Response to RAI1

West Pasco County Class I Landfill
Cell A-4 Construction

CERTIFICATION OF CONSTRUCTION COMPLETION AND QUALITY ASSURANCE DOCUMENTATION

Dept. Of Environmental Protection

MAR 23 2011

Southwest District

Pasco County

March 2011

CDM

CDM

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March 23, 2010

Ms. Susan Pelz, P.E.
Solid Waste Section
Southwest District
Florida Department of Environmental Protection
13051 North Telecom Parkway
Temple Terrace, Florida 33637

Dept. Of Environmental Protection

MAR 23 2011

Southwest District

Subject: Response to RAI#1
West Pasco Class I Landfill – Cell A-4 Construction
Certification of Construction Completion
Pasco County Resource Recovery Facility, Pasco County
Power Plant Site Certification No. PA87-23
WACS No.: SWD/51/45799

Dear Ms. Pelz:

CDM received the first Request for Additional Information (RAI) from the Department's Southwest District on February 7, 2011 for the subject project. A meeting was arranged with the Department on March 3, 2011 to discuss these review comments. As discussed with the Department, the following are our responses to RAI 1 comments.

Comment:

1. Section B:

   a. This section of the cover letter report and several parts of the supporting documents refer to Technical Specification Section 00900, which was not included in the Technical Specifications provided as part of the post certification submittal. Please verify that Section 00900 is the CQA Plan for the project and that the CQA Plan was not modified other than changing the title of the document. In the event that the CQA Plan was modified in the creation of Section 00900, please provide a copy of Section 00900.

Response: The Section 00900 is the CQA Plan for the project and the CQA plan was not modified other than changing the title and the formatting of the document. Section 00900 is provided in **Attachment 2.**

Comment:

   b. Specification Section 02230-2.01.B.5 specifies that the sand drainage layer shall have a minimum hydraulic conductivity of $1x10^{-3}$ cm/sec. The supporting certification documentation does not appear to include hydraulic conductivity conformance testing on the sand drainage layer material. Please revise this section to explain how

conformance with this specification was verified and provide copies of any analytical testing and results relied upon, as applicable.

Response: The hydraulic conductivity of the sand drainage layer was referred to as "permeability" in test reports SA#1 to SA#46 located in Tab 5 of the report prepared by Universal Engineering (see Appendix B). Universal Engineering has revised test reports SA#1 to SA#46 to provide clarification. These replacement pages are in **Attachment 3** to this letter.

Comment:

2. Section E: Compositional Analysis by Thermogravimetry does not appear to be a conformance test required by Specification Section 02274, as indicated in this section. Please verify and explain purpose of this test and the criteria utilized in determining acceptable results.

Response: This test was not required per the Specifications, however was performed nonetheless. The test is used to verify the composition of the polymer resin used in the Geosynthetics. The results from these tests demonstrated compliance with Specification 02274-Table 1, which states that the polymer composition shall be a minimum of 97% polyethylene by weight.

CERTIFICATION OF CONSTRUCTION COMPLETION – DEP Form #62-701.900 (2)

Comment:

3. **Deviations from Plans and Application Approved by DEP:**

   a. This section of the certification form states, "The construction of this project was completed in general conformance with the approved plans and specifications by FDEP, dated August 24, 2009." As indicated by the comments provided below, there appear to be deviations from the plans and post certification submittals approved by the Department. Please verify and revise the cover letter report to provide a narrative, which identifies all changes in plans and construction and includes a description of the cause of the deviations and the "submittals" or "information" approved by the Department, in accordance with Section 4.3.h of the CQA Plan and Conditions of Certification #XIII.D.2. and #XIII.D.6. Please revise Form #62-701.900 (2) accordingly to reference this narrative.

Response: The deviations from the plans are clouded on the record drawings. These deviations are also noted on Table 3 of the cover letter, which is provided in **Attachment 1**.

