de la companya | electrical property | The A | Para Cara | | |
|--|----------|--|----------------------|--------------|--|---------------------|--------|-----------|----------------|---|
| Job Number: 40273 | | _ | | | Area: SC#9 & SC#10 | | | | | |
| Equipment/Line No.: | | | | | Man-Hole # 32 | | | | | |
| Service: 1 | .eachate | | | | Test: Torque | | | | | |
| System Being Tested: | | Boiler | | | Exchanger | Furnace | | | | |
| | Flange | d Connections | | | Vessel | Other | | | | |
| Torque Requirements: | 105 | ft-lbs | 12" Flanges | 0/ | 12" Flange x Valve | 75 | ft-lbs | | | |
| Torque Requirements: | 80 | ft-lbs | 10" Flanges | ∇ | 10" Flange x Valve | 58 | ft-lbs | | | |
| Torque Requirements: | 80 | ft-lbs | 8" Flanges | | 8™ Flange x Valve | 58 | ft-lbs | | | |
| Torque Requirements: | 50 | ft-lbs | 6" Flanges | | 6" Flange x Vaive | 44 | ft-lbs | | | |
| Torque Requirements: | 33 | _ft-lbs | 4" Flanges | - | 4" Flange x Valve | 30 | ft-lbs | | • | |
| Reason For Test: N Wrench Serial# 5981138958 | | hate Transmis ibration Date: 3/30/2010 | | Calibra | nation Due; 30/2011 | | | | and the second | |
| Date of Torque: | Monsle | y Cing 5 | Hi 2010 | | | | | | | ı |
| | | | ~ | | 13 | | | | | |
| Comments: $\frac{2(10)}{4(4)}$ | ") Fl | inge to | o Valve | 2)(2 | 1(4") Flange to 2 values) | f/an | gc, | | | |
| Test Witnessed and Accept | led By: | MUS A | Representat | Won ive | | 8- | 9-/ | 0 | | |

GLOBAL CALIBRATION SERVICES

502 S LUCILE ST SEATTLE, WA 98108-2507

CERTIFICATE OF CALIBRATION #128566

Issued To:

BMWC CONSTRUCTORS, INC 20638 84TH AVE S KENT, WA 98032 ISO 9001
Regulatores

Asguard

Quality Management System Certificate No. 11495

Item ID: 5981138958

Item Description: TORQUE WRENCH

Item Sizs: 250 ft-lb CW

Manufacturer: ARMSTRONG

Model Number: 64-086

Serial Number: 5981138958

Assigned Department: N/A

Item Location: N/A

Calibration Location: INHOUSE LAB

Purchase Order Number: 4027380105

Calibration Date: 03/30/2010

Calibration Due: 03/30/2011

Temperature (Deg F): 67

Humidity (%): 37

Procedure: GCS-8002

lan Torres, Technical Specialist

Date Certificate Issued: 03/30/2010

Global Calibration Services' quality management system conforms to ISO 9001:2000, ANSI/NCSI, Z540-1, ISO/IEC 17025-2005, ISO 10012:2003, and the technical requirements of the customer's order. All calibrations are performed using internationally recognized standards traceable to the SI Units. Traceability is achieved through the National Institute of Standards and Technology (NIST), other National Measurement Institutes (NMIs), or by using natural physical constraints, intrinsic standards or ratio calibration techniques. Unless otherwise indicated, the combined estimated uncertainty of the measurement has a coverage factor of k-2 at a confidence lovel of 95%. Any number of factors may cause the instrument to drift out of specification before the recommended recalibration date contained in this certificate applies only to the instrument identified above and may not be reproduced, except in full, without prior written consent from Global Calibration Services.

EXAMPLES OF ESTIMATED BOLT TORQUE TO "SEAT" HOPE FLANGE FACES:

The engineer of record is usually responsible for establishing each flange joint criteria, and performing the required calculations to determine the initial and residual torque values.

These estimated values are based on non-plated bolts and studs, using a nut factor of K=0.16 for lightly greased bolts and nuts. The calculations uses a HDPE flange face seating stress of 1200-psi as a minimum and 1800-psi as a maximum, and assumes the flanged joint is between two HDPE flange adapters (in which the contact area is largest), without a rubber gasket.

NOTE: For boilting to ductile-iron pipe, steel flanges or butterfly valves, the flange face contact area is about half, so bolt torque for that flange pair will be measurably less (refer to Table #3).

| IPS | LJF | Initia | Minimum | Initial Maximum | Flange |
|-----------|----------|----------|--------------|-----------------|---------------|
| Nominal | Bolt | Number | Lubed | Lubed | OD/ ID |
| Pipe Size | Dlameter | of Bolts | Torque (Ft-) | | |
| 2" | 0.625 | 4 | 23 | 35 | 3.9 / 1.94 |
| 3" | 0.625 | 4 | 33 | 50 | 5.0 / 2.86 |
| 417 | 0.825 | 8 | 33 V | 50 | 6.8 / 3.68 |
| 5" | 0.75 | 8 | 44 | 66 | 7.5 / 4.40 |
| 6" | 0.75 | 8 | 50 | 75 | 8.5 / 5.42 |
| 819 | 0.75 | 8 | 80 | 120 | 10.63 / 6.76 |
| 10" | 0.875 | 12 | 801 | 120 | 12.75 / 8.79 |
| 12" | 0.875 | 12 | 1051 | 160 | 15.00/ 10.43 |
| 14" | 1.000 | 12 | 180 | 270 | 17.50 / 11.45 |
| 16" | 1.000 | 18 | 180 | 270 | 20.00 / 13.09 |
| 18" | 1.125 | 16 | 200 | 300 | 21.12 / 14.73 |
| 20* | 1.125 | 20 | 200 | 300 | 23.50 / 16.36 |
| 22" | 1.25 | 20 | 260 | 390 | 25.60 / 18.00 |
| 24" | 1.25 | 20 | 290 | 435 | 28.00 / 19.64 |
| 26" | 1.25 | 24 | 290- | 435 | 30.00 / 21.27 |
| 28" | 1.25 | 28 | 290 | 435 | 32.30 / 22.91 |
| 30" | 1.25 | 28 | 325 | 488 | 34.30 / 24.54 |
| 32" | 1.50 | 28 | 425 | 640 | 36.50 / 26.18 |
| 34" | 1.50 | 32 | 425 | 640 | 38.50 / 27.82 |
| 36" | 1.50 | 32 | 480 | 690 | 40.80 / 29.45 |
| 40" | 1.50 | 36 | 460 | 890 | 46,00 / 35.29 |
| 42" | 1.50 | 36 | 460 | 690 | 47.50 / 37.06 |
| 48" | 1.50 | 44 | 460 | 690 | 54.00 / 43.43 |
| 54" | 1.75 | 44 | 560 | 840 | 60.00 / 48.86 |

NOTE: Uniform bolt pre-load (torque), without large "scatter", is as useful as the target pre-load. Within the limits of the HDPE flange adapter, gasket, or metal LJF, higher pre-load is desirable. The higher the pre-load safely achievable, the more closely the assembly will behave like the theoretical model and seal well. Higher pre-load means that a given internal pressure will result in the least possible change in contact sealing pressure. Be consistent (avoid changes) with materials and tools when following written assembly procedures.

Train and supervise the bolting personnel. Tell the crew what is to be accomplished, why, and explain that good results are not automatically achieved. Skill and care are essential. Bolted Joint assembly is a technical skill that is not common in the construction and maintenance profession, being considered more like a specialty. There is no universally accepted testing, nor certification, of bolted-joint assembly mechanics. With no common training, certification, nor standards, it is no surprise there is +/- 25% variability in assembly torque. Specifications and instructions by the engineer, followed by trained mechanics, help to solve the dilemma.

Examples of Estimated Bolt Torque to "Seat" the HDPE Flange Face To

A Butterfly-Valve, Steel Pipe Flange, or Ductile Iron Flange.

The engineer of record is usually responsible for establishing each flange joint criteria, and performing the required calculations to determine the initial and residual torque values.

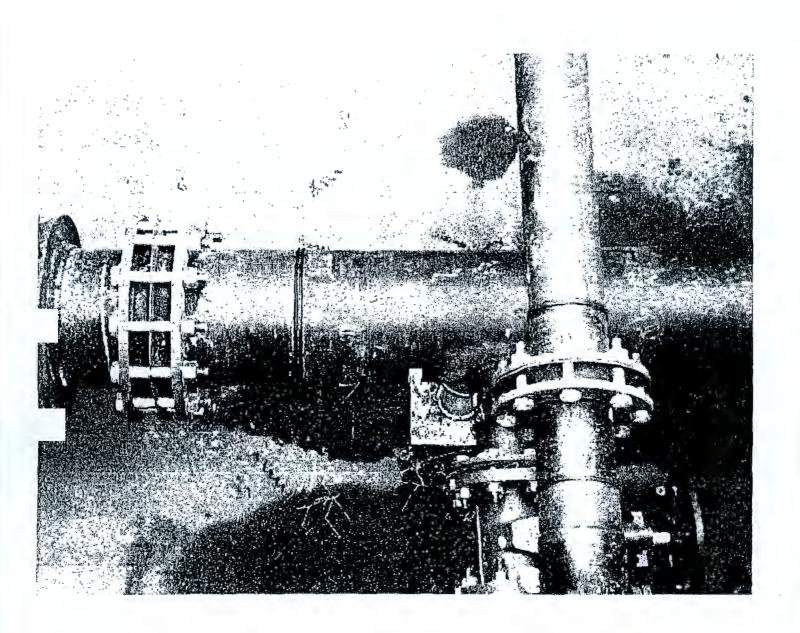
These estimated lightly lubricated torque values assume the flanged joint connects one HDPE flange-adapter to a Butterfly-Valve or Steel Pipe flange of Schedule 40 ID, or a Ductile-Iron flange. For bolting to steel flanges or butterfly valves, the flange face contact area is just over half that of HDPE to HDPE flanges, so calculated bolt torque for this flange pair will be measurably less than the values listed in Table #2.

Dimensional flange data should be obtained for each case from the pipe flange suppliers, so as to be able to calculate the face contact area.

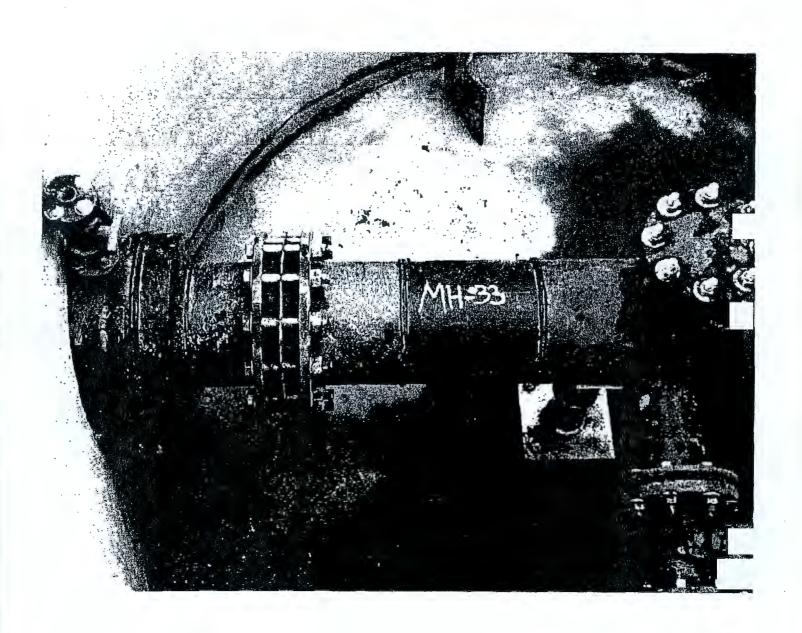
These <u>estimated values</u> are based on non-plated botts and studs, using a K=0.16 for lightly greased botts and nuts. These calculations use an HDPE material minimum and maximum compressive seating stress of 1200-psi to 1800-psi.

| | IPS | LJF | Initia | Minimum | Initial Maximum | HDPE |
|---|-----------|-----------|-------------|-----------------|-----------------|---------------|
| | Nominal | Bolt Dia. | Number | Lubed \ | Lubed | Flange OD |
| | Pipe Size | (inches) | of Boits | Torque (Ft-Lbs) | Torque (Ft- | |
| | .2" | 0.625 | 4 | 22 | 32 | 3,90 / 2,067 |
| | 3" | 0.625 | 4 | 30 | 45 | 5.00 / 3.088 |
| • | 4" | 0.625 | | 301 | 45 | 6.60 / 4.026 |
| | 5" | 0.75 | 8 | 44 | 66 | 7.50 / 4.40 |
| | ·6" | 0.75 | 8 8 8 | 441 | 66 | 8.50 / 6.06 |
| | 8" | 0.75 | 8 | 581 | 88 | 10.63 / 7.98 |
| | 10" | 0.875 | 12 | 58 | 88 | 12.75 / 10.02 |
| | 12° | 0.875 | 12 | 75 1 | 114 | 15:00 / 11.94 |
| | 14" | 1.000 | 12 | 140 | 210 | 17.50 / 13.13 |
| | 16" | 1.000 | 16 | 140 | 210 | 20.00 / 15.00 |
| | 18" | 1.125 | 16 | 140 | 210 | 21.12 / 16.88 |
| | 20" | 1.125 | 20 | 140 | 210 | 23.50 / 18.81 |
| | 22" | 1.25 | 20 | 160 | 240 | 25.60 / 21.25 |
| | 24" | 1.25 | 20 | 180 | 270 | 28.00 / 23.25 |
| | 26" | 1.25 | 24 | 180 | 270 | 30.00 / 25.25 |
| | 28" | 1.25 | 28 | 180 | 270 | 32.30 / 27.25 |
| | 30" | 1.25 | 28 | 180 | 270 | 34.30 / 29.25 |
| | 32" | 1.50 | 28 | 240 | 360 | 36.50 / 31.00 |
| | 34" | 1.50 | 32 | 240 | 360 | 38.50 / 33.00 |
| | 36" | 1.50 | 32 | 260 | 390 | 40.80 / 35.00 |
| | 40" | 1.50 | 36 | 310 | 465 | 46.00 / 39.00 |
| | 42" | 1.50 | 36 | 310 | 465 | 47.50 / 41.00 |
| | 48" | 1.50 | 44 | 310 | 465 | 54.00 / 47.00 |
| | 64" | 1.75 | 44 | 365 | 550 | 60.00 / 53.00 |
| | | | | | | |

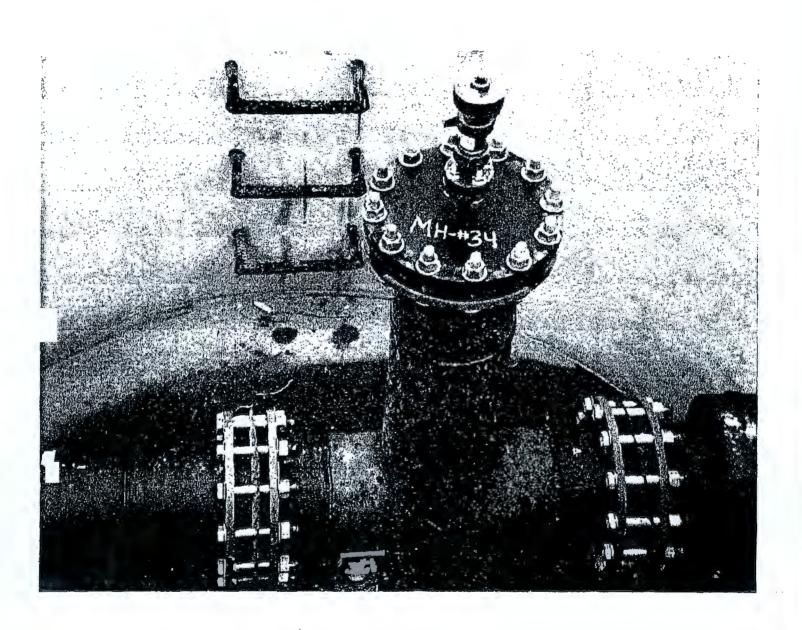
Train and supervise the boiling personnel. Tell the crew what is to be accomplished, why, and explain that good results are not automatically achieved. Skill and care are essential. Bolted Joint assembly is a technical skill that is not common in the construction and maintenance profession, being considered more like a specialty. There is no universally accepted testing, nor certification, of bolted-joint assembly mechanics. With no common training, certification, nor standards, it is no surprise there is +/- 25% variability in assembly torque. Specifications and instructions by the engineer, followed by trained mechanics, help to solve the dilemma.



| Job Number: 40273 | 8 | _ | | | Area: SC#9 & SC | #10 | | |
|--|----------|----------------|--------------------|-------------------|--------------------|-------------|--------------|-----|
| Equipment/Line No.: | | | | M | an-Hole # 33 | | | |
| Service: L | Leachate | | | | Test: Torque | | | |
| | | | | | | .* | | |
| System Being Tested: | | Boiler | | 1 | Exchanger 🗌 | Furne | ace 🗌 | |
| | Flange | d Connections | J | | Vessel 🗌 | Oth | her | _ |
| Torque Requirements: | 105 | ft-lbs | 12" Flanges | | 12" Flange x Valve | 75 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 10" Flanges | Ø | 10" Flange x Valve | 58 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 8" Flanges | | 8" Flange x Valve | 58 | ft-lbs | |
| Torque Requirements: | 50 | ft-lbs | 6" Flanges | | 6" Flange x Valve | 44 | ft-lbs | |
| Torque Requirements: | 33 | ft-lbs | 4" Flanges | V | 4" Flange x Valve | 30 | ft-lbs | V |
| Reason For Test: N | New Leac | nate Transmis | Sidit Late hist | anation | | | | |
| Reason For Test: N Wrench Serial# 5981138958 | | ibration Date: | | Calibrati | on Due: /2011 | | | |
| Wrench Serial# | Cal | ibration Date: | | Calibrati | | | | |
| Wrench Serial# 5981138958 | Cal | ibration Date: | | Calibrati 3/30 | | | | |
| Wrench Serial# 5981138958 Date of Torque: | Cal | ibration Date: | | Calibrati 3/30 | /2011 | ge, to | Valve | |
| Wrench Serial# 5981138958 Date of Torque: | Cal | ibration Date: | -9 th 2 | Calibrati 3/30 | /2011 | ge to 10"B" | Value ingl F | lan |



| BMWC Constru | | | State Verification | (************************************ | on the second state of the second | 3.排查数4.4%。 | | Sec. 1 |
|---------------------------|------------|----------------------|-----------------------------|---------------------------------------|--|------------|-------------|--------|
| Job Number: 40273 | 8 | PRO-NA | | | Area: SC#9 & SC#1 | 0 | | |
| Equipment/Line No.: | | | | M | an-Hole # 34 | | | |
| Service: L | eachate | , | | | Test : Torque | | - | |
| System Being Tested: | | Boi | iler 🗌 | E | xchanger | Furnace | | |
| | Flange | d Connection | ons 🗸 | | Vessel | Other | | |
| Torque Requirements: | 105 | ft-lbs | 12" Flanges | ٠, | 12" Flange x Valve | 75 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 10" Flanges | | 10" Flange x Valve | - 58 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 8" Flanges | | 8" Flange x Valve | 58 | ft-lbs | |
| Torque Requirements: | 50 | ft-lbs | 6" Flanges | | 6" Flange x Valve | 44 | ft-lbs | |
| Torque Requirements: | 33 | ft-lbs | 4" Flanges | i | 4" Flange x Valve | 30 | ft-lbs | |
| Wrench Serial# 5981138958 | | libration Da 3/30/20 | | ibratio | on Due: /2011 | | | |
| Date of Torque: | londe | iy Augus | of 16, 2010 | | | | | |
| r | | | | | | | | |
| Comments: 3/11 |)"))E | Flange lauge 7 | to Flange | Flo | enge | | | |
| Test Witnessed and Accept | eed By: | BMY | A Late VC Representative | 70 | | 9-2 D | _/ <u>/</u> | |



| Job Number: 40273 | 8 | | | Area: SC#9 & SC#1 | 0 | | |
|------------------------------|---------|--------------|---------------|---------------------------|--------|--------|--|
| Equipment/Line No.: | | | | Man-Hole # 9 | | | |
| Service: I | enchate | | | Test : Torque | | | |
| System Being Tested: | | Boi | iler 🔲 | Exchanger | Furnac | e 🗌 | |
| | Flange | d Connection | ons 🗸 | Vessel [] | Oth | er | |
| Torque Requirements: | 105 | ft-lbs | 12" Flanges 🗹 | 12" Flange x Valve | 75 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 10" Flanges 🗹 | 10" Flange x Valve | 58 | ft-lbs | |
| Torque Requirements: | 80 | ft-lbs | 8" Flanges | 8" Flange x Valve | 58 | ft-lbs | |
| Torque Requirements: | 50 | ft-lbs | 6" Flanges | 6" Flange x Valve | 44 | ft-lbs | |
| Torque Requirements: | 33 | ft-lbs | 4" Flanges | 4" Flange x Valve | 30 | ft-lbs | |
| Wrench Serial# 5981138958 | Cal | libration Da | | bration Due: 3/30/2011 | | | |
| | Thur | sday | august 12 | th 2010 | | | |
| Date of Torque: | | , | | • | | | |
| _ | | Flange | 2 (12") | Flange | | | |

GLOBAL CALIBRATION SERVICES

502 S LUCILE ST SEATTLE, WA 98108-2507

CERTIFICATE OF CALIBRATION #128566

Issued To:

BMWC CONSTRUCTORS, INC 20638 84TH AVE S KENT, WA 98032 150 oden Grensteres

Quality Management System

Certificate No. 11495

Item ID: 5981138958

Item Description: TORQUE WRENCH

Item Size: 250 R-lb CW

Manufacturer: ARMISTRONG

Model Number: 64-086

Serial Number: 5981138958

Assigned Department: N/A

Item Location: N/A

Calibration Location: INHOUSE LAB

Purchase Order Number: 4027380105

Calibration Date: 03/30/2010

Calibration Due: 03/30/2011

Temperature (Deg F): 67

Humidity (%): 37

Procedure: GCS-8002

Ian Torres, Tachnical Specialist

Date Certificate Issued: 03/30/2010

Global Calibration Services' quality management system conforms to ISO 9001:2000, ANSVNCSL Z540-1, ISO/IEC 17025-2005, ISO 10012:2003, and the technical requirements of the customer's order. All calibrations are performed using internationally recognized standards traceable to the SI Units. Traceability is achieved through the National Institute of Standards and Technology (NIST), other National Measurement Institutes (NMIs), or by using natural physical constraints, intrinsic standards or ratio calibration techniques. Unless otherwise indicated, the combined estimated uncertainty of the measurement has a coverage factor of k-2 at a confidence level of 95%. Any number of factors may cause the instrument to drift out of specification before the recommended recalibration date contained in this certificate applies only to the instrument identified above and may not be reproduced, except in fulf, without prior written consent from Global Calibration Services.

EXAMPLES OF ESTIMATED BOLT TORQUE TO "SEAT" HDPE FLANGE FACES

The engineer of record is usually responsible for establishing each flange joint criteria, and performing the required calculations to determine the initial and residual torque values.

These estimated values are based on non-plated boits and studs, using a nut factor of K=0.16 for lightly greased boits and nuts. The calculations uses a HDPE flange face seating stress of 1200-psi as a minimum and 1800-psi as a maximum, and assumes the flanged joint is between two HDPE flange adapters (in which the contact area is largest), without a rubber gasket.

NOTE: For botting to ductile-iron pipe, steel flanges or butterfly valves, the flange face contact area is about half, so bolt torque for that flange pair will be measurably less (refer to Table #3).

| IPS | LJF | init | iai Minimum | Initial Maximum | Flange |
|------------------|----------|----------|-------------|--------------------|---------------|
| Nominal · | Bolt | Number | Lubed | Lubed | OD/ ID |
| Pipe Size | Diameter | of Bolts | Torque (Ft | Lbs) Torque (Ft-Lb | s) (Inches) |
| 2" | 0.625 | 4 | 23 | 35 | 3.9 / 1.94 |
| 3 ⁷⁸ | 0.625 | 4 | 33 | 50 | 5.0 / 2.86 |
| 4" | 0.625 | 8 | 33 V | 50 | 6.6 / 3.68 |
| 5" | 0.75 | 8 | 44 | 66 | 7.5 / 4.40 |
| 6" | 0.75 | 8 | 50 L | 75 | 8.5 / 5.42 |
| 8" | 0.75 | 8 | 80 | 120 | 10.63 / 6.76 |
| 10" | 0.875 | 12 | 801 | 120 | 12.75 / 8.79 |
| 12" | 0.875 | 12 | 1051 | 160 | 15.00/ 10.43 |
| 14 ¹¹ | 1.000 | 12 | 180 | 270 | 17.50 / 11.45 |
| 16" | 1.000 | 16 | 180 | 270 | 20.00 / 13.09 |
| 18" | 1.125 | 16 | 200 | 300 | 21.12 / 14.73 |
| 20" | 1.125 | 20 | 200 | 300 | 23.50 / 16.36 |
| 22" | 1.25 | 20 | 260 | 390 | 25.60 / 18.00 |
| 24" | 1.25 | 20 | 290 | 435 | 28.00 / 19.64 |
| 26" | 1.25 | 24 | 290- | 435 | 30.00 / 21.27 |
| 28" | 1.25 | 28 | 290 | 435 | 32.30 / 22.91 |
| 30" | 1.25 | 28 | 325 | 488 | 34.30 / 24.54 |
| 32" | 1.50 | 28 | 425 | 640 | 36.50 / 26.18 |
| 34" | 1.50 | 32 | 425 | 640 | 38.50 / 27.82 |
| 36" | 1.50 | 32 | 460 | 690 | 40.80 / 29.45 |
| 40" | 1.50 | 36 | 460 | 690 | 46,00 / 35.29 |
| 42" | 1.50 | 36 | 460 | 890 | 47.50 / 37.06 |
| 48" | 1.50 | 44 | 460 | 690 | 54,00 / 43,43 |
| 54" | 1.75 | 44 | 560 | 840 | 60.00 / 48.86 |

NOTE: Uniform boit pre-load (torque), without large "scatter", is as useful as the target pre-load. Within the limits of the HDPE flange adapter, gasket, or metal LJF, higher pre-load is destrable. The higher the pre-load safely achievable, the more closely the assembly will behave like the theoretical model and seal well. Higher pre-load means that a given internal pressure will result in the least possible change in contact sealing pressure. Be consistent (avoid changes) with materials and tools when following written assembly procedures.

Train and supervise the boiting personnel. Tell the crew what is to be accomplished, why, and explain that good results are not automatically achieved. Skill and care are assential. Boited Joint assembly is a technical skill that is not common in the construction and maintenance profession, being considered more like a specialty. There is no universally accepted testing, nor certification, of boited-joint assembly mechanics. With no common training, certification, nor standards, it is no surprise there is +/- 25% variability in assembly torque. Specifications and instructions by the engineer, followed by trained mechanics, help to solve the dilemma.

Examples of Estimated Bolt Torque to "Seat" the HDPE Flange Face To

A Butterfly-Valve, Steel Pipe Flange, or Ductile Iron Flange.

The engineer of record is usually responsible for establishing each flange joint criteria, and performing the required calculations to determine the initial and residual torque values.

These estimated lightly lubricated torque values assume the flanged joint connects one HDPE flange-adapter to a Butterfly-Valve or Steel Pipe flange of Schedule 40 ID, or a Ductile-Iron flange. For bolting to steel flanges or butterfly valves, the flange face contact area is just over half that of HDPE to HDPE flanges, so calculated bolt torque for this flange pair will be measurably less than the values listed in Table #2.

Dimensional flange data should be obtained for each case from the pipe flange suppliers, so as to be able to calculate the face contact area.

These <u>estimated values</u> are based on non-plated bolts and studs, using a K=0.16 for lightly greased bolts and nuts. These calculations use an HDPE material minimum and maximum compressive seating stress of 1200-psi to 1800-psi.

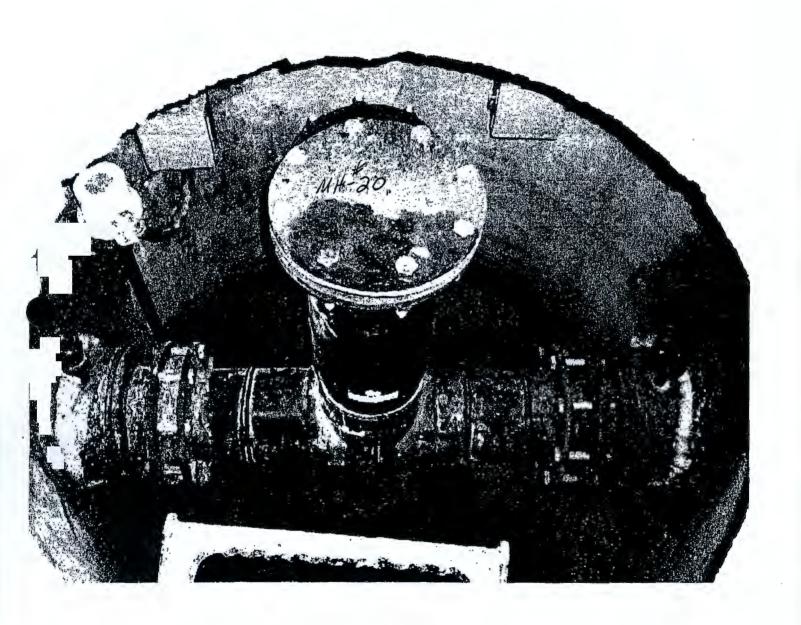
| IPS | LJF | Initia | Minimum | Initial Maximum | HDPE |
|-----------------|-----------|-------------|-----------------|-----------------|---------------|
| Nominal | Bolt Dia. | Number | Lubed | Lubed | Flange OD |
| Pipe Size | (inches) | of Bolts | Iorque (Ft-Lbs) | Torque (Ft-L | |
| 2" | 0.625 | 4 | 22 | 32 | 3.90 / 2.067 |
| 3" | 0.625 | 4 | 30 | 45 | 5.00 / 3.068 |
| 4 ⁿ | 0.625 | 8 | 301 | 45 | 6.60 / 4.026 |
| 6" | 0.75 | | 44 | 66 | 7.50 / 4.40 |
| 6" | 0.75 | 8 | 441 | 66 | 8.50 / 8.06 |
| 8" | 0.75 | 8 8 8 | 58 | 88 | 10.83 / 7.98 |
| 10" | 0.875 | 12 | 58 | 88 | 12.75 / 10,02 |
| 12" | 0.875 | 12 | 75 | 114 | 15.00 / 11.94 |
| 14" | 1.000 | 12 | 140 | 210 | 17,50 / 13,13 |
| 16" | 1.000 | 16 | 140 | 210 | 20.00 / 15.00 |
| 18" | 1.125 | 16 | 140 | 210 | 21.12 / 16.88 |
| 20" | 1.125 | 20 | 140 | 210 | 23.50 / 18.81 |
| 22" | 1.25 | 20 | 160 | 240 | 25.60 / 21.25 |
| 24" | 1.25 | 20 | 180 | 270 | 28.00 / 23.25 |
| 26" | 1.25 | 24 | 180 | 270 | 30.00 / 25.25 |
| 28" | 1.25 | 28 | 180 | 270 | 32,30 / 27,25 |
| 30 ⁿ | 1.25 | 28 | 180 | 270 | 34.30 / 29.25 |
| 32" | 1.50 | 28 | 240 | 360 | 36.50 / 31.00 |
| 34" | 1.50 | 32 | 240 | 360 | 38.50 / 33.00 |
| 36" | 1.50 | 32 | 260 | 390 | 40.80 / 35.00 |
| 40" | 1.50 | 36 | 310 | 465 | 46.00 / 39.00 |
| 42" | 1.50 | 36 | 310 | 465 | 47.50 / 41.00 |
| 48" | 1.50 | 44 | 310 | 465 | 54.00 / 47.00 |
| 54" | 1.75 | 44 | 365 | 550 | 60.00 / 53.00 |

Train and supervise the bolting personnel. Tell the crew what is to be accomplished, why, and explain that good results are not automatically achieved. Skill and care are essential. Bolted Joint assembly is a technical skill that is not common in the construction and maintenance profession, being considered more like a specialty. There is no universally accepted testing, nor certification, of bolted-joint assembly mechanics. With no common training, certification, nor standards, it is no surprise there is +/- 25% variability in assembly torque. Specifications and instructions by the engineer, followed by trained mechanics, help to solve the dilemma.

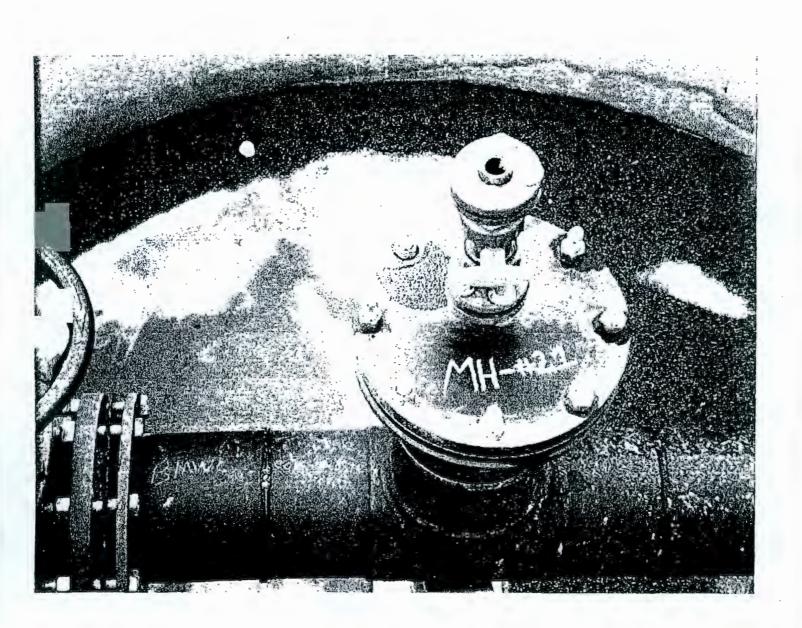


New MH-#9 W/ Tee TO MH-#38

| Job Number: 40273 | 8 | _ | | Area: SC#9 & SC#10 | | | | | | |
|--|--------------------------------|----------------|----------------------|---------------------------|---------|-----------|--|--|--|--|
| Equipment/Line No.: | | | | Man-Hole # ZO | | | | | | |
| Service: I | eachate | chate | | Test: Torque | | _ | | | | |
| System Being Tested: | Boiler ☐ Flanged Connections ☑ | | | Exchanger | Furnace | • | | | | |
| | | | | Vessel | Othe | | | | | |
| Torque Requirements: | 105 | ft-lbs | 12" Flanges | 12" Flange x Valve | 75 | ft-lbs | | | | |
| Torque Requirements: | 80 | ft-lbs | 10" Flanges | 10" Flange x Valve | 58 | ft-lbs | | | | |
| Torque Requirements: | 80 | ft-lbs | 8" Flanges | 8" Flange x Valve | 58 | ft-lbs | | | | |
| Torque Requirements: | 50 | ft-lbs | 6" Flanges | 6" Flange x Valve | 44 | ft-lbs | | | | |
| Torque Requirements: | 33 | ft-lbs | 4" Flanges | 4" Flange x Valve | 30 | ft-lbs | | | | |
| Reason For Test: 1 | New Lead | hate Transmis | ssion Line Installat | nion | | | | | | |
| Reason For Test: No. 1 N | | hate Transmis | Cali | bration Due: 3/30/2011 | | | | | | |
| Wrench Serial# 5981138958 Date of Torque: | Ca | libration Date | Cali | bration Due: 3/30/2011 | | | | | | |
| Wrench Serial# 5981138958 | Ca | libration Date | Cali | bration Due: 3/30/2011 | | | | | | |



| Job Number: 40273 | 8 | _ | | | Area: | SC#9 & SC#1 | 0 | | | |
|------------------------------|-----------|---------------------------|---------------|--------------------|-----------|---------------|-------------|---------|------|--|
| Equipment/Line No.: | | | Man-Hole # 21 | | | | | | | |
| Service: 1 | Leachate | | | Test: Torque | | | | • | | |
| stem Being Tested: | | Boile | r 🗆 | Ex | Exchanger | | | Furnace | | |
| | Flangeo | I Connection | s 🗸 | Vessel | | | Other | | | |
| • | | | | | | | | | | |
| Torque Requirements: | 105 | ft-lbs | 12" Flanges | | 12" Fla | nge x Valve | 75 | ft-lbs | | |
| Torque Requirements: | 80 | ft-lbs | 10" Flanges | | 10" Fla | nge x Valve | 58 | ft-lbs | | |
| Torque Requirements: | 80 | ft-lbs | 8" Flanges | | 8" Fla | nge x Valve _ | 58 | ft-lbs | | |
| Torque Requirements: | 50 | ft-lbs | 6" Flanges | | 6" Fla | nge x Valve_ | 44 | ft-lbs | | |
| Torque Requirements: | 33 | ft-lbs | 4" Flanges | | 4" Fla | nge x Valve | 30 ft-lbs □ | | | |
| | | | | | | | | | | |
| Wrench Serial# 5981138958 | Cali | bration Date 3/30/2010 | | Calibration 3/30/2 | | | | | | |
| | Cali 8/19 | | | | | | | | | |
| 5981138958 | 6/19 | | | | | | | | | |
| 5981138958 | 8/19 | | | | 2011 | z") Valu | ic to | Fl | 2179 | |





TANK 4 AND LEACHATE TRANSMISSION SYSTEM REPORT

CONSTRUCTION QUALITY ASSURANCE (CQA)

ENVIRONMENTAL RESTORATION DISPOSAL FACILITY (ERDF)

SUPER CELLS 9

SUBCONTRACT S013213A00

JANUARY 2011 (010032)

APPENDIX C.

EARTHWORK TESTING



Soils and Proctor Summary



| Test | Description | Pro | ctor | Sieve | Classification | | |
|--------|----------------------------|---------|----------|---------|----------------|----------------------------|--|
| Number | | Dry | Moisture | Passing | | | |
| | | Density | % | -200% | | | |
| SF-01 | Light Brown Sand with Silt | 113.6 | 12.4% | 22.6 | SM | Silty Sand | |
| SF-02 | Light Brown Silt with Sand | 124.9 | 9.7% | 12.4 | SP-SM | Poorly Graded Sand w/ Silt | |
| SF-03 | Black Sand w/ Gravel | 120.6 | 14.0% | 9.8 | SW-SM | Well Graded Sand w/ Silt | |
| SF-04 | Brown/Black Sand | 120.5 | 12.8% | 9.6 | SW-SM | Well Graded Sand w/ Silt | |
| SF-05 | Brown/Black Sand | 124.2 | 12.5% | 9.8 | SW-SM | Well Graded Sand w/ Silt | |
| SF-06 | Brown/Black Sand | 120.8 | 14.3% | 7.3 | SW | Well Graded Sand | |
| SF-07 | Lowest Layer of Excavation | 117.3 | 11.5% | 10.4 | SW | Well Graded Sand | |
| SF-08 | Manhole 21 Backfill | 118 | 11.3% | 1.8 | SP | Poorly Graded Sand | |
| SF-09 | WashDOT Base course | 138.9 | 2.6% | 3.1 | GP | Poorly Graded Gravel | |
| SF-10 | WashDOT Top course | 135.2 | 6.0% | 5.1 | GP | Poorly Graded Gravel | |
| SF-11 | Riser Trench Backfill | 114.5 | 11.0% | 1.6 | SP | Poorly Graded Sand | |
| | | | | | | | |

Summary Log:

Leachate Transmission Manholes

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

ENVIROTECH ENGINEERING & CONSULTING, INC

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. Ibs/cuft | % Moist Content | Percent Proctor | Dry Den. Ibs/cuft | Pass / Fail |
|-------------------|------------|-------------|-------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|----------------|
| Manhole # 21 | | | | | | | | | | |
| MH21-01 | SF-01 | Sub | 9:00 | 12 | 27 | 119.7 | 7.3% | 98.2% | 111.6 | Pass |
| MH21-02 | SF-01 | Sub | 9:05 | 12 | 27 | 121.2 | 8.7% | 98.2% | 111.5 | Pass |
| Manhole # 39 | | | | | | | | | | |
| MH39-01 | SF-05 | Sub | 9:10 | 12 | 27 | 130.5 | 7.0% | 98.2% | 122.0 | Pass |
| MH39-02 | SF-05 | Sub | 9:15 | 12 | 27 | 128.7 | 6.0% | 97.8% | 121.4 | Pass |
| Manhole #21 | | | | | | | | | | |
| MH21-03 | SF-06 | 1 | 13:00 | 12 | 31 | 118.5 | 7.6% | 91.2% | 110.1 | Pass |
| MH21-04 | SF-06 | 2 | 13:10 | 12 | 31 | 120.7 | 9.0% | 91.7% | 110.7 | Pass |
| MH21-05 | SF-06 | 3 | 13:20 | 12 | 31 | 121.4 | 9.2% | 92.0% | 111.2 | Pass |
| Manhole #21 (9 | 5% Compact | tion) | | | | | | | | |
| MH21-06 | SF-06 | 4 | 13:30 | 6 | 31 | 123.6 | 7.5% | 95.2% | 115.0 | Pass |
| Manhole #39 | | | | | | | | | | |
| MH39-03 | SF-06 | 1 | 13:40 | 12 | 31 | 127.8 | 8.0% | 98.0% | 118.3 | Pass |
| MH39-04 | SF-06 | 2 | 13:50 | 12 | 31 | 126.7 | 7.5% | 97.6% | 117.9 | Pass |
| MH39-05 | SF-06 | 3 | 14:00 | 12 | 31 | 127.8 | 7.7% | 98.2% | 118.7 | Pass |
| Manhole #39 (95 | 5% Compact | ion) | | | | | | | | |
| MH39-06 | SF-06 | 4 | 14:10 | 6 | 31 | 127.6 | 8.8% | 97.1% | 117.3 | Pass |
| Manhole #32 | | | | | | | | | | |
| MH32-01 | SF-06 | Sub | 14:20 | 12 | 31 | 130.7 | 5.3% | 102.7% | 124.1 | Pass |
| MH32-02 | SF-06 | Sub | 14:25 | 12 | 31 | 126.0 | 4.9% | 99.4% | 120.1 | Pass |
| Manhole #33 | | | | | | | | | | |
| MH33-01 | SF-06 | Sub | 14:40 | 12 | 31 | 129.9 | 8.7% | 98.9% | 119.5 | Pass |
| MH33-02 | SF-06 | Sub | 14:45 | 12 | 31 | 131.0 | 9.1% | 99.4% | 120.1 | Pass |
| Manhole #33 | | | | | | | | | | |
| MH33-03 | SF-06 | 1 | 7:30 | 12 | 36 | 135.0 | 14.6% | 97.5% | 117.8 | Pass |
| MH33-04 | SF-06 | 2 | 7:55 | 12 | 36 | 131.4 | 9.7% | 99.2% | 119.8 | Pass |
| */lanhole #33 (95 | % Compacti | on) | | | | | | | | |
| MH33-05 | SF-06 | 3 | 8:35 | 6 | 36 | 130.2 | 10.7% | 97.4% | 117.6 | Pass |

Summary Log:

Leachate Transmission Manholes

Client:

WCF

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

ENVIROTECH ENGINEERING & CONSULTING, INC.

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. Ibs/cuft | % Moist Content | Percent Proctor | Dry Den. Ibs/cuft | Pass / Fail |
|----------------|------------|-------------|-------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|----------------|
| MH33-06 | SF-06 | 4 | 9:15 | 6 | 36 | 127.9 | 7.3% | 98.7% | 119.2 | Pass |
| Manhole #32 | | | | | | | | | | |
| MH32-03 | SF-06 | 1 | 9:45 | 12 | 36 | 130.7 | 11.3% | 97.2% | 117.4 | Pass |
| MH32-04 | SF-06 | 2 | 10:45 | 12 | 36 | 125.0 | 7.4% | 96.3% | 116.4 | Pass |
| MH32-05 | SF-06 | 3 | 11:50 | 12 | 36 | 124.7 | 8.3% | 95.3% | 115.1 | Pass |
| MH32-06 | SF-06 | 4 | 13:00 | 12 | 36 | 128.4 | 7.9% | 98.5% | 119.0 | Pass |
| Manhole #33 (9 | 5% Compact | ion) | | | | | | | | |
| MH33-07 | SF-06 | 5 | 14:00 | 6 | 36 | 128.2 | 10.7% | 95.9% | 115.8 | Pass |
| MH33-08 | SF-06 | 6 | 14:30 | 6 | 36 | 126.8 | 9.7% | 95.7% | 115.6 | Pass |
| MH33-09 | SF-06 | 7 | 15:00 | 6 | 36 | 128.1 | 10.9% | 95.6% | 115.5 | Pass |
| MH33-10 | SF-06 | 8 | 15:30 | 6 | 36 | 127.6 | 10.1% | 95.9% | 115.9 | Pass |
| MH33-11 | SF-06 | 9 | 15:45 | 6 | 36 | 129.4 | 11.3% | 96.2% | 116.3 | Pass |
| MH33-12 | SF-06 | 10 | 16:10 | 6 | 36 | 128.8 | 9.6% | 97.3% | 117.5 | Pass |
| Manhole #34 | | | | | | | | | | |
| MH34-01 | SF-05 | Sub | 9:40 | 12 | 41 | 129.5 | 9.5% | 95.2% | 118.3 | Pass |
| MH34-02 | SF-05 | Sub | 9:45 | 12 | 41 | 130.2 | 8.1% | 97.0% | 120.4 | Pass |
| Manhole #35 | | | | | | | | | | |
| MH35-01 | SF-05 | Sub | 9:50 | 12 | 41 | 131.4 | 7.9% | 98.1% | 121.8 | Pass |
| MH35-02 | SF-05 | Sub | 9:55 | 12 | 41 | 130.5 | 8.6% | 96.8% | 120.2 | Pass |
| Manhole #34 | | | | | | | | | | |
| MH34-03 | SF-06 | 1 | 7:30 | 12 | 44 | 126.9 | 7.6% | 97.6% | 117.9 | Pass |
| MH34-04 | SF-06 | 2 | 8:15 | 12 | 44 | 132.6 | 12.7% | 97.4% | 117.7 | Pass |
| MH34-05 | SF-06 | 3 | 9:00 | 12 | 44 | 125.5 | 8.4% | 95.8% | 115.8 | Pass |
| MH34-06 | SF-06 | 4 | 9:45 | 12 | 44 | 127.1 | 6.4% | 98.9% | 119.5 | Pass |
| MH34-07 | SF-06 | 5 | 10:30 | 12 | 44 | 128.5 | 9.6% | 97.1% | 117.2 | Pass |
| Manhole #35 | | | | | | | | | | |
| MH35-03 | SF-05 | 1 | 12:00 | 12 | 44 | 130.4 | 7.7% | 97.5% | 121.1 | Pass |
| MH35-04 | SF-05 | 2 | 12:45 | 12 | 44 | 129.3 | 8.4% | 96.0% | 119.3 | Pass |
| MH35-05 | SF-05 | 3 | 13:50 | 12 | 44 | 130.4 | 9.1% | 96.2% | 119.5 | Pass |
| MH35-06 | SF-05 | 4 | 14:45 | 12 | 44 | 131.3 | 10.2% | 95.9% | 119.1 | Pass |

Summary Log:

Leachate Transmission Manholes

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

CENVIRUTED FINGINEERING & CONSULTING

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. Ibs/cuft | % Moist Content | Percent Proctor | Dry Den. Ibs/cuft | Pass / Fail |
|-----------------|-------------|-------------|-------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|----------------|
| MH35-07 | SF-05 | 5 | 15:30 | 12 | 44 | 129.1 | 8.7% | 95.6% | 118.8 | Pass |
| Manhole #36 | | | | | | | | | | |
| MH36-01 | SF-05 | Sub | 14:45 | 12 | 51 | 132.9 | 5.2% | 101.7% | 126.3 | Pass |
| MH36-02 | SF-05 | Sub | 14:50 | 12 | 51 | 134.5 | 4.8% | 103.3% | 128.3 | Pass |
| Manhole #37 | | | | | | | | | | |
| MH37-01 | SF-05 | Sub | 15:00 | 12 | 51 | 127.8 | 5.3% | 97.7% | 121.4 | Pass |
| MH37-02 | SF-05 | Sub | 15:05 | 12 | 51 | 132.0 | 4.6% | 101.6% | 126.2 | Pass |
| Manhole #38 (9 | 5% Compac | tion) | | | | | | | | |
| MH38-1 | SF-05 | sub | 14:30 | 12 | 53 | 133.7 | 4.0% | 103.5% | 128.6 | Pass |
| MH38-2 | SF-05 | sub | 14:35 | 12 | 53 | 127.5 | 2.6% | 100.1% | 124.3 | Pass |
| Manhole #37 | | | | | | | | | | |
| MH37-03 | SF-07 | 1 | 7:30 | 12 | 55 | 121.4 | 8.1% | 95.7% | 112.3 | Pass |
| MH37-04 | SF-07 | 2 | 7:51 | 12 | 55 | 122.6 | 9.6% | 95.4% | 111.9 | Pass |
| MH37-05 | · SF-07 | 3 | 8:21 | 12 | 55 | 123.7 | 9.1% | 96.7% | 113.4 | Pass |
| MH37-06 | SF-07 | 4 | 8:42 | 12 | 55 | 125.6 | 11.4% | 96.1% | 112.7 | Pass |
| MH37-07 | SF-07 | 5 | 9:10 | 12 | 55 | 122.5 | 8.3% | 96.4% | 113.1 | Pass |
| Manhole #36 | | | | | | | | | | |
| MH36-03 | SF-05 | 1 | 10:25 | 12 | 55 | 130.5 | 8.8% | 96.6% | 119.9 | Pass |
| MH36-04 | SF-05 | 2 | 10:55 | 12 | 55 | 131.2 | 9.1% | 96.8% | 120.3 | Pass |
| MH36-05 | SF-05 | 3 | 11:50 | 12 | 55 | 133.6 | 12.3% | 95.8% | 119.0 | Pass |
| MH36-06 | SF-05 | 4 | 12:45 | 12 | 55 | 132.1 | 9.8% | 96.9% | 120.3 | Pass |
| Manhole #34 | | | | | | | | | | |
| MH34-08 | SF-08 | 6 | 8:28 | 12 | 169 | 123.3 | 8.0% | 96.8% | 114.2 | Pass |
| Manhole #34 (95 | 5% Compacti | on) | | | | | | | | |
| MH34-09 | SF-08 | 7 | 9:14 | 6 | 169 | 121.6 | 7.7% | 95.7% | 112.9 | Pass |
| MH34-10 | SF-08 | 8 | 9:18 | 6 | 169 | 121.5 | 7.4% | 95.9% | 113.1 | Pass |
| MH34-11 | SF-08 | 9 | 9:40 | 6 | 169 | 122.1 | 8.0% | 95.8% | 113.1 | Pass |
| MH34-12 | SF-08 | 10 | 9:44 | 6 | 169 | 120.5 | 6.8% | 95.6% | 112.8 | Pass |
| MH34-13 | SF-08 | 11 | 13:43 | 6 | 169 | 122.6 | 7.0% | 97.1% | 114.6 | Pass |
| MH34-14 | SF-08 | 12 | 13:48 | 6 | 169 | 122.5 | 6.8% | 97.2% | 114.7 | Pass |

Summary Log:

Leachate Transmission Manholes

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

ENVIROTECH ENGINEERING & CONSULTING, INC.

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. Ibs/cuft | % Moist Content | Percent Proctor | Dry Den. Ibs/cuft | Pass / Fail |
|-----------------|------------|-------------|-------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|----------------|
| Manhole #35 | | | | | | | | | | |
| MH35-08 | SF-08 | 6 | 8:13 | 12 | 169 | 127.2 | 11.5% | 96.7% | 114.1 | Pass |
| Manhole #35 (9 | 5% Compact | ion) | | | | | | | | |
| MH35-09 | SF-08 | 7 | 8:54 | 6 | 169 | 123.1 | 8.6% | 96.1% | 113.4 | Pass |
| MH35-10 | SF-08 | 8 | 8:51 | 6 | 169 | 122.0 | 5.4% | 98.1% | 115.7 | Pass |
| MH35-11 | SF-08 | 9 | 15:40 | 6 | 169 | 123.7 | 8.8% | 96.4% | 113.7 | Pass |
| MH35-12 | SF-08 | 10 | 15:45 | 6 | 169 | 122.5 | 7.6% | 96.5% | 113.8 | Pass |
| MH35-13 | SF-08 | 11 | 15:48 | 6 | 169 | 120.7 | 7.7% | 95.0% | 112.1 | Pass |
| MH35-14 | SF-08 | 12 | 15:51 | 6 | 169 | 127.8 | 12.3% | 96.4% | 113.8 | Pass |
| MH35-15 | SF-08 | 13 | 15:59 | 6 | 169 | 123.8 | 8.2% | 97.0% | 114.4 | Pass |
| Manhole #36 (95 | 5% Compact | ion) | | | | | | | | |
| MH36-07 | SF-08 | 5 | 9:27 | 6 | 178 | 122.3 | 7.5% | 96.4% | 113.8 | Pass |
| MH36-08 | SF-08 | 6 | 9:29 | 6 | 178 | 125.5 | 11.3% | 95.6% | 112.8 | Pass |
| MH36-09 | SF-08 | 7 | 9:32 | 6 | 178 | 124.4 | 7.0% | 98.5% | 116.3 | Pass |
| MH36-10 | SF-08 | 8 | 9:37 | 6 | 178 | 125.1 | 8.7% | 97.5% | 115.1 | Pass |
| Manhole #36 (95 | 5% Compact | ion) | | | | | | | | |
| MH36-11 | SF-08 | 9 | 9:00 | 6 | 182 | 122.5 | 6.4% | 97.6% | 115.1 | Pass |
| MH36-12 | SF-08 | 10 | 9:05 | 6 | 182 | 122.4 | 6.8% | 97.1% | 114.6 | Pass |
| MH36-13 | SF-08 | 11 | 10:17 | 6 | 182 | 124.0 | 5.2% | 99.9% | 117.9 | Pass |
| MH36-14 | SF-08 | 12 | 10:22 | 6 | 182 | 124.6 | 5.7% | 99.9% | 117.9 | Pass |
| MH36-15 | SF-08 | 13 | 15:22 | 6 | 182 | 120.7 | 4.6% | 97.8% | 115.4 | Pass |
| | | | | | | | | | • | |

Summary Log:

Leachate Transmission Line

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

ENVIROTECH ENGINEERING & CONSULTING, INC.

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. Ibs/cuft | % Moist Content | Percent Proctor | Dry Den. Ibs/cuft | Pass / Fail |
|---|-------------------------------|-------------|----------------------------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|----------------|
| Leachate Trans | mission Lin | e: MH-3 | 3 to Cres | t Pad 10 (| 95% Modifi | ed under Cre | est Pad) | | | |
| LT-1 | SF-05 | 1 | 9:35 | 6 | 53 | 135.2 | 9.9% | 99.1% | 123.0 | Pass |
| LT-2 | SF-05 | 2 | 9:55 | 6 | 53 | 128.5 | 8.1% | 95.7% | 118.9 | Pass |
| LT-3 | SF-05 | 3 | 10:30 | 6 | 53 | 129.2 | 8.1% | 96.2% | 119.5 | Pass |
| LT-4 | SF-05 | 4 | 10:55 | 6 | 53 | 129.6 | 9.6% | 95.2% | 118.2 | Pass |
| LT-5 | SF-05 | 5 | 11:55 | 6 | 53 | 127.6 | 10.5% | 93.0% | 115.5 | Fail |
| LT-5A | SF-05 | 5 | 12:00 | 6 | 53 | 133.4 | 10.8% | 96.9% | 120.4 | Pass |
| LT-5B | SF-05 | 5 | 12:05 | 6 | 53 | 131.3 | 9.6% | 96.5% | 119.8 | Pass |
| Cell 10 Dischar The Discharge L pipe was excava | ine from MH ated, and rein | -33 to Co | rest Pad 1 at the corre | 0 was inst | alled with th | | | | | |
| the compaction | of the reinsta | lled pipe |). | | | | | | | |
| LT-006 | SF-06 | 1 | 8:05 | 12 | 57 | 122.7 | 6.9% | 95.0% | 114.8 | Pass |
| LT-007 | SF-06 | 2 | 8:15 | 6 | 57 | 122.2 | 6.4% | 95.1% | 114.8 | Pass |
| LT-008 | SF-06 | 3 | 8:25 | 6 | 57 | 125.9 | 6.4% | 98.0% | 118.3 | Pass |
| LT-009 | SF-06 | 4 | 8:45 | 6 | 57 | 126.3 | 5.8% | 98.8% | 119.4 | Pass |
| LT-010 | SF-06 | 5 | 9:15 | 6 | 57 | 119.4 | 5.3% | 93.9% | 113.4 | Pass |
| LT-011 | SF-06 | 6 | 9:45 | 6 | 57 | 128.4 | 10.6% | 96.1% | 116.1 | Pass |
| LT-012 | SF-06 | 7 | 10:05 | 6 | 57 | 127.3 | 9.3% | 96.4% | 116.5 | Pass |
| LT-013 | SF-06 | 8 | 10:20 | 6 | 57 | 126.4 | 9.7% | 95.4% | 115.2 | Pass |
| Leachate Trans | mission Lin | e: MH-3 | 2 to Crest | Pad 9 | | | | | | |
| LT-09 | SF-06 | 1 | 9:15 | 12 | 60 | 122.7 | 9.4% | 92.8% | 112.2 | Pass |
| LT-10 | SF-06 | 2 | 9:45 | 6 | 60 | 121.0 | 7.4% | 93.3% | 112.7 | Pass |
| LT-11 | SF-06 | 3 | 10:45 | 6 | 60 | 125.3 | 11.4% | 93.1% | 112.5 | Pass |
| LT-12 | SF-06 | 4 | 12:00 | 6 | 60 | 118.5 | 6.8% | 91.9% | 111.0 | Pass |
| LT-13 | SF-06 | 5 | 15:10 | 6 | 60 | 134.5 | 13.7% | 97.9% | 118.3 | Pass |
| LT-14 | SF-06 | 6 | 15:50 | 6 | 60 | 122.8 | 10.8% | 91.7% | 110.8 | Pass |
| Leachate Trans | mission Line | e: MH-3 | 2 to Crest | Pad 9 | | | | | | |
| LT -15 | SF-06 | 7 | 7:22 | 6 | 61 | 123.3 | 10.0% | 92.8% | 112.1 | Pass |
| LT-16 | SF-06 | 8 | 9:00 | 6 | 61 | 124.9 | 12.6% | 91.8% | 110.9 | Pass |

Summary Log:

Leachate Transmission Line

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

ENVIROTECH ENGINEERING & CONSULTING, INC.

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. Ibs/cuft | % Moist Content | Percent Proctor | Dry Den. lbs/cuft | Pass / |
|---------------|-------------|-------------|-----------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|--------|
| LT-17 | SF-06 | 9 | 9:41 | 6 | 61 | 120.1 | 9.2% | 91.0% | 110.0 | Pass |
| LT-18 | SF-06 | 10 | 12:45 | 6 | 61 | 129.5 | 14.2% | 93.9% | 113.4 | Pass |
| eachate Trans | mission Lin | e: MH-3 | 2 to MH-3 | 33 | | | | | | |
| LT-19 | SF-06 | 0 | 8:55 | 12 | 71 | 123.0 | 11.2% | 91.6% | 110.6 | Pass |
| LT-20 | SF-06 | 0 | 9:00 | 12 | 71 | 122.4 | 11.2% | 91.1% | 110.1 | Pass |
| LT-21 | SF-06 | 1 | 12:05 | 12 | 71 | 123.7 | 9.0% | 93.9% | 113.5 | Pass |
| LT-22 | SF-06 | 1 | 12:10 | 12 | 71 | 123.5 | 7.8% | 94.8% | 114.6 | Pass |
| LT-23 | SF-06 | 2 | 14:15 | 12 | 71 | 122.9 | 7.9% | 94.3% | 113.9 | Pass |
| LT-24 | SF-06 | 2 | 14:20 | 12 | 71 | 123.3 | 8.6% | 94.0% | 113.5 | Pass |
| eachate Trans | mission Lin | e: MH-3 | 2 to MH-3 | 3 (95 % C | compaction) | | | | | |
| LT-25 | SF-06 | 3 | 6:45 | 6 | 72 | 125.5 | 9.1% | 95.2% | 115.0 | Pass |
| LT-26 | SF-06 | 3 | 6:50 | 6 | 72 | 127.4 | 9.7% | 96.1% | 116.1 | Pass |
| LT-27 | SF-06 | 4 | 8:05 | 6 | 72 | 126.3 | 7.1% | 97.6% | 117.9 | Pass |
| LT-28 | SF-06 | 4 | 8:10 | 6 | 72 | 125.9 | 6.5% | 97.9% | 118.2 | Pass |
| eachate Trans | mission Lin | e: MH-3 | 2 to MH-3 | 3 (95 % (| Compaction) | | | | | |
| LT-29 | SF-06 | 5 | 6:25 | 6 | 73 | 126.8 | 9.9% | 95.5% | 115.4 | Pass |
| LT-30 | SF-06 | 5 | 6:27 | 6 | 73 | 125.5 | 8.5% | 95.8% | 115.7 | Pass |
| LT-31 | SF-06 | 6 | 7:25 | 6 | 73 | 127.4 | 10.3% | 95.6% | 115.5 | Pass |
| LT-32 | SF-06 | 6 | 7:29 | 6 | 73 | 126.3 | 9.5% | 95.5% | 115.3 | Pass |
| LT-33 | SF-06 | 7 | 8:10 | 6 | 73 | 125.9 | 6.5% | 97.9% | 118.2 | Pass |
| LT-34 | SF-06 | 7 | 8:14 | 6 | 73 | 128.5 | 11.2% | 95.7% | 115.6 | Pass |
| LT-35 | SF-06 | 8 | 10:50 | 6 | 73 | 125.9 | 9.5% | 95.2% | 115.0 | Pass |
| LT-36 | SF-06 | 8 | 10:53 | 6 | 73 | 126.4 | 10.2% | 95.0% | 114.7 | Pass |
| LT-37 | SF-06 | 9 | 12:30 | 6 | 73 | 127.3 | 10.5% | 95.4% | 115.2 | Pass |
| LT-38 | SF-06 | 9 | 12:33 | 6 | 73 | 126.1 | 9.6% | 95.2% | 115.1 | Pass |
| LT-39 | SF-06 | 10 | 16:10 | 6 | 73 | 126.4 | 9.4% | 95.6% | 115.5 | Pass |
| LT-40 | SF-06 | 10 | 16:15 | 6 | 73 | 125.7 | 7.5% | 96.8% | 116.9 | Pass |
| eachate Trans | mission Lin | e: MH-39 | to Tank | 3 | | | | | | |
| LT-41 | SF-04 | 1 | 13:00 | 6 | 76 | 120.9 | 5.2% | 95.4% | 114.9 | Pass |
| LT-42 | SF-04 | 2 | 13:10 | 6 | 76 | 129.1 | 8.7% | 98.6% | 118.8 | Pass |

Summary Log:

Leachate Transmission Line

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

ENVIROTED ENGINEERING & CONSULTING

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. Ibs/cuft | % Moist Content | Percent Proctor | Dry Den. Ibs/cuft | Pass / Fail |
|----------------|--------------------------------------|-------------|------------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|----------------|
| LT-43 | SF-04 | 3 | 13:20 | 6 | 76 | 125.4 | 7.3% | 97.0% | 116.9 | Pass |
| LT-44 | SF-04 | 4 | 13:30 | 6 | 76 | 129.7 | 9.9% | 97.9% | 118.0 | Pass |
| Leachate Trans | mission Lin | e: MH-2 | 1 to Tank | 3 | | | | | | |
| LT-45 | SF-04 | 1 | 13:40 | 6 | 76 | 125.2 | 6.6% | 97.5% | 117.4 | Pass |
| LT-46 | SF-04 | 2 | 13:50 | 6 | 76 | 124.4 | 8.4% | 95.2% | 114.8 | Pass |
| LT-47 | SF-04 | 3 | 14:00 | 6 | 76 | 124.4 | 8.0% | 95.6% | 115.2 | Pass |
| LT-48 | SF-04 | 4 | 14:10 | 6 | 76 | 125.6 | 8.7% | 95.9% | 115.5 | Pass |
| Leachate Trans | mission Lin | e: Tank | 3 to Pum | p House | | | | | | |
| LT-49 | SF-04 | 1 | 14:20 | 6 | 76 | 124.6 | 8.1% | 95.7% | 115.3 | Pass |
| Leachate Trans | mission Lin | e: Tank | 3 to Tran | sducer | | | | | | |
| LT-50 | SF-04 | 1 | 14:30 | 6 | 76 | 124.0 | 7.7% | 95.5% | 115.1 | Pass |
| Leachate Trans | mission Lin | e: Tank | 3 to Pum | p House | | | | | | |
| LT-51 | SF-04 | 2 | 14:40 | 6 | 76 | 127.3 | 9.2% | 96.7% | 116.6 | Pass |
| Leachate Trans | mission Lin | e: Tank | 3 to Trans | sducer | | | | | | |
| LT-52 | SF-04 | 2 | 14:50 | 6 | 76 | 126.1 | 9.4% | 95.7% | 115.3 | Pass |
| Leachate Trans | mission Lin | e: Tank | 3 to Pum | p House | | | | | | |
| LT-53 | SF-04 | 3 | 15:00 | 6 | 76 | 123.9 | 8.3% | 94.9% | 114.4 | Pass |
| Leachate Trans | mission Lin | e: Tank | 3 to Trans | sducer | | | | | | |
| LT-54 | SF-04 | 3 | 15:10 | 6 | 76 | 125.0 | 9.1% | 95.1% | 114.6 | Pass |
| Leachate Trans | mission: Mi | 1-32 to I | VIH-34 | | | | | | | |
| LT-55 | SF-05 | SG | 12:30 | 12 | 77 | 125.0 | 7.1% | 94.0% | 116.7 | Pass |
| LT-56 | SF-05 | SG | 12:35 | 12 | 77 | 124.3 | 7.6% | 93.0% | 115.5 | Pass |
| LT-57 | SF-05 | 1 | 13:45 | 12 | 77 | 125.1 | 8.3% | 93.0% | 115.5 | Pass |
| LT-58 | SF-05 | 1 | 13:50 | 12 | 77 | 130.2 | 9.4% | 95.8% | 119.0 | Pass |
| _eachate Trans | eachate Transmission: MH-32 to MH-34 | | | | | | | | | |
| LT-59 | SF-06 | 2 | 7:30 | 12 | 78 | 118.3 | 7.9% | 90.8% | 109.6 | Pass |
| LT-60 | SF-06 | 2 | 7:35 | 12 | 78 | 124.2 | 7.8% | 95.4% | 115.2 | Pass |
| LT-61 | SF-06 | 3 | 8:30 | 12 | 78 | 132.5 | 11.4% | 98.5% | 118.9 | Pass |
| | SF-06 | 3 | 8:35 | 12 | 78 | 125.2 | 7.8% | 96.1% | 116.1 | Pass |

Summary Log:

Leachate Transmission Line

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

ENVIROTECH ENGINEERING & CONSULTING, INC

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. Ibs/cuft | % Moist Content | Percent Proctor | Dry Den. Ibs/cuft | Pass / Fail |
|----------------|-------------|-------------|------------------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|----------------|
| LT-63 | SF-06 | 4 | 10:00 | 6 | 78 | 124.8 | 6.9% | 96.6% | 116.7 | Pass |
| LT-64 | SF-06 | 4 | 10:35 | 6 | 78 | 126.6 | 8.1% | 96.9% | 117.1 | Pass |
| LT-65 | SF-06 | 5 | 11:30 | 6 | 78 | 129.7 | 10.2% | 97.4% | 117.7 | Pass |
| LT-66 | SF-06 | 5 | 11:35 | 6 | 78 | 129.6 | 10.4% | 97.2% | 117.4 | Pass |
| LT-67 | SF-06 | 6 | 13:00 | 6 | 78 | 122.6 | 5.5% | 96.2% | 116.2 | Pass |
| LT-68 | SF-06 | 6 | 13:05 | 6 | 78 | 124.3 | 6.4% | 96.7% | 116.8 | Pass |
| LT-69 | SF-06 | 7 | 14:40 | 6 | 78 | 121.5 | 5.4% | 95.4% | 115.3 | Pass |
| LT-70 | SF-06 | 7 | 14:45 | 6 | 78 | 127.4 | 7.4% | 98.2% | 118.6 | Pass |
| Leachate Trans | mission: Mi | 1-32 to I | VH-34 (95 | 5 % Comp | action) | | | | | |
| LT-71 | SF-06 | 8 | 8:20 | 6 | 79 | 127.4 | 7.0% | 98.6% | 119.1 | Pass |
| LT-72 | SF-06 | 8 | 8:25 | 6 | 79 | 127.9 | 7.3% | 98.7% | 119.2 | Pass |
| LT-73 | SF-06 | 9 | 10:00 | 6 | 79 | 127.7 | 8.4% | 97.5% | 117.8 | Pass |
| LT-74 | SF-06 | 9 | 10:05 | 6 | 79 | 128.9 | 8.6% | 98.3% | 118.7 | Pass |
| LT-75 | SF-06 | 10 | 13:00 | 6 | 79 | 128.1 | 8.1% | 98.1% | 118.5 | Pass |
| LT-76 | SF-06 | 10 | 13:05 | 6 | 79 | 125.1 | 8.7% | 95.3% | 115.1 | Pass |
| LT-77 | SF-06 | 11 | 16:05 | 6 | 79 | 126.9 | 9.2% | 96.2% | 116.2 | Pass |
| LT-78 | SF-06 | 11 | 16:10 | 6 | 79 | 126.3 | 8.9% | 96.0% | 116.0 | Pass |
| Leachate Trans | mission: MH | 1-35 to N | /H-36 | | | | | | | |
| LT-79 | SF-06 | 1 | 13:45 | 12 | 84 | 128.6 | 6.5% | 100.0% | 120.8 | Pass |
| LT-80 | SF-06 | 1 | 13:50 | 12 | 84 | 127.2 | 8.1% | 97.4% | 117.7 | Pass |
| LT-81 | SF-06 | 2 | 14:00 | 12 | 84 | 120.7 | 7.1% | 93.3% | 112.7 | Pass |
| LT-82 | SF-06 | 3 | 14:08 | 12 | 84 | 121.1 | 9.3% | 91.7% | 110.8 | Pass |
| LT-83 | SF-06 | 2 | 15:00 | 12 | 84 | 124.3 | 7.2% | 96.0% | 116.0 | Pass |
| LT-84 | SF-06 | 3 | 16:20 | 12 | 84 | 120.6 | 4.8% | 95.3% | 115.1 | Pass |
| eachate Trans | mission: MH | -35 to N | 1H-36 | | | | | | | |
| LT-85 | SF-06 | 4 | 8:41 | 12 | 87 | 128.9 | 6.7% | 100.0% | 120.8 | Pass |
| LT-86 | SF-06 | 4 | 12:22 | 12 | 87 | 125.4 | 5.3% | 98.6% | 119.1 | Pass |
| eachate Transi | mission: MH | -35 to N | IH-36 (95 | | action) | | | | | |
| LT-87 | SF-06 | 5 | 15:16 | 6 | 87 | 128.7 | 8.1% | 98.6% | 119.1 | Pass |
| LT-88 | SF-06 | 5 | 15:19 | 6 | 87 | 129.0 | 7.6% | 99.2% | 119.9 | Pass |

Summary Log:

Leachate Transmission Line

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

ENVIROTED TEC

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. lbs/cuft | % Moist Content | Percent Proctor | Dry Den. lbs/cuft | Pass / |
|------------------|---------------|-------------|------------------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|--------|
| Leachate Trans | mission: Mi | H-35 to | MH-36 (95 | | action) | | | | | |
| LT-89 | SF-06 | 6 | 13:00 | 6 | 88 | 128.1 | 8.5% | 97.7% | 118.1 | Pass |
| LT-90 | SF-06 | 6 | 13:04 | 6 | 88 | 128.2 | 9.3% | 97.1% | 117.3 | Pass |
| LT-91 | SF-06 | 7 | 15:16 | 6 | 88 | 128.2 | 6.2% | 99.9% | 120.7 | Pass |
| LT-92 | SF-06 | 7 | 15:19 | 6 | 88 | 126.9 | 7.2% | 98.0% | 118.4 | Pass |
| Leachate Trans | mission: Mi | 1-35 to | MH-36 (95 | % Comp | action) | | | | | |
| LT-93 | SF-06 | 8 | 7:06 | 6 | 89 | 125.3 | 6.2% | 97.7% | 118.0 | Pass |
| LT-94 | SF-06 | 8 | 7:11 | 6 | 89 | 124.9 | 4.2% | 99.2% | 119.9 | Pass |
| LT-95 | SF-06 | 9 | 11:46 | 6 | 89 | 126.1 | 7.3% | 97.3% | 117.5 | Pass |
| LT-96 | SF-06 | 9 | 13:04 | 6 | 89 | 128.2 | 6.3% | 99.8% | 120.6 | Pass |
| Leachate Trans | mission: Mł | 1-35 to | MH-36 (95 | % Compa | action) | | | | | |
| LT-97 | SF-06 | 10 | 7:06 | 6 | 90 | 130.7 | 8.7% | 99.5% | 120.2 | Pass |
| LT-98 | SF-06 | 10 | 7:11 | 6 | 90 | 129.5 | 9.5% | 97.9% | 118.3 | Pass |
| Leachate Trans | mission: Mh | 1-35 to | MH-36 (95 | % Compa | action) | | | | | |
| LT-99 | SF-06 | 11 | 11:55 | 6 | 91 | 125.0 | 6.4% | 97.3% | 117.5 | Pass |
| LT-100 | SF-06 | 11 | 11:59 | 6 | 91 | 123.5 | 7.5% | 95.1% | 114.9 | Pass |
| Transmission L | ine MH-37 to | MH-38 | 3 | | | | | | | |
| Tests LT-101, LT | Γ-102, and LT | Γ-103 w | ere accept | ed by WC | H under SD | DR-23 | | | | |
| LT-101 | SF-06 | 1 | 13:21 | 6 | 94 | 119.1 | 10.9% | 88.9% | 107.4 | Pafi |
| LT-102 | SF-06 | 1 | 13:56 | 6 | 94 | 117.7 | 12.0% | 87.0% | 105.1 | Fall |
| Leachate Trans | mission MH | -37 to N | MH-38 | | | | | | | |
| LT-101 | SF-08 | 1 | 13:21 | 6 | 95 | 119.1 | 10.9% | 91.0% | 107.4 | Pass |
| LT-102 | SF-08 | 1 | 13:56 | 6 | 95 | 117.7 | 12.0% | 89.1% | 105.1 | Fail |
| LT-103 | SF-08 | 2 | 7:45 | 6 | 95 | 116.9 | 11.0% | 89.3% | 105.3 | Fail |
| LT-104 | SF-08 | 2 | 9:32 | 6 | 95 | 118.3 | 9.9% | 91.2% | 107.6 | Pass |
| LT-105 | SF-08 | 3 | 12:32 | 6 | 95 | 115.0 | 7.3% | 90.8% | 107.2 | Pass |
| LT-106 | SF-08 | 3 | 12:35 | 6 | 95 | 114.2 | 6.3% | 91.0% | 107.4 | Pass |
| LT-107 | SF-08 | 4 | 15:12 | 6 | 95 | 116.3 | 8.0% | 91.3% | 107.7 | Pass |
| LT-108 | SF-08 | 4 | 15:18 | 6 | 95 | 116.5 | 9.3% | 90.3% | 106.6 | Pass |

Summary Log:

Leachate Transmission Line

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. Ibs/cuft | % Moist Content | Percent Proctor | Dry Den. Ibs/cuft | Pass / Fail |
|------------------|---------------|-------------|------------------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|----------------|
| LT-109 | SF-08 | 6 | 11:51 | 12 | 96 | 121.7 | 8.6% | 95.0% | 112.1 | Pass |
| LT-110 | SF-08 | 6 | 11:56 | 12 | 96 | 120.4 | 11.7% | 91.3% | 107.8 | Pass |
| Leachate Trans | smission Mi | H-37 to | MH-38 (95 | % Comp | action) | | | | | |
| LT-111 | SF-08 | 6 | 13:08 | 6 | 97 | 117.6 | 10.4% | 90.3% | 106.5 | Pass |
| LT-112 | SF-08 | 6 | 13:12 | 6 | 97 | 113.7 | 6.5% | 90.5% | 106.8 | Pass |
| Leachate Trans | mission Lin | e MH-2 | 1 to Tank | 3 | | | | | | |
| LT-113 | SF-01 | 5 | 9:30 | 6 | 111 | 122.6 | 12.8% | 95.7% | 108.7 | Pass |
| LT-114 | SF-01 | 6 | 10:00 | 6 | 111 | 122.6 | 10.9% | 97.3% | 110.6 | Pass |
| LT-115 | SF-01 | 7 | 14:10 | 6 | 111 | 123.3 | 12.2% | 96.7% | 109.9 | Pass |
| LT-116 | SF-01 | 8 | 14:35 | 6 | 111 | 122.9 | 11.8% | 96.8% | 109.9 | Pass |
| Leachate Trans | mission Lin | e: MH-3 | 2 Drain Li | ne | | | | | | |
| LT-117 | SF-08 | 1 | 13:08 | 12 | 112 | 124.8 | 7.8% | 98.1% | 115.8 | Pass |
| LT-118 | SF-08 | 2 | 13:10 | 6 | 112 | 126.7 | 8.1% | 99.3% | 117.2 | Pass |
| LT-119 | SF-08 | 3 | 13:05 | 6 | 112 | 122.2 | 7.1% | 96.7% | 114.1 | Pass |
| LT-120 | SF-08 | 4 | 13:13 | 6 | 112 | 120.5 | 6.9% | 95.5% | 112.7 | Pass |
| LT-121 | SF-08 | 5 | 14:35 | 6 | 112 | 124.2 | 8.9% | 96.7% | 114.0 | Pass |
| LT-122 | SF-08 | 6 | 14:44 | 6 | 112 | 124.4 | 7.5% | 98.1% | 115.7 | Pass |
| Drain Line Bacl | kfill from MH | -33 Dra | in Line | | | | | | | |
| LT-123 | SF-08 | 1 | 16:15 | 6 | 112 | 131.7 | 8.1% | 103.2% | 121.8 | Pass |
| LT-124 | SF-08 | 2 | 16:18 | 6 | 112 | 130.2 | 10.5% | 99.9% | 117.8 | Pass |
| LT-125 | SF-08 | 3 | 16:21 | 6 | 112 | 120.9 | 5.8% | 96.8% | 114.3 | Pass |
| Drain Line Back | cfill from MH | -33 Dra | in Line | | | | | | | |
| ifts 1, 2, and 3 | of MH-33 Dra | in Line | were retes | ted on Re | port day 114 | | | | | |
| LT-126 | SF-08 | 1 | 10:05 | 6 | 114 | 127.2 | 8.6% | 99.3% | 117.1 | Pass |
| LT-127 | SF-08 | 2 | 10:41 | 6 | 114 | 125.9 | 7.4% | 99.3% | 117.2 | Pass |
| LT-128 | SF-08 | 3 | 11:03 | 6 | 114 | 124.1 | 5.6% | 99.6% | 117.5 | Pass |
| LT-129 | SF-08 | 4 | 12:35 | 6 | 114 | 125.5 | 6.1% | 100.2% | 118.3 | Pass |
| LT-130 | SF-08 | 5 | 15:01 | 6 | 114 | 124.9 | 6.7% | 99.2% | 117.1 | Pass |
| rain Line Back | fill from MH | -34 and | MH-35 | | | | | | | |
| LT-131 | SF-08 | 1 | 15:03 | 12 | 126 | 125.3 | 8.0% | 98.3% | 116.0 | Pass |

Summary Log:

Leachate Transmission Line

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

ENVIROTECH ENGINEERING & CONSULTING INC

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. Ibs/cuft | % Moist Content | Percent Proctor | Dry Den. lbs/cuft | Pass / |
|-----------------|---------------|------------------|-----------------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|--------|
| LT-132 | SF-08 | 1 | 16:02 | 12 | 126 | 115.9 | 7.1% | 91.7% | 108.2 | Pass |
| LT-133 | SF-08 | 1 | 16:08 | 12 | 126 | 129.6 | 11.1% | 98.9% | 116.7 | Pass |
| Orain Line Bac | kfill from MH | 1-38 to 1 | ИН-39 | | | | | | | |
| LT-134 | SF-08 | 1 | 6:55 | 12 | 127 | 119.1 | 8.5% | 93.0% | 109.8 | Pass |
| Drain Line Bac | kfill from MH | 1-34 and | MH-35 | | | | | | | |
| LT-135 | SF-08 | 2 | 10:05 | 12 | 129 | 122.7 | 8.7% | 95.7% | 112.9 | Pass |
| LT-136 | SF-08 | 2 | 10:08 | 12 | 129 | 126.8 | 10.7% | 97.1% | 114.5 | Pass |
| LT-137 | SF-08 | 2 | 10:11 | 12 | 129 | 121.6 | 7.1% | 96.2% | 113.5 | Pass |
| LT-138 | SF-08 | 3 | 14:40 | 12 | 129 | 125.9 | 7.1% | 99.6% | 117.6 | Pass |
| LT-139 | SF-08 | 3 | 14:43 | 12 | 129 | 125.4 | 6.5% | 99.8% | 117.7 | Pass |
| LT-140 | SF-08 | 3 | 14:48 | 12 | 129 | 119.6 | 6.3% | 95.3% | 112.5 | Pass |
| Orain Line Bac | kfill from MH | l-38 and | MH-39 (9 | 5% Comp | action) | | | | | |
| LT-141 | SF-08 | 2 | 12:40 | 6 | 129 | 126.1 | 9.1% | 98.0% | 115.6 | Pass |
| LT-142 | SF-08 | 3 | 15:15 | 6 | 129 | 118.9 | 4.8% | 96.1% | 113.5 | Pass |
| Backfill from M | H-34 and MF | 1-35 | | | | | | | | |
| LT-143 | SF-08 | 4 | 10:09 | 12 | 130 | 129.0 | 12.7% | 97.0% | 114.5 | Pass |
| LT-144 | SF-08 | 4 | 10:12 | 12 | 130 | 124.2 | 9.3% | 96.3% | 113.6 | Pass |
| LT-145 | SF-08 | 4 | 10:15 | 12 | 130 | 123.1 | 8.8% | 95.9% | 113.1 | Pass |
| LT-146 | SF-08 | 5 | 14:35 | 12 | 130 | 123.4 | 9.6% | 95.4% | 112.6 | Pass |
| LT-147 | SF-08 | 5 | 14:37 | 12 | 130 | 124.7 | 8.5% | 97.4% | 114.9 | Pass |
| LT-148 | SF-08 | 5 | 14:40 | 12 | 130 | 129.8 | 10.1% | 99.9% | 117.9 | Pass |
| Backfill from M | H-34 and MF | I-35 (95 | % Compa | ction) | | | | | | |
| LT-149 | SF-08 | 6 | 9:10 | 6 | 131 | 125.0 | 6.4% | 99.6% | 117.5 | Pass |
| LT-150 | SF-08 | 6 | 9:13 | 6 | 131 | 128.0 | 9.3% | 99.2% | 117.1 | Pass |
| LT-151 | SF-08 | 6 | 9:15 | 6 | 131 | 129.0 | 11.0% | 98.5% | 116.2 | Pass |
| LT-152 | SF-08 | 7 | 13:25 | 6 | 131 | 129.0 | 12.0% | 97.6% | 115.2 | Pass |
| LT-153 | SF-08 | 7 | 13:29 | 6 | 131 | 130.1 | 12.6% | 97.9% | 115.5 | Pass |
| LT-154 | SF-08 | 7 | 13:34 | 6 | 131 | 127.4 | 9.4% | 98.7% | 116.5 | Pass |
| ackfill from M | H-38 and MH | - 39 (95° | % Compac | ction) | | | | | | |
| LT-155 | SF-08 | 4 | 10:35 | 6 | 131 | 122.7 | 8.9% | 95.5% | 112.7 | Pass |

Summary Log:

Leachate Transmission Line

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

ENVIROTECH ENGINEERING & CONSULTING, INC.