Comment:

   b. Department records do not appear to indicate that a post certification submittal was submitted to and approved by the Department for the construction deviations noted in the construction completion supporting information and/or identified in the

Department comments provided below, or that these deviations were otherwise approved by the Department. Please verify and provide an explanation of why prior approval of these changes was not obtained from the Department, in accordance with Part A.3. of the clarification memo attached to the Department's August 24, 2009 Cell A-4 Construction post certification submittal approval letter and in accordance with Condition of Certification #XIII.D.2.

Response: The changes that were made did not affect the intent of the Plans or the Specifications. Field circumstances encountered during construction and improvement to constructability were the basis of the changes. The changes are clouded on the record drawings and noted on Table 3 of the cover letter.

SECTION 1 - DAILY CONSTRUCTION REPORTS & PHOTOS

Comment:

4. It appears that daily reports for December 2nd, 4th - 6th, and 12th - 14th; February 6th - 7th and 10th - 13th; and the second page of the March 6th report were not included in Section 1. Please verify whether daily reports were prepared for these days and provide copies of these reports, as applicable.

Response: Daily reports were not generated for December 2nd, 4th-6th, 12th-14th 2009 and February 6th-7th, 13th, 2010, because these were either off-days (Saturday and Sunday) or days with no construction activities. Daily reports for February 10th - 12th, 2010, have been submitted as additional pages for Appendix B of the Certification of Construction Completion Report and are provided in **Attachment 4** to this letter. The daily report for March 6th, 2010, does not have a second page.

Comment:

5. 2-15-2010 & 3-15-10: Please provide the logs and details for the identified Mortenson SPT borings and piezometers.

Response: The log for borings PS-1, MH-1, and MH-2 that were conducted by Mortensen Engineering, Inc., on February 15, 2010, are provided in **Attachment 5** to this letter.

Comment:

6. 3-4-2010: Please identify and discuss the modification to the leachate manhole location, depth, dimensions, etc. discussed in this and several other daily reports, and any other resulting modifications to the leachate management system, in the construction deviation narrative section (see Comment #3.a., above) and identify modifications to the leachate manhole & leachate management system on the revised record drawings (see Comment #42., below).

Response: The geotechnical investigation determined that the limestone was shallower than previously estimated. In order to prevent penetration into the limestone stratum, potentially interfering with the aquifer, the depths of the manholes were modified. The calculations were performed to demonstrate that there is no change to the design capacity of the leachate management system. These calculations are provided in **Attachment 6** to this letter. The modifications have been identified on the revised record drawings and noted on Table 3 of the cover letter (**Attachment 1**).

Comment:

7. 4-21-2010: Please identify and discuss the redesign and relocation of the leachate and relocation of the leachate force main discussed in this and several other daily reports in the construction deviation narrative section (see Comment 33.a., above) and identify modifications to the force main installation on the revised drawings (see Comment #42., below).

Response: Due to field conditions, the route of the leachate forcemain had to be slightly adjusted so that it did not interfere with the existing natural gas main that was previously installed by Florida Gas Transmission Line. The actual route of the natural gas line deviated from its established easement. The relocation of the leachate forcemain was coordinated with the Florida Gas Transmission Line. Revised Sheets C-2 and C-3 of the record drawings show the leachate force main's slightly modified route and are noted on Table 3 of the cover letter (**Attachment 1**).

Comment:

8. 4-24-2010: Please verify whether the "folded back" geocomposite was damaged and discuss any necessary repairs made.

Response: The comment regarding the "folded back" geocomposite was noted on the Daily Report for April 26, 2010. The geocomposite had been rolled out on the previous Friday, but was not tied down. During the weekend, wind had folded back the geocomposite. It was determined on Monday, April 26, 2010, that the geocomposite was not damaged. It was subsequently pulled back into place, tied and sewn together.

Comment:

9. 6-9-2010: Please identify and discuss the modification to the east cell berm discussed in this and several other daily reports in the construction deviation narrative section (see Comment #3.a., above) and identify modifications to the east cell berm on the revised record drawings (see Comment #42., below).