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. lbs/cuft | % Moist Content | Percent Proctor | Dry Den. lbs/cuft | Pass / Fail |
|------------------|-------------|------------------|------------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|----------------|
| Backfill from M | H-34 and Mi | H-35 (95 | 5% Compa | ction) | | | | | | |
| LT-156 | SF-08 | 8 | 14:31 | 6 | 132 | 126.5 | 7.3% | 99.9% | 117.9 | Pass |
| LT-157 | SF-08 | 8 | 14:34 | 6 | 132 | 121.7 | 7.0% | 96.4% | 113.7 | Pass |
| LT-158 | SF-08 | 8 | 14:39 | 6 | 132 | 126.8 | 8.5% | 99.0% | 116.9 | Pass |
| Backfill from M | H-34 and MI | H -35 (95 | % Compa | ction) | | | | | | |
| LT-159 | SF-08 | 9 | 12:19 | 6 | 133 | 126.6 | 7.5% | 99.8% | 117.8 | Pass |
| LT-160 | SF-08 | 9 | 12:31 | 6 | 133 | 121.4 | 3.1% | 99.8% | 117.7 | Pass |
| LT-161 | SF-08 | 9 | 12:34 | 6 | 133 | 123.8 | 5.1% | 99.8% | 117.8 | Pass |
| Backfill from M | H-34 and MI | 1-35 (95 | % Compa | ction) | | | | | | |
| LT-162 | SF-08 | 10 | 8:10 | 6 | 134 | 122.0 | 5.4% | 98.1% | 115.7 | Pass |
| LT-163 | SF-08 | 10 | 8:13 | 6 | 134 | 120.7 | 3.1% | 99.2% | 117.1 | Pass |
| LT-164 | SF-08 | 10 | 8:16 | 6 | 134 | 117.5 | 3.9% | 95.8% | 113.1 | Pass |
| LT-165 | SF-08 | 11 | 15:53 | 6 | 134 | 127.3 | 9.0% | 99.0% | 116.8 | Pass |
| LT-166 | SF-08 | 11 | 15:56 | 6 | 134 | 127.6 | 8.7% | 99.5% | 117.4 | Pass |
| LT-167 | SF-08 | 10 | 15:59 | 6 | 134 | 128.9 | 9.9% | 99.4% | 117.3 | Pass |
| Backfill from M | H-38 and Mi | 1-9 | | | | | | | | |
| LT-168 | SF-08 | 1 | 15:15 | 12 | 135 | 116.4 | 8.9% | 90.6% | 106.9 | Pass |
| LT-169 | SF-08 | 2 | 15:30 | 12 | 135 | 122.5 | 6.7% | 97.3% | 114.8 | Pass |
| Backfill from MI | H-38 and MI | 1-9 (95% | 6 Compact | ion) | | | | | | |
| LT-170 | SF-08 | 3 | 6:48 | 6 | 136 | 121.5 | 6.6% | 96.6% | 114.0 | Pass |
| LT-171 | SF-08 | 4 | 7:20 | 6 | 136 | 126.1 | 8.4% | 98.6% | 116.3 | Pass |
| LT-172 | SF-08 | 5 | 8:15 | 6 | 136 | 120.3 | 6.8% | 95.5% | 112.6 | Pass |
| Backfill Leacha | te Transmis | sion Lir | ne MH-36 t | o MH-37 | | | | | | |
| LT-173 | SF-08 | 1_ | 13:40 | 12 | 141 | 122.9 | 5.0% | 99.2% | 117.0 | Pass |
| LT-174 | SF-08 | 1 | 15:12 | 12 | 141 | 123.5 | 8.0% | 96.9% | 114.4 | Pass |
| LT-175 | SF-08 | 1 | 15:15 | 12 | 141 | 118.1 | 10.9% | 90.2% | 106.5 | Pass |
| Backfill Leacha | te Transmis | sion Lir | ne MH-36 t | o MH-37 | | | | | | |
| LT-176 | SF-08 | 2 | 6:50 | 12 | 142 | 120.3 | 7.1% | 95.2% | 112.3 | Pass |
| LT-177 | SF-08 | 2 | 6:55 | 12 | 142 | 122.0 | 7.4% | 96.3% | 113.6 | Pass |
| LT-178 | SF-08 | 3 | 9:00 | 12 | 142 | 121.9 | 11.4% | 92.7% | 109.4 | Pass |

Summary Log:

Leachate Transmission Line

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

CENVIROTECH ENGINEERING & CONSULTING INC

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. Ibs/cuft | % Moist Content | Percent Proctor | Dry Den. Ibs/cuft | Pass / Fail |
|------------------|-------------|-------------|-----------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|----------------|
| LT-179 | SF-08 | 3 | 9:05 | 12 | 142 | 122.6 | 10.0% | 94.5% | 111.5 | Pass |
| LT-180 | SF-08 | 4 | 10:50 | 12 | 142 | 121.1 | 6.9% | 96.0% | 113.3 | Pass |
| LT-181 | SF-08 | 4 | 10:55 | 12 | 142 | 119.0 | 9.1% | 92.4% | 109.1 | Pass |
| LT-182 | SF-08 | 5 | 14:00 | 12 | 142 | 125.7 | 6.3% | 100.2% | 118.3 | Pass |
| Backfill Leacha | te Transmis | sion Lir | ne MH-36 | to MH-37 | (95% Comp | action) | | | | |
| LT-183 | SF-08 | 5 | 14:05 | 6 | 142 | 131.2 | 6.9% | 104.0% | 122.7 | Pass |
| Backfill Leacha | te Transmis | sion Lir | ne MH-36 | to MH-37 | | | | | | |
| LT-184 | SF-08 | 6 | 15:45 | 12 | 142 | 129.2 | 6.6% | 102.7% | 121.2 | Pass |
| Backfill Leacha | te Transmis | sion Lir | ne MH-36 | to MH-37 | (95% Comp | action) | | | | |
| LT-185 | SF-08 | 6 | 15:50 | 6 | 142 | 127.7 | 5.7% | 102.4% | 120.8 | Pass |
| LT-186 | SF-05 | 7 | 8:15 | 6 | 144 | 128.2 | 8.0% | 95.6% | 118.7 | Pass |
| Backfill Leacha | te Transmis | sion Lir | ne MH-36 | to MH-37 | | | | | | |
| LT-187 | SF-05 | 7 | 8:20 | 12 | 144 | 124.4 | 8.2% | 92.6% | 115.0 | Pass |
| Backfill Leacha | te Transmis | sion Lin | e MH-36 | to MH-37 | (95% Comp | action) | | | | |
| LT-188 | SF-05 | 8 | 10:45 | 6 | 144 | 129.1 | 8.3% | 96.0% | 119.2 | Pass |
| LT-189 | SF-05 | 8 | 10:50 | 6 | 144 | 130.4 | 6.4% | 98.7% | 122.6 | Pass |
| LT-190 | SF-05 | 9 | 13:10 | 6 | 144 | 132.2 | 9.0% | 97.7% | 121.3 | Pass |
| LT-191 | SF-05 | 9 | 13:15 | 6 | 144 | 129.0 | 8.3% | 95.9% | 119.1 | Pass |
| LT-192 | SF-05 | 10 | 14:45 | 6 | 144 | 130.1 | 8.6% | 96.5% | 119.8 | Pass |
| LT-193 | SF-05 | 10 | 14:50 | 6 | 144 | 129.3 | 7.3% | 97.0% | 120.5 | Pass |
| LT-194 | SF-05 | 11 | 16:15 | 6 | 144 | 126.9 | 6.3% | 96.1% | 119.4 | Pass |
| LT-195 | SF-05 | 11 | 16:20 | 6 | 144 | 130.1 | 6.2% | 98.6% | 122.5 | Pass |
| Backfill Leachat | e Transmis | sion Lin | e MH-36 t | o MH-37 | (95% Compa | action) | | | | |
| LT-196 | SF-05 | 12 | 9:05 | 6 | 145 | 128.1 | 6.9% | 96.5% | 119.8 | Pass |
| LT-197 | SF-05 | 12 | 9:15 | 6 | 145 | 128.4 | 7.5% | 96.2% | 119.4 | Pass |
| LT-198 | SF-05 | 13 | 12:55 | 6 | 145 | 129.1 | 8.1% | 96.2% | 119.4 | Pass |
| LT-199 | SF-05 | 13 | 13:00 | 6 | 145 | 127.7 | 5.8% | 97.2% | 120.7 | Pass |
| Backfill Leachat | e Transmiss | sion Lin | e MH-36 t | o MH-37 (| (95% Compa | action) | | | | |
| LT-200 | SF-05 | 14 | 6:54 | 6 | 146 | 135.7 | 9.5% | 99.8% | 123.9 | Pass |
| LT-201 | SF-05 | 14 | 7:00 | 6 | 146 | 132.9 | 7.4% | 99.6% | 123.7 | Pass |

Summary Log:

Leachate Transmission Line

Client:

WCH

Note:

Unless otherwise noted, all testing was verified to 90% modified Proctor

ENVIROTECH ENGINEERING & CONSULTING, INC.

| Test No | Proctor | Lift Num | Time | Test Depth | Report Number | Wet Den. Ibs/cuft | % Moist Content | Percent Proctor | Dry Den. lbs/cuft | Pass / |
|---------|---------|-------------|-------|---------------|------------------|----------------------|--------------------|--------------------|----------------------|--------|
| LT-202 | SF-09 | 15 | 8:22 | 6 | 146 | 142.2 | 6.4% | 96.2% | 133.6 | Pass |
| LT-203 | SF-09 | 15 | 8:27 | 6 | 146 | 145.1 | 5.3% | 99.2% | 137.8 | Pass |
| LT-204 | SF-09 | 16 | 13:55 | 6 | 146 | 142.0 | 2.8% | 99.4% | 138.1 | Pass |
| LT-205 | SF-09 | 16 | 13:59 | 6 | 146 | 144.8 | 4.0% | 100.2% | 139.2 | Pass |

Summary Log:

Tank 4 Subgrade

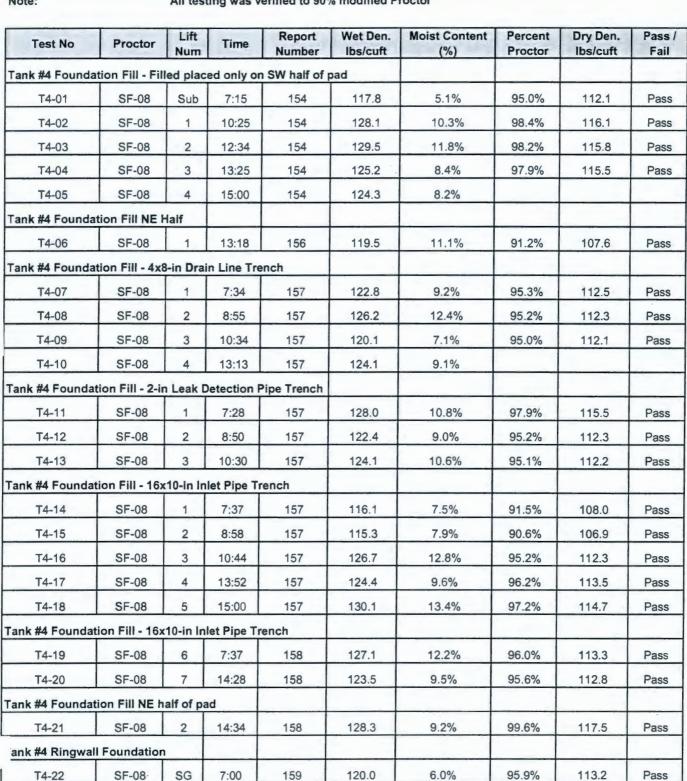
Client:

WCH

Note:

All testing was verified to 90% modified Proctor

ENVIROTECH



Summary Log:

Tank 4 Subgrade

Client:

WCH

Note:

All testing was verified to 90% modified Proctor



| Test No | Proctor | Lift Num | Time | Report Number | Wet Den. Ibs/cuft | Moist Content (%) | Percent Proctor | Dry Den. Ibs/cuft | Pass / Fail |
|---------------|--------------|-------------|-------|------------------|----------------------|----------------------|--------------------|----------------------|----------------|
| T4-23 | SF-08 | SG | 7:07 | 159 | 120.3 | 6.5% | 95.7% | 113.0 | Pass |
| ank #4 Ringwa | all Backfill | | | | | | | | |
| T4-24 | SF-08 | 1 | 14:40 | 175 | 125.5 | 11.6% | 95.3% | 112.5 | Pass |
| T4-25 | SF-08 | 1 | 14:43 | 175 | 124.8 | 9.3% | 96.8% | 114.2 | Pass |
| T4-26 | SF-08 | 2 | 14:48 | 175 | 121.3 | 8.1% | 95.1% | 112.2 | Pass |
| T4-27 | SF-08 | 2 | 14:52 | 175 | 123.3 | 8.2% | 96.6% | 114.0 | Pass |
| T4-28 | SF-08 | 3 | 14:58 | 175 | 124.2 | 10.4% | 95.3% | 112.5 | Pass |
| T4-29 | SF-08 | 3 | 15:02 | 175 | 123.7 | 8.9% | 96.3% | 113.6 | Pass |
| T4-30 | SF-08 | 4 | 15:10 | 175 | 122.8 | 9.3% | 95.2% | 112.4 | Pass |
| T4-31 | SF-08 | 4 | 15:14 | 175 | 122.9 | 9.2% | 95.4% | 112.5 | Pass |



TANK 4 AND LEACHATE TRANSMISSION SYSTEM REPORT

CONSTRUCTION QUALITY ASSURANCE (CQA)

ENVIRONMENTAL RESTORATION DISPOSAL FACILITY (ERDF)

SUPER CELLS 9

SUBCONTRACT S013213A00

JANUARY 2011 (010032)

C.1

STRUCTURAL FILL PROCTORS

Client:

Washington Closure Hanford

Form: 05-18A Earthwork Data Sheet



2500 N. 13th Street | Enid, OK | 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skib | а | | Sample ID: | SF-01 | |
|------------------|---------------|-------|-----------|----------------|------------|--|
| Project: | S013213A00 |) | | Sample Des: | Brown Sand | |
| Project Location | n: ERDF Cells | 9-10 | | Sampling Date: | 2/12/2010 | |
| Tested By: | P. Davis | Date: | 2/13/2010 | Sampled By: | L. Hay | |
| Reviewed By: | J. Voss | Date: | 2/15/2010 | Date Received: | 2/12/2010 | |

Natural Moisture Content

| Natural | Moisture | N/A |
|---------|----------|-----|
| | | |

Atterberg Limits Test Results (ASTM D-4318)

| Flow Index | Non-Plastic | Spec |
|------------------|-------------|------|
| Liquid Limit | Non-Plastic | |
| Plastic Limit | Non-Plastic | |
| Plasticity Index | Non-Plastic | |

Particle Size Anaylsis (ASTM D-422) 200 Wash Sieve Analysis (ASTM D-1140)

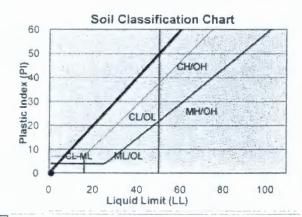
| Sieve No | Sieve Opening | % Passing | Spec |
|----------|---------------|-----------|------|
| 3/4 " | 19.000 | 100.0 | |
| 3/8 " | 9.500 | 99.5 | |
| No.4 | 4.750 | 99.1 | |
| No. 10 | 2.000 | 98.5 | |
| No. 40 | 0.425 | 89.2 | |
| No. 50 | 0.300 | 84.5 | |
| No. 100 | 0.150 | 57.5 | |
| No. 200 | 0.075 | 22.6 | |
| Pan | - | 0.0 | |

| Cu | N/A |
|----|-----|
| Cc | N/A |

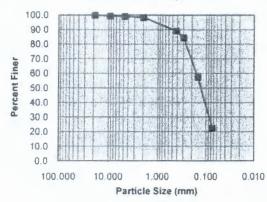
Unified Soil Classification (ASTM D-2487)

SM: Silty Sand

Deviations from ASTM: None



Grain Size Analysis



Particle Size Anaylais (ASTM D-

422)

Envirotech

4/30/10

Date

Client: Washington Closure Hanford

Washington Closure Hanford 05-18A Earthwork Data Sheet



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Estx (580) 237-4302

Sample Information

Form:

| Contact Name. | Charlie Skiba | | | Sample ID. | SF-02 | |
|------------------|----------------|-------|-----------|----------------|------------------|--|
| Project: | S013213A00 | | | Sample Des: | Brown/Black Sand | |
| Project Location | : ERDF Cells 9 | -10 | | Sampling Date: | 2/12/2010 | |
| Tested By: | P. Davis | Date: | 2/13/2010 | Sampled By: | L. Hay | |
| Reviewed By: | J. Voss | Date: | 2/15/2010 | Date Received: | 2/12/2010 | |

Natural Moisture Content

| Natural | Moisture | N/A |
|---------|----------|-----|

Atterberg Limits Test Results (ASTM D-4318)

| Flow Index | Non-Plastic | Spec |
|------------------|-------------|------|
| Liquid Limit | Non-Plastic | |
| Plastic Limit | Non-Plastic | |
| Plasticity Index | Non-Plastic | |

Particle Size Analysis (ASTM D-422) 200 Wash Sieve Analysis (ASTM D-1140)

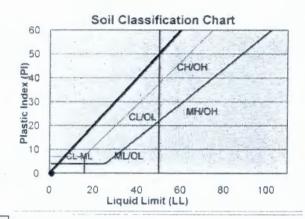
| Sieve No | Sieve Opening | % Passing | Spec |
|----------|---------------|-----------|------|
| 1" | 25.000 | 100.0 | |
| 3/4 " | 19.000 | 99.6 | |
| 3/8 " | 9.500 | 99.1 | |
| No.4 | 4.750 | 98.7 | |
| No. 10 | 2.000 | 96.2 | |
| No. 40 | 0.425 | 61 6 | |
| No. 50 | 0.300 | 56.1 | |
| No. 100 | 0.150 | 36 1 | |
| No. 200 | 0.075 | 12.4 | |
| | | | |

| Си | 5.80 |
|----|------|
| Cc | 0.66 |

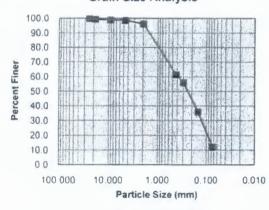
Unified Soil Classification (ASTM D-2487)

SP-SM: Pooly-Graded Sand with Silt

Deviations from ASTM: None



Grain Size Analysis



Particle Size Analysis (ASTM D-422)

THE PLUE SHOWING

Envirotech

4/30/10

Date

Client: Address:

Washington Closure Hanford 05-18A Earthwork Data Sheet



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 1 Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skiba | | | Sample ID: | SF-03 | |
|------------------|----------------|-------|----------|----------------|----------------------|--|
| Project: | S013213A00 | | | Sample Des: | Black Sand w/ Gravel | |
| Project Location | : ERDF Cells 9 | -10 | | Sampling Date: | 2/24/2010 | |
| Tested By: | L. Hay | Date: | 3/8/2010 | Sampled By: | L. Hay | |
| Reviewed By: | T. Williams | Date: | 3/8/2010 | Date Received: | 2/24/2010 | |

Natural Moisture Content

| Natural Moisture | 8.2 |
|------------------|-----|
| | |

Atterberg Limits Test Results (ASTM D-4318)

| Flow Index | N/A | Spec |
|------------------|-------------|------|
| Liquid Limit | Non-Plastic | |
| Plastic Limit | Non-Plastic | |
| Plasticity Index | Non-Plastic | |

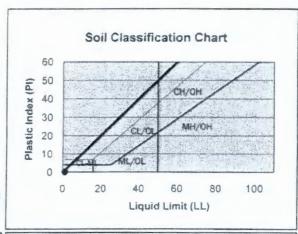
Particle Size Anaylsis (ASTM D-422) 200 Wash Sieve Analysis (ASTM D-1140)

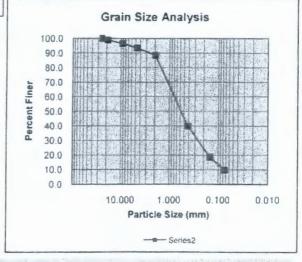
| Sieve No | Sieve Opening | % Passing | Spec |
|----------|---------------|-----------|------|
| 1 " | 25.000 | 100.0 | |
| 3/4 " | 19.000 | 99.0 | |
| 3/8 " | 9.500 | 96.4 | |
| No.4 | 4.750 93.3 | | |
| No. 10 | 2.000 | 88.3 | |
| No. 40 | 0.425 | 39.7 | |
| No. 100 | 0.150 | 18.4 | |
| No. 200 | 0.075 9.8 | | |
| Pan | - du | 0 | |

| Cu | 11.17 |
|----|-------|
| Cc | 1.27 |

Unified Soil Classification (ASTM D-2487) SW-SM: Well Graded Sand with Silt

Deviations from ASTM: None





5-4-1C Date

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheet



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skiba | | | Sample ID: | SF-04 | |
|------------------|----------------|-------|----------|----------------|------------------|--|
| Project: | S013213A00 | | | Sample Des: | Brown/Black Sand | |
| Project Location | : ERDF Cells 9 | -10 | | Sampling Date: | 3/1/2010 | |
| Tested By: | L. Hay | Date: | 3/8/2010 | Sampled By: | L. Hay | |
| Reviewed By: | T. Williams | Date: | 3/9/2010 | Date Received: | 3/1/2010 | |

Natural Moisture Content

| Natural Moisture | 8.2 |
|------------------|-----|
| | |

Atterberg Limits Test Results (ASTM D-4318)

| Flow Index | Non-Plastic | Spec |
|------------------|-------------|------|
| Liquid Limit | Non-Plastic | |
| Plastic Limit | Non-Plastic | |
| Plasticity Index | Non-Plastic | |

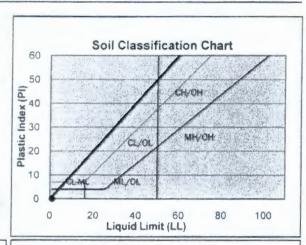
Particle Size Anaylsis (ASTM D-422) 200 Wash Sieve Analysis (ASTM D-1140)

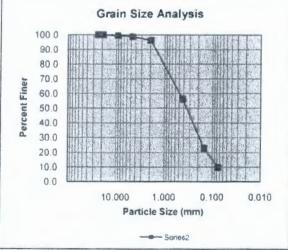
| Sieve No | Sieve Opening | % Passing | Spec | |
|----------|---------------|-----------|------|--|
| 1 " | 25.000 100.0 | | | |
| 3/4 " | 19.000 | 100.0 | | |
| 3/8 " | 9,500 | 99.5 | | |
| No.4 | 4.750 | 98.8 | | |
| No. 10 | 2.000 | 96.2 | | |
| No. 40 | 0.425 | 56.0 | | |
| No. 100 | 0.150 | 22.6 | | |
| No. 200 | 0.075 | 9.6 | | |
| Pan | - | 0 | | |

| Cu | 7.25 |
|----|------|
| Сс | 0.95 |

Unified Soil Classification (ASTM D-2487) SW-SM: Well Graded Sand with Silt

Deviations from ASTM: None





Envirotech

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Shee!



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 1 Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skiba | | | Sample ID: | SF-05 | |
|------------------|-----------------|-------|----------|----------------|------------|--|
| Project: | S013213A00 | | | Sample Des: | Black Sand | |
| Project Location | n: ERDF Cells 9 | -10 | | Sampling Date: | 3/3/2010 | |
| Tested By: | L. Hay | Date: | 3/8/2010 | Sampled By: | L. Hay | |
| Reviewed By: | T. Williams | Date: | 3/9/2010 | Date Received: | 3/3/2010 | |

Natural Moisture Content

| Natural | Moistur | e | 4.7 |
|---------|---------|---|-----|
| | | | |

Atterberg Limits Test Results (ASTM D-4318)

| Flow Index | Non-Plastic | Spec |
|------------------|-------------|------|
| Liquid Limit | Non-Plastic | |
| Plastic Limit | Non-Plastic | |
| Plasticity Index | Non-Plastic | |

Particle Size Anaylsis (ASTM D-422) 200 Wash Sieve Analysis (ASTM D-1140)

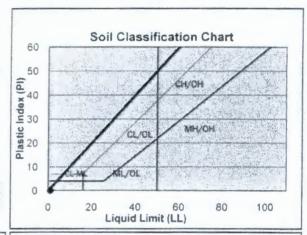
| Sieve No | Sieve Opening | % Passing | Spec | |
|----------|---------------|-----------|------|--|
| 1 " | 25.000 | 97.6 | | |
| 3/4 " | 19.000 | 97.4 | | |
| 3/8 " | 9.500 | 96 7 | | |
| No.4 | 4.750 93.2 | | | |
| No. 10 | 2.000 | 87.5 | | |
| No. 40 | 0.425 | 33.6 | | |
| No. 100 | 0.150 | 19.0 | | |
| No. 200 | 0.075 | 9.8 | | |
| Pan | - | 0 | | |

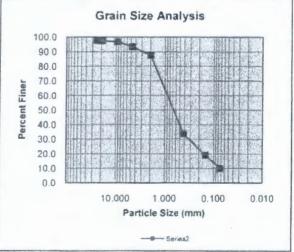
| Cu | 7.25 |
|----|------|
| Cc | 0.95 |

Unified Soil Classification (ASTM D-2487)

SW-SM: Well Graded Sand with Silt

Deviations from ASTM: None





Envirotech

5-4-10 Date

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Shee!



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skiba | | | Sample ID: | SF-06 | |
|------------------|-----------------|-------|--|----------------|------------------|--|
| Project: | S013213A00 | | obsession of the second of the | Sample Des: | Brown/Black Sand | |
| Project Location | n: ERDF Cells 9 | -10 | | Sampling Date: | 3/9/2010 | |
| Tested By: | L. Hay | Date: | 3/10/2010 | Sampled By: | L. Hay | |
| Reviewed By: | T. Williams | Date: | 3/11/2010 | Date Received: | 3/9/2010 | |

Natural Moisture Content

| I | Natural | Moisture | 5.7 |
|---|---------|----------|-----|
| | | | |

Atterberg Limits Test Results (ASTM D-4318)

| Flow Index | Non-Plastic | Spec |
|------------------|-------------|------|
| Liquid Limit | Non-Plastic | |
| Plastic Limit | Non-Plastic | |
| Plasticity Index | Non-Plastic | |

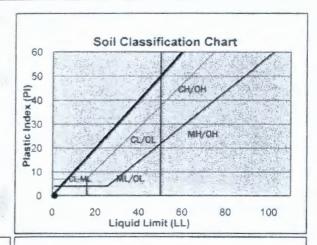
Particle Size Anaylsis (ASTM D-422) 200 Wash Sieve Analysis (ASTM D-1140)

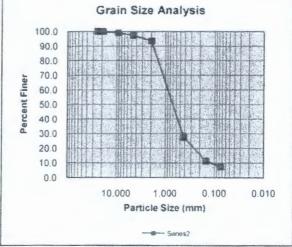
| Sieve No | Sieve Opening | % Passing | Spec |
|----------|---------------|-----------|------|
| 1 " | 25.000 | 100 0 | |
| 3/4 " | 19.000 | 100.0 | |
| 3/8 " | 9.500 | 99.0 | |
| No.4 | 4.750 | 97.2 | |
| No. 10 | 2.000 | 93.4 | |
| No. 40 | 0.425 | 27.3 | |
| No. 100 | 0.150 | 11 3 | |
| No. 200 | 0.075 | 7.3 | |
| Pan | ~ | 0.0 | |

| Cu | 7.18 |
|----|------|
| Cc | 1.99 |

Unified Soil Classification (ASTM D-2487) SW: Well Graded Sand

Deviations from ASTM: None





5-4-10 Date

Client: Address: Washington Closure Hanford

05-18A Earthwork Data Sheet



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skiba | | | Sample ID: | SF-07 | |
|------------------|-----------------|-------|-----------|----------------|------------|--|
| Project: | S013213A00 | | | Sample Des: | Brown Sand | |
| Project Location | n: ERDF Cells 9 | -10 | | Sampling Date: | 3/17/2010 | |
| Tested By: | L. Hay | Date: | 3/18/2010 | Sampled By: | L. Hay | |
| Reviewed By: | T. Williams | Date: | 3/19/2010 | Date Received: | 3/17/2010 | |

Natural Moisture Content

| Natural Moisture | 6.0% |
|------------------|------|

Atterberg Limits Test Results (ASTM D-4318)

| Flow Index | Non-Plastic | Spec |
|------------------|-------------|------|
| Liquid Limit | Non-Plastic | |
| Plastic Limit | Non-Plastic | |
| Plasticity Index | Non-Plastic | |

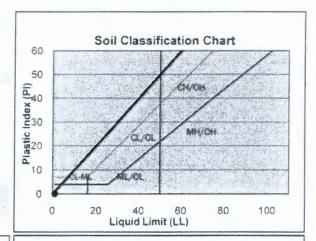
Particle Size Anaylsis (ASTM D-422) 200 Wash Sieve Analysis (ASTM D-1140)

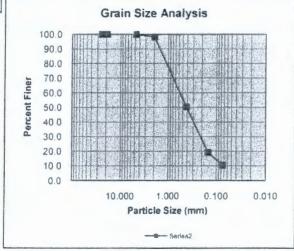
| Sieve No | Sieve Opening | % Passing | Spec |
|----------|---------------|-----------|------|
| 1 " | 25.000 | 100.0 | |
| 3/4 " | 19.000 | 100.0 | |
| 3/8 " | 9.500 | 10000.0 | |
| No.4 | 4.750 | 99.9 | |
| No. 10 | 2.000 | 98 1 | |
| No. 40 | 0.425 | 50.2 | |
| No. 100 | 0.150 | 19.1 | |
| No. 200 | 0.075 | 10.4 | |
| Pan | ** | 0.0 | |

| Cu | 10.71 |
|----|-------|
| Cc | 1 19 |

Unified Soil Classification (ASTM D-2487) SW: Well Graded Sand

Deviations from ASTM: None





Page 1 of 1

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheet



2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 1 Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skib | а | | Sample ID: | SF-08 |
|-----------------------------------|--------------|-------|-----------|----------------|--------------------------------|
| Project: | S013213A0 |) | | Sample Des: | Brown Sand:MH-37 to MH-38 Fill |
| Project Location: ERDF Cells 9-10 | | | | Sampling Date: | 6/22/2010 |
| Tested By: | L. Hay | Date: | 6/23/2010 | Sampled By: | L. Hay |
| Reviewed By: | J. Voss | Date: | 6/24/2010 | Date Received: | 6/22/2010 |

Natural Moisture Content

| Natural | Moisture | 7.6% | |
|---------|----------|------|--|
| | | | |

Atterberg Limits Test Results (ASTM D-4318)

| Flow Index | Non-Plastic | Spec |
|------------------|-------------|------|
| Liquid Limit | Non-Plastic | |
| Plastic Limit | Non-Plastic | |
| Plasticity Index | Non-Plastic | |

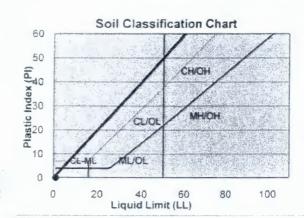
Particle Size Analysis (ASTM D-422) 200 Wash Sieve Analysis (ASTM D-1140)

| Sieve No | Sieve Opening | % Passing | Spec |
|----------|---------------|-----------|------|
| 1 1 | 25.000 | 100.0 | |
| 3/4 " | 19.000 | 100.0 | |
| 3/8 " | 9.500 | 99.0 | |
| No.4 | 4.750 | 99.6 | |
| No. 10 | 2.000 | 98.1 | |
| No. 40 | 0.425 | 60 4 | |
| No. 100 | 0.150 | 20.7 | |
| No. 200 | 0.075 | 1.8 | |
| Pan | 10 | 0.1 | |

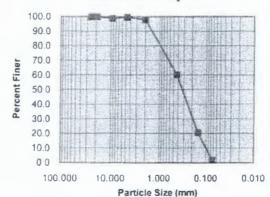
| Cu | 3.93 |
|----|------|
| Сс | 1.01 |

Unified Soil Classification (ASTM D-2487) SP: Pooly Graded Sand

Deviations from ASTM: None



Grain Size Analysis



arocke Size (mail)

Particle Size Anayleis (ASTM D-422)

Envirotech

6/24/10

Date

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheet



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skit | ра | | Sample ID: | SF-09 |
|------------------|--------------|-------|-----------|----------------|------------------------|
| Project: | S013213A0 | 0 | | Sample Des: | Round Rock Base Course |
| Project Location | : ERDF Cells | 9-10 | | Sampling Date: | 7/16/2010 |
| Tested By: | QISI | Date: | 7/30/2010 | Sampled By: | L. Hay |
| Reviewed By: | J. Voss | Date: | 8/2/2010 | Date Received: | 7/16/2010 |

Natural Moisture Content

| Natural Moisture | N/A | |
|------------------|-----|--|
| | | |

Atterberg Limits Test Results (ASTM D-4318)

| Flow Index | Non-Plastic | Spec |
|------------------|-------------|------|
| Liquid Limit | Non-Plastic | |
| Plastic Limit | Non-Plastic | |
| Plasticity Index | Non-Plastic | |

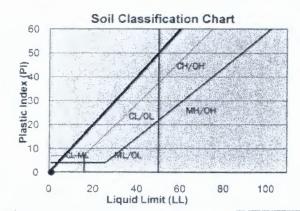
Particle Size Analysis (ASTM D-422) 200 Wash Sieve Analysis (ASTM D-1140)

| Sieve No | Sieve Opening | % Passing | Spec |
|----------|---------------|-----------|------|
| 1 1/2 " | 37.500 | 100.0 | |
| 1 " | 25.000 | 94.3 | |
| 3/4 " | 19.000 | 712 | |
| 1/2 " | 12.500 | 45.6 | |
| No.4 | 4.750 | 25.1 | |
| No. 10 | 2.000 | 16 1 | |
| No. 40 | 0 425 | 8.1 | |
| No. 200 | 0.075 | 3.1 | |

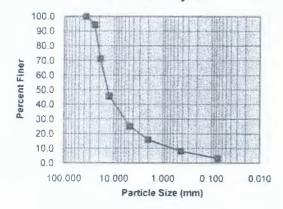


Unified Soil Classification (ASTM D-2487) GP: Pooly Graded Gravel

Deviations from ASTM: None



Grain Size Analysis



Particle Size Anaylsis (ASTM D-422)

Envirotech

8/2/10

Date

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheet



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skib | а | | Sample ID: | SF-10 | |
|------------------|---------------|-------|-----------|----------------|------------|--|
| Project: | S013213A0 | 0 | | Sample Des: | Top Course | |
| Project Location | n: ERDF Cells | 9-10 | | Sampling Date: | 7/16/2010 | |
| Tested By: | QISI | Date: | 7/30/2010 | Sampled By: | L. Hay | |
| Reviewed By: | J. Voss | Date: | 8/2/2010 | Date Received: | 7/16/2010 | |

Natural Moisture Content

| | **** |
|--------------------|------|
| Natural Moisture N | Α |

Atterberg Limits Test Results (ASTM D-4318)

| Flow Index | Non-Plastic | Spec |
|------------------|-------------|------|
| Liquid Limit | Non-Plastic | |
| Plastic Limit | Non-Plastic | |
| Plasticity Index | Non-Plastic | |

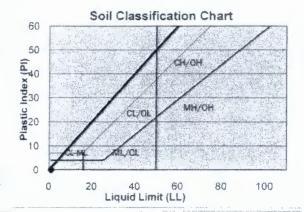
Particle Size Anaylsis (ASTM D-422) 200 Wash Sieve Analysis (ASTM D-1140)

| Sieve No | Sieve Opening | % Passing | Spec |
|----------|---------------|-----------|------|
| 1 1/2 " | 37.500 | 100.0 | |
| 1" | 25.000 | 100.0 | |
| 3/4 " | 19.000 | 100.0 | |
| 1/2 " | 12.500 92.2 | | |
| 3/8 " | 9.500 | 80.0 | |
| No.4 | 4.750 | 30.3 | |
| No. 10 | 2.000 | 27.5 | |
| No. 40 | 0.425 | 25 11.8 | |
| No. 200 | 0.075 | 5.1 | |

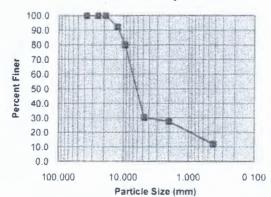
| Сп | 22.93 |
|----|-------|
| Сс | 7.90 |

Unified Soil Classification (ASTM D-2487) **GP: Pooly Graded Gravel**

Deviations from ASTM None



Grain Size Analysis



Particle Size Anaylais (ASTM 0-422)

Envirotech 8/10/10

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheet



2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 1 Fax (580) 237-4302

Sample Information

| Contact Name: | Chartie Skil | oa | | Sample ID: | SF-11 | |
|------------------|---------------|-------|-----------|----------------|-----------------------|--|
| Project: | S013213A0 | 0 | | Sample Des: | Riser Trench Backfill | |
| Project Location | n: ERDF Cells | 9-10 | | Sampling Date: | 7/23/2010 | |
| Tested By: | L. Hay | Date | 7/26/2010 | Sampled By: | L. Hay | |
| Reviewed By: | J. Voss | Date: | 7/26/2010 | Date Received: | 7/23/2010 | |

Natural Moisture Content

| Natural Moisture | 11.1% |
|------------------|-------|
| | |

Atterberg Limits Test Results (ASTM D-4318)

| Flow Index | Non-Plastic | Spec |
|------------------|-------------|------|
| Liquid Limit | Non-Plastic | |
| Plastic Limit | Non-Plastic | |
| Plasticity Index | Non-Plastic | |

Particle Size Analysis (ASTM D-422) 200 Wash Sieve Analysis (ASTM D-1140)

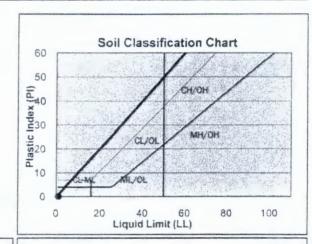
| Sieve No | Sieve Opening | % Passing | Spec |
|----------|---------------|-----------|------|
| 1 11 | 25.000 | 100.0 | |
| 3/4 " | 19.000 | 100.0 | |
| 3/8 " | 9.500 | 98.8 | |
| No.4 | 4.750 | 98.3 | |
| No. 10 | 2.000 | 97.0 | |
| No. 40 | 0.425 | 51.0 | |
| No. 100 | 0.150 | 11.2 | |
| No. 200 | 0.075 | 16 | |
| Pan | - | 0.0 | |

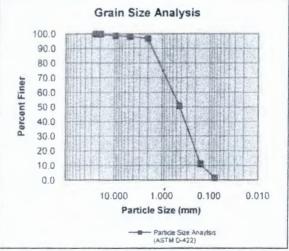
| Cu | 5.23 |
|----|------|
| Сс | 0 76 |

Unified Soil Classification (ASTM D-2487)

SP: Pooly Graded Sand

Deviations from ASTM: None





8/2/10

Date



TANK 4 AND LEACHATE TRANSMISSION SYSTEM REPORT

CONSTRUCTION QUALITY ASSURANCE (CQA)

ENVIRONMENTAL RESTORATION DISPOSAL FACILITY (ERDF)

SUPER CELLS 9

SUBCONTRACT S013213A00

JANUARY 2011 (010032)

C.2

STRUCTURAL FILL SOIL CLASSIFICATIONS



Client

Washington Closure Hanford

Form:

05-18A Earthwork Data Sheets



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skiba | | | Sample ID: | SF-01 |
|-------------------|---------------|-----------------|-----------|---------------|--------------|
| Project: | S013213A00 | | | Sample Des: | Base Soil |
| Project Location: | ERDF Cells | ERDF Cells 9-10 | | Sampling Date | e: 2/12/2010 |
| Tested By: | P. Davis | Date: | 2/13/2010 | Sampled By: | L. Hay |
| Reviewed By: | J. Voss | Date: | 2/15/2010 | Date Received | d: 2/12/2010 |
| Comments: | | | | Report No. | 05-016-004 |

DENSITY DATA (lbs)

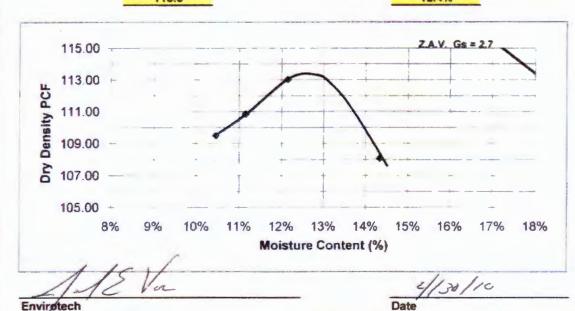
| Mold + Wet Soil | 13.30 | 13.38 | 13.50 | 13.39 | |
|-------------------|-------|-------|-------|-------|--|
| Mold Wt. | 9.27 | 9.27 | 9.27 | 9.27 | |
| Wet Soil | 4.03 | 4.11 | 4.22 | 4.12 | |
| tbs/cu ft. (wet) | 120.9 | 123.2 | 126.7 | 123.6 | |
| ibs/cu. ft. (dry) | 109.5 | 110.9 | 113.0 | 108.1 | |

MOISTURE DATA (grams)

| Tin No. | 1 | 2 | 3 | 4 | |
|----------------|--------|--------|--------|--------|--|
| Wet Soil + Tin | 711.00 | 725.50 | 706.50 | 706.10 | |
| Dry Soil + Tin | 643.70 | 652.70 | 630.00 | 617.60 | |
| Tin Wt. | 0.00 | 0.00 | 0.00 | 0.00 | |
| Dry Soil | 643.70 | 652.70 | 630.00 | 617.60 | |
| % Moisture | 10.5% | 11.2% | 12.1% | 14.3% | |
| % Saturation | 52.4% | 57.9% | 66.8% | 69.2% | |

MAXIMUM DRY DENSITY (PCF) 113.6

OPTIMUM MOISTURE CONTENT (%) 12.4%



Client:

Washington Closure Hanford

Form:

05-18A Earthwork Data Sheets



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name. | Charlie Skiba | | | Sample ID: | SF-02 |
|-------------------|-----------------|-------|--------------------|---------------|-------------|
| Project: | S013213A00 | | roject: S013213A00 | Sample Des: | Brown/Black |
| Project Location: | ERDF Cells 9-10 | | | Sampling Date | 2/12/2010 |
| Tested By: | P. Davis | Date: | 2/13/2010 | Sampled By: | L. Hay |
| Reviewed By: | J. Voss | Date: | 2/15/2010 | Date Received | 2/12/2010 |
| Comments: | | | | Report No. | 05-016-004 |

DENSITY DATA (lbs)

| Mold + Wet Soil | 13.45 | 13.62 | 13.84 | 13.77 | |
|-------------------|-------|-------|-------|-------|--|
| Mold Wt. | 9.27 | 9.27 | 9.27 | 9.27 | |
| Wet Soil | 4.18 | 4.35 | 4.56 | 4.50 | |
| lbs/cu. ft. (wet) | 125.3 | 130.4 | 136.9 | 135.0 | |
| lbs/cu ft. (dry) | 119.2 | 121.6 | 124.2 | 120.5 | |

MOISTURE DATA (grams)

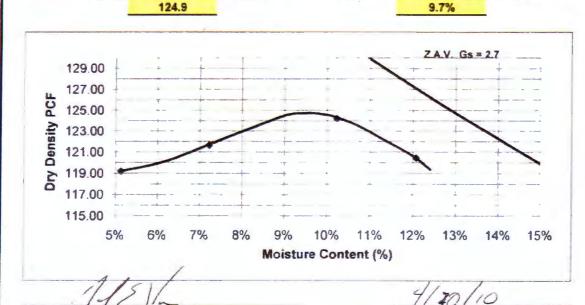
Envirotech

| Tin No. | 1 | 2 | 3 | 4 | |
|----------------|--------|--------|--------|--------|--|
| Wet Soil + Tin | 722.20 | 720.50 | 637.20 | 743.50 | |
| Dry Soil + Tin | 687.00 | 672.00 | 578.10 | 663.40 | |
| Tin Wt. | 0.00 | 0.00 | 0.00 | 0.00 | |
| Dry Soil | 687.00 | 672.00 | 578.10 | 663.40 | |
| % Moisture | 5.1% | 7.2% | 10.2% | 12.1% | |
| % Saturation | 33.5% | 50.6% | 77.4% | 81.8% | |

MAXIMUM DRY DENSITY (PCF)

OPTIMUM MOISTURE CONTENT (%)

Date



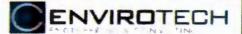
Page 1 of 1

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheets



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Si | kiba | 2 | Sample ID: | SF-03 |
|-------------------|-----------------|----------------|----------|---------------|------------------------|
| Project: | S013213/ | A00 | | Sample Des: | Black Sand with Gravel |
| Project Location: | ERDF Cells 9-10 | | | Sampling Date | 2/24/2010 |
| Tested By: | LH | Date: | 3/1/2010 | Sampled By: | L. Hay |
| Reviewed By. | TW | Date: | 3/1/2010 | Date Received | 2/24/2010 |
| Comments | Method C | - (ASTM D4718) | | Report No. | 1/11/1900 |

DENSITY DATA (lbs)

| Mold + Wet Soil | 12.95 | 13.08 | 13.27 | 13.22 | |
|------------------|-------|-------|-------|-------|--|
| Mold Wt. | 8.72 | 8.72 | 8.72 | 8.72 | |
| Wet Soil | 4.23 | 4 36 | 4.55 | 4.50 | |
| lbs/cu ft. (wet) | 126.9 | 130.8 | 136.5 | 135.0 | |
| bs/cu. ft. (dry) | 115.5 | 116.9 | 119.2 | 116.2 | |

MOISTURE DATA (grams)

Envirotech

| Tin No. | E3 | E2 | E5 | E1 | |
|----------------|--------|--------|---------|---------|--|
| Wet Soil + Tin | 913.20 | 976.10 | 1122.60 | 1032.10 | |
| Dry Soil + Tin | 853.10 | 898.40 | 1011.50 | 922.70 | |
| Tin Wt. | 246.30 | 246.80 | 246.60 | 245.30 | |
| Dry Soil | 606.80 | 651.60 | 764.90 | 677.40 | |
| % Moisture | 9.9% | 11.9% | 14.5% | 16.1% | |
| % Saturation | 56.9% | 71.1% | 92.4% | 94.7% | |

MAXIMUM DRY DENSITY (PCF) OPTIMUM MOISTURE CONTENT (%) 119.3 14.5% 120.6 14.0% Corrected ZAV. Gs = 2.73 130.00 125.00 Pusity Density Density 120.00 115.00 110.00 10% 11% 12% 13% 14% 15% 16% 17% 18% 19% Moisture Content (%) 5-4-10

Date

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheets



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name. | Charlie Sk | iba | | Sample ID. | SF-04 |
|-------------------|------------|--------|----------|---------------|------------------|
| Project: | S013213A | 00 | | Sample Des: | Brown/Black Sand |
| Project Location: | ERDF Cell | s 9-10 | | Sampling Date | te: 3/1/2010 |
| Tested By: | LH | Date: | 3/4/2010 | Sampled By: | LH |
| Reviewed By: | TW | Date: | 3/4/2010 | Date Receive | d: 3/1/2010 |
| Comments | | | | Report No. | 05-016-017 |

DENSITY DATA (lbs)

| Mold + Wet Soil | 12.91 | 13.05 | 13.18 | 13.24 | 13.29 |
|-------------------|-------|-------|-------|-------|-------|
| Mold Wt. | 8.72 | 8.72 | 8.72 | 8.72 | 8.72 |
| Wet Soil | 4,19 | 4.33 | 4.46 | 4.52 | 4.57 |
| lbs/cu. ft. (wet) | 125.6 | 129.8 | 133.8 | 135.5 | 137.1 |
| lbs/cu. ft. (dry) | 116.7 | 118.4 | 120.5 | 120.3 | 118.4 |

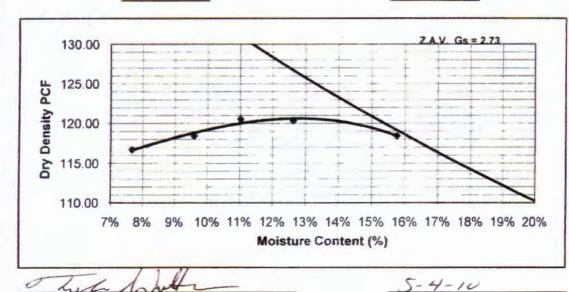
MOISTURE DATA (grams)

Envirotech

| Tin No. | XIII | E-1 | V-1 | E-2 | E-5 |
|----------------|---------|---------|--------|--------|--------|
| Wet Soil + Tin | 1025.10 | 1110.90 | 930.30 | 959.10 | 960.30 |
| Dry Soil + Tin | 965.10 | 1035.40 | 855.30 | 879.30 | 863.20 |
| Tin Wt. | 181.50 | 247.30 | 174.00 | 246.90 | 246.60 |
| Dry Soil | 783.60 | 788 10 | 681.30 | 632.40 | 616.60 |
| % Moisture | 7.7% | 9.6% | 11.0% | 12.6% | 15.7% |
| % Saturation | 45.5% | 59.7% | 72.7% | 82.9% | 98.1% |

MAXIMUM DRY DENSITY (PCF) 120.5

OPTIMUM MOISTURE CONTENT (%) 12.8%



Page 1 of 1

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheets



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name. | Charlie S | Charlie Skiba | | Sample ID: | SF-05 |
|-------------------|-----------|------------------|-----------|---------------|------------|
| Project: | S013213/ | A00 | | Sample Des: | Black Sand |
| Project Location. | ERDF Ce | lis 9-10 | | Sampling Date | 3/3/2010 |
| Tested By: | LH | Date: | 3/8/2010 | Sampled By: | LH |
| Reviewed By: | TW | Date: | 3/10/2010 | Date Received | 3/3/2010 |
| Comments | Gs Estima | ated based on Sa | aturation | Report No. | 05-016-021 |

DENSITY DATA (lbs)

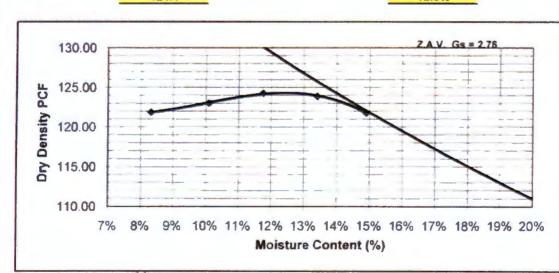
| Mold + Wet Soil | 13.12 | 13.24 | 13.35 | 13.41 | 13.39 |
|-------------------|-------|-------|-------|-------|-------|
| Mold Wt. | 8.72 | 8.72 | 8.72 | 8.72 | 8.72 |
| Wet Soil | 4,40 | 4.51 | 4.63 | 4.68 | 4.66 |
| lbs/cu. ft. (wet) | 132.0 | 135.4 | 138.9 | 140.5 | 139.9 |
| lbs/cu. ft. (dry) | 121.8 | 123.0 | 124.3 | 123.9 | 121.7 |

MOISTURE DATA (grams)

| Tin No. | A | k | A11 | BBB | ddd |
|----------------|--------|--------|--------|--------|--------|
| Wet Soil + Tin | 539.30 | 575.20 | 614.90 | 574.10 | 609.30 |
| Dry Soil + Tin | 501.80 | 527.10 | 555.50 | 512.17 | 536.80 |
| Tin Wt. | 50.40 | 50.20 | 49.80 | 50.10 | 50.10 |
| Dry Soil | 451.40 | 476 90 | 505.70 | 462.07 | 486.70 |
| % Moisture | 8.3% | 10.1% | 11.7% | 13.4% | 14.9% |
| % Saturation | 55.5% | 69.6% | 84.0% | 94.7% | 99.1% |

MAXIMUM DRY DENSITY (PCF)

OPTIMUM MOISTURE CONTENT (%) 12.5%



Envirotech Communication

S-4-10

Page 1 of 1

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheets



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skiba | 1 | | Sample ID: | SF-06 |
|-------------------|---------------|----------------|-----------|---------------|------------------|
| Project: | S013213A00 | | | Sample Des: | Brown/Black Sand |
| Project Location: | ERDF Cells 9 | RDF Cells 9-10 | | Sampling Date | 3/9/2010 |
| Tested By: | L. Hay | Date: | 3/11/2010 | Sampled By: | L. Hay |
| Reviewed By: | T. Williams | Date: | 3/11/2010 | Date Received | 3/9/2010 |
| Comments: | | | | Report No. | 05-016-022 |

DENSITY DATA (lbs)

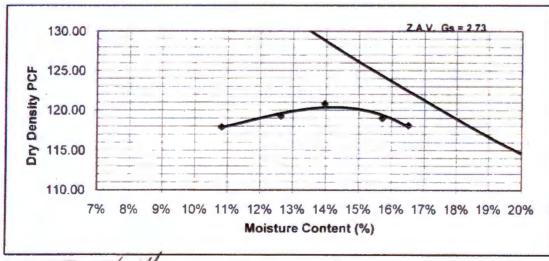
| Mold + Wet Soil | 13.08 | 13.20 | 13.31 | 13.31 | 13.31 |
|------------------|-------|-------|-------|-------|-------|
| Mold Wt. | 8.72 | 8.72 | 8.72 | 8.72 | 8.72 |
| Wet Soil | 4.35 | 4.48 | 4.59 | 4.59 | 4.59 |
| lbs/cu ft. (wet) | 130.6 | 134.3 | 137 6 | 137.7 | 137.6 |
| lbs/cu ft. (dry) | 117.9 | 119.3 | 120.8 | 119.0 | 118.1 |

MOISTURE DATA (grams)

| Tin No. | K | A9 | A12 | A8 | A7 |
|----------------|--------|--------|--------|--------|--------|
| Wet Soil + Tin | 540.00 | 577.40 | 632.00 | 622.30 | 588.80 |
| Dry Soil + Tin | 492.20 | 518.10 | 560.70 | 544.60 | 512.40 |
| Tin Wt. | 50.20 | 48.50 | 50.00 | 50.00 | 49.60 |
| Dry Soil | 442.00 | 469.60 | 510.70 | 494.60 | 462.80 |
| % Moisture | 10.8% | 12.6% | 14.0% | 15.7% | 16.5% |
| % Saturation | 58.6% | 70.8% | 81.2% | 87.4% | 89.9% |

MAXIMUM DRY DENSITY (PCF) 120.8

OPTIMUM MOISTURE CONTENT (%) 14.3%



Envirotech

5-4-10 Date

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheets



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skiba | | | Sample ID: | SF-07 |
|-------------------|----------------|---------------|-------------|---------------|------------|
| Project: | S013213A00 | | | Sample Des: | Brown Sand |
| Project Location: | ERDF Cells 9 | -10 | | Sampling Date | 3/17/2010 |
| Tested By: | L. Hay | Date: | 3/18/2009 | Sampled By: | L. Hay |
| Reviewed By: | T. Williams | Date: | 3/19/2010 | Date Received | 3/9/2010 |
| Comments: | Proctor for us | e on Subgrade | of test pad | Report No. | 05-016-027 |

DENSITY DATA (lbs)

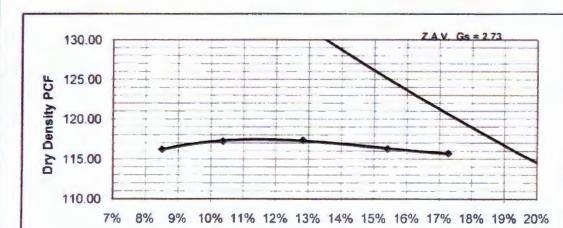
| Mold + Wet Soil | 12.92 | 13.03 | 13.13 | 13.19 | 13.24 |
|-------------------|-------|-------|-------|-------|-------|
| Mold Wt. | 8.72 | 8.72 | 8.72 | 8.72 | 8.72 |
| Wet Soil | 4.20 | 4.31 | 4.41 | 4.47 | 4.52 |
| lbs/cu. ft. (wet) | 126.1 | 129.3 | 132.4 | 134.2 | 135.7 |
| lbs/cu. ft. (dry) | 116.2 | 117.2 | 1173 | 116.3 | 115.7 |

MOISTURE DATA (grams)

| Tin No. | VI | В | LH | Bx | IIIX |
|----------------|--------|--------|--------|--------|--------|
| Wet Soil + Tin | 656.80 | 712.10 | 575.90 | 750.20 | 727.20 |
| Dry Soil + Tin | 609.30 | 649.80 | 516.10 | 656.70 | 627.40 |
| Tin Wt. | 50.20 | 48.50 | 50.00 | 50.00 | 49.60 |
| Dry Soil | 559.10 | 601.30 | 466.10 | 606.70 | 577.80 |
| % Moisture | 8.5% | 10.4% | 12.8% | 15.4% | 17.3% |
| % Saturation | 44.2% | 55.2% | 68.6% | 80.3% | 88.8% |

MAXIMUM DRY DENSITY (PCF) 117.3

OPTIMUM MOISTURE CONTENT (%) 11.5%



Moisture Content (%)

Enviroteen

5-4-10 Date

Page 1 of 1

Client:

Washington Closure Hanford

Address: 05-

05-18A Earthwork Data Sheets



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skiba | Charlie Skiba | | Sample ID: | SF-08 |
|-------------------|-----------------|----------------|------------|---------------|------------|
| Project: | S013213A00 | 013213A00 | | Sample Des: | Brown Sand |
| Project Location: | ERDF Cells 9- | | | Sampling Date | 6/22/2010 |
| Tested By: | L. Hay | Date. | 6/23/2010 | Sampled By: | L. Hay |
| Reviewed By: | J. Voss | Date: | 6/24/2010 | Date Received | 6/22/2010 |
| Comments: | Proctor for use | on Subgrade of | f test pad | Report No. | 05-016-095 |

DENSITY DATA (lbs)

| Mold + Wet Soil | 12.91 | 13.00 | 13.09 | 13.07 | 13.03 |
|-------------------|-------|-------|-------|-------|-------|
| Mold Wt. | 8.72 | 8.72 | 8.72 | 8.72 | 8.72 |
| Wet Soil | 4.19 | 4 28 | 4.37 | 4.35 | 4.31 |
| lbs/cu_ft. (wet) | 125.6 | 128.5 | 131.2 | 130.4 | 129.4 |
| fbs/cu. ft. (dry) | 116.8 | 117.3 | 117.8 | 115.4 | 111.5 |

MOISTURE DATA (grams)

| Tin No. | MO | M7 | M8 | M9 | M6 |
|----------------|--------|--------|--------|--------|--------|
| Wet Soil + Tin | 634.70 | 636.70 | 505.20 | 623.80 | 653.80 |
| Dry Soil + Tin | 593.50 | 585.40 | 458.70 | 557.90 | 570.10 |
| Tin Wt. | 50.00 | 50.00 | 50.10 | 49.80 | 49.60 |
| Dry Soil | 543.50 | 535.40 | 408.60 | 508.10 | 520.50 |
| % Moisture | 7.6% | 9.6% | 11.4% | 13.0% | 16.1% |
| % Saturation | 46.2% | 59.3% | 71.4% | 76.2% | 85.0% |

MAXIMUM DRY DENSITY (PCF)

OPTIMUM MOISTURE CONTENT (%) 11.3%

130.00
125.00
120.00
110.00
5% 6% 7% 8% 9% 10% 11% 12% 13% 14% 15% 16% 17% 18%

Moisture Content (%)

Envirotech Elva

6/24/10 Date

Page 1 of 1

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheets



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

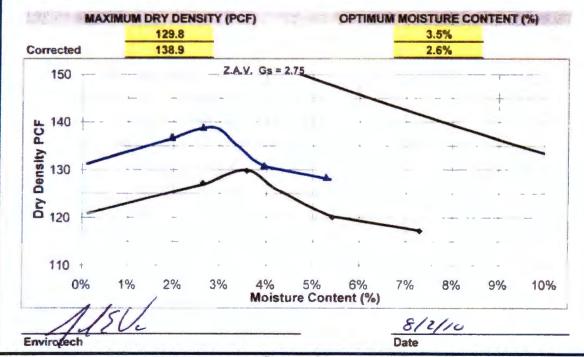
| Contact Name: | Charlie Skiba | | | Sample ID: | SF-09 |
|-------------------|-------------------------|-------|-----------|---------------|-------------|
| Project: | S013213A00 | | | Sample Des: | Base Course |
| Project Location. | ERDF Cell 9-1 | | | Sampling Date | 7/16/2010 |
| Tested By: | QISI | Date: | 7/30/2010 | Sampled By: | L. Hay |
| Reviewed By: | J. Voss | Date: | 8/2/2010 | Date Received | 7/16/2010 |
| Comments: | Method C - (ASTM D4718) | | | Report No. | 5-16-123 |

DENSITY DATA (lbs)

| Mold + Wet Soil | 23.91 | 24.50 | 24.21 | 23.85 | |
|------------------|-------|-------|-------|-------|--|
| Mold Wt. | 14.42 | 14.42 | 14.42 | 14.42 | |
| Wet Soil | 9.49 | 10.08 | 9.79 | 9.43 | |
| bs/cu. ft. (wet) | 126 5 | 134.4 | 130 5 | 125.7 | |
| bs/cu. ft. (dry) | 120.0 | 129.8 | 127.2 | 117.2 | |

MOISTURE DATA (grams)

| Tin No. | | | | | |
|----------------|---------|---------|---------|---------|--|
| Wet Soil + Tin | 3477.90 | 4276.10 | 4557.40 | 3395.20 | |
| Dry Soil + Tin | 3299.20 | 4128.40 | 4440.60 | 3164.40 | |
| Tin Wt. | 0.00 | 0.00 | 0.00 | 0.00 | |
| Dry Soil | 3299.20 | 4128.40 | 4440.60 | 3164.40 | |
| % Moisture | 5.4% | 3.6% | 2.6% | 7.3% | |
| % Saturation | 36.2% | 32.4% | 21.9% | 45.0% | |



Page 1 of 1

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheets



2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 1 Fax (580) 237-4302

Sample Information

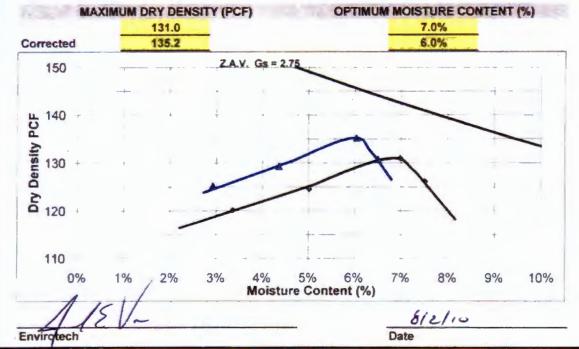
| Contact Name: | Charlie Skiba | | | Sample ID. | SF-10 |
|-------------------|---------------|---------------|-----------|---------------|------------|
| Project: | S013213A0 | 00 | | Sample Des: | Top Course |
| Project Location: | ERDF Cell | RDF Cell 9-10 | | Sampling Date | 7/16/2010 |
| Tested By: | QISI | Date: | 7/30/2010 | Sampled By: | L. Hay |
| Reviewed By: | J. Voss | Date: | 8/2/2010 | Date Received | 7/16/2010 |
| Comments | | | | Report No. | 5-16-123 |

DENSITY DATA (lbs)

| Mold + Wet Soil | 13.41 | 13.63 | 13.94 | 13.79 | |
|------------------|-------|-------|-------|-------|--|
| Mold Wt. | 9.27 | 9.27 | 9.27 | 9.27 | |
| Wet Soil | 4.14 | 4 36 | 4.67 | 4.52 | |
| bs/cu. ft. (wet) | 124.2 | 130.8 | 140.1 | 135.6 | |
| bs/cu. ft. (dry) | 120.2 | 124.6 | 131.0 | 126.1 | |

MOISTURE DATA (grams)

| Tin No. | | | | | |
|----------------|---------|---------|---------|---------|--|
| Wet Soil + Tin | 1933.40 | 1976.00 | 2026.30 | 2026.40 | |
| Dry Soil + Tin | 1870.60 | 1881.70 | 1894.20 | 1884.90 | |
| Tin Wt. | 0.00 | 0.00 | 0.00 | 0.00 | |
| Dry Soil | 1870.60 | 1881.70 | 1894.20 | 1884.90 | |
| % Moisture | 3.4% | 5.0% | 7.0% | 7 5% | |
| % Saturation | 22.5% | 38.4% | 65.7% | 60.4% | |



Page 1 of 1

Client:

Washington Closure Hanford

Address:

05-18A Earthwork Data Sheets



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name. | Charlie Ski | ba | | Sample ID: | SF-11 |
|---------------|---------------------------------|----------------|-----------|---------------|-------------------|
| Project: | S013213A0 | 00 | | Sample Des: | Riser Trench Fill |
| | oject Location: ERDF Cells 9-10 | | | Sampling Date | 7/22/2010 |
| Tested By: | Ryan S. | Date: | 7/26/2010 | Sampled By: | L. Hay |
| Reviewed By: | J. Voss | Date: | 7/26/2010 | Date Received | 7/22/2010 |
| Comments: | Proctor for | riser trenches | | Report No. | 5-16-119 |

DENSITY DATA (lbs)

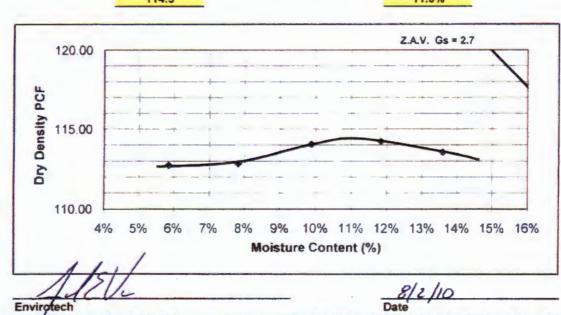
| Mold + Wet Soil | 5758.90 | 5794.40 | 5849.40 | 5886.10 | 5904.80 |
|-------------------|---------|---------|---------|---------|---------|
| Mold Wt. | 3954.80 | 3954.80 | 3954.80 | 3954.80 | 3954.80 |
| Wet Soil | 3.98 | 4.06 | 4.18 | 4.26 | 4.30 |
| lbs/cu. ft. (wet) | 119.3 | 121.7 | 125.3 | 127.7 | 129.0 |
| lbs/cu. ft. (dry) | 112.7 | 112.8 | 114.0 | 114.2 | 113.5 |

MOISTURE DATA (grams)

| Tin No. | E1 | Bx | LH | E4 | XIII |
|----------------|---------|---------|---------|---------|---------|
| Wet Soil + Tin | 2047.20 | 1990.60 | 2023.10 | 2061.20 | 2124.00 |
| Dry Soil + Tin | 1947,80 | 1858.90 | 1857.00 | 1861.60 | 1891.50 |
| Tin Wt. | 245.30 | 174.10 | 175.30 | 174.40 | 181.00 |
| Dry Soil | 1702.50 | 1684.80 | 1681.70 | 1687.20 | 1710.50 |
| % Moisture | 5.8% | 7.8% | 9.9% | 11.8% | 13.6% |
| % Saturation | 31.9% | 42.8% | 55.9% | 67.2% | 75.8% |

MAXIMUM DRY DENSITY (PCF) 114.5

OPTIMUM MOISTURE CONTENT (%) 11.0%



Page 1 of 1



TANK 4 AND LEACHATE TRANSMISSION SYSTEM REPORT

CONSTRUCTION QUALITY ASSURANCE (CQA)

ENVIRONMENTAL RESTORATION DISPOSAL FACILITY (ERDF)

SUPER CELLS 9

SUBCONTRACT S013213A00

JANUARY 2011 (010032)

C.3

FIELD DENSITY TESTING



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701 '580) 234-8780 | Fax (580) 237-4302

Soil Information

Revised 3/25/2010

3/18/2010

2208

Project:

ERDF Cells 9-10 Expansion

Project ID:

S013213A00

Report No.

05-016-027 Date

Subgrade for Manholes 21 and 39

Description: Troxler ID:

27881

Maist Std: Moist offset: 645 Density Std:

Density offset:

Allowable Moisture Range: Necessary % Proctor:

N/A

95%

Proctor:

SF-01

Max Dry Density (pcf):

113.6 12.4%

Optimum Moisture (%): SF-05

Max Dry Density (pcf):

124.4

Optimum Moisture (%):

12.5%

Max Dry Density (pcf):

Optimum Moisture (%):

| Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|----------------------|---|---|--|--|---|--|--|---------------------|--------------------------|--------------|
| Mant | nole # 21 | | | | | | | | | |
| Manhole #21 Subgrade | SF-01 | Sub | 9:00 | LH | 12 | 119.7 | 7.3% | 98.2% | 111.6 | PASS |
| Manhole #21 Subgrade | SF-01 | Sub | 9:05 | LH | 12 | 121.2 | 8.7% | 98.2% | 111.5 | PASS |
| Mant | nole # 39 |) | | | | | | | | |
| Manhole #39 Subgrade | SF-05 | Sub | 9:10 | LH | 12 | 130.5 | 7.0% | 98.0% | 122.0 | PASS |
| Manhole #39 Subgrade | SF-05 | Sub | 9:15 | LH | 12 | 128.7 | 6.0% | 97.6% | 121.4 | PASS |
| Sand Cone | Verificati | on Te | st | | | | | | | |
| Pipe Laydown Yard | SF-01 | N/A | 13:30 | LH | 6 | 116.9 | 9.1% | 94.3% | 107.1 | N/A |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | Manhole #21 Subgrade Manhole #21 Subgrade Manhole #39 Subgrade Manhole #39 Subgrade Sand Cone | Manhole # 21 Manhole #21 Subgrade SF-01 Manhole #21 Subgrade SF-01 Manhole #39 Subgrade SF-05 Manhole #39 Subgrade SF-05 Sand Cone Verificati | Manhole # 21 Manhole #21 Subgrade SF-01 Sub Manhole #21 Subgrade SF-01 Sub Manhole #39 Manhole #39 Subgrade SF-05 Sub Manhole #39 Subgrade SF-05 Sub Sand Cone Verification Te | Manhole # 21 Manhole #21 Subgrade SF-01 Sub 9:00 Manhole #21 Subgrade SF-01 Sub 9:05 Manhole # 39 Manhole # 39 Subgrade SF-05 Sub 9:10 Manhole #39 Subgrade SF-05 Sub 9:15 Sand Cone Verification Test | Manhole # 21 Manhole #21 Subgrade SF-01 Sub 9:00 LH Manhole #21 Subgrade SF-01 Sub 9:05 LH Manhole # 39 Manhole #39 Subgrade SF-05 Sub 9:10 LH Manhole #39 Subgrade SF-05 Sub 9:15 LH Sand Cone Verification Test | Manhole # 21 Manhole #21 Subgrade SF-01 Sub 9:00 LH 12 Manhole #21 Subgrade SF-01 Sub 9:05 LH 12 Manhole #39 Subgrade SF-05 Sub 9:10 LH 12 Manhole #39 Subgrade SF-05 Sub 9:15 LH 12 Sand Cone Verification Test | Location Pr. Lift Time Oper (in.) Depth (in.) Density (pcf) Manhole # 21 Manhole #21 Subgrade SF-01 Sub 9:00 LH 12 119.7 Manhole #21 Subgrade SF-01 Sub 9:05 LH 12 121.2 Manhole #39 Subgrade SF-05 Sub 9:10 LH 12 130.5 Manhole #39 Subgrade SF-05 Sub 9:15 LH 12 128.7 Sand Cone Verification Test | Location | Location | Location |

Envirotech Engineering & Consulting. Inc

5/5/10

BY SAND CONE (ASTM 1556)



Client:

WCH

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK | 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: Charlie Skiba | | | Sample ID: | SCV-04 | |
|-----------------------------------|----------------|-------|----------------|---------------------|--------------------------|
| Project: | S013213A00 | | | Sample Description: | Light Brown sand w/ silt |
| Project Location: ERDF Cells 9-10 | | | Sampling Date: | 3/18/2010 | |
| Tested By: | L. Hay | Date: | 3/18/2010 | Sampled By: | L. Hay |
| Reviewed By: | T. Williams Tu | Date: | 3/19/2010 | Date Received: | 3/18/2010 |
| Comments | | | | Report No.: | 05-016-027 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3956.50 g |
|--|--------------------------|
| Mass of Proctor mold + sand, W₂ | 5399.30 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4. Dry unit weight, $Y_{d (sand)} = \frac{W_2 - W_1}{V_1}$ | 95 43 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 4599.20 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 2944 90 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.65 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 6440.4 g |
|--|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W ₈ | 2317.6 g |
| 10. Volume of hole, $V_2 = W_8 - W_8 - W_c$ $ y d (sand) $ | 0.0570 ft ³ |
| 11. Mass of gallon can, W₅ | 0.00 g |
| 12. Mass of gallon can + moist soil, W ₇ | 3009.40 g |
| 13. Mass of gallon can + dry soil, W _g | 2744.00 g |
| 14. Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 116.34 lb/ft ³ |
| 15. Moisture content in the field, w (%) = $\frac{W_7 - W_9}{W_9 - W_5}$ X 100 | 9.7% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 106.08 lb/ft ³ |
| 17. Comparision moisture content = | 9.1% |
| 18. Dry unit weight comparison = | 116.9 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

Project ID:

Report No

Description: Troxler ID:

Moist Std:

Moist offset:

Allowable Moisture Range:

Necessary % Proctor:

ERDF Cells 9-10 Expansion

S013213A00

3/24/2010 05-016-031 Date Brown/Black Sand

27881

648 Density Std:

N/A

Density offset: -

2190

90%

Proctor:

SF-05

Max Dry Density (pcf):

124.4 Optimum Moisture (%): 12.5%

Proctor:

SF-06

Max Dry Density (pcf):

120.8 Optimum Moisture (%): 14.3%

Proctor:

Max Dry Density (pcf):

Optimum Moisture (%):

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|---------|-----------------|-----------|------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|-----------|
| | Ma | nhole #21 | | | | | | | | | |
| MH21-03 | West Side MH21 | SF-06 | 1 | 13:00 | LH | 12 | 118.5 | 7.6% | 91.2% | 110.1 | PASS |
| MH21-04 | North Side MH21 | SF-06 | 2 | 13:10 | LH | 12 | 120.7 | 9.0% | 91.7% | 110.7 | PASS |
| MH21-05 | East Side MH21 | SF-06 | 3 | 13:20 | LH | 12 | 121.4 | 9.2% | 92.0% | 111.2 | PASS |
| MH21-06 | South Side MH21 | SF-06 | 4 | 13:30 | LH | 6 | 123.6 | 7.5% | 95.2% | 115.0 | PASS |
| | Ma | nhole #39 |) | | | | | | | | |
| MH39-03 | West Side MH21 | SF-06 | 1 | 13:40 | LH | 12 | 127.8 | 8.0% | 98.0% | 118.3 | PASS |
| MH39-04 | North Side MH21 | SF-06 | 2 | 13:50 | LH | 12 | 126.7 | 7.5% | 97.6% | 117.9 | PASS |
| MH39-05 | South Side MH21 | SF-06 | 3 | 14:00 | LH | 12 | 127.8 | 7.7% | 98.2% | 118.7 | PASS |
| MH39-06 | East Side MH21 | SF-06 | 4 | 14:10 | LH | 6 | 127.6 | 8.8% | 97.1% | 117.3 | PASS |
| | Mai | nhole #32 | | | | | | | | | |
| MH32-01 | Manhole 32 | SF-06 | Sub | 14:20 | LH | 12 | 130.7 | 5.3% | 102.7% | 124.1 | PASS |
| MH32-02 | Manhole 32 | SF-06 | Sub | 14:25 | LH | 12 | 126.0 | 4.9% | 99.4% | 120.1 | PASS |
| | Mai | nhole #33 | | | | | | | | | |
| MH33-01 | Manhole 33 | SF-06 | Sub | 14:40 | LH | 12 | 129.9 | 8.7% | 98.9% | 119.5 | PASS |
| MH33-02 | Manhole 33 | SF-06 | Sub | 14:45 | LH | 12 | 131.0 | 9.1% | 99.4% | 120.1 | PASS |
| | | | | | - | | | | | | |

Reviewed by:

Envirotech Engineering & Consulting. Inc

5/5/10

BY SAND CONE (ASTM 1556)



Client:

WCH

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK | 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Ski | ba | | Sample ID: | MH39-06 |
|-----------------------------------|-------------|---------|----------------|---------------------|------------------|
| Project: | S013213A0 | 00 | | Sample Description: | Brown Black Sand |
| Project Location: ERDF Cells 9-10 | | | Sampling Date: | 3/24/2010 | |
| Tested By: | L. Hay | Date: | 3/24/2010 | Sampled By: | L. Hay |
| Reviewed By: | T. Williams | Turate. | 3/25/2010 | Date Received: | 3/24/2010 |
| Comments | | | | Report No.: | 05-016-031 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3955.80 g |
|---|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5396.10 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4 Dry unit weight, $Y_{d (sand)} = \frac{W_2 - W_1}{V_1}$ | 95.26 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6718.40 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 5097.10 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.57 lb |

| 8. Mass of bottle + cone + sand (before use), W ₈ | 6408.0 g |
|--|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W ₈ | 2269.2 g |
| 10. Volume of hole, $V_2 = \frac{W_6 - W_4 - W_5}{\gamma}$ d (sand) | 0.0583 ft ³ |
| 11. Mass of gallon can, W ₅ | 0.00 g |
| 12. Mass of gallon can + moist soil, W ₇ | 3347.40 g |
| 13. Mass of gallon can + dry soil, W ₉ | 3080.80 g |
| 14. Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 126.66 lb/ft ³ |
| 15. Moisture content in the field, w (%) = $W_7 - W_8 = X$ 100 $W_9 - W_5$ | 8.7% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 116.57 lb/ft ³ |
| 17. Comparision moisture content = | 8.8% |
| 18. Dry unit weight comparison = | 117.3 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

5-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project: Project ID:

Report No.

Troxler ID:

Moist Std:

Moist offset:

Allowable Moisture Range:

Necessary % Proctor:

Description:

ERDF Cells 9-10 Expansion

S013213A00

05-016-36 Date

03 / 31 / 2010

Brown / Black Sand

27881

639

Density Std:

2213

Density offset: -

N/A

95%

Proctor:

SF-05

Max Dry Density (pcf):

124.4

Optimum Moisture (%):

12.5%

Proctor:

SF-06

Max Dry Density (pcf): Optimum Moisture (%): 120.8 14.3%

Proctor:

Max Dry Density (pcf):

Optimum Moisture (%):

| Test No | LocationC26 | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|------------|-----------------|-----------|------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| | Ma | nhole #33 | | | | | | | | | |
| MH33-03 | Manhole #33 | SF-06 | 1 | 7:30 | LH | 12" | 135.0 | 14.6% | 97.5% | 117.8 | PASS |
| MH33-04 | Manhole #33 | SF-06 | 2 | 7:55 | LH | 12" | 131.4 | 9.7% | 99.2% | 119.8 | PASS |
| MH33-05 | Manhole #33 | SF-06 | 3 | 8:35 | LH | 6" | 130.2 | 10.7% | 97.4% | 117.6 | PASS |
| MH33-06 | Manhole #33 | SF-06 | 4 | 9:15 | LH | 6" | 127.9 | 7.3% | 98.7% | 119.2 | PASS |
| | Ma | nhole #32 | | | | | | | | | |
| MH32-03 | Manhole#32 | SF-06 | 1 | 9:45 | LH | 12" | 130.7 | 11.3% | 97.2% | 117,4 | PASS |
| MH32-04 | Manhole#32 | SF-06 | 2 | 10:45 | LH | 12" | 125.0 | 7.4% | 96.3% | 116.4 | PASS |
| MH32-05 | Manhole#32 | SF-06 | 3 | 11:50 | LH | 12" | 124.7 | 8.3% | 95.3% | 115.1 | PASS |
| MH32-06 | Manhole#32 | SF-06 | 4 | 13:00 | LH | 12" | 128.4 | 7:9% | 98.5% | 119.0 | PASS |
| | Mai | nhole #33 | | | | | | | | | |
| MH33-07 | Manhole#33 (SC) | SF-06 | 5 | 14:00 | LH | 6" | 128.2 | 10.7% | 95.9% | 115.8 | PASS |
| MH33-08 | Manhole#33 | SF-06 | 6 | 14:30 | LH | 6" | 126.8 | 9.7% | 95.7% | 115.6 | PASS |
| MH33-09 | Manhole#33 | SF-06 | 7 | 15:00 | LH | 6" | 128.1 | 10.9% | 95.6% | 115.5 | PASS |
| MH33-10 | Manhole#33 | SF-06 | 8 | 15:30 | LH | 6" | 127.6 | 10.1% | 95.9% | 115.9 | PASS |
| MH33-11 | Manhole#33 | SF-06 | 9 | 15:45 | LH | 6" | 129.4 | 11.3% | 96.2% | 116.3 | PASS |
| MH33-12 | Manhole#33 | SF-06 | 10 | 16:10 | LH | 6" | 128.8 | 9.6% | 97.3% | 117.5 | PASS |
| Reviewed b | y: Tu | / | | | | | | | | | |

Envirotech Engineering & Consulting. Inc

5/5/10

BY SAND CONE (ASTM 1556)



Client:

WCH

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 1 Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skiba | 3 | | Sample ID: | MH33-07 |
|-------------------|---------------|---------|-----------|---------------------|------------|
| Project: | S013213A00 | | - | Sample Description: | Brown Sand |
| Project Location: | ERDF Cells | 9-10 | | Sampling Date: | 3/31/2010 |
| Tested By: | Lucas Hay | Date: | 3/31/2010 | Sampled By: | Lucas Hay |
| Reviewed By: | T. Williams | Topate: | 4/1/2010 | Date Received: | 3/31/2010 |
| Comments | | | | Report No.: | 05-016-036 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1. Mass of Proctor mold, W, | 3955.80 g |
|--|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5396.10 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4. Dry unit weight, $Y_{d (sand)} = W_2 - W_1$ | 95.26 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6718.40 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 5097.10 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.57 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 6268.2 g |
|--|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W ₈ | 2348.0 g |
| 10. Volume of hole, $V_2 = \frac{W_a - W_g - W_c}{7} d$ (sand) | 0.0532 ft ³ |
| 11. Mass of gallon can, W ₅ | 0.00 g |
| 12. Mass of gallon can + moist soil, W ₇ | 3125.60 g |
| 13. Mass of gallon can + dry soil, W _s | 2814.10 g |
| 14. Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 129.52 lb/ft ³ |
| 15. Moisture content in the field, w (%) = $W_7 - W_9 - X$ 100 $W_9 - W_5$ | 11.1% |
| 16. Dry unit weight in the field, d (send) = 7 / (1+(w (%)/100) | 116.61 lb/ft ³ |
| 17. Comparision moisture content = | 10.7% |
| 18. Dry unit weight comparison = | 115.8 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID:

S013213A00

Report No

05-016-041 Date 4/7/2010

Description

Brown/Black Sand

Troxler ID:

27881

Moist Std:

647 2227 Density Std:

Moist offset:

Density offset:

N/A

Allowable Moisture Range: Necessary % Proctor:

95%

Proctor:

SF-05

Max Dry Density (pcf):

124.4 Optimum Moisture (%): 12.5%

Proctor:

SF-06

Max Dry Density (pcf): Optimum Moisture (%):

120.8 14.3%

Proctor:

SF-07

Max Dry Density (pcf):

117.3

Optimum Moisture (%): 12.5%

| Test No | Location | PG | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|------------|------------------------|--------|------|-------|----------------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| Cell 9 Cre | st Pad | | | | ·genrunerennum | y | | | | | |
| CP9-01 | Cell 9 Crest Pad Bldg. | SF-06 | Sub | 9:00 | LH | 12 | 128.6 | 9.3% | 97.4% | 117.7 | PASS |
| CP9-02 | Cell 9 Crest Pad Bldg. | SF-06 | Sub | 9:05 | LH | 12 | 129.6 | 10.1% | 97.4% | 117.7 | PASS |
| CP9-03 | Cell 9 Crest Pad Bldg. | SF-07 | 1 | 9:25 | LH | 6 | 127.4 | 13.5% | 95.7% | 112.2 | PASS |
| CP9-04 | Cell 9 Crest Pad Bldg. | SF-07 | 1 | 9:30 | LH | 6 | 126.6 | 12.3% | 96.1% | 112.7 | PASS |
| CP9-05 | Cell 9 Crest Pad Bldg. | SF-07 | 2 | 10:45 | LH | 6 | 128.7 | 14.8% | 95.6% | 112.1 | PASS |
| CP9-06 | Cell 9 Crest Pad Bldg. | SF-07 | 2 | 10:50 | LH | 6 | 132.8 | 15.0% | 98.4% | 115.5 | PASS |
| CP9-07 | Cell 9 Crest Pad Bldg. | SF-07 | 3 | 12:45 | LH | 6 | 125.5 | 9.9% | 97.4% | 114.2 | PASS |
| CP9-08 | Cell 9 Crest Pad Bldg. | SF-07 | 3 | 12:50 | LH | 6 | 131.1 | 15.1% | 97.1% | 113.9 | PASS |
| CP9-09 | Cell 9 Crest Pad Bldg. | SF-07 | 4 | 13:50 | LH | 6 | 127.4 | 12.8% | 96.3% | 112.9 | PASS |
| CP9-10 | Cell 9 Crest Pad Bldg. | SF-07 | 4 | 13:55 | LH | 6 | 130.0 | 15.4% | 96.0% | 112.7 | PASS |
| Leachate | Transmission Line | | , | | | | | | | | |
| MH34-01 | MH-34 Subgrade | SF-05 | Sub | 9:40 | LH | 12 | 129.5 | 9.5% | 95.1% | 118.3 | PASS |
| MH34-02 | MH-34 Subgrade | SF-05 | Sub | 9:45 | LH | 12 | 130.2 | 8.1% | 96.8% | 120.4 | PASS |
| MH35-01 | MH-35 Subgrade | SF-05 | Sub | 9:50 | LH | 12 | 131.4 | 7.9% | 97.9% | 121.8 | PASS |
| MH35-02 | MH-35 Subgrade | -SF-05 | Sub | 9:55 | LH | 12 | 130.5 | 8.6% | 96.6% | 120.2 | PASS |

Reviewed by

Envirotech Engineering & Consulting. Inc

5/5/10

BY SAND CONE (ASTM 1556)



Client:

WCH

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 1 Fax (580) 237-4302

Sample Information

| Charlie Skiba | | | Sample ID: | CP9-07 | |
|---------------|--------------------------------------|----------|--|---|--|
| S013213A00 | | | Sample Description: | Brown Sand | |
| ERDF Cells 9 | 9-10 | | Sampling Date: | 4/7/2010 | |
| L. Hay | Date: | 4/7/2010 | Sampled By: | L.Hay | |
| J. Voss IN | Date: | 4/8/2010 | Date Received: | 4/7/2010 | |
| 4 | | | Report No.: | 05-016-041 | |
| | S013213A00 ERDF Cells 9 L. Hay | | S013213A00 ERDF Cells 9-10 L. Hay Date: 4/7/2010 | S013213A00 Sample Description: ERDF Cells 9-10 Sampling Date: L. Hay Date: 4/7/2010 Sampled By: J. Voss Date: 4/8/2010 Date Received: | |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3955.80 g |
|--|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5396.10 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4. Dry unit weight, Y _{d (sand)} = W ₂ - W ₁ V ₁ | 95.26 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6718.40 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 5097.10 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.57 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 6424.5 g |
|--|---------------------------|
| 9 Mass of bottle + cone + sand (after use), W ₈ | 3146.1 g |
| 10. Volume of hole, $V_2 = W_6 - W_8 - W_c$ | 0.0384 ft ³ |
| 11. Mass of gallon can, W ₅ | 0.00 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2188.30 g |
| 13. Mass of gallon can + dry soil, W₂ | 1993.90 g |
| 14. Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 125.80 lb/ft ³ |
| 15. Moisture content in the field, w (%) = $\frac{W_7 - W_9}{W_9 - W_5}$ X 100 | 9.7% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 114.62 lb/ft ³ |
| 17. Comparision moisture content = | 9.9% |
| 18. Dry unit weight comparison = | 114.2 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK | 73701 (580) 234-8780 | Fax (580) 237-4302

SF-05

124.4

12.5%

SF-06

Soil Information

Project:
Project ID:
Report No

Report No.
Description:
Troxler ID:

Moist Std:
Moist offset:

Allowable Moisture Range. Necessary % Proctor: ERDF Cells 9-10 Expansion

S013213A00

05-016-044 Date Brown/Black Sand

27881

645 Density Std:
- Density offset:

N/A 95% 4/12/2010

2199

Proctor:

Max Dry Density (pcf):

Optimum Moisture (%)

Proctor:
May Dry Density (not

Max Dry Density (pcf): 120.8
Optimum Moisture (%): 14.3%

Proctor:

Max Dry Density (pcf):

Optimum Moisture (%):

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|---------|-------------|-----------|------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| | Man | hole MH-3 | 34 | | | | | | | | |
| MH34-03 | Manhole #34 | SF-06 | 1 | 7:30 | LH | 12 | 126.9 | 7.6% | 97.6% | 117.9 | PASS |
| MH34-04 | Manhoie #34 | SF-06 | 2 | 8:15 | LH | 12 | 132.6 | 12.7% | 97.4% | 117.7 | PASS |
| MH34-05 | Manhole #34 | SF-06 | 3 | 9:00 | LH | 12 | 125.5 | 8.4% | 95.8% | 115.8 | PASS |
| MH34-06 | Manhole #34 | SF-06 | 4 | 9:45 | LH | 12 | 127.1 | 6.4% | 98.9% | 119.5 | PASS |
| MH34-07 | Manhole #34 | SF-06 | 5 | 10:30 | LH | 12 | 128.5 | 9.6% | 97.1% | 117.2 | PASS |
| | Man | hole MH-3 | 5 | | | | | | | | |
| MH35-03 | Manhole #35 | SF-05 | 1 - | 12:00 | LH | 12 | 130.4 | 7.7% | 97.3% | 121.1 | PASS |
| MH35-04 | Manhole #35 | SF-05 | 2 | 12:45 | LH | 12 | 129.3 | 8.4% | 95.9% | 119.3 | PASS |
| MH35-05 | Manhole #35 | SF-05 | 3 | 13:50 | LH | 12 | 130.4 | 9.1% | 96.1% | 119.5 | PASS |
| MH35-06 | Manhole #35 | SF-05 | 4 | 14:45 | LH | 12 | 131.3 | 10.2% | 95.8% | 119.1 | PASS |
| MH35-07 | Manhole #35 | SF-05 | 5 | 15:30 | LH | 12 | 129.1 | 8.7% | 95.5% | 118.8 | PASS |
| | <i>f</i> | | | | | | | | | | |

Reviewed by:

Envirotech Engineering & Consulting. Inc

5/5/10

BY SAND CONE (ASTM 1556)



Client:

WCH

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street T Enid, OK 73701 (580) 234-8780 T Fax (580) 237-4302

Sample Information

| Contact Name: Charlie Skiba | | | | Sample ID: | MH34-06 | |
|-----------------------------|-------------|---------|-----------|--------------------|------------------|--|
| Project: | S013213A | 00 | | Sample Description | Brown/Black Sand | |
| Project Location: | ERDF Cell | s 9-10 | | Sampling Date: | 4/12/2010 | |
| Tested By: | L. Hay | Date | 4/12/2010 | Sampled By: | L. Hay | |
| Reviewed By: | T. Williams | Typate: | 4/13/2010 | Date Received: | 4/12/2010 | |
| Comments | | | | Report No.: | 05-016-044 | |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3955.80 g |
|---|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5396.10 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4. Dry unit weight, Y _{d (send)} = W ₂ - W ₁ | 95.26 lb/ft ³ |
| V ₁ | 93.20 IB/IL |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6718.40 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 5097.10 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.57 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 6279.4 g |
|--|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W ₈ | 2753.6 g |
| 10. Volume of hole, $V_2 = W_6 - W_6 - W_6$ \neq d (sand) | 0.0441 ft ³ |
| 11. Mass of gallon can, W ₅ | 385.20 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2936.40 g |
| 13. Mass of gallon can + dry soil, W ₉ | 2754.40 g |
| 14. Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 127.61 lb/ft ³ |
| 15. Moisture content in the field, w (%) = $\frac{W_7 - W_9}{W_9 - W_5}$ X 100 | 7.7% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 118.50 lb/ft ³ |
| 17. Comparision moisture content = | 6.4% |
| 18. Dry unit weight comparison = | 119.5 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID:

S013213A00

Proctor:

SF-05

Max Dry Density (pcf):

124.4

Report No.