Response: The cross-section of the interim cell separation berm (running east-west) in Detail M on Sheet CD-2, previously showed the top of the berm to be 6 feet above the top of the 2 feet sand cover. A clarification of the design was necessary, because if the interim cell separation berm was constructed according to the detail, the east end of the berm would have been

approximately 4 feet higher than the east exterior berm and the west end of the berm would have been shorter than the west exterior berm. After discussions with the County, it was decided that the top of the east-west interim cell separation berm have an elevation of 53 feet. See the revised Detail M on Sheet CD-2 for the current cross-section of the east-west interim cell separation berm.

Comment:

10. 7-6-2010: Please identify and discuss the revised access road to the A-4 lift station for tanker trucks discussed in this and several other daily reports in the construction deviation narrative section (see Comment #3.a., above) and identify modifications to the access road on the revised record drawings (see Comment #42., below).

Response: The access road to the A-4 lift station was originally designed for service trucks to access the pumps in the lift station during maintenance. However, during construction, the County stated that they needed the access road large enough to also provide access to the lift station for tanker trucks in very unlikely case that the leachate loading station is unavailable and the leachate storage tank is approaching capacity. It was thereafter that the design of the access was modified to also provide access for tanker trucks. The modified access road is shown on Sheet C-2.

Comment:

11. 7-8-2010: Please identify and discuss the misalignment of the vault to the lift station and the realignment of the lift station discussed in this and several other daily reports in the construction deviation narrative section (see Comment #3.a., above) and identify these modifications on the revised record drawings (see Comment #42., below).

Response: The last sentence describing Ripa's activities in the Daily Report for July 9, 2010, provides clarification, stating, "Ripa pipe crew is on site to turn the top section of the lift station so pipe holes align". Photographs documenting the correction of the misalignment of the exposed structure are also provided in the July 9, 2010, Daily Report. Hence, the vault to the lift station was not modified and was constructed in accordance with the design.

Comment:

12. 8-6-2010: Please identify and discuss the added berm in the Subcell 4 discussed in this and several other daily reports in the construction deviation narrative section (see Comment #3.a., above) and identify this modification on the revised record drawings (see Comment #42., below).

Response: The interim berm in sub-cell 4 was added to capture the stormwater so that it would not be treated as leachate. The temporary berm is shown on the revised Sheet C-2 of the record drawings

Comment:

13. 10-28-2010: Please identify the pump discussed in this and other daily reports and discuss the pump modification in the construction deviation narrative section, as appropriate (see Comment #3.a., above). Please provide revised pump design information and calculations utilized in support of this modification, as applicable.

Response: As discussed in the meeting with the FDEP on March 3, 2011, the information regarding this pump was provided by John Power, Pasco County, to Susan Pelz, FDEP.

SECTION 3 - GCL PANAL PLACEMENT

Comment:

14. Please provide a panel layout drawing, for the GCL layer that includes the location of any repairs, as specified in Specification Section 02775-1.05.F.

Response: The GCL Proposed Panel Placement drawing is provided in **Attachment 7.** The GCL conformance testing was completed and approved before the material was shipped to the site. Tracking individual roll location was not necessary. However, a daily placement log was maintained to track material used and is in Section 3 of the Construction Certification Report. This was addressed in Section O.b. of the Liner Pre-Installation Conference's meeting minutes from April 7, 2010. These minutes were part of the quarterly report sent to the FDEP on June 15, 2010.

SECTION 8 - DESTRUCTIVE TEST LOG

Secondary Log:

Comment:

15. DS-76: Both the secondary panel layout drawing provided in Appendix E and the destructive test report for DS-76 provided in Appendix A indicate that this test was conducted on Seam 146/147. Please verify that the location entry on this log is a data entry error.

Response: The data entry for DS-76 on page 2 of the Secondary Destruct Sample Log in Section 8 was corrected to record that it was conducted on seam S146/147. The revised page of the Destruct Sample Log is provided in **Attachment 8.**

Comment:

16. DS-81B1: A destructive test location DS-81B1 was shown on the secondary panel layout drawing provided in appendix E. However destructive test DS-81B1 was not identified in this log and a destructive test report for DS-81B1 was not provided in Appendix A. Please verify whether this destructive test was conducted and revise the panel layout drawing or provide the destructed test report for DS-81B1 and revise this log, as appropriate.

Response: In the course of tracking a failed destruct, field samples are taken to track the failure down the seam. These intermediate samples (i.e. DS-81B1) are tested on site, not sent to the lab. Only the bounding samples go to the lab. The entire space between the bounding samples is repaired as shown on the as-built.

Primary Log:

Comment:

17. DP-41: Both the primary panel layout drawing provided in Appendix E and the destructive test report for DP-41 provided in Appendix A indicates that this test was conducted on Seam 95/97. Please verify that the location entry on this log is a data entry error.

Response: The data entry for DP-41 on page 2 of the Primary Destruct Sample Log in Section 8 was corrected to record that it was conducted on seam P95/97. The revised page of the Primary Destructive Test Log is provided in **Attachment 8** to this letter.

Comment:

18. DP-55R1 - DP55R4: Destructive test locations for DP-55R1 through DP-55R4 are shown on primary panel layout drawing provided in Appendix E. However destructive tests DP-55R1 through DP-55R4 were not identified in this log and destructive test reports for DP-55R1 through DP-55R4 were not provided in Appendix A. Please verify whether these destructive tests were conducted and revise the panel layout drawing or provide the destructive test reports for DP-55R1 through DP-55R4 and revise this log, as appropriate.

Response: The only destructs that went to the lab were the original DP55 and DP55A and DP55B. The "DP 55 R" designations refer to the repair locations not to destructive tests. Comanco has revised the as-built drawing for the primary liner to correctly distinguish between the repairs and the destructive test sample locations. The revised Primary Panel Layout drawing is provided in **Attachment 14**.

SECTION 9 - PANEL PLACEMENT (SECONDARY AND PRIMARY GEOCOMPOSITE)

Comment:

19. Please provide panel layout drawings for the secondary and primary geocomposite layers that includes the location of any repairs, as specified in Section 4.3.h. of the CQA Plan, to verify conformance with Specification Section 02774-3.02.B.1.g.

Response: The Proposed Panel Placement drawings for both the secondary and primary geocomposite layers are provided in **Attachment 9**. Conformance testing was completed prior to materials being shipped to site. Hence individual roll locations were not recorded. However, daily panel placement logs were kept for both the secondary and primary geocomposite layers, and were included in Section 9 of the Certification for Construction Completion. This was

addressed in Section O.b. of the Liner Pre-Installation Conference's meeting minutes from April 7, 2010. These minutes were part of the quarterly report sent to the FDEP on June 15, 2010.

APPENDIX A - PRECISION GEOSYNTHETIC LABORATORY REPORT

Destructive Seam Test Reports:

Comment:

20. DS-81B: A destructive test location DS-81B was shown on secondary panel layout drawing provided in Appendix E and included in the secondary destructive test log provided in Section 9. However a destructive test report for DS-81B was not provided in Appendix A. Please verify whether this destructive test was conducted and revise the panel layout drawing and destructive test log or provide the destructive test report for DS-81B, as appropriate.

Response: As stated previously in the response to Comment #16, DS-81 B was a field test and was not sent to the lab. Therefore there is no need to list DS-81B in Appendix A.

Comment:

21. DP-82-DP87: Please verify that the destructive test reports for destructive tests DP-82 through DP-87 provided in Appendix A are identified as DS-82 through DS-87 on the report in error, and provide revise reports for these tests, as appropriate.

Response: Yes, these destructive tests DP-82 through DP-87 were conducted on the primary liner. Revised destructive test reports for DP-82 through DP-87, pages 120 to 123 of the Precision Geosynthetic Laboratory Report, are provided in **Attachment 10**.

Geocomposite Conformance Test Reports:

Comment:

22. The geocomposite test reports indicate that both the geonet and geocomposite transmissivity tests were conducted at a normal pressure of 10,000 psf. Specification Section 02274-Table 1 specifies that the test will be conducted at 6780 psf. Please explain why the geocomposite transmissivity conformance test were conducted at a different normal pressure and how transmissivity results at a different normal pressure was evaluated to verify compliance with project specifications.