05-016-051 Date

Optimum Moisture (%):

12.5%

Brown/Black Sand

Proctor

Proctor:

Description

Max Dry Density (pcf):

SF-06

Troxler ID: Moist Std:

27881

120.8

637 Density Std: 2223

4/21/2010

Optimum Moisture (%): 14.3%

Moist offset:

Density offset: N/A

Max Dry Density (pcf):

Allowable Moisture Range: Necessary % Proctor:

95%

Optimum Moisture (%):

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / |
|---------|------------------------|----------|------|-------|---|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------|
| | Mani | nole #36 | | | | | | - | | | |
| MH36-01 | Manhole #36 Subgrade | SF-05 | Sub | 14:45 | TW | 12 | 132.9 | 5.2% | 101.6% | 126.3 | PASS |
| MH36-02 | Manhole #36 Subgrade | SF-05 | Sub | 14:50 | TW | 12 | 134.5 | 4.8% | 103.2% | 128.3 | PASS |
| | Mani | nole #36 | | | | | | | | | |
| MH37-01 | Manhole #37 Subgrade | SF-05 | Sub | 15:00 | TW | 12 | 127.8 | 5.3% | 97.6% | 121.4 | PASS |
| MH37-02 | Manhole #37 Subgrade | SF-05 | Sub | 15:05 | TW | 12 | 132.0 | 4.6% | 101.4% | 126.2 | PASS |
| | Crest f | Pad Cell | 9 | | | | | | | | |
| CP9-11 | Discharge line CP #9 | SF-06 | 1 | 13:45 | TW | 6 | 121.6 | 17.0% | 86.0% | 103.9 | FAIL |
| SCV-05 | N. Berm West of CP #9 | SF-06 | | 15:30 | TW | 6 | 120.6 | 4.4% | 95.6% | 115.5 | |
| 300-03 | N. Deim West of Cr. #3 | 31-00 | | 10.30 | 1 9 4 | 0 | 120.0 | 4,470 | 95.076 | 110,5 | - |
| | | | | | Programme Control of the Control of | | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

Envirotech Engineering & Consulting. Inc

Reviewed by

BY SAND CONE (ASTM 1556)



Client:

WCH

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK | 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skiba | | | Sample ID: | SCV-05 |
|-------------------|---------------|-------|-----------|---------------------|------------------|
| Project: | S013213A00 | | | Sample Description: | Brown/Black Sand |
| Project Location: | ERDF Cells 9 | 9-10 | | Sampling Date: | 4/21/2010 |
| Tested By: | T. Williams, | Date: | 4/21/2010 | Sampled By: | T. Williams |
| Reviewed By: | J. Voss (A) | Date: | 4/22/2010 | Date Received: | 4/21/2010 |
| Comments | 4 | | | Report No.: | 05-016-051 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1. Mass of Proctor mold, W₁ | 3955.80 g |
|--|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5396.10 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4. Dry unit weight, $Y_{d \text{ (sand)}} = \frac{W_2 - W_1}{V_1}$ | 95.26 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6718.40 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 5097.10 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.57 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 6399.0 g |
|--|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W ₈ | 3218.8 g |
| 10. Volume of hole, $V_2 = \frac{W_6 - W_8 - W_c}{\gamma d \text{ (sand)}}$ | 0.0361 ft ³ |
| 11. Mass of gallon can, W ₅ | 174.30 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2182.80 g |
| 13. Mass of gallon can + dry soil, W ₉ | 2075.50 g |
| 14. Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 122.73 lb/ft ³ |
| 15. Moisture content in the field, w (%) = $W_7 - W_9 - W_5$ X 100 $W_9 - W_5$ | 5.6% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 116.18 lb/ft ³ |
| 17. Comparision moisture content = | 4.4% |
| 18. Dry unit weight comparison = | 115.5 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID:

S013213A00

Report No.

05-016-053 Date 4/23/2010

Description:

Troxier ID: Moist Std: Moist offset 27881

641

Density Std: 2203

Density offset:

N/A

95%

Proctor

SF-05 Max Dry Density (pcf): 124.4

Optimum Moisture (%): 12.5%

Proctor:

SF-06 120.8

Max Dry Density (pcf): 14.3% Optimum Moisture (%):

Proctor:

SF-07

Max Dry Density (pcf):

117.3

Necessary % Proctor (Structural Fill)

Allowable Moisture Range:

Optimum Moisture (%):

12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|---------|-----------------------------------|----------|--------|------------|----------|----------------|-------------------------|--|---------------------|--------------------------|--------------|
| Cell | 9 Crest Pad Building Dr | ain Line | Back | fill - Pro | ctor = 9 | 5% | | | | | |
| CP9-14A | CP-9 Drain line backfill | SF-07 | 1 | 6:40 | TW | 6 | 124.2 | 8.3% | 97.8% | 114.7 | PASS |
| Le | achate Transmission Li | ne - Nec | essa | ry Procte | or = 90% | la | | nini parameter de la constanta | | | |
| LT-1 | Drain Line from MH-33 to CP-10 | SF-05 | 1 | 9"35 | TW | 6 | 135.2 | 9.9% | 98.9% | 123.0 | PASS |
| LT-2 | Drain Line from MH-33 to CP-10 | SF-05 | 2 | 9:55 | TW | 6 | 128.5 | 8.1% | 95.6% | 118.9 | PASS |
| LT-3 | Drain Line from MH-33 to CP-10 | SF-05 | 3 | 10:30 | TW | 6 | 129.2 | 8.1% | 96.1% | 119.5 | PASS |
| LT-4 | Drain Line from MH-33 to CP-10 | SF-05 | 4 | 10:55 | TW | 6 | 129.6 | 9.6% | 95.1% | 118.2 | PASS |
| LT-5 | Drain Line from MH-33 to CP-10 | SF-05 | 5 | 11:55 | TW | 6 | 127.6 | 10.5% | 92.8% | 115.5 | PASS |
| LT-5A | Drain Line from MH-33 to CP-10 | SF-05 | 5 | 12:00 | TW | 6 | 133.4 | 10.8% | 96.8% | 120.4 | PASS |
| LT-5B | Drain Line from MH-33 to CP-10 | SF-05 | 5 | 12:05 | TW | 6 | 131,3 | 9.6% | 96.3% | 119.8 | PASS |
| N | lanhole No. 38 Subgrad | e - Nece | ssary | Proctor | = 95% | | | | | | |
| MH38-1 | MH-38 Subgrade | SF-05 | sub | 14:30 | TW | 12 | 133.7 | 4.0% | 103.3% | 128.6 | PASS |
| VH38-2 | MH-38 Subgrade | SF-05 | sub | 14:35 | TW | 12 | 127.5 | 2.6% | 99.9% | 124.3 | PASS |
| | Sand Cone Verification | - Neces | sary I | Proctor | = N/A | | | | | | |
| SCV-107 | W. of Crest Pad 9 | N/A | ~ | 15:30 | TW | 6 | 120.2 | 4.1% | - | 115.5 | _ |

Envirotech Engineering & Consulting. Inc

5/5/10

BY SAND CONE (ASTM 1556)



Client:

WCH

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK | 73701 | (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skiba | 1 | | Sample ID: | SCV-07 |
|-------------------|---------------|------------------|-----------|---------------------|------------------|
| Project: | S013213A00 | | | Sample Description: | Brown/Black Sand |
| Project Location: | ERDF Cells | 3 -10 | | Sampling Date: | 4/23/2010 |
| Tested By: | T. Williams | Date: | 4/23/2010 | Sampled By: | T. Williams |
| Reviewed By | J. Voss/(V | Date: | 4/26/2010 | Date Received: | 4/23/2010 |
| Comments | No | | | Report No.: | 05-016-053 |
| | | | | | |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1. | Mass of Proctor mold, W₁ | 3955.60 g |
|----|---|---------------------------|
| 2. | Mass of Proctor mold + sand, W ₂ | 5511.00 g |
| 3. | Volume of mold, V ₁ | 0.03 ft |
| 4. | Dry unit weight, $Y_{d (sand)} = \frac{W_2 - W_1}{V_1}$ | 102.87 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 7146.30 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 5507.30 g |
| 7. | Weight of sand to fill the cone, $W_c = W_4 - W_3$ | 3.61 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 6167.4 g |
|---|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W ₈ | 3046.0 g |
| 10. Volume of hole, $V_2 = \frac{W_6 - W_8 - W_6}{\gamma}$ d (sand) | 0.0318 ft ³ |
| 11. Mass of gallon can, W ₅ | 174.00 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2105.70 g |
| 13. Mass of gallon can + dry soil, W ₉ | 2014.60 g |
| 14. Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 134.05 lb/ft ³ |
| 15. Moisture content in the field, w (%) = $\frac{W_7 - W_9}{W_9} \times 100$ | 4.9% |
| 16. Dry unit weight in the field, d (sand) = -7 / (1+(w (%)/100) | 127.73 lb/ft ³ |
| 17. Comparision moisture content = | 4.1% |
| 18. Dry unit weight comparison = | 115.5 lb/ft ³ |



| - | | | | |
|---|---|---|----|----|
| 1 | 1 | e | 27 | ** |
| | | | | |

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701

(580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

Project ID

Report No

Description:

Troxler ID:

Moist Std

Moist offset:

Allowable Moisture Range: Necessary % Proctor:

ERDF Cells 9-10 Expansion

S013213A00

05-016-055 Date 4/27/2008

Brown/Black Sand

27881

635

Density Std: Density offset:

N/A

90%

2207

Proctor:

Max Dry Density (pcf):

124.4 Optimum Moisture (%): 12.5%

Proctor:

SF-06 120.8

Max Dry Density (pcf): Optimum Moisture (%):

Proctor

117.3 Max Dry Density (pcf):

Optimum Moisture (%):

12.5%

14.3%

SF-07

SF-05

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|---------|---------------------------|---------|-------|-----------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|-----------|
| | Manhole MH-37: Ne | cessary | Proc | tor = 95° | % | | | | | | |
| MH37-03 | Manhole 37 | SF-07 | 1 | 7:30 | LH | 12 | 121.4 | 8.1% | 95.7% | 112.3 | PASS |
| MH37-04 | Manhole 37 | SF-07 | 2 | 7:51 | LH | 12 | 122.6 | 9.6% | 95.4% | 111.9 | PASS |
| MH37-05 | Manhole 37 | SF-07 | 3 | 8:21 | LH | 12 | 123.7 | 9.1% | 96.7% | 113.4 | PASS |
| MH37-06 | Manhole 37 | SF-07 | 4 | 8:42 | LH | 12 | 125.6 | 11.4% | 96.1% | 112.7 | PASS |
| MH37-07 | Manhole 37 | SF-07 | 5 | 9:10 | LH | 12 | 122.5 | 8.3% | 96.4% | 113.1 | PASS |
| | Manhole MH-36: Ne | cessary | Proc | tor = 95° | % | | | | | | |
| MH36-03 | Manhole 36 | SF-05 | 1 | 10:25 | LH | 12 | 130.5 | 8.8% | 96.4% | 119.9 | PASS |
| MH36-04 | Manhole 36 | SF-05 | 2 | 10:55 | LH | 12 | 131.2 | 9.1% | 96.7% | 120.3 | PASS |
| MH36-05 | Manhole 36 | SF-05 | 3 | 11:50 | LH | 12 | 133.6 | 12.3% | 95.6% | 119.0 | PASS |
| MH36-06 | Manhole 36 | SF-05 | 4 | 12:45 | LH | 12 | 132.1 | 9.8% | 96.7% | 120.3 | PASS |
| | Sand Cone | Verific | ation | | | | | | | | |
| SCV-08 | Northeast side of Project | * | - | 15:30 | LH | 6 | 106.0 | 3.9% | ~ | 102.0 | |
| - | | | | | | | | | | | |
| | | | | | | | | | | | |

Reviewed by:

Envirotech Engineering & Consulting. Inc

Date

5/5/10

BY SAND CONE (ASTM 1556)



Client:

WCH

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK | 73701 (580) 234-8780 | Fax (580) 237-4302

Sample Information

| Contact Name: Charlie Skiba | | | Sample ID: | SCV-08 | | |
|-----------------------------|--------------|-------|------------|---------------------|------------------|--|
| Project: | S013213A00 | | | Sample Description: | Brown/Black Sand | |
| Project Location: | ERDF Cells 9 | -10 | | Sampling Date: | 4/27/2010 | |
| Tested By: | L. Hay. | Date: | 4/27/2010 | Sampled By: | L. Hay | |
| Reviewed By: | J. Voss ACV | Date: | 4/28/2010 | Date Received: | 4/27/2010 | |
| Comments | J. | | | Report No.: | 05-016-055 | |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3956.60 g |
|--|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5394.30 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4. Dry unit weight, Y _{d (sand)} = W ₂ - W ₁ V ₁ | 95.09 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 3768.20 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use). W ₄ | 2132.50 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.61 lb |

| Mass of bottle + cone + sand (before use), W₆ | 6459.2 g |
|--|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W ₈ | 3138.0 g |
| 10. Volume of hole, $V_2 = \frac{W_6 - W_8 - W_c}{y}$ d (sand) | 0.0391 ft ³ |
| 11. Mass of gallon can, W ₅ | 0.00 g |
| 12. Mass of gallon can + moist soil, W ₇ | 1886.90 g |
| 13. Mass of gallon can + dry soil, W ₉ | 1823.10 g |
| 14. Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 106.45 lb/ft ³ |
| 15. Moisture content in the field, w (%) = $W_7 - W_9 - X$ 100 $W_9 - W_5$ | 3.5% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 102.85 lb/ft ³ |
| 17. Comparision moisture content = | 3.9% |
| 18. Dry unit weight comparison = | 102.0 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

Project ID:

Report No.

Description: Troxler ID:

Maist Std:

Moist offset: Allowable Moisture Range:

Necessary % Proctor:

ERDF Cells 9-10 Expansion

S013213A00

05-16-057 Date Crest Pad and Manholes

27881

644 2187 Density Std: Density offset:

> N/A 90%

4/29/2010

Proctor:

SF-05 124.4

Max Dry Density (pcf): Optimum Maisture (%): 12.5%

Proctor:

SF-06 120.8

Max Dry Density (pcf):

Optimum Moisture (%): 14.3% SF-07

Proctor*

Max Dry Density (pcf): 117.3

Optimum Moisture (%):

12.5%

Necessary % Proctor: 95%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|---------|--------------------------|---------|--------|----------|---------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Cell 1 | 0 Discharge Line Utility | Trench: | Nece | ssary Pr | octor = | 90% | | | | | |
| LT-006 | Crest Pad 10 to MH-33 | SF-06 | .1 | 8.05 | LH | 12 | 122.7 | 6.9% | 95.0% | 114.8 | PASS |
| LT-007 | Crest Pad 10 to MH-33 | SF-06 | 2 | 8:15 | LH | 6 | 122.2 | 6.4% | 95.1% | 114.8 | PASS |
| LT-008 | Crest Pad 10 to MH-33 | SF-06 | 3 | 8:25 | LH | 6 | 125.9 | 6.4% | 98.0% | 118.3 | PASS |
| LT-009 | Crest Pad 10 to MH-33 | SF-06 | 4 | 8:45 | LH | 6 | 126.3 | 5.8% | 98.8% | 119.4 | PASS |
| LT-010 | Crest Pad 10 to MH-33 | SF-06 | 5 | 9:15 | LH | 6 | 119.4 | 5.3% | 93.9% | 113.4 | PASS |
| LT-011 | Crest Pad 10 to MH-33 | SF-06 | 6 | 9:45 | LH | 6 | 128.4 | 10.6% | 96.1% | 116.1 | PASS |
| LT-012 | Crest Pad 10 to MH-33 | SF-06 | 7 | 10:05 | LH | 6 | 127.3 | 9.3% | 96.4% | 116.5 | PASS |
| LT-013 | Crest Pad 10 to MH-33 | SF-06 | 8 | 10:20 | LH | 6 | 126.4 | 9.7% | 95.4% | 115.2 | PASS |
| | Crest Pad 10 Earthwork | : Neces | sary F | roctor | = 95% | | | | | | |
| CP10-01 | Crest Pad 10 Subgrade | SF-06 | SG | 13:15 | LH | 12 | 129.8 | 12.9% | 95.2% | 115.0 | PASS |
| CP10-02 | Crest Pad 10 Subgrade | SF-06 | SG | 13:20 | LH | 12 | 128.5 | 9.9% | 96.8% | 116.9 | PASS |
| CP10-03 | Crest Pad 10 Fill | SF-07 | 1 | 14:15 | LH | 6 | 129.1 | 11.9% | 98.4% | 115.4 | PASS |
| CP10-04 | Crest Pad 10 Fill | SF-07 | 1 | 14:25 | LH | 6 | 127.3 | 11.2% | 97.6% | 114.5 | PASS |
| CP10-05 | Crest Pad 10 Fill | SF-07 | 2 | 16:10 | LH | 6 | 131.4 | 14.3% | 98.0% | 115.0 | PASS |
| CP10-06 | Crest Pad 10 Fill | SF-07 | 2 | 16:15 | LH | 6 | 130.4 | 14.9% | 96.8% | 113.5 | PASS |
| | | | | | | | | | | | |

Reviewed by:

Envirotech Engineering & Consulting. Inc

5/5/10

BY SAND CONE (ASTM 1556)



2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Client:

WCH

Submittal:

05-18B Earthwork Field Data

Sample Information

| Contact Name: Charlie Skiba | | | | Sample ID: | CP10-03 | |
|-----------------------------|--------------------|-------|------------------|---------------------|------------------|--|
| Project: | roject: S013213A00 | | MANUFORM PROMISE | Sample Description: | Brown/Black Sand | |
| Project Location: | ERDF Cells 9 | -10 | - | Sampling Date: | 4/29/2010 | |
| Tested By: | L. Hay | Date | 4/29/2010 | Sampled By: | L. Hay | |
| Reviewed By: | J Voss 14 | Date: | 4/30/2010 | Date Received: | 4/29/2010 | |
| Comments | 1 | | | Report No.: | 05-016-057 | |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3956.60 g |
|--|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5394.30 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4. Dry unit weight. $Y_{d (sand)} = \frac{W_2 - W_1}{V_1}$ | 95.09 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 3768.20 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 2132.50 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.61 lb |

| O Many of habita to annot be need the form and 1861 | 5000 5 |
|--|---------------------------|
| 8. Mass of bottle + cone + sand (before use), W ₈ | 5833.5 g |
| Mass of bottle + cone + sand (after use), W₈ | 2869.5 g |
| 10. Volume of hole, $V_2 = W_6 - W_8 - W_c$ | 0.0000.03 |
| y d (sand) | 0.0308 ft ³ |
| 11. Mass of gallon can, W₅ | 0.00 g |
| 12. Mass of gallon can + moist soil, W ₇ | 1810.60 g |
| 13. Mass of gallon can + dry soil, W ₉ | 1615.70 g |
| 14. Moist unit weight of soil in field, $\gamma_1 = W_7 - W_5 / V_2$ | 129.61 lb/ft ³ |
| 15. Moisture content in the field, w (%) = W ₇ - W ₉ X 100 | 12.1% |
| W ₉ ~ W ₅ | 12.170 |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 115.66 lb/ft ³ |
| 17. Comparision moisture content = | 11.9% |
| 18. Dry unit weight comparison = | 115.4 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-188 Earthwork Field Data

2500 N. 11th Street T Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

SF-06

Soil Information

Project:

Project ID: Report No.

Description: Troxler ID:

Moist Std: Moist offset:

Allowable Moisture Range: Necessary % Proctor:

ERDF Cells 9-10 Expansion

S013213A00

5/4/2010 05-016-060 Date Brown/Black Sand

27881

647 Density Std: 2181 Density offset:

> N/A 95%

Proctor:

SF-05 Max Dry Density (pcf): 124.4

Optimum Moisture (%): 12.5%

Proctor:

120.8 Max Dry Density (pcf): 14.3%

Optimum Moisture (%):

Proctor: SF-07 Max Dry Density (pcf): 117.3

Optimum Moisture (%): 12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|---------|-----------------------------|----------|--------|----------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| | Leachate Transmiss | ion Lin | e: 90° | % Procto | or | | | | | | |
| LT-09 | Discharge line CP9 to MH-32 | SF-06 | 1 | 9:15 | LH | 12 | 122.7 | 9.4% | 92.8% | 112.2 | PASS |
| LT-10 | Discharge line CP9 to MH-32 | SF-06 | 2 | 9:45 | LH | 6 | 121.0 | 7.4% | 93.3% | 112.7 | PASS |
| LT-11 | Discharge line CP9 to MH-32 | SF-06 | 3 | 10:45 | LH | 6 | 125.3 | 11.4% | 93.1% | 112.5 | PASS |
| LT-12 | Discharge line CP9 to MH-32 | SF-06 | 4 | 12:00 | LH | 6 | 118.5 | 6.8% | 91.9% | 111.0 | PASS |
| LT-13 | Discharge line CP9 to MH-32 | SF-06 | 5 | 15:10 | LH | 6 | 134.5 | 13.7% | 97.9% | 118.3 | PASS |
| LT-14 | Discharge line CP9 to MH-32 | SF-06 | 6 | 15:50 | LH | 6 | 122.8 | 10.8% | 91.7% | 110.8 | PASS |
| | Crest Pad 10 |): 95% F | rocto | r | , | | | | | | |
| CP10-7 | Crest Pad 10 | SF-07 | 3 | 10:20 | LH | 6 | 116.9 | 4.2% | 95.6% | 112.2 | PASS |
| CP10-8 | Crest Pad 10 | SF-07 | 3 | 10:25 | LH | 6 | 116.2 | 3.6% | 95.6% | 112.2 | PASS |
| | | | | | | | | | | | |
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Reviewed by:

Envirotech Engineering & Consulting. Inc

5/5/10

BY SAND CONE (ASTM 1556)



Client:

WCH

Submittal:

05-18B Earthwork Field Data

2500 N 11th Street 1 Enid, OK 73701 (580) 234-8780 1 Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skib | а | | Sample ID: | LT-12 | |
|---------------------|--------------|---------|--|---------------------|------------------|--|
| Project: S013213A00 | | 0 | POLICE CONTRACTOR CONT | Sample Description: | Brown/Black Sand | |
| Project Location: | ERDF Cells | 9-10 | | Sampling Date: | 5/4/2010 | |
| Tested By: | L. Hay | Date: | 5/4/2010 | Sampled By: | L.Hay | |
| Reviewed By: | T. Williams | Twoate: | 5/5/2010 | Date Received: | 5/4/2010 | |
| Comments | | | | Report No.: | 05-016-060 | |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1. | Mass of Proctor moid, W ₁ | 3956.60 g |
|----|---|--------------------------|
| 2. | Mass of Proctor mold + sand, W ₂ | 5394.30 g |
| 3. | Volume of mold, V ₁ | 0.03 ft |
| 4. | Dry unit weight, $Y_{d \text{ (sand)}} = \frac{W_2 - W_4}{W_1}$ | 95.09 lb/ft ³ |
| | V ₁ | |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 3768.20 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 2132.50 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.61 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 5958.9 g |
|---|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W ₈ | 2550.7 g |
| 10. Volume of hole, $V_2 = \frac{W_8 - W_8 - W_c}{7} d$ (sand) | 0 0411 ft ³ |
| 11. Mass of gallon can, W ₅ | 394.40 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2619.30 g |
| 13. Mass of gallon can + dry soil, W ₉ | 2466.50 g |
| 14. Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 119.36 lb/ft ³ |
| 15 Moisture content in the field, w (%) = $W_7 - W_9 - X$ 100 $W_9 - W_5$ | 7.4% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 111.16 lb/ft ³ |
| 17. Comparision moisture content = | 6.8% |
| 18. Dry unit weight comparison = | 111.0 lb/ft ³ |



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|---|---|---|---|----|----|
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Washington Closure Hanford

Submittal:

5-18B Earthwork Field Data

N/A

90%

ENVIROTECH

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project: ERDF Cells 9-10 Expansion Project ID: S013213A00 5-16-061 5/5/2010 Report No Date Brown/Black Sand Description: 27881 Troxler ID Moist Std. 637 Density Std: 2195 Moist offset: Density offset:

Allowable Moisture Range:

Necessary % Proctor:

| Proctor: | SF-01 |
|----------------|---------|
| | |
| 11. 0. 0 1. 1. | -0 4400 |

Max Dry Density (pcf): 113.6 Optimum Moisture (%): 12.4%

Proctor SF-06

Max Dry Density (pcf): 120.8 Optimum Moisture (%): 14.3%

Proctor. SF-07

Max Dry Density (pcf): 117.3 Optimum Moisture (%): 12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|---------|--|---------|--|---|------|----------------|-------------------------|-------------------------|------------------|--------------------------|--------------|
| | Leachate Transmiss | ion Lin | e: 90° | 6 Procto | or | | | | | | |
| LT-15 | Discharge line CP9 to MH-32 | SF-06 | 7 | 7:22 | LH | 6 | 123.3 | 10.0% | 92.8% | 112.1 | PASS |
| LT-16 | Discharge line CP9 to MH-32 | SF-06 | 8 | 9:00 | LH | 6 | 124.9 | 12.6% | 91.8% | 110.9 | PASS |
| LT-17 | Discharge line CP9 to MH-32 | SF-06 | 9 | 9:41 | LH | 6 | 120.1 | 9.2% | 91.0% | 110.0 | PASS |
| LT-18 | Discharge line CP9 to MH-32 | SF-06 | 10 | 12:45 | LH | 6 | 129.5 | 14.2% | 93.9% | 113.4 | PASS |
| | Sand Cone | Verific | ation | | | | | | | | |
| SCV-10 | NE end of project | N/A | N/A | 14:25 | LH | 6 | 108.1 | 4.1% | N/A | 103.8 | N/A |
| | | | | | | | | | | | |
| | | | | | | | | | | | |
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| Reviewed by: | |
|--|---------|
| 1.121/- | 8120/10 |
| Envirotech Engineering & Consulting. Inc | Date |

BY SAND CONE (ASTM 1556)



Client:

WCH

Submittal:

05-18B Earthwork Field Data

2500 N - 11th Street - L Enid, OK - 73701 - 580) 234-8780 - L Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Ski | iba | | Sample ID: | SCV-10 |
|-------------------|-------------|--------|---|---------------------|------------------------|
| Project: | S013213A | 00 | over the second | Sample Description: | Lt. Brown Sand w/ Slit |
| Project Location: | ERDF Cell | s 9-10 | - | Sampling Date: | 5/5/2010 |
| Tested By: | L. Hay | Date: | 5/5/2010 | Sampled By: | L.Hay |
| Reviewed By: | T. Williams | Date: | 5/6/2010 | Date Received: | 5/5/2010 |
| Comments | | | | Report No.: | 05-016-061 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3956.60 g |
|--|--------------------------|
| 2 Mass of Proctor mold + sand, W ₂ | 5394.30 g |
| Volume of mold, V₁ | 0.03 ft |
| 4. Dry unit weight. $Y_{d \text{ (sand)}} = \frac{W_2 - W_1}{V_2}$ | 95.09 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 3768.20 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 2132.50 g |
| 7. | Weight of sand to fill the cone, $W_c = W_4 - W_3$ | 3.61 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 6237.6 g |
|---|---------------------------|
| 9. Mass of bottle + cone + sand (after use), Wa | 2765.2 g |
| 10. Volume of hole, $V_2 = W_a - W_{g} - W_{g}$ y d (sand) | 0.0426 ft ³ |
| 11. Mass of gallon can, W ₅ | 394.10 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2487.50 g |
| 13. Mass of gallon can + dry soil, W ₉ | 2403.70 g |
| 14. Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 108.38 lb/ft ³ |
| 15. Moisture content in the field, w (%) = $\frac{W_7 - W_9}{V_9} \times 100$ | 4.2% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 104.04 lb/ft ³ |
| 17. Comparision moisture content = | 4.1% |
| 18. Dry unit weight comparison = | 103.8 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701

(580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID:

S013213A00

Report No

05-016-071 Date 5/19/2010

Description:

Brown/Black Sand

Troxler ID: Moist Std

27881 2245 650 Density Std:

Moist offset:

Density offset:

Allowable Moisture Range

N/A

90%

Proctor:

SF-01

Max Dry Density (pcf):

Max Dry Density (pcf):

113.6

Optimum Moisture (%):

12.4%

Proctor:

SF-06

120.8

Optimum Moisture (%):

14.3%

Proctor:

SF-07

Max Dry Density (pcf)

117.3 12.5%

| Necessar | | 90 | 90% | - | | Optimum N | Moisture (%): | 12.5% | - | | |
|----------|-------------------------|---------|-------|----------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
| | Leachate Transmi | ssion T | rench | Backfill | 1 | | | | | | |
| LT-19 | Backfill MH-32 to MH-33 | SF-06 | 0 | 8:55 | LH | 12 | 123.0 | 11.2% | 91.6% | 110.6 | PASS |
| LT-20 | Backfill MH-32 to MH-33 | SF-06 | 0 | 9:00 | LH | 12 | 122.4 | 11.2% | 91.1% | 110.1 | PASS |
| LT-21 | Backfill MH-32 to MH-33 | SF-06 | 1 | 12:05 | LH | 12 | 123.7 | 9.0% | 93.9% | 113.5 | PASS |
| LT-22 | Backfill MH-32 to MH-33 | SF-06 | 1 | 12:10 | LH | 12 | 123.5 | 7.8% | 94.8% | 114.6 | PASS |
| LT-23 | Backfill MH-32 to MH-33 | SF-06 | 2 | 14:15 | LH | 12 | 122.9 | 7.9% | 94.3% | 113.9 | PASS |
| LT-24 | Backfill MH-32 to MH-33 | SF-06 | 2 | 14:20 | LH | 12 | 123.3 | 8.6% | 94.0% | 113.5 | PASS |
| | | | | | | | | | | | |
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Reviewed by:

Envirotech Engineering & Consulting. Inc

5-20-2010



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

ENVIROTECH

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project: Project ID S013213A00 Report No. Description 27881

Troxler ID Moist Std: Moist offset:

Allowable Moisture Range Necessary % Proctor

ERDF Cells 9-10 Expansion

5/19/2010 05-016-071 Date Brown/Black Sand 650 Density Std: 2245

> N/A 90%

Density offset:

Proctor: SF-01

Max Dry Density (pcf) 113.6 Optimum Moisture (%) 12.4%

Proctor: SF-06 Max Dry Density (pcf): 120.8

Optimum Moisture (%) 14.3% Proctor SF-07

Max Dry Density (pcf): 117.3 Optimum Moisture (%): 12.5%

Wet Moist Dry Depth % Proctor Pass / Test No Location Pr. Lift Time Oper Density Content Density (in.) (calc) Fail (pcf) (%) (calc) Leachate Transmission Trench Backfill LT-25 Backfill MH-32 to MH-33 | SF-06 3 125.5 6:45 LH 6 9.1% 95.2% 115.0 PASS LT-26 SF-06 3 6 Backfill MH-32 to MH-33 6:50 LH 127.4 9.7% 96.1% 116.1 PASS LT-27 Backfill MH-32 to MH-33 SF-06 8.05 LH 6 126.3 7.1% 97.6% 117.9 PASS LT-28 Backfill MH-32 to MH-33 SF-06 8:10 LH 6 125.9 6.5% 97.9% 118.2 PASS Crest Pad 9 Foundation Backfill CP9-15 Crest Pad 9 Backfill SF-06 1 9:00 LH 6 127.1 9.1% 96.4% PASS 116.5 CP9-16 Crest Pad 9 Backfill SF-06 2 10:00 LH 6 126.3 8.3% 96.5% 116.6 PASS CP9-17 Crest Pad 9 Backfill SF-06 6 3 12:30 LH 128.3 11.0% 95.7% 115.6 PASS CP9-18 Crest Pad 9 Backfill SF-06 6 129.0 4 14:00 LH 12.4% 95.0% 114.8 PASS

Reviewed by:

Lik Will Envirotech Engineering & Consulting, Inc.

5-24-2010



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

Project ID:

Report No.

Description:

Troxler ID:

Moist Std:

Moist offset:

Allowable Moisture Range

Necessary % Proctor:

ERDF Cells 9-10 Expansion

S013213A00

05-016-073 Date

Brown/Black Sand

27881

638 Density Std:

Density offset:

N/A 90% 5/21/2010

2237

Proctor:

SF-01

Max Dry Density (pcf):

113.6

Optimum Moisture (%):

12.4% SF-06

Proctor:

120.8

Max Dry Density (pcf): Optimum Moisture (%):

14.3%

Proctor:

SF-07

Max Dry Density (pcf):

117.3

| Optimum | Moisture | (%): | 12.5% |
|---------|----------|------|-------|
|---------|----------|------|-------|

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / |
|---------|-------------------------|-------|------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------|
| LT-29 | Backfill MH-33 to MH-32 | SF-06 | 5 | 6:25 | LH | 6 | 126.8 | 9.9% | 95.5% | 115.4 | PASS |
| LT-30 | Backfill MH-33 to MH-32 | SF-06 | 5 | 6:27 | LH | 6 | 125.5 | 8.5% | 95.8% | 115.7 | PASS |
| LT-31 | Backfill MH-33 to MH-32 | SF-06 | 6 | 7:25 | LH | 6 | 127.4 | 10.3% | 95.6% | 115.5 | PASS |
| LT-32 | Backfill MH-33 to MH-32 | SF-06 | 6 | 7:29 | LH | 6 | 126.3 | 9.5% | 95.5% | 115.3 | PASS |
| LT-33 | Backfill MH-33 to MH-32 | SF-06 | 7 | 8:10 | LH | 6 | 125.9 | 6.5% | 97.9% | 118.2 | PASS |
| LT-34 | Backfill MH-33 to MH-32 | SF-06 | 7 | 8:14 | LH | 6 | 128.5 | 11.2% | 95.7% | 115.6 | PASS |
| LT-35 | Backfill MH-33 to MH-32 | SF-06 | 8 | 10:50 | LH | 6 | 125.9 | 9.5% | 95.2% | 115.0 | PASS |
| LT-36 | Backfill MH-33 to MH-32 | SF-06 | 8 | 10:53 | LH | 6 | 126.4 | 10.2% | 95.0% | 114.7 | PASS |
| LT-37 | Backfill MH-33 to MH-32 | SF-06 | 9 | 12:30 | LH | 6 | 127.3 | 10.5% | 95.4% | 115.2 | PASS |
| LT-38 | Backfill MH-33 to MH-32 | SF-06 | 9 | 12:33 | LH | 6 | 126.1 | 9.6% | 95.2% | 115.1 | PASS |
| LT-39 | Backfill MH-33 to MH-32 | SF-06 | 10 | 16 10 | LH | 6 | 126.4 | 9.4% | 95.6% | 115.5 | PASS |
| LT-40 | Backfill MH-33 to MH-32 | SF-06 | 10 | 16:15 | LH | 6 | 125.7 | 7.5% | 96.8% | 116.9 | PASS |
| | | | | | | | | | | | |
| | 1 / | | | | | | | | | | |

Reviewed by:

Envirotech Engineering & Consulting. Inc

5-25-2010



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street T Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

Project ID

Report No.

Description

Troxler ID

Moist Std

Moist offset:

Allowable Moisture Range:

Necessary % Proctor:

ERDF Cells 9-10 Expansion

S013213A00

05-016-076 Date 5/26/2010

Brown/Black Sand

27881

641 Density Std: 2225

Density offset:

N/A

95%

Proctor:

SF-01

Max Dry Density (pcf):

Optimum Moisture (%): 12.4%

Proctor:

SF-06

113.6

Max Dry Density (pcf):

120.8

Optimum Moisture (%):

14.3%

Proctor:

SF-04 117.3

Max Dry Density (pcf): Optimum Moisture (%):

12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|---------|--------------------|-------|------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| LT-41 | MH-39 to Tank | SF-04 | 1 | 13:00 | LH | 6 | 120.9 | 5.2% | 98.0% | 114.9 | PASS |
| LT-42 | MH-39 to Tank | SF-04 | 2 | 13:10 | LH | 6 | 129.1 | 8.7% | 101.3% | 118.8 | PASS |
| LT-43 | MH-39 to Tank | SF-04 | 3 | 13:20 | LH | 6 | 125.4 | 7.3% | 99.6% | 116.9 | PASS |
| LT-44 | MH-39 to Tank | SF-04 | 4 | 13:30 | LH | 6 | 129.7 | 9.9% | 100.6% | 118.0 | PASS |
| LT-45 | MH-21 to Tank | SF-04 | 1 | 13:40 | LH | 6 | 125.2 | 6.6% | 100.1% | 117.4 | PASS |
| LT-46 | MH-21 to Tank | SF-04 | 2 | 13:50 | LH | 6 | 124.4 | 8.4% | 97.8% | 114.8 | PASS |
| LT-47 | MH-21 to Tank | SF-04 | 3 | 14:00 | LH | 6 | 124.4 | 8.0% | 98.2% | 115.2 | PASS |
| LT-48 | MH-21 to Tank | SF-04 | 4 | 14:10 | LH | 6 | 125.6 | 8.7% | 98.5% | 115.5 | PASS |
| LT-49 | Tank to Pump House | SF-04 | 1 | 14:20 | LH | 6 | 124.6 | 8.1% | 98.3% | 115.3 | PASS |
| LT-50 | Tank to Transducer | SF-04 | 1 | 14:30 | LH | 6 | 124.0 | 7.7% | 98.2% | 115.1 | PASS |
| LT-51 | Tank to Pump House | SF-04 | 2 | 14.40 | LH | 6 | 127.3 | 9.2% | 99.4% | 116.6 | PASS |
| LT-52 | Tank to Transducer | SF-04 | 2 | 14.50 | LH | 6 | 126.1 | 9.4% | 98.3% | 115.3 | PASS |
| LT-53 | Tank to Pump House | SF-04 | 3 | 15:00 | LH | 6 | 123.9 | 8.3% | 97.5% | 114.4 | PASS |
| LT-54 | Tank to Transducer | SF-04 | 3 | 15:10 | LH | 6 | 125.0 | 9.1% | 97.7% | 114.6 | PASS |
| | 4.000 | | | | | | | | | | |

Reviewed by

Envirotech Engineering & Consulting. Inc

5/27/10



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Washington Closure Hanford

Submittal:

05-188 Earthwork Subgrade

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project: ERDF Cells 9-10 Expansion Proctor: SF-01 S013213A00 Max Dry Density (pcf): 113.6 Project ID 5/27/2010 Optimum Moisture (%): 12.4% Report No 05-016-077 Date SF-04 Brown/Black Sand Proctor: Description: Troxler ID: 27881 Max Dry Density (pcf): 117.3 2243 Moist Std: 650 Density Std: Optimum Moisture (%): 12.5% Moist offset: Density offset: -Proctor: SF-05 Allowable Moisture Range N/A Max Dry Density (pcf): 124.4 Optimum Moisture (%): Necessary % Proctor: 95% 12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|----------|--------------------------|---------|-------|-----------|--------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| | Tank #3 Subgrade (Ne | cessary | 95 % | Compac | tion) | | | | | | |
| T3-01 | Tank Footprint | SF-04 | 1 | 9:20 | LH | 6 | 124.7 | 8.3% | 98.2% | 115.1 | PASS |
| T3-02 | Tank Footprint | SF-04 | 1 | 9:25 | LH | 6 | 127.0 | 9.3% | 99.1% | 116.2 | PASS |
| Leachate | Transmission: MH-32 to | MH-34 | (Nece | essary 90 | 0% Com | paction) | | | | | |
| LT-55 | Backfill: MH-32 to MH-34 | SF-05 | SG | 12:30 | LH | 12 | 125.0 | 7.1% | 93.8% | 116.7 | PASS |
| LT-56 | Backfill: MH-32 to MH-34 | SF-05 | SG | 12:35 | LH | 12 | 124.3 | 7.6% | 92.9% | 115.5 | PASS |
| LT-57 | Backfill: MH-32 to MH-34 | SF-05 | 1 | 13:45 | LH | 12 | 125.1 | 8.3% | 92.9% | 115.5 | PASS |
| LT-58 | Backfill: MH-32 to MH-34 | SF-05 | 1 | 13:50 | LH | 12 | 130.2 | 9.4% | 95.7% | 119.0 | PASS |
| | | | | | | | | | | | |
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| Reviewed by: TVJ | | | |
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| 1 a/EVa | | 5-/20/10 | |
| Envirotech Engineering & Consulting, Inc | | Date | |



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 231-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID

S013213A00

Report No.