Response: 10,000 psf is the standard testing load for the transmissivity test and is more conservative for Cell A-4. The transmissivity test results conducted at 10,000 psf exceeded the minimum value required under the test pressure of 6,780 psf. Hence, the geocomposite transmissivity conformance test results met the project specifications.

Comment:

23. A review of the geocomposite test reports indicates that only geocomposite transmissivity testing was conducted in 13 of the 22 conformance tests. Specification Section 02274-Table 1 specifies that the transmissivity conformance testing will be conducted on both the geocomposite and the geonet. Neither Specification Section 02274-Table 1 nor Section 5.3.1 of the CQA Plan appear to specify a reduced testing frequency for geonet transmissivity testing. Please explain this apparent deviation from the specified geocomposite conformance testing for this project.

Response: Geocomposite transmissity testing was conducted in all 22 conformance tests. The transmissivity testing for the geonet was conducted in 7 of the conformance tests to meet the intent of the original CQA testing schedule. However, since geonet is part of the geocomposite drainage layer but is not used by itself as a drainage layer, it is appropriate to allow a reduced testing frequency. Also, Precision had a typographic error in their transmissivity conformance test results for the geonet. The revised geonet conformance test reports (7 tests) are provided in **Attachment 11.**

Comment:

24. Please identify and/or provide the test report for the in-situ transmissivity test conducted in accordance with Specification Section 02274-2.02.F.

Response: The test results for the in-situ transmissivity test for the geocomposite are provided in **Attachment 12.**

APPENDIX D - LEACHATE COLLECTION SYSTEM VIDEO INSPECTION REPORT

Comments: 25 – 34

Response: As discussed with the Department, this submittal does not include responses to items 25 – 34 related Leachate Collection System Video Inspection Report.

APPENDIX E - INSTALLER'S (COMANCO) REPORT

QUALITY CONTROL DATA - PRIMARY:

Section C - Destructive Test Report/Location Summary Pre-Weld Tests:

Comment:

35. **Destructive Sample Report:**

    a. Destruct Number 55: Destructive tests DP-55, DP-55A, DP-55B, and DP-55R1 through DP-55R4, as shown on the primary panel layout drawing provided in Appendix E appear to all be identified as Destructive Number 55 on this report. Please revise this report to specifically identify DP-55, DP-55A, DP-55B, and DP-55R1 through DP55R4.

Response: See response to Comment 18.

Comment:

b. Destruct Number 55: Identical peel and shear test results were reported for all seven destructive tests identified as Destructive Number 55. Please verify the validity of these results and revise this report, as applicable.

Response: These identical peel and shear test results were due to an error in Comanco's software tracking system. Comanco has corrected this error. The revised pages from the Destructive Sample Report for the primary layer, Section C of the Installer's Report in Appendix E, are provided in **Attachment 13**.

Section D - Seam Installation:

Comment:

36. Repair Location Summary: As shown on the Primary Panel Layout drawing in Section F and indicated in the Repair Report in Section D of Appendix E, Repair #50 is on panels 21/22/35; Repair #246 is on panels 116/115/118, Repair #424 is on panel 182; and Repair 425 is on panel 183. Please verify and revise this report or the Primary Panel Layout drawing, as appropriate.

Response: The Primary Panel Layout drawing was corrected by Comanco and is provided in **Attachment 14** along with the corresponding pages from the Repair Report in Section D of Appendix E.

Section F - As-Built (Primary Panel Layout):

Comment:

37. The destructive test locations on the drawing were identified as "DS-1", rather than "DP-1". Since the destructive tests for the primary liner were identified as "DP" in the Destructive Seam Test Reports in Appendix A, please provide a revised Primary Panel Layout drawing identifying the destructive test location as "DP".

Response: The Primary Panel Layout drawing was corrected by Comanco and is provided in **Attachment 14.**

Comment:

38. Repair #R-426 does not appear to be shown on this drawing. Please verify and provide a revised Primary Panel Layout drawing, as appropriate.

Response: Repair number R-426 has been added to the Primary Panel Layout Drawing. The revised drawing is provided in **Attachment 14**.