5/28/2010 05-016-078 Date

Description:

Brown/Black Sand

Troxler ID: Moist Std:

27881

644

2245 Density Std: Density offset:

Moist offset: Allowable Moisture Range

Necessary % Proctor:

N/A 95% Proctor:

SF-06

Max Dry Density (pcf):

120.8 Optimum Moisture (%): 14.3%

Proctor:

SF-04

117.3

Max Dry Density (pcf): Optimum Moisture (%):

12.5%

Proctor:

SF-05

Max Dry Density (pcf):

124.4

Optimum Moisture (%):

12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / |
|----------|--------------------------|-------|-------|----------|--------|----------------|-------------------------|--|------------------|--------------------------|--------|
| Leachate | Transmission: MH-32 to | MH-34 | (Nece | ssary 90 |)% Com | paction) | | | | | |
| LT-59 | Backfill: MH-32 to MH-34 | SF-06 | 2 | 7:30 | LH | 12 | 118.3 | 7.9% | 90.8% | 109.6 | PASS |
| LT-60 | Backfill: MH-32 to MH-34 | SF-06 | 2 | 7:35 | LH | 12 | 124.2 | 7.8% | 95.4% | 115.2 | PASS |
| LT-61 | Backfill: MH-32 to MH-34 | SF-06 | 3 | 8:30 | LH | 12 | 132.5 | 11.4% | 98.5% | 118.9 | PASS |
| LT-62 | Backfill: MH-32 to MH-34 | SF-06 | 3 | 8:35 | LH | 12 | 125.2 | 7.8% | 96.1% | 116.1 | PASS |
| Leachate | Transmission: MH-32 to | MH-34 | (Nece | ssary 95 | % Com | paction) | | | | | |
| LT-63 | Backfill: MH-32 to MH-34 | SF-06 | 4 | 10:00 | LH | 6 | 124.8 | 6 9% | 96.6% | 116.7 | PASS |
| LT-64 | Backfill: MH-32 to MH-34 | SF-06 | 4 | 10:35 | LH | 6 | 126.6 | 8.1% | 96.9% | 117.1 | PASS |
| LT-65 | Backfill: MH-32 to MH-34 | SF-06 | 5 | 11:30 | LH | 6 | 129.7 | 10.2% | 97.4% | 117.7 | PASS |
| LT-66 | Backfill: MH-32 to MH-34 | SF-06 | 5 | 11:35 | LH | 6 | 129.6 | 10.4% | 97.2% | 117.4 | PASS |
| LT-67 | Backfill: MH-32 to MH-34 | SF-06 | 6 | 13:00 | LH | 6 | 122.6 | 5.5% | 96.2% | 116.2 | PASS |
| LT-68 | Backfill: MH-32 to MH-34 | SF-06 | 6 | 13:05 | LH | 6 | 124.3 | 6.4% | 96.7% | 116.8 | PASS |
| LT-69 | Backfill: MH-32 to MH-34 | SF-06 | 7 | 14:40 | LH | 6 | 121.5 | 5.4% | 95.4% | 115.3 | PASS |
| LT-70 | Backfill: MH-32 to MH-34 | SF-06 | 7 | 14:45 | LH | 6 | 127.4 | 7.4% | 98.2% | 118.6 | PASS |
| | | | | | | | | The state of the s | | | |
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Reviewed by:

Envirotech Engineering & Consulting. Inc.

6/1/10

BY SAND CONE (ASTM 1556)



Client:

WCH

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street T Enid, OK 73701 (580) 234-8780 T Fax (580) 237-4302

Sample Information

| Contact Name. | Charlie Skiba | 1 | | Sample ID: | LT-66 |
|-------------------|---------------|-------|-----------|---------------------|------------------|
| Project: | S013213A00 | | | Sample Description: | Brown/Black Sand |
| Project Location: | ERDF Cells 9 | -10 | | Sampling Date: | 5/28/2010 |
| Tested By: | L. Hay | Date: | 5/28/2010 | Sampled By: | L.Hay |
| Reviewed By: | J. Voss/ | Date: | 6/1/2010 | Date Received: | 5/28/2010 |
| Comments | 740 | | | Report No.: | 05-016-078 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3955.60 g |
|---|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5404.60 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4. Dry unit weight, Y _{d (sand)} = W ₂ - W ₁ | 95.84 lb/ft ³ |
| V_1 | |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6374.50 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 4749.20 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.58 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 4958.4 g |
|--|---------------------------|
| 9 Mass of bottle + cone + sand (after use), W ₈ | 1750.5 g |
| 10. Volume of hole, $V_2 = W_6 - W_8 - W_c$ | 0.0264 63 |
| y d (sand) | 0.0364 ft ³ |
| 11. Mass of gallon can, W ₅ | 506.10 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2655.60 g |
| 13. Mass of gallon can + dry soil, W ₉ | 2447.50 g |
| 14. Moist unit weight of soil in field, $\gamma_1 = W_7 - W_5 / V_2$ | 130.16 lb/ft ³ |
| 15. Moisture content in the field, w (%) = W ₇ - W ₉ X 100 | 10.79/ |
| W_9 - W_5 | 10.7% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 117.56 lb/ft ³ |
| 17. Comparision moisture content = | 10.4% |
| 18. Dry unit weight comparison = | 117.4 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

95%

2500 N. 11th Street | Enid, OK 73701 580) 234-8780 | Fax 580) 237-4302

Soil Information

Project: ERDF Cells 9-10 Expansion S013213A00 Project ID 6/1/2010 Report No. 05-016-079 Date Brown/Black Sand Description: Troxler ID 27881 Moist Std 643 Density Std: 2232 Density offset: Moist offset: N/A Allowable Moisture Range

Tru

Necessary % Proctor:

SF-06 Proctor: 120.8 Max Dry Density (pcf): Optimum Moisture (%): 14.3% Proctor: SF-04 Max Dry Density (pcf): 117.3 Optimum Moisture (%): 12.5% SF-05 Proctor 124.4 Max Dry Density (pcf): Optimum Moisture (%): 12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|----------|--------------------------|-------|-------|----------|-------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Leachate | Transmission: MH-32 to | MH-34 | (Nece | ssary 95 | % Com | paction) | | | | | |
| LT-71 | Backfill: MH-32 to MH-34 | SF-06 | 8 | 8:20 | LH | 6 | 127.4 | 7.0% | 98.6% | 119.1 | PASS |
| LT-72 | Backfill; MH-32 to MH-34 | SF-06 | 8 | 8:25 | LH | 6 | 127.9 | 7.3% | 98.7% | 119.2 | PASS |
| LT-73 | Backfill: MH-32 to MH-34 | SF-06 | 9 | 10:00 | LH | 6 | 127.7 | 8.4% | 97.5% | 117.8 | PASS |
| LT-74 | Backfill: MH-32 to MH-34 | SF-06 | 9 | 10:05 | LH | 6 | 128.9 | 8.6% | 98.3% | 118.7 | PASS |
| LT-75 | Backfill: MH-32 to MH-34 | SF-06 | 10 | 13:00 | LH | 6 | 128.1 | 8.1% | 98.1% | 118.5 | PASS |
| LT-76 | Backfill: MH-32 to MH-34 | SF-06 | 10 | 13:05 | LH | 6 | 125.1 | 8.7% | 95.3% | 115.1 | PASS |
| LT-77 | Backfill: MH-32 to MH-34 | SF-06 | 11 | 16:05 | LH | 6 | 126.9 | 9.2% | 96.2% | 116.2 | PASS |
| LT-78 | Backfill: MH-32 to MH-34 | SF-06 | 11 | 16:10 | LH | 6 | 126.3 | 8.9% | 96.0% | 116.0 | PASS |
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| Reviewed by. | |
|--|--------|
| Aut EVa | 6/3/10 |
| Envirotech Engineering & Consulting. Inc | Date |



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project: Project ID:

Report No Description: Troxler ID:

Moist Std Moist offset

Allowable Moisture Range Necessary % Proctor:

ERDF Cells 9-10 Expansion

S013213A00

6/8/2010 05-016-084 Date Brown/Black Sand

27881

2233 648 Density Std: Density offset:

> N/A 90%

Proctor SF-06

120.8 Max Dry Density (pcf) Optimum Moisture (%): 14.3%

Proctor SF-04 Max Dry Density (pcf): 117.3

Optimum Moisture (%): 12.5%

Proctor: SF-05 Max Dry Density (pcf) 124.4

Optimum Moisture (%): 12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / |
|----------|--------------------------|-------|-------|----------|--|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------|
| Leachate | Transmission: MH-35 to | MH-36 | (Nece | ssary 90 | % Com | paction) | | | | | |
| LT-79 | MH-35 to MH-36 West Fill | SF-06 | 1 | 13:45 | LH | 12 | 128.6 | 6.5% | 100 0% | 120.8 | PASS |
| LT-80 | MH-35 to MH-36 East Fill | SF-06 | 1 | 13:50 | LH | 12 | 127.2 | 8.1% | 97.4% | 117.7 | PASS |
| LT-81 | MH-35 to MH-36 East Fill | SF-06 | 2 | 14:00 | LH | 12 | 120.7 | 7.1% | 93.3% | 112.7 | PASS |
| LT-82 | MH-35 to MH-36 East Fill | SF-06 | 3 | 14:08 | LH | 12 | 121.1 | 9.3% | 91.7% | 110.8 | PASS |
| LT-83 | MH-35 to MH-36 West Fill | SF-06 | 2 | 15:00 | LH | 12 | 124.3 | 7.2% | 96.0% | 116.0 | PASS |
| LT-84 | MH-35 to MH-36 West Fill | SF-06 | 3 | 16:20 | ΓH | 12 | 120.6 | 4.8% | 95.3% | 115.1 | PASS |
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14) Reviewed by:

Envirotech Engineering & Consulting. Inc.

6/10/10



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

ENVIROTECH

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

Project ID: Report No Description:

Troxler ID Moist Std

Moist offset: Allowable Moisture Range:

Necessary % Proctor:

ERDF Cells 9-10 Expansion

S013213A00

5-16-087 Date Brown/Black Sand

27881

646 Density Std: Density offset: -

> N/A 90%

6/11/2010

2253

Proctor:

SF-06

120.8 Max Dry Density (pcf): Optimum Moisture (%): 14.3%

Proctor:

SF-04

Max Dry Density (pcf): Optimum Moisture (%):

117.3 12.5%

Proctor:

SF-05 124.4

Max Dry Density (pcf): Optimum Moisture (%): 12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (In.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|----------|--------------------------|-------|-------|----------|-------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Leachate | Transmission: MH-35 to | MH-36 | (Nece | ssary 90 | % Com | paction) | | | | | |
| LT-85 | MH-35 to MH-36 East Fill | SF-06 | 4 | 8:41 | JS | 12 | 128.9 | 6.7% | 100.0% | 120.8 | PASS |
| LT-86 | MH-35 to MH-36 West Fill | SF-06 | 4 | 12:22 | JS | 12 | 125.4 | 5.3% | 98.6% | 119.1 | PASS |
| Leachate | Transmission: MH-35 to | MH-36 | (Nece | ssary 95 | % Com | paction) | | | | | |
| LT-87 | MH-35 to MH-36 East Fill | SF-06 | 5 | 15:16 | JS | 6 | 128.7 | 8.1% | 98.6% | 119.1 | PASS |
| LT-88 | MH-35 to MH-36 West Fill | SF-06 | 5 | 15:19 | JS | 6 | 129.0 | 7.6% | 99.2% | 119.9 | PASS |
| | | | | | | | | | | | |
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Envirotech Engineering & Consulting, Inc.

Reviewed by:

6/16/10



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701

(580) 234-8780 | Fax (580) 237-4302

Soil Information

Project

Project ID:

Report No Description

Troxler ID:

Moist Std:

Moist offset: Allowable Moisture Range:

Necessary % Proctor:

ERDF Cells 9-10 Expansion

S013213A00

5-16-088 Date

Brown/Black Sand

27881 643

Density Std: Density offset:

> N/A 95%

6/14/2010

2221

Proctor

SF-06 Max Dry Density (pcf): 120.8

Optimum Moisture (%): 14.3%

Proctor SF-04

Max Dry Density (pcf):

Optimum Moisture (%): 12.5%

Proctor:

SF-05 124.4

Max Dry Density (pcf): Optimum Moisture (%):

12.5%

117.3

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|----------|--------------------------|-------|-------|----------|-------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Leachate | Transmission: MH-35 to | MH-36 | (Nece | ssary 95 | % Com | paction) | | | | | |
| LT-89 | MH-35 to MH-36 East Fill | SF-06 | 6 | 13:00 | JS | 6 | 128.1 | 8.5% | 97.7% | 118.1 | PASS |
| LT-90 | MH-35 to MH-36 West Fill | SF-06 | 6 | 13:04 | JS | 6 | 128.2 | 9.3% | 97.1% | 117.3 | PASS |
| LT-91 | MH-35 to MH-36 East Fill | SF-06 | 7 | 15:16 | JS | 6 | 128.2 | 6.2% | 99.9% | 120.7 | PASS |
| LT-92 | MH-35 to MH-36 West Fill | SF-06 | 7 | 15:19 | JS | 6 | 126.9 | 7.2% | 98.0% | 118.4 | PASS |
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| Envirotech Engineering | 8 | Consulting. | Inc |

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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project: Project ID Report No

Description: Troxler ID Moist Std: Moist offset:

Allowable Moisture Range: Necessary % Proctor:

ERDF Cells 9-10 Expansion

S013213A00 6/15/2010 5-16-089 Date Brown/Black Sand

27881 642 Density Std: 2226 Density offset: -

> N/A 95%

Proctor: SF-06

Max Dry Density (pcf): 120.8 Optimum Moisture (%): 14.3%

Proctor:

SF-04 Max Dry Density (pcf): 117.3

Optimum Moisture (%): 12.5% SF-05

Proctor:

124.4 Max Dry Density (pcf):

Optimum Moisture (%): 12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / |
|--|--------------------------|-------|-------|----------|-------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------|
| _eachate | Transmission: MH-35 to | MH-36 | (Nece | ssary 95 | % Com | paction) | | | | | |
| LT-93 | MH-35 to MH-36 East Fill | SF-06 | 8 | 7:06 | JS | 6 | 125.3 | 6.2% | 97.7% | 118.0 | PASS |
| LT-94 | MH-35 to MH-36 West Fill | SF-06 | 8 | 7:11 | JS | 6 | 124.9 | 4.2% | 99.2% | 119.9 | PASS |
| LT-95 | MH-35 to MH-36 East Fill | SF-06 | 9 | 11:46 | JS | 6 | 126.1 | 7.3% | 97.3% | 117.5 | PASS |
| LT-96 | MH-35 to MH-36 West Fill | SF-06 | 9 | 13.04 | JS | 6 | 128.2 | 6.3% | 99.8% | 120.6 | PASS |
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Envirotech Engineering & Consulting. Inc

Reviewed by

6/18/10



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

95%

2500 N. 11th Street T Enid, OK 73701 (580) 234-8780 T Fax (580) 237-4302

Soil information

Necessary % Proctor:

| Project: | ERDF Cell | ERDF Cells 9-10 Expansion | | | | | | |
|--------------------------|------------|---------------------------|-----------|--|--|--|--|--|
| Project ID: | S013213A | S013213A00 | | | | | | |
| Report No. | 5-16-090 | Date | 6/16/2010 | | | | | |
| Description: | Brown/Blac | k Sand | | | | | | |
| Troxler ID: | 27881 | | | | | | | |
| Moist Std: | 643 | Density Std: | 2207 | | | | | |
| Moist offset: | - | Density offse | et: - | | | | | |
| Allowable Moisture Range | | N/A | - | | | | | |
| | | | | | | | | |

| Proctor | SF-06 |
|------------------------|-------|
| Max Dry Density (pcf): | 120.8 |
| Optimum Moisture (%): | 14.3% |
| Proctor: | SF-04 |
| Max Dry Density (pcf): | 117.3 |
| Optimum Moisture (%): | 12.5% |
| Proctor: | SF-05 |
| Max Dry Density (pcf): | 124.4 |
| Optimum Moisture (%): | 12.5% |

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|----------|--|-------|-------|----------|--------|----------------|-------------------------|-------------------------|---------------------|---|----------------|
| Leachate | Transmission: MH-35 to | MH-36 | (Nece | ssary 95 | 5% Com | paction) | | | | | |
| LT-97 | MH-35 to MH-36 East Fill | SF-06 | 10 | 7:06 | JS | 6 | 130.7 | 8.7% | 99.5% | 120.2 | PASS |
| LT-98 | MH-35 to MH-36 West Fill | SF-06 | 10 | 7:11 | JS | 6 | 129.5 | 9.5% | 97.9% | 118.3 | PASS |
| | | 15 | | | | | | | | | |
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| Reviewed by: | |
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| 1.121 | 6/18/10 |
| Envirotech Engineering & Consulting. Inc | Date ' |



Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

14.3%

SF-04

Soil Information

Project:

Project ID: Report No.

Description: Troxler ID:

Moist Std: Moist offset:

Allowable Moisture Range: Necessary % Proctor:

ERDF Cells 9-10 Expansion

S013213A00 5-16-091 Date

Brown/Black Sand 27881

643 Density Std: Density offset:

> N/A 95%

6/17/2010

2221

Proctor:

SF-06 Max Dry Density (pcf): 120.8

Optimum Moisture (%): Proctor:

Max Dry Density (pcf): 117.3 Optimum Maisture (%): 12.5% SF-05

Proctor:

Max Dry Density (pcf): 124.4 Optimum Moisture (%): 12.5%

| Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / |
|--------------------------|------------------------|---|------------------------------------|--|---|---|--|---|---|---|
| Transmission: MH-35 to | MH-36 | (Nece | ssary 95 | % Com | paction) | | | | | |
| MH-35 to MH-36 West Fill | SF-06 | 11 | 11:55 | JS | 6 | 125.0 | 6.4% | 97.3% | 117.5 | PASS |
| MH-35 to MH-36 East Fill | SF-06 | 11 | 11:59 | JS | 6 | 123.5 | 7.5% | 95.1% | 114.9 | PASS |
| | | | | | | | | | | |
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| | | | | | | | | | | |
| | Transmission: MH-35 to | Transmission: MH-35 to MH-36 MH-35 to MH-36 West Fill SF-06 | Transmission: MH-35 to MH-36 (Nece | Transmission: MH-35 to MH-36 (Necessary 95 MH-35 to MH-36 West Fill SF-06 11 11:55 | Transmission: MH-35 to MH-36 (Necessary 95% Com MH-35 to MH-36 West Fill SF-06 11 11:55 JS | Transmission: MH-35 to MH-36 (Necessary 95% Compaction) MH-35 to MH-36 West Fill SF-06 11 11:55 JS 6 | Location Pr. Lift Time Oper (in.) Depth (in.) Density (pcf) e Transmission: MH-35 to MH-36 (Necessary 95% Compaction) MH-35 to MH-36 West Fill SF-06 11 11:55 JS 6 125.0 125.0 | Location Pr. Lift Time Oper (in.) Density (pcf) Content (%) e Transmission: MH-35 to MH-36 (Necessary 95% Compaction) MH-35 to MH-36 West Fill SF-06 11 11:55 JS 6 125.0 6.4% | Location Pr. Lift Time Oper Density (pcf) Content (%) | Location Pr. Lift Time Oper Depth (in.) Density (pcf) Content (%) Content (calc) Content (calc) |

Reviewed by

Envirotech Engineering & Consulting. Inc

6/21/10



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK | 73701

(580) 234-8780 | Fax (580) 237-4302

Soil Information

ERDF Cells 9-10 Expansion Project: S013213A00 Project ID 5-16-094 Date 6/22/2010 Report No. Description Brown/Black Sand 27881 Troxler ID: 2229 Moist Std 640 Density Std: Moist offset Density offset: N/A

Allowable Moisture Range

Necessary % Proctor:

Proctor: SF-06

120.8 Max Dry Density (pcf): Optimum Moisture (%): 14.3%

Proctor

SF-04

117.3 Max Dry Density (pcf):

Optimum Moisture (%): 12.5%

SF-05

Max Dry Density (pcf): Optimum Moisture (%):

Proctor

124.4 12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / |
|------------|----------------------|----------|--------|---------|--------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------|
| Electrical | Duct Bank between Ce | Il 9 and | 10 (Ne | cessary | 95% Co | mpaction | 1) | | | | |
| EB-05 | Duct Bank West End | SF-06 | 2 | 8:15 | JS | 6 | 121.8 | 6.0% | 95.1% | 114.9 | PASS |
| EB-06 | Duct Bank East End | SF-06 | 1 | 9:25 | JS | 6 | 129.8 | 11.5% | 96.4% | 116.4 | PASS |
| EB-07 | Duct Bank East End | SF-06 | 2 | 14:50 | JS | 6 | 129.0 | 12.0% | 95.3% | 115.2 | PASS |
| | | | | | | | | | | | |

95%/90%

| s not performed on the firs | t lift on th | ie we | est end of | the duc | t back tr | ench, CQA | shall perfor | m the test in | Report 5-1 | 6-095 |
|-----------------------------|--|---|---|---|---|---|---|---|---|--|
| sion Line MH-37 to MH-3 | 38 (Nece | essar | y 90% Co | mpactic | n) | | | | | |
| MH-37 to MH-38 West | SF-06 | 1 | 13:21 | JS | 6 | 119.1 | 10.9% | 88.9% | 107.4 | FAIL |
| MH-37 to MH-38 East | SF-06 | 1 | 13:56 | JS | 6 | 117.7 | 12.0% | 87.0% | 105.1 | FAIL |
| | sion Line MH-37 to MH-3 MH-37 to MH-38 West | sion Line MH-37 to MH-38 (Nece MH-37 to MH-38 West SF-06 | sion Line MH-37 to MH-38 (Necessar MH-37 to MH-38 West SF-06 1 | sion Line MH-37 to MH-38 (Necessary 90% Co MH-37 to MH-38 West SF-06 1 13:21 | sion Line MH-37 to MH-38 (Necessary 90% Compaction MH-37 to MH-38 West SF-06 1 13:21 JS | sion Line MH-37 to MH-38 (Necessary 90% Compaction) MH-37 to MH-38 West SF-06 1 13:21 JS 6 | sion Line MH-37 to MH-38 (Necessary 90% Compaction) MH-37 to MH-38 West SF-06 1 13:21 JS 6 119.1 | sion Line MH-37 to MH-38 (Necessary 90% Compaction) MH-37 to MH-38 West SF-06 1 13:21 JS 6 119.1 10.9% | sion Line MH-37 to MH-38 (Necessary 90% Compaction) MH-37 to MH-38 West SF-06 1 13:21 JS 6 119.1 10.9% 88.9% | MH-37 to MH-38 West SF-06 1 13:21 JS 6 119.1 10.9% 88.9% 107.4 |

The backfill material between MH-37 and MH-38 has changed consistancy; therefore, a new proctor shall be performed

| Reviewed | by: | - |
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Envirotech Engineering & Consulting. Inc.

6/24/10 Date



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

ENVIROTECH

2500 N. 11th Street | Enid, OK 73701 580) 234-8780 | Fax (580) 237-4302

> SF-06 120.8 14.3% SF-08 118.0 11.3% DGC-01

> > Pass / Fail

Soil Information

| Project: | ERDF Cells | 9-10 Expansion | |
|---------------|------------|----------------|-------|
| Project ID: | S013213A | 00 | |
| Report No | 5-16-095 | Date | 6/23/ |
| Description | Brown/Blac | ck Sand | |
| Troxler ID | 27881 | | |
| Moist Std | 637 | Density Std: | |
| Moist offset: | * | Density offse | t: - |

Allowable Moisture Range

Necessary % Proctor:

| DF Cells 9-1 | 0 Expan | sion | | Proctor |
|--------------|---------|---------|-----------|------------------------|
| 13213A00 | | | | Max Dry Density (pcf): |
| 16-095 | Date | e | 3/23/2010 | Optimum Moisture (%). |
| own/Black S | Sand | | | Proctor |
| 881 | | | | Max Dry Density (pcf): |
| 7 | Density | Std: | 2227 | Optimum Moisture (%): |
| | Density | offset: | - | Proctor: |

Max Dry Density (pcf): 142.7 5.7% Optimum Moisture (%):

| , , , , , | | | | | | - | | | | | |
|-----------|----------|-----|------|------|------|----------------|-------------------------|-------------------------|------------------|--------------------------|---|
| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | F |
| | | | | | | | | | | | 1 |

N/A

95%/90%

Transmission Line MH-37 to MH-38 (Necessary 90% Compaction) MH-37 to MH-38 West 116.9 11.0% 89.3% 105.3 FAIL LT-103 SF-08 2 7.45 JS 6 LT-104 MH-37 to MH-38 East SF-08 2 9:32 JS 6 118.3 9.9% 91.2% 107.6 PASS PASS SF-08 3 12:32 JS 6 115.0 7.3% 90.8% 107.2 LT-105 MH-37 to MH-38 West MH-37 to MH-38 East SF-08 3 12:35 JS 6 114.2 6.3% 91.0% 107.4 **PASS** LT-106 LT-107 MH-37 to MH-38 West SF-08 4 15:12 JS 6 116.3 8.0% 91.3% 107.7 PASS LT-108 MH-37 to MH-38 East SF-08 15:18 JS 116.5 9.3% 90.3% 106.6 PASS Transmission Line MH-37 to MH-38 From Report 5-16-094 (Necessary 90% Compaction) 10.9% 91.0% 107.4 PASS MH-37 to MH-38 West SF-08 13:21 JS 6 119.1 LT-101 JS 6 12.0% 89.1% 105.1 FAIL LT-102 MH-37 to MH-38 East SF-08 13:56 117.7 Missed Electrical Bank Test Between Cell 9 and 10 (Necessary 95% Compaction) 6.2% 1208 PASS EB-08 Cell 9 and 10 West SF-06 13:23 JS 12 128.3 100.0%

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| Reviewed by. | TW | | | | | | | | |
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| Envirotech Engin | eering & Consulting. | Inc | | | - | Date | | | |



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street T Enid, OK 73701 580: 234-8780 T Fax 580: 237 4302

Soil Information

| Project [*] | ERDF Cells | s 9-10 Expansion | on | Proctor: | SF-07 |
|--------------------------|--|------------------|-----------|------------------------|-------|
| Project ID: | S013213A0 | 00 | | Max Dry Density (pcf): | 117.3 |
| Report No | 5-16-096 | Date | 6/24/2010 | Optimum Moisture (%): | 12.5% |
| Description | Brown/Blac | k Sand | | Proctor | SF-08 |
| Troxler ID | 27881 | | | Max Dry Density (pcf): | 118.0 |
| Moist Std: | 643 | Density Std: | 2205 | Optimum Moisture (%): | 11.3% |
| Moist offset: | 46. | Density offse | et: - | Proctor: | |
| Allowable Moisture Range | - company of the control of the cont | N/A | | Max Dry Density (pcf): | |
| Necessary % Proctor | | 90% | | Optimum Moisture (%): | |

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|----------|-----------------------|---|------|----------|------|----------------|-------------------------|-------------------------|---------------------|---|--------------|
| Leachate | Transmission Line Nec | essary (| Comp | action - | 90% | | | | | | |
| LT-109 | MH-37 to MH-38 East | SF-08 | 6 | 11:51 | JS | 12 | 121.7 | 8.6% | 95.0% | 112.1 | PASS |
| LT-110 | MH-37 to MH-38 West | SF-08 | 6 | 11.56 | JS | 12 | 120.4 | 11.7% | 91.3% | 107.8 | PASS |
| | | STATE OF THE PROPERTY AND ADDRESS OF THE PROPERTY ADDRESS | | | | | | | | | |
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| Reviewed by: TW | |
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| 11/8/1/ | 7/12/10 |
| Envirotech Engineering & Consulting. Inc | Date |



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID:

S013213A00

Report No.

5-16-097 Date

Brown/Black Sand

Description: Troxler ID:

Allowable Moisture Range:

Necessary % Proctor:

27881

Moist Std Moist offset: 647

Density Std

2237 Density offset:

6/25/2010

N/A

90%

Proctor:

SF-07

Max Dry Density (pcf):

117.3

Optimum Moisture (%):

12.5%

Proctor:

SF-08

Max Dry Density (pcf)

118.0 Optimum Moisture (%): 11.3%

Proctor:

Max Dry Density (pcf):

Optimum Moisture (%):

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|--|-----------------------|----------|------|----------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| Leachate | Transmission Line Nec | essary (| Comp | action - | 90% | | | | | | |
| LT-111 | MH-37 to MH-38 East | SF-08 | 6 | 13:08 | JS | 6 | 117.6 | 10.4% | 90.3% | 106.5 | PASS |
| LT-112 | MH-37 to MH-38 West | SF-08 | 6 | 13:12 | JS | 6 | 1137 | 6.5% | 90.5% | 106.8 | PASS |
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Envirotech, Engineering & Consulting. Inc

Reviewed by

7/11/10 Date



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 13th Street | Enid, OK 73701 .580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID

S013213A00

05-016-111 Date

7/16/2010

Report No. Description: Troxler ID

Moist Std:

Moist offset:

Allowable Moisture Range:

Necessary % Proctor:

1/4 Base Rock - Brown/Black Sand

27881

646

Density Std: 2211

Density offset:

N/A

95%

Proctor

SF-01

Max Dry Density (pcf):

Optimum Moisture (%):

113.6 12.4%

Proctor:

Max Dry Density (pcf):

Optimum Moisture (%):

Proctor:

SF-09

Max Dry Density (pcf):

139.8

Optimum Moisture (%):

7.5%

Comments SF-09 is an estimated value based on historical data (SF-11 from Cells 7-8)

Comments SF-09 Proctor will be completed in the coming week

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|------------|----------------------|----------|------|-------|------|---|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| North East | Ramp (95% Modified | Proctor) | | | | | | | | | |
| R-03 | East Ramp Fill | SF-09 | 2 | 6:55 | LH | 4 | 143.1 | 3.2% | 99.2% | 138.7 | PASS |
| R-04 | East Ramp Fill | SF-09 | 2 | 7:00 | LH | 4 | 146.6 | 3.6% | 101.2% | 141.5 | PASS |
| Leachate T | ransmission Line (95 | % Procto | r) | | | *************************************** | | | | | |
| LT-113 | Manhole No. 21 | SF-01 | 5 | 9:30 | LH | 6 | 122.6 | 12.8% | 95.7% | 108.7 | PASS |
| LT-114 | Manhole No. 21 | SF-01 | 6 | 10:00 | LH | 6 | 122.6 | 10.9% | 97.3% | 110.6 | PASS |
| LT-115 | Manhole No. 21 | SF-01 | 7 | 14:10 | LH | 6 | 123.3 | 12.2% | 96.7% | 109.9 | PASS |
| LT-116 | Manhole No. 21 | SF-01 | 8 | 14:35 | LH | 6 | 122.9 | 11.8% | 96.8% | 109.9 | PASS |
| | | | | | | | | | | | |
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| Reviewed by. | IW |
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| | 1/EV- |
| Envirotech Engine | ering & Consulting. Inc |

7/26/10

BY SAND CONE (ASTM 1556)



Client:

WCH

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701 1580) 234-8780 1 Fax (580) 237-4302

Sample Information

| Contact Name: | Charlie Skib | a E | | Sample ID: | LT-116 |
|-------------------|--------------|--------|-----------|---------------------|------------------|
| Project: | S013213A00 | | | Sample Description: | Brown/Black Sand |
| Project Location: | ERDF Cells | 9-10 | - | Sampling Date: | 7/16/2010 |
| Tested By: | L. Hay | Date. | 7/16/2010 | Sampled By. | L.Hay |
| Reviewed By: | T. Williams | Whate: | 7/20/2010 | Date Received: | 7/16/2010 |
| Comments | | | | Report No. | 05-016-111 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3955.30 g |
|---|--------------------------|
| 2 Mass of Proctor mold + sand, W ₂ | 5387.10 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4. Dry unit weight, Y _{d (sand)} = W ₂ - W ₁ | 94.70 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 4832.80 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 3215.40 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.57 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 6115.7 g |
|--|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W ₈ | 3078.4 g |
| 10. Volume of hole, $V_2 = \frac{W_8 - W_8 - W_c}{7 \text{ d (sand)}}$ | 0.0331 ft ³ |
| 11. Mass of gallon can, W ₅ | 505.70 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2325.40 g |
| 13 Mass of gallon can + dry soil, W ₉ | 2123.80 g |
| 14. Moist unit weight of soil in field. y = W ₇ - W ₅ / V ₂ | 121.36 lb/ft ³ |
| 15 Moisture content in the field, w (%) = $\frac{W_7 - W_9}{W_9 - W_5}$ X 100 | 12.5% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 107 92 lb/ft ³ |
| 17. Comparision moisture content = | 11.8% |
| 18. Dry unit weight comparison = | 109.9 lb/ft ³ |



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Washington Closure Hanford

Submittal:

05-188 Earthwork Field Data

2500 N | 11th Street | Enid OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

SF-01 Proctor:

Project ID:

S013213A00

113.6 Max Dry Density (pcf)

Report No.

05-016-112 Date 7/19/2010

12.4% Optimum Moisture (%):

Description.

1/4 Base Rock - Brown/Black Sand

SF-08 Proctor

Troxier ID

27881

Max Dry Density (pcf): Optimum Moisture (%):

118.0 11.3%

Moist Std: Moist offset: 635 Density Std: Density offset:

Proctor

SF-09

Allowable Moisture Range

N/A

Max Dry Density (pcf)

148.0

Necessary % Proctor:

95%

Optimum Moisture (%):

3.5%

Comments SF-09 is an estimated value based on historical data. SF-09 Proctor will be completed in the coming week

2229

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|-----------|-------------------------|----------|------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| North Eas | st Ramp (95% Modified F | Proctor) | | | | | | | | | |
| R-05 | East Ramp Fill | SF-09 | 3 | 13.20 | LH | 6 | 145.8 | 3.2% | 95.5% | 141.3 | PASS |
| Leachate | Transmission Line | | | | | | | | | | |
| LT-117 | Drain Line from MH-32 | SF-08 | 1 | 13:08 | LH | 12 | 124.8 | 7.8% | 98.1% | 115.8 | PASS |
| LT-118 | Drain Line from MH-32 | SF-08 | 2 | 13:10 | LH | 6 | 126.7 | 8.1% | 99.3% | 117.2 | PASS |
| LT-119 | Orain Line from MH-32 | SF-08 | 3 | 13:05 | LH | 6 | 122.2 | 7.1% | 96.7% | 114.1 | PASS |
| LT-120 | Drain Line from MH-32 | SF-08 | 4 | 13:13 | LH | 6 | 120.5 | 6.9% | 95.5% | 112.7 | PASS |
| LT-121 | Drain Line from MH-32 | SF-08 | 5 | 14:35 | LH | 6 | 124.2 | 8.9% | 96.7% | 114.0 | PASS |
| LT-122 | Drain Line from MH-32 | SF-08 | 6 | 14:44 | LH | 6 | 124.4 | 7.5% | 98.1% | 115.7 | PASS |
| LT-123 | Drain Line from MH-33 | SF-08 | 1 | 16:15 | LH | 6 | 131.7 | 8.1% | 103.2% | 121.8 | PASS |
| LT-124 | Drain Line from MH-33 | SF-08 | 2 | 16.18 | LH | 6 | 130.2 | 10.5% | 99.9% | 117.8 | PASS |
| LT-125 | Drain Line from MH-33 | SF-08 | 3 | 16:21 | LH | 6 | 120.9 | 5.8% | 96.8% | 114.3 | PASS |
| | | | | | | | | | | | |
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| Reviewed | by | 1 | W |

Envirotech Engineering & Consulting. Inc

7/26/100 Date



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

90%

2500 N. 11th Street T Enid OK 73701 (580) 234-8780 T Fax (580) 237-4302

Soil Information

Project: ERDF Cells 9-10 Expansion Project ID: S013213A00 Report No 05-016-114 Date 7/21/2010 Brown Black Sand Description 27881 Troxler ID: 2231 Moist Std: 646 Density Std: Moist offset: Density offset: Allowable Moisture Range. N/A

Necessary % Proctor:

| Proctor: | SF-01 |
|------------------------|-------|
| Max Dry Density (pcf): | 113.6 |
| Optimum Moisture (%): | 12.4% |
| Proctor | SF-08 |
| Max Dry Density (pcf): | 118.0 |
| Optimum Moisture (%): | 11.3% |
| Proctor: | SF-09 |
| Max Dry Density (pcf): | 148.0 |
| Optimum Moisture (%): | 3.5% |

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|------------|-----------------------|---------|--------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Drain Line | Backfill from MH-33 (| 90% Com | pactio | on) | | | | | | | |
| LT-126 | 9' North of MH-33 | SF-08 | 1 | 10:05 | JS | 6 | 127.2 | 8.6% | 99.3% | 117.1 | PASS |
| LT-127 | 5' North of MH-33 | SF-08 | 2 | 10:41 | JS | 6 | 125.9 | 7.4% | 99.3% | 117.2 | PASS |
| LT-128 | 7' North of MH-33 | SF-08 | 3 | 11:03 | JS | 6 | 124.1 | 5.6% | 99.6% | 117.5 | PASS |
| LT-129 | 8' North of MH-33 | SF-08 | 4 | 12:35 | JS | 6 | 125.5 | 6.1% | 100.2% | 118.3 | PASS |
| LT-130 | 4' North of MH-33 | SF-08 | 5 | 15:01 | JS | 6 | 124.9 | 6.7% | 99.2% | 117.1 | PASS |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| Reviewed t | by: | TW | , |
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Envirotech Engineering & Consulting. Inc

8/2/10

Page 1 of 1 C.3: 44 of 87



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

SF-01

113.6

12.4%

SF-08

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID:

S013213A00

Report No.

05-016-126 Date 8/5/2010 Brown Black Sand

Description: Troxler ID

27881

Moist Std:

640 Density Std: 2227

Moist offset:

Density offset:

Allowable Moisture Range:

N/A

Necessary % Proctor:

Max Dry Density (pcf): 118.0 Optimum Moisture (%): 11.3% SF-09 Proctor: Max Dry Density (pcf): 148.0 90% Optimum Moisture (%): 3.5%

Proctor:

Proctor:

Max Dry Density (pcf):

Optimum Moisture (%):

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|------------|-----------------------|---------|---|---------|---------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| Drain Line | Backfill from MH-34 a | nd MH-3 | 5 (90% | 6 Compa | action) | | | | | | |
| LT-131 | 6-ft W of MH-34 | SF-08 | 1 | 15:03 | JS | 12 | 125.3 | 8.0% | 98.3% | 116.0 | PASS |
| LT-132 | 200-ft W of MH-34 | SF-08 | 1 | 16:02 | JS | 12 | 115.9 | 7.1% | 91.7% | 108.2 | PASS |
| LT-133 | 50-ft E of MH-35 | SF-08 | 1 | 16:08 | JS | 12 | 129.6 | 11.1% | 98.9% | 116.7 | PASS |
| | 30.00 | | | | | | | | | | |
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Reviewed by: TW

Envirotech Engineering & Consulting. Inc

8/10/10



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N | 11th Street | Enid, OK | 73701 (580) 234-8780 | 1 Fax (580) 237-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID

S013213A00

Report No

05-016-127 Date 8/6/2010

Description:

Brown Black Sand 27881

Troxler ID: Moist Std:

646

Moist offset

Density Std:

Density offset:

Allowable Moisture Range Necessary % Proctor:

N/A

2244

90%

Proctor

SF-01

Max Dry Density (pcf):

113.6

Optimum Moisture (%):

12.4%

Proctor:

SF-08

Max Dry Density (pcf): Optimum Moisture (%):

11.3%

Proctor

SF-09

Max Dry Density (pcf):

148.0

Optimum Moisture (%):

3.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|------------|------------------------|-------|------|--------|-------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Drain Line | Backfill from MH-38 to | MH-39 | 90% | Compac | tion) | | | | | | |
| LT-134 | 30-ft North of MH-38 | SF-08 | 1 | 6.55 | JS | 12 | 119.1 | 8.5% | 93.0% | 109.8 | PASS |
| | | | | | | | | | | | |
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Reviewed by

Envirotech Engineering & Consulting. Inc

TW

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Washington Closure Hanford

Submittal:

05-188 Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID:

S013213A00

Report No. Description 05-016-129 Date Brown Black Sand

Troxler ID:

27881

Moist Std:

2226 644 Density Std: Density offset:

Moist offset: Allowable Moisture Range:

N/A

Necessary % Proctor:

90% / 95%

8/9/2010

Proctor

SF-01

Max Dry Density (pcf)

113.6 Optimum Moisture (%):

12.4%

Proctor:

SF-08 118.0

Max Dry Density (pcf): Optimum Moisture (%):

11.3%

Proctor

SF-09

Max Dry Density (pcf):

148.0

Optimum Moisture (%):

3.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|--------------|----------------------|---------|--------------------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Backfill fro | om MH-34 and MH-35 (| 90% Com | pacti | on) | | | | | | | |
| LT-135 | 150-ft E of MH-35 | SF-08 | 2 | 10:05 | JS | 12 | 122.7 | 8.7% | 95.7% | 112.9 | PASS |
| LT-136 | 50-ft E of MH-35 | SF-08 | 2 | 10:08 | JS | 12 | 126.8 | 10.7% | 97.1% | 114.5 | PASS |
| LT-137 | 15-ft W of MH-34 | SF-08 | 2 | 10:11 | JS | 12 | 121.6 | 7.1% | 96.2% | 113.5 | PASS |
| LT-138 | 120-ft E of MH-35 | SF-08 | 3 | 14:40 | JS | 12 | 125.9 | 7.1% | 99.6% | 117.6 | PASS |
| LT-139 | 70-ft E of MH-35 | SF-08 | 3 | 14:43 | JS | 12 | 125.4 | 6.5% | 99.8% | 117.7 | PASS |
| LT-140 | 30-ft W of MH-34 | SF-08 | 3 | 14:48 | JS | 12 | 119.6 | 6.3% | 95.3% | 112.5 | PASS |
| Backfill fro | om MH-38 and MH-39 (| 95% Com | pacti | on) | | | | | | | |
| LT-141 | 12-ft N of MH-38 | SF-08 | 2 | 12:40 | JS | 6 | 126.1 | 9.1% | 98.0% | 1156 | PASS |
| LT-142 | 20-ft N of MH-38 | SF-08 | 3 | 15:15 | JS | 6 | 118.9 | 4.8% | 96.1% | 113.5 | PASS |
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Reviewed by.

Envirotech Engineering & Consulting. Inc.

8/12/10



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Washington Closure Hanford

Submittal:

05-188 Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID:

S013213A00

Report No

8/10/2010 05-016-130 Date

Description

Brown Black Sand

Troxier ID Moist Std:

27881 649 Density Std 2206

Moist offset:

Density offset:

Necessary % Proctor:

Allowable Moisture Range

N/A

90%

Proctor

SF-01

Max Dry Density (pcf):

113.6

Optimum Moisture (%):

12.4%

Proctor:

SF-08

Max Dry Density (pcf):

118.0 11.3%

Optimum Moisture (%):

Proctor:

SF-09

Max Dry Density (pcf):

148.0

Optimum Moisture (%):

3.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|--------------|----------------------|---------|--------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Backfill fro | om MH-34 and MH-35 (| 90% Con | npacti | on) | | | | | | | |
| LT-143 | 100-ft W of MH-34 | SF-08 | 4 | 10:09 | St | 12 | 129.0 | 12.7% | 97.0% | 114.5 | PASS |
| LT-144 | 60-ft E of MH-35 | SF-08 | 4 | 10:12 | JS | 12 | 124.2 | 9.3% | 96.3% | 113.6 | PASS |
| LT-145 | 90-ft E of MH-35 | SF-08 | 4 | 10:15 | JS | 12 | 123.1 | 8.8% | 95.9% | 113.1 | PASS |
| LT-146 | 80-ft W of MH-34 | SF-08 | 5 | 14:35 | JS | 12 | 123.4 | 9.6% | 95.4% | 112.6 | PASS |
| LT-147 | 120-ft E of MH-35 | SF-08 | 5 | 14:37 | JS | 12 | 124.7 | 8.5% | 97.4% | 114.9 | PASS |
| LT-148 | 80-ft E of MH-35 | SF-08 | 5 | 14:40 | JS | 12 | 129.8 | 10.1% | 99.9% | 117.9 | PASS |
| | | | | | | | | | | | |
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TW Reviewed by

Envirotech Engineering & Consulting. Inc.

2/12/10



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK | 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project: ERDF Cells 9-10 Expansion Project ID S013213A00 Report No. 05-016-131 Date 8/11/2010 Brown Black Sand Description Troxler ID 27881 Moist Std. 649 Density Std: 2240 Moist offset: Density offset:

Allowable Moisture Range:

Necessary % Proctor:

N/A

95%

Proctor SF-01 Max Dry Density (pcf): 113.6 Optimum Moisture (%): 12.4% Proctor SF-08 Max Dry Density (pcf): 118.0 Optimum Moisture (%): 11.3% Proctor: SF-09 Max Dry Density (pcf): 148.0

3.5% Optimum Moisture (%):

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|--------------|----------------------|---------|-----------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| Backfill fro | om MH-34 and MH-35 (| 95% Con | pacti | on) | | | | | | | |
| LT-149 | 70-ft E of MH-35 | SF-08 | 6 | 9:10 | JS | 6 | 125.0 | 6.4% | 99.6% | 117.5 | PASS |
| LT-150 | 140-ft E of MH 35 | SF-08 | 6 | 9:13 | JS | 6 | 128.0 | 9.3% | 99.2% | 117.1 | PASS |
| LT-151 | 190-ft E of MH-35 | SF-08 | 6 | 9:15 | JS | 6 | 129.0 | 11.0% | 98.5% | 116.2 | PASS |
| LT-152 | 50-ft W of MH-34 | SF-08 | 7 | 13:25 | JS | 6 | 129.0 | 12.0% | 97.6% | 115.2 | PASS |
| LT-153 | 125-ft W. of MH-34 | SF-08 | 7 | 13:29 | JS | 6 | 130.1 | 12.6% | 97.9% | 115.5 | PASS |
| LT-154 | 180-ft W of MH-34 | SF-08 | 7 | 13:34 | JS | 6 | 127.4 | 9.4% | 98.7% | 116.5 | PASS |
| Backfill fro | om MH-38 and MH-39 (| 95% Com | pacti | on) | | | | | | | |
| LT-155 | 30-ft N. of MH-38 | SF-08 | 4 | 10:35 | JS | 6 | 122.7 | 8.9% | 95.5% | 112.7 | PASS |
| | | | | | | | | | | | |
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Reviewed by: Envirotech Engineering & Consulting. Inc

8/20/14



Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, Ok. 73701

(580) 234-8780 | Fax (580) 237-4302

SF-01

Soil Information

Project ID:

Project ID:
Report No.
Description.
Troxler ID:
Moist Std:

Moist offset:
Allowable Moisture Range:
Necessary % Proctor:

ERDF Cells 9-10 Expansion

\$013213A00 5-16-132 Date 8/12/2010 Brown Black Sand 27881

648 Density Std: 2203
- Density offset: -

N/A 95% Proctor:

Max Dry Density (pcf): 113.6
Optimum Maisture (%): 12.4%
Proctor: SF-08

Max Dry Density (pcf): 118.0
Optimum Moisture (%): 11.3%

Proctor: SF-09

Max Dry Density (pcf): 148.0
Optimum Moisture (%): 3.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|--------------|--------------------|---------|-------------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| Backfill fro | om MH-34 and MH-35 | 95% Con | pacti | оп) | | | | | | | |
| LT-156 | 90-ft E of MH-35 | SF-08 | 8 | 14:31 | JS | 6 | 126.5 | 7.3% | 99.9% | 117.9 | PASS |
| LT-157 | 160-ft of MH-35 | SF-08 | 8 | 14:34 | JS | 6 | 121.7 | 7.0% | 96.4% | 113.7 | PASS |
| LT-158 | 200-ft of MH-35 | SF-08 | 8 | 14:39 | JS | 6 | 126.8 | 8.5% | 99.0% | 116.9 | PASS |
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| Envirotech Engineering & Consulting. Inc | Date |

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Reviewed by:



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Fnid, OK 73701

(580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

Project ID Report No. Description Troxler ID Moist Std:

Moist offset: Allowable Moisture Range

Necessary % Proctor:

ERDF Cells 9-10 Expansion

S013213A00 5-16-133 Date

Brown Black Sand

27881 636

> Density offset: N/A

95%

Density Std:

8/13/2010

2212

Proctor:

SF-01 Max Dry Density (pcf) 113.6

Optimum Moisture (%): 12.4%

SF-08 Proctor:

Max Dry Density (pcf): 118.0 Optimum Moisture (%): 11.3%

Proctor: SF-09

148.0 Max Dry Density (pcf): Optimum Moisture (%): 3.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|-------------|-----------------------|--|-------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Backfill fr | om MH-34 and MH-35 (S | 5% Con | pacti | on) | | | | | | | |
| LT-159 | 40-ft West of MH-34 | SF-08 | 9 | 12:19 | JS | 6 | 126.6 | 7.5% | 99.8% | 117.8 | PASS |
| LT-160 | 100-ft West of MH-34 | SF-08 | 9 | 12:31 | JS | 6 | 121.4 | 3 1% | 99 8% | 117.7 | PASS |
| LT-161 | 140-ft West of MH-34 | SF-08 | 9 | 12:34 | JS | 6 | 123.8 | 5.1% | 99.8% | 117.8 | PASS |
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| Reviewed | by: | 1 | W. |
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Envirotech Engineering & Consulting. Inc.

8120/16

BY SAND CONE (ASTM 1556)



2500 N. 11th Street T Enid, OK 73701 -5801 234-8780 T Fax (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name: | Charlie Skiba | | Sample ID: | LT-159 |
|-------------------|--------------------|-----------|---------------------|------------|
| Project: | S013213A00 | | Sample Description: | Admix Soil |
| Project Location: | ERDF Cells 9-10 | | Sampling Date: | 8/13/2010 |
| Tested By: | J. Schut | 8/13/2010 | Sampled By: | J. Schut |
| Reviewed By. | J. Voss / 1/ Date. | 8/16/2010 | Date Received: | 8/13/2010 |
| Comments | | | Report No.; | 5-16-133 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3955.00 g |
|--|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5394.20 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4. Dry unit weight, $Y_{d \text{ (sand)}} = \frac{W_2 - W_3}{V_3}$ | 95.19 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6370.20 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 4754.00 g |
| 7. | Weight of sand to fill the cone, W _a = W ₄ - W ₃ | 3.56 lb |

| 8 | Mass of bottle + cone + sand (before use), W ₆ | 5232.1 g | | |
|-----|---|---------------------------|--|--|
| 9. | Mass of bottle + cone + sand (after use), W _a | 2505.7 g | | |
| 10. | Volume of hole, $V_2 = W_8 - W_8 - W_c$ $V = V_8 - V_8 - V_6$ | 0.0257 ft ³ | | |
| 11. | Mass of gallon can, W ₅ | 372.90 g | | |
| 12. | Mass of gallon can + moist soil, W ₇ | 1890.70 g | | |
| 13. | Mass of gallon can + dry soil, W ₉ | 1779.30 g | | |
| 14. | Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 130.13 lb/ft ³ | | |
| 15. | Moisture content in the field, w (%) = $W_7 - W_9 = X \cdot 100$ $W_9 - W_5$ | 7.9% | | |
| 16. | Dry unit weight in the field, d (sand) = -7 / (1+(w (%)/100) | 120.58 lb/ft ³ | | |
| 17. | Comparision moisture content = | 7.5% | | |
| 18 | Dry unit weight comparison = | 117.8 lb/ft ³ | | |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID

S013213A00

Report No.

8/16/2010 Date 5-16-134

Description

Brown Black Sand

Troxler ID

27881

Moist Std

2190 Density Std: 645

Moist offset:

Density offset: N/A

Allowable Moisture Range. Necessary % Proctor:

95%

Proctor:

SF-01

Max Dry Density (pcf):

113.6 Optimum Moisture (%): 12.4%

SF-08

Proctor

Max Dry Density (pcf): Optimum Moisture (%):

118.0 11.3%

Proctor:

SF-09

Max Dry Density (pcf):

148.0

Optimum Moisture (%):

3.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|-------------|-----------------------|---------|-------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Backfill fr | om MH-34 and MH-35 (9 | 95% Com | pacti | on) | | | | | | | |
| LT-162 | 60-ft West of MH-34 | SF-08 | 10 | 8:10 | JS | 6 | 122.0 | 5.4% | 98.1% | 115.7 | PASS |
| LT-163 | 125-ft West of MH-34 | SF-08 | 10 | 8:13 | JS | 6 | 120.7 | 3.1% | 99.2% | 117.1 | PASS |
| LT-164 | 190-ft West of MH-34 | SF-08 | 10 | 8:16 | JS | 6 | 117.5 | 3.9% | 95.8% | 113.1 | PASS |
| LT-165 | 40-ft West of MH-34 | SF-08 | 11 | 15:53 | JS | 6 | 127.3 | 9.0% | 99.0% | 116.8 | PASS |
| LT-166 | 90-ft West of MH-34 | SF-08 | 11 | 15:56 | 'JS | 6 | 127.6 | 8.7% | 99.5% | 117.4 | PASS |
| LT-167 | 120-ft West of MH-34 | \$F-08 | 11 | 15:59 | JS | 6 | 128.9 | 9.9% | 99.4% | 117.3 | PASS |
| | | | | | | | | | | | |
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Reviewed by:

Envirotech Engineering & Consulting. Inc.

TW.

8/20/10

BY SAND CONE (ASTM 1556)



2500 N - F1th Street - F. Enid, OK - 73701 - 580) 234-8780 - Fax - 580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name: | Charlie Skiba | | | Sample ID: | LT-164 |
|-------------------|---------------|------------|----------------|---------------------|------------|
| Project: | S013213A00 | | | Sample Description: | Admix Soil |
| Project Location. | ERDF Cells 9 | -10 | news) and | Sampling Date: | 8/16/2010 |
| Tested By: | J Schut / | 1 | 8/16/2010 | Sampled By: | J. Schut |
| Reviewed By. | J. Voss | Date: | 8/17/2010 | Date Received: | 8/16/2010 |
| Comments | Tester noted | inconsista | incies in soil | Report No : | 5-16-134 |
| | composition | during san | d cone test | | |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1. Mass of Proctor me | old, W ₁ | 3955.00 g |
|------------------------------------|----------------------------|--------------------------|
| 2. Mass of Proctor me | old + sand, W ₂ | 5394.20 g |
| 3. Volume of mold, V. | [| 0.03 ft |
| 4. Dry unit weight, Y _d | $(sand) = W_2 - W_1$ | 95.19 lb/ft ³ |
| | \vee_i | 33.73 10/11 |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6370.20 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use). W ₄ | 4754.00 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.56 lb |

| 8. | Mass of bottle + cone + sand (before use), W ₆ | 5835.7 g |
|-----|---|---------------------------|
| 9 | Mass of bottle + cone + sand (after use), W ₈ | 3042.7 g |
| 10. | Volume of hole, $V_2 = W_6 - W_8 - W_c$ \neq d (sand) | 0 0273 ft ³ |
| 11. | Mass of gallon can, W₅ | 505.80 g |
| 12. | Mass of gallon can + moist soil, W ₇ | 2076.70 g |
| 13. | Mass of gallon can + dry soil, W ₉ | 2009.40 g |
| 14 | Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 127.06 lb/ft ³ |
| 15. | Moisture content in the field, w (%) = $W_7 - W_9 - X$ 100 $W_9 - W_5$ | 4.5% |
| 16. | Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 121.62 lb/ft ³ |
| 17. | Comparision moisture content = | 3.9% |
| 18. | Dry unit weight comparison = | 113.1 lb/ft ³ |



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|-----|----|------|----|
| | | | |
| No. | 38 | 8911 | ш. |

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

95%

2500 N. 11th Street | Enid, OK 73701

(580) 234-8780 | Fax (580) 237-4302

Soil Information

| Project: | ERDF Cells 9-10 Expansion | | | | | | |
|--------------------------|---------------------------|------------------|-----------|--|--|--|--|
| Project ID: | S013213A0 | S013213A00 | | | | | |
| Report No. | 5-16-135 | Date | 8/17/2010 | | | | |
| Description | Brown Blad | Brown Black Sand | | | | | |
| Troxler ID: | 27881 | | | | | | |
| Moist Std: | 643 | Density Std: | 2206 | | | | |
| Moist offset: | - Density offset: - | | rt: - | | | | |
| Allowable Moisture Range | N/A | | | | | | |

Allowable Moisture Range

Necessary % Proctor

| Proctor: | SF-01 |
|------------------------|-------|
| Max Dry Density (pcf): | 113.6 |
| Optimum Moisture (%): | 12.4% |
| Proctor: | SF-08 |
| Max Dry Density (pcf) | 118.0 |
| Optimum Moisture (%). | 11.3% |
| Proctor | SF-09 |
| Man Day Danathy (mal) | 140.0 |

Max Dry Density (pcf): Optimum Moisture (%): 3.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|------------|------------------------|--|--------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Backfill f | rom MH-38 and MH-9 (95 | % Com | pactio | n) | | | | | | | |
| LT-168 | MH-38 to MH-9 | SF-08 | 1 | 15:15 | LH | 12 | 116.4 | 8.9% | 90.6% | 106.9 | PASS |
| LT-169 | MH-38 to MH-9 | SF-08 | 2 | 15:30 | LH | 12 | 122.5 | 6.7% | 97.3% | 114.8 | PASS |
| Sand Cor | ne Verification | Table of the state | | | | | | | | | |
| SCV-12 | Sand Cone Verification | SF-01 | N/A | 16:08 | LH | 6 | 104.1 | 2.3% | 89.6% | 101.8 | N/A |
| | | | | | | | | | | | |
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| Reviewed by: | TW | |
|--------------|-----|-----|
| | 1/2 | 1/2 |

Envirotech Engineering & Consulting. Inc.

8/18/10 Date

BY SAND CONE (ASTM 1556)



2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 1 Fax (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name: | Charlie Skiba | 3 | | Sample ID. | SCV-12 | |
|-------------------|---------------|------|-------------|---------------------|------------|--|
| Project: | S013213A00 | | | Sample Description: | Brown Sand | |
| Project Location: | ERDF Cells | 9-10 | | Sampling Date: | 8/17/2010 | |
| Tested By: | L. Hay | | 8/17/2010 | Sampled By: | L. Hay | |
| Reviewed By: | J Voss Al | Date | 8/18/2010 | Date Received: | 8/17/2010 | |
| Comments | /+V | V | | Report No | 5-16-135 | |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1. Ma | ass of Proctor mold, W ₁ | 3955.00 g |
|-------|---|--------------------------|
| 2. Ma | ass of Proctor mold + sand, W ₂ | 5394.20 g |
| 3 Vo | plume of mold, V ₁ | 0.03 ft |
| 4 Dr | y unit weight. $Y_{d (sand)} = \frac{W_2 - W_1}{V_1}$ | 95.19 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6370.20 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 4754.00 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.56 lb |

| 8. | Mass of bottle + cone + sand (before use), W ₆ | 5684.6 g |
|-----|--|---------------------------|
| | Mass of bottle + cone + sand (after use), W _a | 2114.6 g |
| - | Volume of hole, $V_2 = W_6 - W_8 - W_c$ $y 	ext{ d (sand)}$ | 0.0453 ft ³ |
| 11. | Mass of gallon can, W ₅ | 505.80 g |
| 12. | Mass of gallon can + moist soil, W ₇ | 2679.90 g |
| 13. | Mass of gallon can + dry soil, W ₉ | 2629.20 g |
| 14. | Moist unit weight of soil in field. $\gamma = W_7 - W_5 / V_2$ | 105.92 lb/ft ³ |
| 15. | Moisture content in the field, w (%) = $\frac{W_2 - W_9}{W_9 - W_5}$ X 100 | 2.4% |
| 16. | Dry unit weight in the field, d(sand) = 7 / (1+(w (%)/100) | 103 45 lb/ft ³ |
| 17. | Comparision moisture content = | 2.3% |
| 18. | Dry unit weight comparison = | 101.8 lb/ft ³ |



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 1 Fax (580) 237-4302

Soil Information

ERDF Cells 9-10 Expansion Proctor SF-01 Project: Project ID: S013213A00 Max Dry Density (pcf): 113.6 8/18/2010 Report No 5-16-136 Date Optimum Moisture (%): 12.4% SF-08 Brown Black Sand Proctor: Description: 27881 Max Dry Density (pcf): 118.0 Troxier ID 2218 Optimum Moisture (%): 11.3% Moist Std 635 Density Std Proctor: SF-04 Moist offset: Density offset: Allowable Moisture Range NIA Max Dry Density (pcf): 120.5 Necessary % Proctor: 95% Optimum Moisture (%): 12.8%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|-------------|-----------------------|---------|--------|------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Backfill fr | om MH-38 and MH-9 (9) | 5% Comp | pactio | n) | | | | | | | |
| LT-170 | 30-ft West of MH-38 | SF-08 | 3 | 6:48 | JS | 6 | 121.5 | 6.6% | 96.6% | 114.0 | PASS |
| LT-171 | 35-ft West of MH-38 | SF-08 | 4 | 7:20 | JS | 6 | 126.1 | 8.4% | 98.6% | 116.3 | PASS |
| LT-172 | 40-ft West of MH-38 | SF-08 | 5 | 8:15 | JS | 6 | 120.3 | 6.8% | 95.5% | 112.6 | PASS |
| | | | | | | | | | | | |
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| Reviewed by: Tu | v | | negative of the second of the | | | |
|--------------------------|-----------------|--|---|------|-------|--|
| 1120 | | | | 8/ | 20/10 | |
| Envirotech Engineering & | Consulting, Inc | | | Date | | |

BY SAND CONE (ASTM 1556)



2500 N. Lith Street F. Enid, OK. 73701 580) 234-8780 F. Fax (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name | Charlie Skil | ba | | Sample ID | LT-170 |
|-------------------|--------------|--------|--|---------------------|------------|
| Project: | S013213A0 | 00 | | Sample Description: | Brown Sand |
| Project Location: | ERDF Cells | s 9-10 | Name of the last o | Sampling Date | 8/18/2010 |
| Tested By: | J. Schut | | 8/18/2010 | Sampled By | J. Schut |
| Reviewed By: | J Voss | Date: | 8/19/2010 | Date Received: | 8/18/2010 |
| Comments | | | | Report No. | 5-16-136 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3955.00 g |
|---|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5394,20 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| Dry unit weight, $Y_{d \text{ (sand)}} = \frac{W_2 - W_1}{V_1}$ | 95.19 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6370.20 g |
|----|---|-----------|
| 6 | Mass of bottle + cone + sand (after use), W ₄ | 4754.00 g |
| 7. | Weight of sand to fill the cone. $W_c = W_4 - W_3$ | 3.56 lb |

| 8 Mass of bottle + cone + sand (before use). W ₅ | 5821.3 g |
|---|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W ₈ | 2947.9 g |
| 10. Volume of hole, $V_2 = W_6 - W_8 - W_c$ / d (sand) | 0.0291 ft ³ |
| 11. Mass of gallon can, W ₅ | 505.70 g |
| 12 Mass of gallon can + moist soil, W ₇ | 2137.80 g |
| 13. Mass of gallon can + dry soil, W ₉ | 2028.80 g |
| 14. Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 123.57 lb/ft ³ |
| 15. Moisture content in the field w (%) = $W_7 - W_9 - X$ 100 $W_9 - W_5$ | 7 2% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 115.32 lb/ft ³ |
| 17. Comparision moisture content = | 6.6% |
| 18. Dry unit weight comparison = | 114.0 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid OK 73701

(580) 234-8780 1 Fax (580) 237-4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID:

S013213A00

Report No.

8/25/2010 5-16-141

Description

Brown Black Sand

Troxler ID

27881

Moist Std:

2206 Density Std: 639

Moist offset

Density offset:

Allowable Moisture Range Necessary % Proctor:

N/A

90%/95%

Proctor:

SF-01

Max Dry Density (pcf):

113.6

Optimum Moisture (%):

12.4%

Proctor

SF-08

Max Dry Density (pcf): Optimum Moisture (%): 118.0

11.3%

Proctor:

SF-04

Max Dry Density (pcf):

120.5

12.8% Optimum Moisture (%):

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|------------|------------------------------------|---------|-------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| Backfill o | f Tank #3 Ringwall | | | | | | | | | | |
| T3-11 | Ringwall (RW) 25-ft NE of MH-39 | SF-08 | 4 | 6:56 | JS | 6 | 124.4 | 8.4% | 97.3% | 114.8 | PASS |
| T3-12 | RW 75-ft NW of MH-39 | SF-08 | 4 | 7:00 | JS | 6 | 124.3 | 9.2% | 96.5% | 113.8 | PASS |
| T3-13 | RW 65-ft NE of MH-39 | SF-08 | 5 | 8:08 | JS | 6 | 121.5 | 8.4% | 95.0% | 112.1 | PASS |
| T3-14 | RW 30-ft NW of MH-39 | SF-08 | 5 | 8:12 | JS | 6 | 121.5 | 6.1% | 97.0% | 114.5 | PASS |
| T3-15 | RW 65-ft NE of MH-39 | SF-08 | 6 | 13:04 | JS | 6 | 127.6 | 8.8% | 99.4% | 117.3 | PASS |
| T3-16 | RW 60-ft NW of MH-39 | SF-08 | 6 | 13:19 | JS | 6 | 123.3 | 7.5% | 97.2% | 114.7 | PASS |
| Backfill L | eachate Transmission L | ine MH- | 36 to | MH-37 | | | | | 7 | | |
| LT-173 | 18-ft W of MH-36 | SF-08 | 1 | 13:40 | JS | 12 | 122.9 | 5.0% | 99 2% | 117.0 | PASS |
| LT-174 | 200-ft W of MH-36 | SF-08 | 1 | 15:12 | JS | 12 | 123.5 | 8.0% | 96.9% | 114.4 | PASS |
| LT-175 | 350-ft W of MH-36 | SF-08 | 1 | 15:15 | JS | 12 | 118.1 | 10.9% | 90.2% | 106.5 | PASS |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

Reviewed by

Envirotech Engineering & Consulting. Inc

5/26/10

BY SAND CONE (ASTM 1556)



2500 N. 11th Street T Enid, OK 73701 (580) 234-8780 T Fax (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| | 1 | | Sample ID: | T3-15 |
|------------|---------------------------------------|-------------------------------|---|------------|
| S013213A00 | | | Sample Description: | Brown Sand |
| ERDF Cells | 9-10 | | Sampling Date: | 8/25/2010 |
| J Schut / | | 8/25/2010 | Sampled By: | J. Schut |
| I. Voss/ | Date: | 8/26/2010 | Date Received: | 8/25/2010 |
| 10 | | | Report No.: | 5-16-141 |
| | RDF Cells (Schut / I. Voss/, / | RDF Cells 9-10 I Schut I Voss | RDF Cells 9-10 I Schut 8/25/2010 I Voss / Date: 8/26/2010 | Schut |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3955.00 g |
|--|--------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5398.80 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4 Dry unit weight, Y _{d (sand)} = W ₂ - W ₁ | 95.49 lb/ft³ |
| V_1 | |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6369.40 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 4748.00 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.57 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 5151.1 g |
|---|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W _a | 2284.9 g |
| 10. Volume of hole, $V_2 = W_6 - W_8 - W_c$ \neq d (sand) | 0.0287 ft ³ |
| 11. Mass of gallon can, W₅ | 372.20 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2047.10 g |
| 13. Mass of gallon can + dry soil, W ₉ | 1891.90 g |
| 14. Moist unit weight of soil in field, $y_1 = W_7 - W_5 / V_2$ | 128.49 lb/ft ³ |
| 15 Moisture content in the field, w (%) = $\frac{W_7 - W_9}{W_9 - W_5}$ X 100 | 10.2% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 116.58 lb/ft ³ |
| 17. Comparision moisture content = | 8.8% |
| 18. Dry unit weight comparison = | 117.3 lb/ft ³ |



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| | | | |

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street | Enid, OK | 73701 | 1580) 234-8780 | Fax (580) 237-4302

Soil Information

| Project: | ERDF Cells | 9-10 Expansion | | Proctor [*] | SF-01 |
|---------------------------|-------------------|----------------|-----------|------------------------|-------|
| Project ID: | S013213A | 50 | | Max Dry Density (pcf): | 113.6 |
| Report No | 5-16-142 | Date | 8/26/2010 | Optimum Maisture (%): | 12.4% |
| Description | Brown Blad | ck Sand | | Proctor: | SF-08 |
| Troxler ID | 27881 | | | Max Dry Density (pcf) | 118.0 |
| Moist Std | 646 | Density Std: | 2216 | Optimum Moisture (%): | 11.3% |
| Moist offset: | - | Density offse | et: - | Proctor | SF-04 |
| Allowable Moisture Range: | | N/A | | Max Dry Density (pcf): | 120.5 |
| Necessary % Proctor: | | 90%/95% | | Optimum Moisture (%): | 12.8% |

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|--|---------------------------|---------|--------|-----------|--------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Backfill Leachate Transmission Line MH-36 to MH-37 | | | | | | | | | | | |
| LT-176 | East half of the trench | SF-08 | 2 | 6:50 | LH | 12 | 120.3 | 7.1% | 95.2% | 112.3 | PASS |
| LT-177 | West half of the trench | SF-08 | 2 | 6:55 | LH | 12 | 122.0 | 7.4% | 96.3% | 113.6 | PASS |
| LT-178 | East half of the trench | SF-08 | 3 | 9:00 | LH | 12 | 121.9 | 11.4% | 92.7% | 109.4 | PASS |
| LT-179 | West half of the trench | SF-08 | 3 | 9:05 | LH | 12 | 122.6 | 10.0% | 94.5% | 111.5 | PASS |
| LT-180 | West half of the trench | SF-08 | 4 | 10:50 | LH | 12 | 121.1 | 6.9% | 96.0% | 113.3 | PASS |
| LT-181 | East half of the trench | SF-08 | 4 | 10.55 | LH | 12 | 119.0 | 9.1% | 92.4% | 109.1 | PASS |
| LT-182 | West half of the trench | SF-08 | 5 | 14:00 | LH | 12 | 125.7 | 6.3% | 100.2% | 118.3 | PASS |
| LT-183 | East half of the trench | SF-08 | 5 | 14:05 | LH | 6 | 131.2 | 6.9% | 104.0% | 122.7 | PASS |
| LT-184 | West half of the trench | SF-08 | 6 | 15:45 | LH | 12 | 129.2 | 6.6% | 102.7% | 121.2 | PASS |
| LT-185 | East half of the trench | SF-08 | 6 | 15:50 | LH | 6 | 127.7 | 5.7% | 102.4% | 120.8 | PASS |
| Note: 6-in | tests require 95% proctor | and 12- | n test | s require | 90% pr | roctor | | | | | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| Reviewed by: TW | **** | | | | | |
|--|------|--|------|------|--|--|
| 112 Va | | | 8/27 | 7/10 | | |
| Envirotech Engineering & Consulting. Inc | | | Date | | | |





2500 N | 11th Street | 1 Enid_OK | 73701 | 580) 234-8780 | 1 Fax | 580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name: | Charlie Skiba | | Sample ID: | LT-183 |
|-------------------|-----------------|-----------|---------------------|------------|
| Project: | S013213A00 | | Sample Description. | Brown Sand |
| Project Location: | ERDF Cells 9-10 | | Sampling Date: | 8/26/2010 |
| Tested By: | L. Hay | 8/26/2010 | Sampled By: | L. Hay |
| Reviewed By: | J Voss A Date: | 8/27/2010 | Date Received: | 8/26/2010 |
| Comments | // 0 | | Report No. | 5-16-142 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1. | Mass of Proctor mold, W ₁ | 3955.00 g |
|----|---|--------------------------|
| 2. | Mass of Proctor mold + sand, W ₂ | 5398.80 g |
| 3. | Volume of mold, V ₁ | 0.03 ft |
| 4. | Dry unit weight, $Y_{d \text{ (sand)}} = W_2 - W_1$ | 95.49 lb/ft ³ |
| | V_1 | 00.40 10/10 |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6369.40 g |
|----|---|-----------|
| 6 | Mass of bottle + cone + sand (after use), W ₄ | 4748.00 g |
| 7. | Weight of sand to fill the cone, $W_a = W_4 - W_3$ | 3.57 lb |

| 8. | Mass of bottle + cone + sand (before use), W ₆ | 6115.7 g |
|-----|--|---------------------------|
| 9 | Mass of bottle + cone + sand (after use). W ₈ | 3057.2 g |
| 10 | Volume of hole, $V_2 = W_8 - W_8 - W_c$ | 0.0332 ft ³ |
| | y d (sand) | 0.0002 11 |
| 11 | Mass of gallon can, W ₅ | 505.50 g |
| 12. | Mass of gallon can + moist soil, W ₇ | 2576.00 g |
| 13. | Mass of gallon can + dry soil, W ₉ | 2422.20 g |
| 14. | Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 137.58 lb/ft ³ |
| 15 | Moisture content in the field, w (%) = $W_7 - W_9$ X 100 | 8.0% |
| | W ₃ - W ₅ | 8.076 |
| 16. | Dry unit weight in the field, d (sand) = // (1+(w (%)/100) | 127.36 lb/ft ³ |
| 17. | Comparision moisture content = | 6 9% |
| 18. | Dry unit weight comparison = | 122.7 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

N/A 90%/95% 2500 N. 11th Street T Enid OK 73701 580(234-8780 T Fax (580) 237-4302

Soil Information

ERDF Cells 9-10 Expansion Project: S013213A00 Project ID: 5-16-144 Date 8/30/2010 Report No Brown Black Sand Description: 27881 Troxler ID: 2235 655 Density Std: Moist Std. Density offset Moist offset.

Allowable Moisture Range. Necessary % Proctor: Proctor: SF-01

Max Dry Density (pcf): 113.6

Optimum Moisture (%): 12.4%

Proctor: SF-08

Max Dry Density (pcf): 118.0

Optimum Moisture (%): 11.3%

Proctor: SF-05

Max Dry Density (pcf) 124.2

Max Dry Density (pcf)
Optimum Moisture (%):

12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|------------|---------------------------|---------|---------|-----------|---------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Backfill L | eachate Transmission L | ine MH- | 36 to | MH-37 | | | | | | | |
| LT-186 | 35-ft West of MH-36 | SF-05 | 7 | 8:15 | LH | 6 | 128.2 | 8.0% | 95.6% | 118.7 | PASS |
| LT-187 | 285-ft West of MH-36 | SF-05 | 7 | 8:20 | LH | 12 | 124.4 | 8.2% | 92.6% | 115.0 | PASS |
| LT-188 | 115-ft West of MH-36 | SF-05 | 8 | 10:45 | LH | 6 | 129.1 | 8.3% | 96.0% | 119.2 | PASS |
| LT-189 | 375-ft West of MH-36 | SF-05 | 8 | 10.50 | LH | 6 | 130.4 | 6.4% | 98.7% | 122.6 | PASS |
| LT-190 | 409-ft West of MH-36 | SF-05 | 9 | 13.10 | LH | 6 | 132.2 | 9.0% | 97.7% | 121.3 | PASS |
| LT-191 | 165-ft West of MH-36 | SF-05 | 9 | 13 15 | LH | 6 | 129.0 | 8.3% | 95.9% | 119.1 | PASS |
| LT-192 | 80-ft West of MH-36 | SF-05 | 10 | 14:45 | LH | 6 | 130.1 | 8.6% | 96.5% | 119.8 | PASS |
| LT-193 | 475-ft West of MH-36 | SF-05 | 10 | 14.50 | LH | 6 | 129.3 | 7.3% | 97.0% | 120 5 | PASS |
| LT-194 | 135-ft West of MH-36 | SF-05 | 11 | 16:15 | LH | 6 | 126.9 | 6.3% | 96.1% | 119.4 | PASS |
| LT-195 | 250-ft West of MH-36 | SF-05 | 11 | 16:20 | LH | 6 | 130.1 | 6.2% | 98.6% | 122.5 | PASS |
| Note: 6-in | tests require 95% proctor | and 12- | in test | s require | ≥ 90% p | roctor | | | | | |
| | | | | | | | | | | | |
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| | | | | 0.444 | | | | | | | |

Reviewed by:

111211-

8/3/110

Envirotech Engineering & Consulting Inc

BY SAND CONE (ASTM 1556)



2500 N - 11th Street - 1 Enid, OK - 73701 (580) 234-8780 - 1 Fax (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name: | Charlie S | kiba | | Sample ID: | LT-186 | | |
|-------------------|-------------------------------|-----------|--|----------------|--|---------------------|------------|
| Project: | S013213A00 ERDF Cells 9-10 | | | | ************************************** | Sample Description: | Brown Sand |
| Project Location: | | | annia Para de la Caración de la Cara | Sampling Date | 8/30/2010 | | |
| Tested By: | L. Hay | 1-1 | 8/30/2010 | Sampled By: | L. Hay | | |
| Reviewed By | J. Voss | / / Date: | 8/31/2010 | Date Received: | 8/30/2010 | | |
| Comments | 1 | 1 | | Report No : | 5-16-144 | | |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1 | Mass of Proctor mold, W ₁ | 3955.00 g |
|----|---|--------------------------|
| 2. | Mass of Proctor mold + sand, W ₂ | 5398.80 g |
| 3. | Volume of mold, V ₁ | 0.03 ft |
| 4 | Dry unit weight, $Y_{d \text{ (sand)}} = \frac{W_2 - W_1}{V_1}$ | 95.49 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6369.40 g |
|----|---|-----------|
| 6 | Mass of bottle + cone + sand (after use), W ₄ | 4748.00 g |
| 7. | Weight of sand to fill the cone, $W_c = W_4 - W_3$ | 3.57 lb |

| 8. Mass of bottle + cone + sand | (before use) W ₆ | 5467.1 g |
|---|---|---------------------------|
| 9. Mass of bottle + cone + sand | (after use), W ₈ | 2430.4 g |
| 10. Volume of hole, $V_2 = W_B - V_C$ $\neq d$ (s | | 0.0327 ft ³ |
| 11. Mass of gallon can, W _s | | 505.50 g |
| 12. Mass of gallon can + moist : | soil, W ₇ | 2553.20 g |
| 13. Mass of gallon can + dry soi | l, W _g | 2386.40 g |
| 14. Moist unit weight of soil in fie | $eld, \gamma = W_7 - W_5 / V_2$ | 138.16 lb/ft ³ |
| 15 Moisture content in the field, | $W (\%) = W_7 - W_9 X 100$ $W_9 - W_5$ | 8.9% |
| 16. Dry unit weight in the field, d | (sand) = 7 / (1+(w (%)/100) | 126.91 lb/ft ³ |
| 17. Comparision moisture conte | nt = | 8.0% |
| 18. Dry unit weight comparison | | 118.7 lb/ft ³ |



| page 1 | 2 | _ | 4 | _ |
|--------|---|---|-------|---|
| | | | | |
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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street T Enid, OK 73701 (580) 234-8780 ± Fax (580) 237-4302

SF-01

113.6

12.4%

SF-08

11.3% SF-05

Soil Information

| Project* | ERDF Cells | 9-10 Expansion | Proctor: | | |
|--------------------------|------------------|----------------|-----------|------------------------|--|
| Project ID | ct ID S013213A00 | | | | |
| Report No | 5-16-145 | Date | 8/31/2010 | Optimum Moisture (%): | |
| Description: | Brown Blac | k Sand | | Proctor | |
| Troxler ID. | 27881 | | | Max Dry Density (pcf): | |
| Moist Std | 645 | Density Std: | 2217 | Optimum Moisture (%). | |
| Moist offset: | - | Density offse | t: - | Proctor: | |
| Allowable Moisture Range | | N/A | | Max Dry Density (pcf): | |

Allowable Moisture Range: N/A Max Dry Density (pcf): 124.2

Necessary % Proctor: 90%/95% Optimum Moisture (%): 12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass . Fail |
|------------|------------------------|---------|-------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| Backfill L | eachate Transmission l | ine MH- | 36 to | MH-37 | | | | | | | |
| LT-196 | 85-ft West of MH-36 | SF-05 | 12 | 9:05 | LH | 6 | 128.1 | 6.9% | 96.5% | 119.8 | PASS |
| LT-197 | 280-ft West of MH-36 | SF-05 | 12 | 9:15 | LH | 6 | 128.4 | 7.5% | 96.2% | 119.4 | PASS |
| LT-198 | 160-ft West of MH-36 | SF-05 | 13 | 12:55 | LH | 6 | 129.1 | 8.1% | 96.2% | 119.4 | PASS |
| LT-199 | 290-ft West of MH-36 | SF-05 | 13 | 13:00 | LH | 6 | 127.7 | 5.8% | 97.2% | 120.7 | PASS |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

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|-------------------------------------|--------|--|---|------|----|------|----|--|
| Reviewed by: TW | | | | | | | | |
| 1/8// | | | _ | | 7/ | 1/10 | | |
| Envirotech Engineering & Consulting | g. Inc | | | Date | | | | |

BY SAND CONE (ASTM 1556)



2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 1 Fax (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name: | Charlie Si | kiba | | Sample ID: | LT-196 |
|-------------------|-------------------------------|---|-----------|---------------------|------------|
| Project: | S013213A00 ERDF Cells 9-10 | | | Sample Description: | Brown Sand |
| Project Location: | | | | Sampling Date. | 8/31/2010 |
| Tested By | L. Hay | *************************************** | 8/31/2010 | Sampled By: | L. Hay |
| Reviewed By: | J. Voss | M Date: | 9/1/2010 | Date Received: | 8/31/2010 |
| Comments | | 110 | | Report No.: | 5-16-145 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3955.00 g |
|---|--------------------------|
| Mass of Proctor mold + sand, W ₂ | 5398.80 g |
| Volume of mold, V ₁ | 0.03 ft |
| Dry unit weight, $Y_{d \text{ (sand)}} = \frac{W_2 - W_1}{V_1}$ | 95.49 lb/ft ³ |
| V_1 | |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6369.40 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 4748.00 g |
| 7. | Weight of sand to fill the cone, $W_c = W_4 - W_3$ | 3.57 lb |

| 8. | Mass of bottle + cone + sand (before use), W ₆ | 5254.6 g |
|-----|---|---------------------------|
| 9. | Mass of bottle + cone + sand (after use), W ₈ | 2338.5 g |
| 10. | Volume of hole, $V_2 = W_s - W_s - W_c$ / d (sand) | 0.0299 ft ³ |
| 11. | Mass of gallon can, W ₅ | 505.60 g |
| 12. | Mass of gallon can + moist soil, W ₇ | 2293.00 g |
| 13. | Mass of gallon can + dry soil, W ₉ | 2150.30 g |
| 14. | Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 131.83 lb/ft ³ |
| 15 | Moisture content in the field, w (%) = $W_7 - W_9 - W_5$ X 100 $W_9 - W_5$ | 8.7% |
| 16. | Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 121.31 lb/ft ³ |
| 17. | Comparision moisture content = | 6.9% |
| 18. | Dry unit weight comparison = | 119.8 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 | Fax (580) 237 4302

Soil Information

| Project: | ERDF Cells 9-10 Expansion | | | |
|---------------------------|---------------------------|----------------|----------|--|
| Project ID: | S013213A0 | 00 | | |
| Report No | 5-16-146 | Date | 9/1/2010 | |
| Description | Brown Black Sand | | | |
| Troxler ID | 27881 | | | |
| Moist Std: | 641 | Density Std | 2229 | |
| Moist offset | - | Density offset | | |
| Allowable Moisture Range: | | N/A | | |

95% Necessary % Proctor

SF-09 Proctor Max Dry Density (pcf): 139.8 Optimum Moisture (%): 2.6% Proctor: SF-08 Max Dry Density (pcf): 118.0 Optimum Moisture (%): 11.3% Proctor: SF-05 Max Dry Density (pcf): 124.2 Optimum Moisture (%): 12.5%

Dry

% Proctor Depth Pass / Test No Location Pr. Lift Time Oper Density Content Density (in.) Fall (calc) (pcf) (%) (calc) Backfill Leachate Transmission Line MH-36 to MH-37 LT-200 60-ft West of MH-36 SF-05 9.5% 123.9 PASS 14 6:54 JS 6 135.7 99.8% SF-05 7:00 JS 6 132.9 7.4% 99.6% 123.7 PASS LT-201 120-ft West of MH-36 14 8:22 JS 6 142.2 6.4% 133.6 PASS LT-202 150-ft East of MH-37 SF-09 15 95.6% SF-09 8:27 JS 6 145.1 PASS LT-203 70-ft East of MH-37 15 5.3% 98.6% 137.8 SF-09 16 JS 6 142.0 LT-204 13:55 2.8% 98.8% 138.1 PASS 50-ft East of MH-37 SF-09 JS 6 LT-205 16 13:59 144.8 4.0% 99.6% 139.2 PASS 100-ft east of MH-37 Sand Cone Verification **SCV-14** Information Test 10:22 JS 6 128.2 4.5% 122.7

Wet

Moist

Reviewed by

Envirotech Engineering & Consulting. Inc

9/z/10 Date





2500 N +11th Street | Enid, OK | 73701 | 580) 234-8780 | Enix (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name: | Charlie Skib | а | | Sample ID. | SCV-14 |
|-------------------|--------------|-------|----------|--------------------|------------|
| Project: | S013213A00 |) | | Sample Description | Brown Sand |
| Project Location: | ERDF Cells | 9-10 | | Sampling Date | 9/1/2010 |
| Tested By: | J. Schut | | 9/1/2010 | Sampled By | J. Schut |
| Reviewed By. | J. Voss | Date: | 9/2/2010 | Date Received: | 9/1/2010 |
| Comments | 11 | | | Report No. | 5-16-146 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1. | Mass of Proctor mold, W ₁ | 3955.00 g |
|----|---|--------------------------|
| 2 | Mass of Proctor mold + sand, W ₂ | 5398.80 g |
| 3. | Volume of mold, V ₁ | 0.03 ft |
| 4. | Dry unit weight, $Y_{d (sand)} = W_2 - W_1$ V_1 | 95.49 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6369.40 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 4748.00 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.57 lb |

| - | | |
|-----|---|---------------------------|
| 8 | Mass of bottle + cone + sand (before use), W ₈ | 5783.5 g |
| 9. | Mass of bottle + cone + sand (after use), W ₈ | 2849.7 g |
| 10. | Volume of hole, $V_2 = \frac{W_6 - W_8 - W_c}{\gamma d \text{ (sand)}}$ | 0.0303 ft ³ |
| 11. | Mass of gallon can, W ₅ | 505.60 g |
| 12. | Mass of gallon can + moist soil, W ₇ | 2303,50 g |
| 13. | Mass of gallon can + dry soil, W ₉ | 2205.50 g |
| 14. | Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 130.82 lb/ft ³ |
| 15 | Moisture content in the field. w (%) = $W_7 - W_9 = X$ 100 $W_9 - W_5$ | 5.8% |
| 16. | Dry unit weight in the field, d (sand) = -7 / (1+(w (%)/100) | 123.69 lb/ft ³ |
| 17. | Comparision moisture content = | 4.5% |
| 18. | Dry unit weight comparison = | 122.7 lb/ft ³ |



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. 11th Steet T Enid, OK 73701

(580) 234-8780 | Fax (580) 237-4302

Soil Information

| Project: | ERDF Cells | 9-10 Expansion | |
|---------------|------------|----------------|-----------|
| Project ID: | S013213A | 00 | |
| Report No. | 5-16-154 | Date | 9/14/2010 |
| Description: | Brown Blac | ck Sand | |
| Troxler ID: | 27881 | | |
| Moist Std: | 645 | Density Std: | 2222 |
| Moist offset: | - | Density offse | t: - |
| | | | |

Allowable Moisture Range: N/A
Necessary % Proctor: 95%

| Proctor | SF-09 |
|------------------------|-------|
| Max Dry Density (pcf) | 139.8 |
| Optimum Moisture (%). | 2.6% |
| Proctor | SF-08 |
| Max Dry Density (pcf): | 118.0 |
| Optimum Moisture (%): | 11.3% |
| Proctor: | SF-05 |
| Max Dry Density (pcf) | 124.2 |
| Optimum Moisture (%): | 12.5% |

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|------------|---|--|--------|---------|--------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Tank #4 Fo | undation Fill - Filled | placed or | ily on | SW half | of pad | | | | | | |
| T4-01 | W. Side of Pad | SF-08 | Sub | 7:15 | JS | 8 | 117.8 | 5.1% | 95.0% | 112.1 | PASS |
| T4-02 | SW side of Pad | SF-08 | 1 | 10:25 | JS | 6 | 128 1 | 10.3% | 98.4% | 116 1 | PASS |
| T4-03 | W. Side of Pad | SF-08 | 2 | 12.34 | JS | 6 | 129.5 | 11.8% | 98.2% | 115.8 | PASS |
| T4-04 | SW side of Pad | SF-08 | 3 | 13:25 | JS | 6 | 125.2 | 8.4% | 97.9% | 115.5 | PASS |
| T4-05 | W. Side of Pad | SF-08 | 4 | 15:00 | JS | 6 | 124.3 | 8.2% | 97.4% | 114.9 | PASS |
| | | - Commenter of the Comm | | | | | | | | | |
| | *************************************** | | | | | | | | | | |
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Reviewed by:

| 1/5/~ 5 | 9/16/10
| Envirotech Engineering & Consulting. Inc | Date

BY SAND CONE (ASTM 1556)



2500 N. 11th Street | L. Enid, OK | 73701 | (580) 234-8780 | L. Fatx (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name: | Charlie Si | riba | | Sample ID: | T4-02 |
|-------------------|------------|----------|--|---------------------|------------|
| Project: | S013213A | 400 | Incompanies and the second sec | Sample Description: | Brown Sand |
| Project Location: | ERDF Ce | lls 9-10 | *************************************** | Sampling Date: | 9/14/2010 |
| Tested By: | J. Schut | | 9/14/2010 | Sampled By: | J. Schut |
| Reviewed By: | J Voss / | 7 /Date: | 9/15/2010 | Date Received: | 9/14/2010 |
| Comments | 1/ | 10 | | Report No.: | 5-16-154 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3955,00 g |
|--|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5398.80 g |
| 3. Volume of mold, V ₃ | 0.03 ft |
| 4. Dry unit weight, $Y_{d \text{ (sand)}} = \frac{W_2 - W_1}{V_1}$ | 95.49 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 6369.40 g |
|----|---|-----------|
| 6 | Mass of bottle + cone + sand (after use), W ₄ | 4748.00 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.57 lb |

| 8. Mass of bottle + cone + sand (before use), \ | N _e 5880.3 g |
|---|---|
| 9. Mass of bottle + cone + sand (after use), W | 3178.9 g |
| 10. Volume of hole, $V_2 = W_6 - W_8 - W_c$ / d (sand) | 0.0249 ft ³ |
| 11. Mass of gallon can, W ₅ | 505.40 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2013.00 g |
| 13. Mass of gallon can + dry soil, W ₉ | 1854.10 g |
| 14. Moist unit weight of soil in field, ** = W ₇ - V | V ₅ / V ₂ 133.30 lb/ft ³ |
| 15. Moisture content in the field, w (%) = $W_2 - V_3$ $W_9 - W_5$ | V ₃ X 100 11.8% |
| 16. Dry unit weight in the field, d (sand) = 17 / (1 | +(w (%)/100) 119.25 lb/ft ³ |
| 17 Comparision moisture content = | 10.3% |
| 18. Dry unit weight comparison = | 116.1 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

2500 N. Lith Street T Enid, OK 73701 (580) 234-8780 | Fax (580) 237 4302

Soil Information

Project:

ERDF Cells 9-10 Expansion

Project ID

S013213A00

Brown Black Sand

Report No

9/16/2010 5-16-156 Date

Description Troxler ID

27881

Moist Std:

638

Moist offset:

Allowable Moisture Range:

Necessary % Proctor:

Density Std: Density offset.