QUALITY CONTROL DATA - SECONDARY:

Comment:

39. **Destructive Sample Report**:

    a. Destruct Number 81: Destructive tests DS-81, DS-81A, DS-81B, DS-81B1, and DS-81B2, as shown on the primary panel layout drawing provided in Appendix E appear to all be identified as Destructive Number 81 on this report. Please revise this report to specifically identify DS-81, DS-81A, DS-81B, DS-81B1, and DS-81B2.

Response: The Secondary Destruct Sample Report was revised by Comanco to correctly identify all destructs associated with DS-81. The revised Section C is provided in **Attachment 15**.

Comment:

    b. Destruct Number 81: Identical peel and shear test results were reported for four of the five destructive tests identified as Destructive Number 81. Please verify the validity of these results and revise this report, as applicable.

Response: These identical peel and shear test results were due to an error in Comanco's software tracking system. Comanco has corrected this error. The revised results are on page 6 of the Destructive Sample Report for the secondary layer provided in **Attachment 15**.

Section D - Seam Installation:

Comment:

40. **Repair Location Summary**: Repair Numbers 421-423 identified in this report do not appear to be included in the Repair Report in Section D and Repair #423 does not appear to be shown on the Secondary Panel Layout drawing in Section F of Appendix E. Please verify and revise this report, the Repair Report and the Secondary Panel Layout drawing, as appropriate.

Response: Comanco has added repairs 421 to 423 (page 22) to the Secondary Repair Report in Section D and the Secondary Panel Layout drawing in Section F of Appendix E. These are both provided in **Attachment 16**.

APPENDIX F - WELL COMPLETION REPORT AND APPENDIX G - INITIAL SAMPLING RESULTS

Comment:

41. Please address the comments in John Morris' February 2, 2011 memorandum (attached) regarding Appendices F and G. You may contact Mr. Morris at (813) 632-7600, extension 336, to discuss the items in his memorandum.

Response: A letter addressing Mr. John Morris' memorandum is attached.

RECORD DRAWINGS TITLES "WEST PASCO CLASS I LANDFILL CELL A-4 CONSTRUCTION"

Please provide revised drawings that address the comments provided above and below, including all necessary details for certification of the construction of the GCCS. **The drawings may be reviewed in their entirety after the responses to these requests for information are submitted.**

Comment:

42. As-built changes to the facility design from the approved construction drawings submitted as part of the post certification submittal for Cell A-4 construction are not identified on the record drawings, in accordance with Condition of Certification #XIII.D.6. Please provide revised record drawings that specifically identify changes made to the approved construction drawings (by clouding or other similar method). The revised drawings will be reviewed in their entirety and additional comments and requests for additional information or revisions may be generated based on the Department's review of the revises drawings.

Response: Clouding has been added to the drawings to identify changes to the approved construction drawings. Only replacement sheets are provided with this submittal.

Comment:

43. **Sheet C-2**

    a. Please explain why the invert elevations of the leachate collection manhole inlet and outlet were modified to be at the same elevation and how this does not impact gravity flow to the leachate pumping station.

Response: The invert elevations have been modified to reflect the as-built survey provided in **Attachment 17**. The inlet elevation is 40.73 feet and the outlet elevation is 40.66, which are not at the same elevation.

Comment:

    b. The leachate valve for the southern leachate collection line in Subcell 4 appears to be located beneath the temporary berm. Please verify and explain how this valve will be accessed prior to Subcell 4 operation.

Response: Sheet C-2 has been revised to show the actual location of the valve east of the temporary berm.

Comment:

c. This sheet cross-references to Detail D on Sheet CD-1 for the cross-sectional detail of how the temporary berm was constructed. Please revise this sheet to also cross reference to the cross section detail of the constructed temporary berm where the leachate collection pipes penetrate the berm.

Response: Sheet C-2 has been revised to cross reference both Detail D and Detail H on Sheet CD-1.