N/A

2231

95%

Proctor:

Max Dry Density (pcf):

Optimum Moisture (%):

Proctor

SF-08 Max Dry Density (pcf): 118.0

Optimum Moisture (%):

11.3%

Proctor.

SF-05

SF-09

139.8

2.6%

Max Dry Density (pcf):

124.2

Optimum Moisture (%):

12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / |
|-----------|------------------------|-------|------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------|
| Tank #4 F | oundation Fill NE Half | | | | | | | | | | |
| T4-06 | NE Foundation Fill | SF-08 | 1 | 13:18 | JS | 12 | 1195 | 11.1% | 91.2% | 107.6 | PASS |
| Tank #4 F | oundation Fill | | | | | | | | | | |
| SCV-15 | Sand Cone Verify | | | | JS | 6 | 114.8 | 4.2% | * | 110.2 | - |
| | | | | | | | | | | | |
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Reviewed by

Envirotech Engineering & Consulting. Inc

9/23/10

BY SAND CONE (ASTM 1556)



2500 N. 11th Street T Enid, OK 73701 (580) 234-8780 T Fax (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name. | Charlie Sk | iba | | Sample ID: | SCV-15 |
|-------------------|------------|----------|--------------|---------------------|------------|
| Project: | S013213A | 00 | and a second | Sample Description: | Brown Sand |
| Project Location: | ERDF Cel | s 9-10 | obusanomono. | Sampling Date: | 9/16/2010 |
| Tested By: | J. Schut | 1 | 9/16/2010 | Sampled By: | J. Schut |
| Reviewed By: | J. Voss / | 14 Date: | 9/17/2010 | Date Received. | 9/16/2010 |
| Comments | 11 | | | Report No : | 5-16-156 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1 | Mass of Proctor mold, W ₁ | 3955.20 g |
|----|---|--------------------------|
| 2. | Mass of Proctor mold + sand, W ₂ | 5398.40 g |
| 3 | Volume of mold, V ₁ | 0.03 ft |
| 4 | Dry unit weight, $Y_{d \text{ (sand)}} = \frac{W_2 - W_1}{V_1}$ | 95.45 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 7231.90 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 5615.30 g |
| 7. | Weight of sand to fill the cone, $W_c = W_4 - W_3$ | 3.56 lb |

| 8. | Mass of bottle + cone + sand (before use), W ₆ | 6451.8 g |
|-----|---|---------------------------|
| 9. | Mass of bottle + cone + sand (after use), W ₈ | 3476.7 g |
| 10. | Volume of hole, $V_2 = W_6 - W_8 - W_c$ $V_0 = V_0 + V_0 + V_0$ | 0.0314 ft ³ |
| 11. | Mass of gallon can, W _s | 505.50 g |
| 12. | Mass of gallon can + moist soil, W ₇ | 2110.70 g |
| 13. | Mass of gallon can + dry soil, W ₉ | 2022.00 g |
| 14. | Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 112.79 lb/ft ³ |
| 15. | Moisture content in the field, w (%) = $W_7 - W_9 - X$ 100 $W_9 - W_5$ | 5.8% |
| 16. | Dry unit weight in the field, d(sand) = - 2 / (1+(w (%)/100) | 106.55 lb/ft ³ |
| 17. | Comparision moisture content = | 4.2% |
| 18. | Dry unit weight comparison = | 110.2 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

3500 N 11th Street | Enid OK 23701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

| Project. | ERDF Cells | 9-10 Expansion | |
|--------------------------|-------------------|----------------|-----------|
| Project ID: | S013213A | 00 | |
| Report No. | 5-16-157 | Date | 9/17/2010 |
| Description | Brown Blad | ck Sand | |
| Troxler ID | 27881 | | |
| Moist Std | 643 | Density Std: | 2217 |
| Moist offset: | - | Density offse | t: - |
| Allowable Moisture Range | | N/A | |

| MOISE OHSEL | - Density onset. |
|--------------------------|------------------|
| Allowable Moisture Range | N/A |
| Necessary % Proctor | 95% |

| Proctor: | SF-09 |
|------------------------|-------|
| Max Dry Density (pcf): | 139.8 |
| Optimum Moisture (%): | 2.6% |
| Proctor | SF-08 |
| Max Dry Density (pcf) | 118.0 |
| Optimum Moisture (%): | 11 3% |
| Proctor | SF-05 |
| Max Dry Density (pcf): | 124.2 |
| Optimum Moisture (%): | 12.5% |

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|-----------|----------------------------|----------|--------|----------|------|----------------|-------------------------|--|---------------------|--------------------------|----------------|
| Tank #4 | Foundation Fill - 4x8-in D | rain Lin | e Tre | nch | | | | The state of the s | | | |
| T4-07 | 10-ft SW of MH-18 | SF-08 | 1 | 7:34 | JS | 6 | 122.8 | 9 2% | 95.3% | 112.5 | PASS |
| T4-08 | 25-ft SW of MH-18 | SF-08 | 2 | 8:55 | JS | 6 | 126.2 | 12.4% | 95.2% | 112.3 | PASS |
| T4-09 | 30-ft SW of MH-18 | SF-08 | 3 | 10.34 | JS | 6 | 120.1 | 7.1% | 95.0% | 112.1 | PASS |
| T4-10 | 20-ft SW of MH-18 | SF-08 | 4 | 13:13 | JS | 6 | 124.1 | 9.1% | 96.4% | 113.7 | PASS |
| Tank #4 | Foundation Fill - 2-in Lea | k Detec | tion P | ipe Trer | nch | | | | | | |
| T4-11 | 15-ft NW of Tank Center | SF-08 | 1 | 7:28 | JS | 12 | 128.0 | 10.8% | 97.9% | 115.5 | PASS |
| T4-12 | 20-ft NW of Tank Center | SF-08 | 2 | 8:50 | JS | 6 | 122.4 | 9.0% | 95.2% | 112.3 | PASS |
| T4-13 | 18-ft NW of Tank Center | SF-08 | 3 | 10:30 | JS | 6 | 124.1 | 10.6% | 95.1% | 112.2 | PASS |
| Tank #4 i | Foundation Fill - 16x10-in | Inlet Pi | pe Tr | ench | | | | | | | |
| T4-14 | 12-ft NW of MH-17 | SF-08 | 1 | 7:37 | JS | 12 | 116.1 | 7.5% | 91.5% | 108.0 | PASS |
| T4-15 | 8-ft W. of MH-17 | SF-08 | 2 | 8:58 | JS | 12 | 115.3 | 7.9% | 90.6% | 106.9 | PASS |
| T4-16 | 18-ft W of MH -17 | SF-08 | 3 | 10:44 | JS | 6 | 126.7 | 12.8% | 95.2% | 112.3 | PASS |
| T4-17 | 10-ft W. of MH-17 | SF-08 | 4 | 13:52 | JS | 6 | 124.4 | 9.6% | 96.2% | 113.5 | PASS |
| T4-18 | 6-ft W. of MH-17 | SF-08 | 5 | 15:00 | JS | 6 | 130.1 | 13.4% | 97.2% | 114.7 | PASS |
| SCV-16 | Sand Cone Verification | der | | | JS | 6 | 119.5 | 7.2% | | 111.5 | _ |

Reviewed by:

Envirotech Engineering & Consulting. Inc

9/23/10

Date





2500 N. 11th Street 1 Enicl OK 13701 (580) 234-8780 1 Fax (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name. | Charlie Skiba | | Sample ID: | SCV-16 |
|-------------------|-----------------|----------------|---------------------|------------|
| Project: | S013213A00 | | Sample Description: | Brown Sand |
| Project Location: | ERDF Cells 9-10 |) | Sampling Date: | 9/17/2010 |
| Tested By: | J. Schut | 9/17/2010 | Sampled By: | J. Schut |
| Reviewed By | J. Voss /YUD | ate: 9/20/2010 | Date Received: | 9/17/2010 |
| Comments | 1 | | Report No: | 5-16-157 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1. | Mass of Proctor mold, W ₁ | 3955.20 g |
|----|---|--------------------------|
| 2. | Mass of Proctor mold + sand, W ₂ | 5398.40 g |
| 3. | Volume of mold, V ₁ | 0.03 ft |
| 4 | Dry unit weight. $Y_{d \text{ (sand)}} = \frac{W_2 - W_1}{V_1}$ | 95.45 lb/ft ³ |

Calibration Cone

| 5 | Mass of bottle + cone + sand (before use), W ₃ | 7231.90 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 5615.30 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3 56 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 5643.0 g |
|---|---------------------------|
| 9 Mass of bottle + cone + sand (after use), W ₈ | 2773.5 g |
| 10. Volume of hole, $V_2 = W_6 - W_8 - W_7$ / d (sand) | 0 0289 ft ³ |
| 11. Mass of gallon can, W ₅ | 505.50 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2081.10 g |
| 13. Mass of gallon can + dry soil, W ₃ | 1959.30 g |
| 14. Moist unit weight of soil in field $y_1 = W_7 - W_5 / V_2$ | 120.04 lb/ft ³ |
| 15. Moisture content in the field w (%) = $W_7 - W_9 - W_5$ X 100 $W_9 - W_5$ | 8.4% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 110.76 lb/ft ³ |
| 17. Comparision moisture content = | 7.2% |
| 18. Dry unit weight comparison = | 111.5 lb/ft ³ |



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Washington Closure Hanford

Submittal:

05-18B Earthwork Field Data

N/A

95%

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 | Fax -580) 237 4302

SF-09

Soil Information

Project: ERDF Cells 9-10 Expansion S013213A00 Project ID. 9/20/2010 5-16-158 Date Report No. Brown Black Sand Description Troxler ID 27881 Moist Std: 641 Density Std. Moist offset: Density offset:

Allowable Moisture Range

Necessary % Proctor

| Max Dry Density (pcf): | 139.8 |
|------------------------|-------|
| Optimum Moisture (%): | 2.6% |
| Proctor: | SF-08 |
| Max Dry Density (pcf): | 118.0 |
| Optimum Moisture (%): | 11.3% |

Proctor:

SF-05 Proctor:

Max Dry Density (pcf): 124.2 Optimum Moisture (%): 12.5%

Dry Wet Moist Pass / % Proctor Depth Location Pr. Lift Time Oper Density Content Density Test No (in.) (calc) Fail. (pcf) (%) (calc) Tank #4 Foundation Fill - 16x10-in Inlet Pipe Trench 8-ft NW of MH-17 SF-08 7:37 JS 6 127.1 12.2% 96.0% 113.3 PASS T4-19 6 6 123.5 95.6% 112.8 PASS SF-08 14:28 JS 9.5% 9-ft W of MH-17 T4-20 Tank #4 Foundation Fill NE half of pad PASS JS 6 128.3 9.2% 99.6% 117.5 SF-08 2 14:34 NE Center of Pad T4-21 7:46 JS 112.3 6 118.5 5.5% SCV-17 Sand Cone Verification

2220

Reviewed by:

Envirotech Engineering & Consulting. Inc.

9/23/10





2500 N. 11th Street J. Enid, OK. 73701 580) 234-8780 J. Fax (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name: | Charlie Skiba | | Sample ID | SCV-17 |
|-------------------|--------------------|---|---------------------|------------|
| Project: | S013213A00 | OF THE PERSON NAMED IN COLUMN | Sample Description: | Brown Sand |
| Project Location: | ERDF Cells 9-10 | | Sampling Date: | 9/20/2010 |
| Tested By: | J. Schut A | 9/20/2010 | Sampled By | J. Schut |
| Reviewed By: | J. Voss / Y/ Date: | 9/21/2010 | Date Received: | 9/20/2010 |
| Comments | | | Report No. | 5-16-158 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3955.20 g |
|--|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5398.40 g |
| 3 Volume of mold, V ₁ | 0.03 ft |
| 4. Dry unit weight, $Y_{d \in sand} = \frac{W_2 - W_1}{V_1}$ | 95.45 lb/ft ³ |

Calibration Cone

| 5 | Mass of bottle + cone + sand (before use), W ₃ | 7231.90 g |
|----|---|-----------|
| 6 | Mass of bottle + cone + sand (after use), W ₄ | 5615.30 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.56 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 5680.1 g |
|---|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W ₈ | 2697.3 g |
| 10. Volume of hole, $V_2 = W_6 - W_8 - W_6$ \neq d (sand) | 0.0316 ft ³ |
| 11. Mass of gallon can, W₅ | 505.50 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2240.60 g |
| 13. Mass of gallon can + dry soil, W ₉ | 2122.90 g |
| 14. Moist unit weight of soil in field, $y_1 = W_7 - W_5 / V_2$ | 121.23 lb/ft ³ |
| 15. Moisture content in the field. w (%) = $W_7 - W_q = X$ 100 $W_g - W_5$ | 7.3% |
| 16. Dry unit weight in the field, d (sand) = - / (1+(w (%)/100) | 113.00 lb/ft ³ |
| 17. Comparision moisture content = | 5.5% |
| 18 Dry unit weight comparison = | 112.3 lb/ft ³ |



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Washington Closure Hanford

Submittal:

5-18B Earthwork Field Data

N/A

95%

2500 N. 11th Street T. Enid. OK. 73701 7801 234-8780 T. Fax: 5801 237, 4302

Soil Information

| Project: | ERDF Cells | 9-10 Expansion |
|---------------|------------|-----------------|
| Project ID | S013213A | 00 |
| Report No. | 5-16-159 | Date 9/ |
| Description: | Brown Blad | ck Sand |
| Troxler ID | 27881 | |
| Moist Std: | 649 | Density Std: |
| Moist offset: | 44 | Density offset: |

Allowable Moisture Range

Necessary % Proctor

| (100(0) | 0. 00 |
|------------------------|-------|
| Max Dry Density (pcf): | 139.8 |
| Optimum Moisture (%): | 2.6% |
| Proctor | SF-08 |
| Max Dry Density (pcf) | 118.0 |
| Optimum Moisture (%) | 11.3% |

Proctor

Optimum Moisture (%): 11.3%
Proctor SF-05

Max Dry Density (pcf):

Optimum Moisture (%):

124.2

SE-09

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / |
|-----------|------------------------|-------|--|------|---------------|----------------|-------------------------|-------------------------|------------------|--------------------------|--------|
| Tank #4 F | Ringwall Foundation | | | | | | | | | | |
| T4-22 | Southside of Ringwall | SF-08 | SG | 7:00 | JS | 6 | 120.0 | 6.0% | 95.9% | 113.2 | PASS |
| T4-23 | Northside of Ringwall | SF-08 | SG | 7:07 | JS | 6 | 120.3 | 6.5% | 95.7% | 113.0 | PASS |
| SCV-18 | Sand Cone Verification | - | - | 7:46 | JS | 6 | 122.2 | 6.1% | | 115.2 | - |
| | | | | | | | | | | | |
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21/2010

2227

| 1121/2 | |
|--------------------------------------|-----|
| Envirotech Engineering & Consulting. | Inc |

Reviewed by:

9/23/10

Date





Client:

WCH

Submittal:

5-18B Earthwork Field Testing

2500 N. 13th Street T. Enid, OK. 73701 580(234-8780 T. Fux. 580(237-4302)

Sample Information

| Charlie Skib | а | | Sample ID: | SCV-18 | | |
|--------------|--------------------------------------|-----------------------------|---|--|---------------------|------------|
| S013213A00 | | S013213A00 | | | Sample Description: | Brown Sand |
| ERDF Cells | 9-10 | | Sampling Date: | 9/21/2010 | | |
| J. Schut | | 9/21/2010 | Sampled By. | J. Schut | | |
| J. Voss /// | Date. | 9/22/2010 | Date Received: | 9/21/2010 | | |
| 460 | | | Report No. | 5-16-159 | | |
| | S013213A00 ERDF Cells J. Schut | ERDF Cells 9-10 J. Schut | S013213A00 ERDF Cells 9-10 J. Schut 9/21/2010 | S013213A00 Sample Description: ERDF Cells 9-10 Sampling Date: J. Schut 9/21/2010 Sampled By. J. Voss // Date. 9/22/2010 Date Received: | | |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1. 1 | Mass of Proctor mold, W ₁ | 3955 20 g |
|------|---|--------------------------|
| 2 1 | Mass of Proctor mold + sand, W ₂ | 5398 40 g |
| 3. \ | Volume of mold, V, | 0.03 ft |
| 4 [| Dry unit weight, $Y_{d (sand)} = \frac{W_2 - W_1}{V_1}$ | 95.45 lb/ft ³ |

Calibration Cone

| 5 | Mass of bottle + cone + sand (before use), W ₃ | 7231.90 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 5615.30 g |
| 7. | Weight of sand to fill the cone, $W_c = W_4 - W_3$ | 3.56 lb |

| 8. Mass of bottle + cone + sand (before use), W ₆ | 5933.7 g |
|--|---------------------------|
| 9 Mass of bottle + cone + sand (after use), W ₃ | 2985.4 g |
| 10 Volume of hole, $V_2 = W_6 - W_8 - W_9$ / d (sand) | 0 0308 ft ³ |
| 11. Mass of gallon can, W ₅ | 372.10 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2021.70 g |
| 13. Mass of gallon can + dry soil, W ₉ | 1909.80 g |
| 14. Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 118.24 lb/ft ³ |
| 15. Moisture content in the field, w (%) = $\frac{W_7 - W_9}{W_9 - W_5}$ X 100 | 7.3% |
| 16. Dry unit weight in the field, d (send) = // (1+(w (%)/100) | 110.22 lb/ft ³ |
| 17. Comparision moisture content = | 6.1% |
| 18. Dry unit weight comparison = | 115.2 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

5-18B Earthwork Field Data

N/A

95%

2500 N. 11th Street | Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

ERDF Cells 9-10 Expansion Project: S013213A00 Project ID 5-16-169 Date 10/4/2010 Report No Description: Brown Black Sand 27881 Troxler ID: Moist Std: 647 Density Std: 2232 Moist offset: Density offset:

Allowable Moisture Range

Necessary % Proctor

| Max Dry Density (pcf): | 139.8 |
|------------------------|-------|
| Optimum Moisture (%): | 2.6% |
| Proctor: | SF-08 |
| Max Dry Density (pcf): | 118.0 |
| Optimum Moisture (%): | 11.3% |
| Proctor: | SF-05 |
| Max Dry Density (pcf): | 124.2 |
| | |

Proctor:

Optimum Moisture (%): 12.5%

SF-09

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|-------------|-----------------|-------|------|--|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|-----------|
| Manhole # | 34 Backfill | | | | | | | | | | |
| MH34-08 | East Side | SF-08 | 6 | 8:28 | JS | 12 | 123.3 | 8.0% | 96.8% | 114.2 | PASS |
| MH34-09 | North Side | SF-08 | 7 | 9:14 | JS | 6 | 121.6 | 7 7% | 95.7% | 112.9 | PASS |
| MH34-10 | South Side | SF-08 | 8 | 9:18 | JS | 6 | 121.5 | 7.4% | 95.9% | 113.1 | PASS |
| MH34-11 | South Side | SF-08 | 9 | 9 40 | JS | 6 | 122.1 | 8.0% | 95.8% | 113.1 | PASS |
| MH34-12 | West Side | SF-08 | 10 | 9:44 | JS | 6 | 120.5 | 6.8% | 95.6% | 112.8 | PASS |
| MH34-13 | North Side | SF-08 | 11 | 13:43 | JS | 6 | 122.6 | 7.0% | 97.1% | 114.6 | PASS |
| MH34-14 | South Side | SF-08 | 12 | 13:48 | JS | 6 | 122.5 | 6.8% | 97.2% | 114.7 | PASS |
| Manhole #3 | 5 Backfill | | | | | | | | | | |
| MH35-08 | East Side | SF-08 | 6 | 8:13 | JS | 12 | 127.2 | 11.5% | 96.7% | 114,1 | PASS |
| MH35-09 | North Side | SF-08 | 7 | 8:54 | JS | 6 | 123.1 | 8.6% | 96.1% | 113.4 | PASS |
| MH35-10 | South Side | SF-08 | 8 | 8:51 | JS | 6 | 122.0 | 5.4% | 98.1% | 115.7 | PASS |
| MH35-11 | East Side | SF-08 | 9 | 15:40 | JS | 6 | 123.7 | 8.8% | 96.4% | 113.7 | PASS |
| MH35-12 | North Side | SF-08 | 10 | 15:45 | JS | 6 | 122.5 | 7.6% | 96.5% | 113.8 | PASS |
| MH35-13 | West Side | SF-08 | 11 | 15:48 | JS | 6 | 120.7 | 7.7% | 95.0% | 112.1 | PASS |
| MH35-14 | South Side | SF-08 | 12 | 15:51 | JS | 6 | 127.8 | 12.3% | 96.4% | 113.8 | PASS |
| MH35-15 | South East Side | SF-08 | 13 | 15:59 | JS | 6 | 123.8 | 8.2% | 97.0% | 114.4 | PASS |
| Reviewed by | y. Tw | | - | THE PERSON NAMED IN COLUMN TWO IS NOT THE PERSON NAMED IN COLUMN TWO IS NAM | | | | 1 | | | |

Envirotech Engineering & Consulting. Inc

10/7/10



Client:

Washington Closure Hanford

Submittal:

5-18Q Anchor Trench/Riser Field Testing

2500 N. 11th Street 1 Enid, OK 73701 580) 134-8780 1 Fax (580) 237-4302

Soil Information

Project: ERDF Cells 9-10 Expansion Proctor SF-01 Project ID S013213A00 Max Dry Density (pcf): 113.6 Report No 10/4/2010 Optimum Moisture (%): 5-16-169 Date 12.4% Description Brown Black Sand Proctor: SF-02 Troxler ID: 27881 Max Dry Density (pcf): 124.9 Moist Std: 647 Density Std: 2232 Optimum Moisture (%): 9.7% Moist offset: Proctor: SF-04 Density offset: Allowable Moisture Range N/A Max Dry Density (pcf): 120.5 Optimum Moisture (%): Necessary % Proctor No Compaction Specification 12.8%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|-----------|---------------------------|-------|------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Cell 9 No | rth Anchor Trench | | | | | | | | | | |
| AT-07 | Cell 9 West end of trench | SF-02 | 7 | 12:47 | JS | 6 | 127 7 | 7.1% | 95.5% | 119.2 | - |
| AT-08 | Cell 9 East end of trench | SF-02 | 1 | 12:54 | JS | 6 | 121.2 | 6.5% | 91 1% | 113.8 | - |
| ÁT-09 | Cell 9 East side | SF-02 | 2 | 13:53 | JS | 6 | 119.8 | 7.5% | 89.2% | 111.4 | _ |
| AT-10 | Cell 9 East side | SF-02 | 3 | 16:15 | JS | 6 | 125.8 | 10.4% | 91.2% | 113.9 | - |
| Cell 10 N | orth Anchor trench | | | | | | | | | | - |
| AT-11 | Cell 10 West side | SF-02 | 1 | 12:59 | JS | 6 | 123.7 | 5 9% | 93.5% | 116.8 | - |
| AT-12 | Cell 10 West side | SF-02 | 2 | 16:03 | JS | 6 | 120.8 | 9.9% | 88.0% | 109.9 | - |
| AT-13 | Cell 10 West side | SF-02 | 3 | 16:09 | JS | 6 | 121.5 | 10.3% | 88.2% | 110.2 | - |
| Sand Co | ne Verification | | | | | | | | | | - |
| SCV-20 | - | | - | 9:25 | JS | 6 | 115.1 | 4.8% | * | 109.8 | - |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

| Reviewed by: W | |
|---|----------|
| 1121- | 10/11/10 |
| Envirotech Engipering & Consulting. Inc | Date |

BY SAND CONE (ASTM 1556)



2500 N, 11th Street | Enid, OK | 73701 | (580) 234-8780 | Eax (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name: | Charlie Skiba | | Sample ID: | SCV-20 |
|-------------------|-------------------|-----------|---------------------|------------|
| Project: | S013213A00 | | Sample Description: | Brown Sand |
| Project Location: | ERDF Cells 9-10 | | Sampling Date: | 10/4/2010 |
| Tested By: | J. Schut | 10/4/2010 | Sampled By: | J. Schut |
| Reviewed By | J. Voss A / Date: | 10/5/2010 | Date Received: | 10/4/2010 |
| Comments | 13. | | Report No | 5-16-169 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1 | Mass of Proctor mold, W ₁ | 3955.40 g |
|----|---|--------------------------|
| 2. | Mass of Proctor mold + sand, W ₂ | 5397.80 g |
| 3. | Volume of mold, V ₁ | 0.03 ft |
| 4. | Dry unit weight, $Y_{d (sand)} = \frac{W_2 - W_1}{V_1}$ | 95 40 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 4722.90 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 3107.90 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.56 lb |

| Mass of bottle + cone + sand (before use), W₆ | 5884.4 g |
|---|---------------------------|
| 9. Mass of bottle + cone + sand (after use), W _s | 2873.7 g |
| 10. Volume of hole, $V_2 = W_6 - W_8 - W_c$? d (sand) | 0.0323 ft ³ |
| 11. Mass of gallon can, W ₅ | 505.60 g |
| 12. Mass of gallon can + moist soil, W ₇ | 2169.10 g |
| 13. Mass of gallon can + dry soil, W ₉ | 2067.90 g |
| 14. Moist unit weight of soil in field, $\gamma_1 = W_7 - W_5 / V_2$ | 113.70 lb/ft ³ |
| 15 Moisture content in the field, w (%) = $\frac{W_7 - W_9}{W_9 - W_5}$ X 100 | 6.5% |
| 16. Dry unit weight in the field, d (sand) = 7 / (1+(w (%)/100) | 106.79 lb/ft ³ |
| 17. Comparision moisture content = | 4.8% |
| 18. Dry unit weight comparison = | 109.8 lb/ft ³ |



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Washington Closure Hanford

Submittal:

5-18B Earthwork Field Data

ENVIROTECH

2500 N. 11th Street T Enid, OK 73701 580) 234-8780 | Fax 580) 237-4302

Soil Information

| Project: | |
|----------|----|
| Project | D: |

Report No

Description

Troxler ID

Moist Std:

Moist offset:

Allowable Moisture Range

Necessary % Proctor

ERDF Cells 9-10 Expansion

S013213A00

5-16-175

10/11/2010

Date Brown Black Sand

27881

621

Density Std: 2207

Density offset:

N/A

95%

Proctor

SF-09

Max Dry Density (pcf):

139.8 2.6%

Optimum Moisture (%) Practor

Max Dry Density (pcf):

SF-08 118.0

Optimum Moisture (%):

11.3%

Proctor:

SF-05

Max Dry Density (pcf):

124.2

Optimum Moisture (%):

12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass Fail |
|-----------|------------------------|-------|------|-------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|--------------|
| Tank #4 i | Ringwall Backfill | | | | | | | | | | |
| T4-24 | NW side of Ringwall | SF-08 | 1 | 14:40 | JS | 6 | 125.5 | 11.6% | 95.3% | 112.5 | PASS |
| T4-25 | SE side of Ringwall | SF-08 | 1 | 14:43 | JS | 6 | 124.8 | 9.3% | 96.8% | 114.2 | PASS |
| T4-26 | N side of Ringwall | SF-08 | 2 | 14:48 | JS | 6 | 121.3 | 8.1% | 95.1% | 112.2 | PASS |
| T4-27 | S side of Ringwall | SF-08 | 2 | 14:52 | JS | 6 | 123.3 | 8.2% | 96.6% | 114.0 | PASS |
| T4-28 | NE side of Ringwall | SF-08 | 3 | 14:58 | JS | 6 | 124.2 | 10.4% | 95.3% | 112.5 | PASS |
| T4-29 | W side of Ringwall | SF-08 | 3 | 15.02 | JS | 6 | 123.7 | 8.9% | 96.3% | 113.6 | PASS |
| T4-30 | E side of Ringwall | SF-08 | 4 | 15:10 | JS | 6 | 122.8 | 9.3% | 95.2% | 112.4 | PASS |
| T4-31 | SW side of Ringwall | SF-08 | 4 | 15:14 | JS | . 6 | 122.9 | 9.2% | 95.4% | 112.5 | PASS |
| T4-32 | SW side of Ringwall | SF-08 | 5 | 16:25 | JS | 6 | 122.0 | 8.3% | 95.5% | 112.7 | PASS |
| T4-33 | E side of Ringwall | SF-08 | 5 | 16:28 | JS | 6 | 124.2 | 9.7% | 95.9% | 113.2 | PASS |
| SCV-22 | Sand Cone Verification | | * | 15:18 | JS | 6 | 110.5 | 3.7% | - | 106.6 | |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

Reviewed by

Envirotech Engineering & Consulting. Inc.

10/18/10

Date





2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Charlie Ski | iba | | Sample ID. | SCV-22 |
|-------------|-------------------------------------|--|--|---|
| S013213A | 00 | and the same of th | Sample Description: | Brown Sand |
| ERDF Cell | s 9-10 | | Sampling Date: | 10/11/2010 |
| J. Schut / | 1 1 | 10/11/2010 | Sampled By: | J. Schut |
| J. Voss / | 4 Mate: | 10/12/2010 | Date Received: | 10/11/2010 |
| 21 | | | Report No.: | 5-16-175 |
| | S013213A ERDF Cell J. Schut / | Charlie Skiba S013213A00 ERDF Cells 9-10 J. Schut J. Voss | S013213A00 ERDF Cells 9-10 J. Schut / / 10/11/2010 | S013213A00 Sample Description: ERDF Cells 9-10 Sampling Date: J. Schut / / 10/11/2010 Sampled By: J. Voss / 17 Cate: 10/12/2010 Date Received: |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| Mass of Proctor mold, W ₁ | 3955.40 g |
|---|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5397.80 g |
| 3. Valume of mold, V ₁ | 0.03 ft |
| 4 Dry unit weight, $Y_{d \text{ (sand)}} = \frac{W_2 - W_1}{V_1}$ | 95.40 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 4722.90 g |
|----|---|-----------|
| 6 | Mass of bottle + cone + sand (after use), W ₄ | 3107.90 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.56 lb |

| 8. | Mass of bottle + cone + sand (before use). W ₆ | 5864.9 g |
|-----|---|---------------------------|
| 9. | Mass of bottle + cone + sand (after use), W ₈ | 2881.0 g |
| 10. | Volume of hole, $V_2 = W_6 - W_3 - W_c$ / d (sand) | 0.0316 ft ³ |
| 11. | Mass of gallon can, W ₅ | 505.90 g |
| 12 | Mass of gallon can + moist soil, W ₇ | 2121.10 g |
| 13. | Mass of gallon can + dry soil, W ₉ | 2055.00 g |
| 14. | Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 112.56 lb/ft ³ |
| 15 | Moisture content in the field, w (%) = $W_7 - W_9 = X \cdot 100$ $W_9 - W_5$ | 4.3% |
| 16. | Dry unit weight in the field, d (sand) = 1/1 (1+(w (%)/100) | 107.96 lb/ft ³ |
| 17. | Comparision moisture content = | 3.7% |
| 18. | Dry unit weight comparison = | 106.6 lb/ft ³ |



Client:

Washington Closure Hanford

Submittal:

5-18B Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701 (580) 234-8780 | Fax (580) 237-4302

Soil Information

Necessary % Proctor:

Project: ERDF Ceils 9-10 Expansion S013213A00 Project ID 5-16-178 Date 10/14/2010 Report No Brown Black Sand Description 27881 Troxler ID: Moist Std 647 Density Std: 2241 Density offset: Moist offset: Allowable Moisture Range N/A

95%

Proctor: SF-09 Max Dry Density (pcf): 139.8 Optimum Moisture (%): 2.6% SF-08 Proctor Max Dry Density (pcf): 118.0 Optimum Moisture (%): 11.3% Proctor: SF-05 124.2 Max Dry Density (pcf): Optimum Moisture (%): 12.5%

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|-----------|--------------------|-------|------|------|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| Manhole 3 | 6 Fill | | | | | | **** | | | | |
| MH36-07 | N side of Manhole | SF-08 | 5 | 9:27 | JS | 6 | 122 3 | 7.5% | 96.4% | 113.8 | PASS |
| MH36-08 | W. side of Manhole | SF-08 | 6 | 9:29 | JS | 6 | 125.5 | 11.3% | 95.6% | 112.8 | PASS |
| MH36-09 | S. side of Manhole | SF-08 | 7 | 9:32 | JS | 6 | 124.4 | 7.0% | 98.5% | 116.3 | PASS |
| MH36-10 | E. side of Manhole | SF-08 | 8 | 9:37 | JS | 6 | 125 1 | 8.7% | 97.5% | 115.1 | PASS |
| | | | | | | | | | | | |
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| Reviewed by | TW | |
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10/19/10

Envirotech Engineering & Consulting, Inc.





2500 N. 11th Street T Enid, OK 73701 (580) 234-8780 T Fax (580) 237-4302

Client:

WCH

Submittal:

5-18B Earthwork Field Testing

Sample Information

| Contact Name: | Charlie Skiba | | | Sample ID: | MH36-08 |
|-------------------|---------------|-----------------|------------|---------------------|------------|
| Project: | S013213A00 | | - | Sample Description: | Brown Sand |
| Project Location: | ERDF Cells 9 | - 10 | - | Sampling Date: | 10/14/2010 |
| Tested By: | J. Schut | | 10/14/2010 | Sampled By: | J. Schut |
| Reviewed By: | J. Voss A.A. | Date: | 10/15/2010 | Date Received: | 10/14/2010 |
| Comments | 1100 | | | Report No.: | 5-16-178 |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1. 1 | Mass of Proctor mold, W ₁ | 3955.40 g |
|------|---|--------------------------|
| 2. 1 | Mass of Proctor mold + sand, W ₂ | 5397.80 g |
| 3. \ | Volume of mold, V ₁ | 0.03 ft |
| 4. (| Dry unit weight, $Y_{d \text{ (sand)}} = \frac{W_2 - W_1}{V_1}$ | 95.40 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 4722.90 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 3107.90 g |
| 7. | Weight of sand to fill the cone, W _c = W ₄ - W ₃ | 3.56 lb |

| 8. | Mass of bottle + cone + sand (before use), W ₆ | 6095.9 g |
|-----|--|---------------------------|
| 9. | Mass of bottle + cone + sand (after use), W ₈ | 3083.7 g |
| 10. | Volume of hole, $V_2 = W_6 - W_8 - W_c$ 7 d (sand) | 0.0323 ft ³ |
| 11. | Mass of gallon can, W ₅ | 505.20 g |
| 12. | Mass of gallon can + moist soil, W ₇ | 2438.70 g |
| 13. | Mass of gallon can + dry soil, W ₉ | 2259.30 g |
| 14. | Moist unit weight of soil in field, $\gamma = W_7 - W_5 / V_2$ | 132.02 lb/ft ³ |
| 15. | Moisture content in the field, w (%) = $\frac{W_7 - W_9}{V_9 - W_5}$ X 100 | 10.2% |
| 16. | Dry unit weight in the field, d (sand) = - / / (1+(w (%)/100) | 119.77 lb/ft ³ |
| 17. | Comparision moisture content = | 11.3% |
| 18. | Dry unit weight comparison = | 112.8 lb/ft ³ |



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Washington Closure Hanford

Submittal:

5-188 Earthwork Field Data

2500 N. 11th Street 1 Enid, OK 73701

(580) 234-8780 | Fax (580) 237-4302

Soil Information

| Project: | ERDF Cells | 9-10 Expansion | ì | Proctor: | SF-09 | |
|--------------------------|------------|----------------|------------|------------------------|-------|--|
| Project ID | S013213A | 00 | | Max Dry Density (pcf) | 139.8 | |
| Report No. | 5-16-182 | Date | 10/19/2010 | Optimum Moisture (%): | 2.6% | |
| Description: | Brown Blad | k Sand | | Proctor: | SF-08 | |
| Troxler ID: | 27881 | | | Max Dry Density (pcf): | 118.0 | |
| Moist Std: | 651 | Density Std | 2211 | Optimum Moisture (%): | 11.3% | |
| Moist offset: | * | Density offs | et: - | Proctor: | SF-05 | |
| Allowable Moisture Range | N/A | | | Max Dry Density (pcf). | 124.2 | |
| Necessary % Proctor: | | 95% | | Optimum Moisture (%): | 12.5% | |

| Test No | Location | Pr. | Lift | Time | Oper | Depth (in.) | Wet Density (pcf) | Moist Content (%) | % Proctor (calc) | Dry Density (calc) | Pass / Fail |
|-----------|---------------------|-------|------|--|------|----------------|-------------------------|-------------------------|---------------------|--------------------------|----------------|
| Manhole : | 36 Fill | | | | | | | | | | |
| MH36-11 | SW. side of Manhole | SF-08 | 9 | 9:00 | JS | 6 | 122.5 | 6.4% | 97.6% | 115.1 | PASS |
| MH36-12 | E. side of Manhole | SF-08 | 10 | 9:05 | JS | 6 | 122.4 | 6.8% | 97.1% | 114.6 | PASS |
| MH36-13 | S. side of Manhole | SF-08 | 11 | 10:17 | JS | 6 | 124.0 | 5.2% | 99.9% | 117.9 | PASS |
| MH36-14 | SE, side of Manhole | SF-08 | 12 | 10:22 | JS | 6 | 124.6 | 5.7% | 99.9% | 117.9 | PASS |
| MH36-15 | S. side of Manhole | SF-08 | 13 | 15:22 | JS | 6 | 120.7 | 4.6% | 97.8% | 115.4 | PASS |
| | | | | | | | | | | | |
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| Reviewed by TW | | | | / | 0/2//1 | <u>_</u> | |
| Envirotech Engineering & Consulting. Inc | | | | Date | | | |
| | p | age 1 | of 1 | | | | |





Client:

WCH

Submittal:

5-188 Earthwork Field Testing

2500 N. 11th Street T Enid, OK 73701 580) 234-8780 T Fax (580) 237-4302

Sample Information

| Contact Name: Charlie Skiba | | | | Sample ID. | MH36-12 | |
|-----------------------------|---------------|-------|------------|---------------------|--------------------------|--|
| Project: | ject Location | | | Sample Description: | Brown Sand 10/19/2010 | |
| Project Location | | | | Sampling Date: | | |
| Tested By: | | | 10/19/2010 | Sampled By | J. Schut | |
| Reviewed By: | J. Voss | Date: | 10/20/2010 | Date Received. | 10/19/2010 | |
| Comments | No | | | Report No | 5-16-182 | |

FIELD UNIT WEIGHT - SAND CONE METHOD

Calibration of Unit Weight of Ottawa Sand

| 1 Mass of Proctor mold, W ₁ | 3955.40 g |
|--|--------------------------|
| 2. Mass of Proctor mold + sand, W ₂ | 5397.80 g |
| 3. Volume of mold, V ₁ | 0.03 ft |
| 4 Dry unit weight, Y _{d (sand)} = W ₂ - W ₃ | 95.40 lb/ft ³ |

Calibration Cone

| 5. | Mass of bottle + cone + sand (before use), W ₃ | 4722.90 g |
|----|---|-----------|
| 6. | Mass of bottle + cone + sand (after use), W ₄ | 3107.90 g |
| 7. | Weight of sand to fill the cone, $W_c = W_4 - W_3$ | 3.56 lb |

| 8 Ma | ass of bottle + cone + sand (before use). W ₆ | 5508.9 g |
|--------|---|---------------------------|
| 9. Ma | ass of bottle + cone + sand (after use), W _a | 2593.3 g |
| 10. V | plume of hole, $V_2 = \frac{W_8 - W_8 - W_c}{2}$ d (sand) | 0.0301 ft ³ |
| 11. M | ass of gallon can, W ₅ | 505.30 g |
| 12. M | ass of gallon can + moist soil, W ₇ | 2176.70 g |
| 13. M | ass of gallon can + dry soil, W ₉ | 2042.20 g |
| 14. M | oist unit weight of soil in field, $y_1 = W_7 - W_5 / V_2$ | 122.60 lb/ft ³ |
| 15. M | oisture content in the field, w (%) = $\frac{W_7 - W_9}{W_9 - W_5}$ X 100 | 8.8% |
| 16. Dr | ry unit weight in the field, d(sand) = 7 / (1+(w (%)/100) | 112.73 lb/ft ³ |
| 17. Co | omparision moisture content = | 6.8% |
| 18. Dr | y unit weight comparison = | 114.6 lb/ft ³ |