Comment:

44. **Sheets C-16 through C-19; CD-6; and E-1 through E-5**: Please note that the construction details provided on these plan sheets were neither submitted as part of the post certification submittal for Cell A-4 construction nor approved as part of the Department's August 24, 20-9 Cell A-4 construction post certification approval letter. **This comment is provided for informational purposes and does not necessarily require a response, other than acknowledgment of the comment.**

Comment:

45. **Sheet CD-3**:

a. Detail J: Please explain the deletion of Detail J from Sheet CD-3. Please not that Detail J is referenced on approved Fill Sequence Drawings C-6 through C-11. Therefore, as applicable, please provide revised Drawings C-6 through C-11.

Response: Revised Detail J is provided on Sheet CD-3.

Comment:

46. **Sheet CD-5:** Please identify and discuss the modifications to the stormwater pumping system shown on this plan sheet in the construction deviation narrative section requested in Comment #3.a. above and identify these modifications on revised record drawing Sheet CD-5.

Response: The changes to Sheet CD-5 have been clouded per Comment #3.a. In Detail A, the carrier pipe containing the 3 inch force-main and electrical cord was deleted. In Detail C, geocomposite is used under the gravel face, instead of the sacrificial textured 60-mil liner and 8 oz geotextile. Also, Detail C was updated to show the 3 inch force-main and electrical cord, which runs to the sump pump. Detail E was updated to reflect the increased size of the concrete pad, to show the control panels and transformer, and the change to the access road.

Comment:

47. **Sheet M-1:**
    a. Section 1:
        1) It appears that the as-built leachate pump station has been reduced in size and capacity from the designed and approved as part of the post certification submittal for Cell A-4 construction. Please explain this construction modification and provide supporting calculations (e.g. pump cycle and capacity calculations) that demonstrate that the leachate collection and removal system will function as designed with the smaller capacity pump station.

Response: The leachate pump station was constructed per the intended design. Calculations of the pump cycle time and pumping capacity for the primary and secondary lift stations are provided in **Attachment 6.**

Comment:

2) It appears that a 4th float switch has been added to the pump station. Please verify and explain the function of the 4th float switch.

Response: A fourth float switch was installed for the primary leachate pumping station to start the second pump in an unlikely event when one pump cannot keep up with the leachate entering the pump station.

Comment:

b. Detail J:

1) It appear that the as-built secondary lift station manhole has been significantly reduced in size and capacity from that designed and approved as part of the post certification submittal for Cell A-4 construction. Please explain this construction modification and provide supporting calculations (e.g. pump cycle and capacity calculations) that demonstrate that the leachate collection and removal system will function as designed with the smaller capacity secondary lift station manhole.

Response: See response to Comment #47.a.1.

Comment:

2) It appears that three additional float switches has been added to the secondary lift station manhole. Please verify and explain the function of these additional float switches.

Response: These three float switches are used for "pump off", "pump on", and "high alarm".

Please call me if you have any questions.

Sincerely,

Aamod Sonawane, P.E., BCEE
Senior Project Manager
Camp Dresser & McKee Inc.

cc: John Power, Pasco County
Nathan Schmaus, CDM

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March 23, 2011

Mr. John Morris
Solid Waste Section
Florida Department of Environmental Protection
13051 North Telecom Parkway
Temple Terrace, Florida 33637-0926

Subject: Responses to Comments provided in FDEP Letter dated February 2, 2011 from John Morris to Steve Morgan Regarding the Pasco County Resource Recovery Facility, Pasco County Cell A-4 Construction Certification Construction Details/Initial Sampling Results for New Wells
DEP Case No. PA87-23
WACS Facility No.: 45799

Dear Mr. Morris

The following are responses to comments provided in the FDEP letter dated February 2, 2011 from John Morris to Steve Morgan regarding construction details/initial groundwater sampling results for new wells installed at the Pasco County Resource Recovery Facility in association with the Pasco County Cell A-4 construction. Mr. Morris referenced his comments to the requirements presented in Part E of the clarification memorandum attached to the Department's August 24, 2009 Cell A-4 construction post certification approval letter.

On March 15, 2011, Candia Mulhern, Laboratory Manager of the Pasco County Environmental Laboratory, sent an e-mail to the attention of John Morris and Clark Moore. The e-mail from Candia Mulhern contains several attachments that provide the Cell A-4 Construction Certification Construction Details/Initial Sampling Results for New Wells documentation identified as being deficient in Mr. Morris' February 2, 2011 letter. This documentation is referenced in the responses below as "attachments in Candia Mulhern's e-mail dated March 15, 2011".

Comment:

1. **Part #E.1.a.**

Information Submitted:

- Appendix G provided the report of results for the July 1, 2010 and September 9, 2010 initial sampling events.

Deficiency:

- No documentation was provided to certify that the new background wells or new detection wells were purged in accordance with the Department's SOPs during the July 1, 2010 and September 9, 2010 initial sampling events, respectively.

- No documentation was provided to demonstrate that samples from the new background wells or new detection wells were collected in accordance with the Department's SOPs during the July 1, 2010 and September 9, 2010 initial sampling events, respectively.

Corrective Actions:

- Please provide a completed DEP Form #FD 9000-24 for each of the new wells included in the July 1, 2010 and September 9, 2010 initial sampling events.
- Please provide a completed DEP Form #62-701.900(31) for the July 1, 2010 and for the September 9, 2010 initial sampling events.

Response: The initial sampling of the new wells was performed by Pasco County Laboratory personnel during the July 1, 2010 and September 9, 2010 sampling events. A Groundwater Sampling Log (DEP Form #FD 9000-24) was completed by Pasco County Laboratory personnel for each of the wells. These logs were provided as attachments in Candia Mulhern's e-mail dated March 15, 2011. The groundwater samples were analyzed by Pasco County Laboratory. Water Quality Monitoring Certification forms (DEP Form #62-701.900(31) completed by Pasco County Laboratory for these two sampling events were provided as attachments in Candia Mulhern's e-mail dated March 15, 2011.

Comment:

2. Part #E.3./#E.5.b./#E.5.d.

Information Submitted:

- Appendix F provided the Well Construction Permits #805238, #805240, #805242, #805243, #806582 and #806614 issued by the Southwest Florida Water Management District.
- Appendix F provided the boring logs that described the lithology encountered at the locations of 2MW-24D, 2MW-25D, 2MW-26D and 2MW-27D.
- Appendix F provided DEP Form #62-520.900(3) for wells 2MW-24S, 2MW-24D, 2MW-25S, 2MW-25D, 2MW-26S, 2MW-26D, 2MW-27S, 2MW-27D, 4MW-27 and 4MW-27D.
- Appendix H provided the as-built survey, prepared by Florida Design Consultants, Inc., revised November 8, 2010, drawing #5 of 5.

Deficiency:

- The survey drawing provided northing/easting coordinates for new monitor wells.

Corrective Actions:

- Please provide a revised as-built survey (signed and sealed) that includes the degrees, minutes and seconds of latitude and longitude for the new monitor wells.

Response: A revised as-built survey (signed and sealed) that includes the degrees, minutes and seconds of latitude and longitude for the new monitor wells is provided in **Attachment 17**.

Comment:

3. Parts #E.4/#E.4.a./#E.4.b.

Information Submitted:

- Appendix G provided the report of results prepared by Pace Analytical and by Pasco County Environmental Laboratory for the July 1, 2010 sampling event conducted at wells 2MW-27S [dry at the time of sampling], 2MW-27D, 4MW-27, and 4MW-27D.
- Appendix G provided the report of results prepared by Pace Analytical for the September 9, 2010 sampling event conducted at wells 2MW-24S, 2MW-24D, 2MW-25S [dry at the time of sampling], 2MW-25D, 2MW-26S [dry at the time of sampling], and 2MW-26D.

Deficiency:

- The report of results prepared by Pasco County Environmental Laboratory was not provided for the September 9, 2010 sampling event.
- Nine semi-volatile organic compounds referenced in Rule 62-701.510(8)(d), F.A.C. [the parameters listed in 40 CFR Part 258, Appendix II] were reported at elevated detection limits that do not demonstrate compliance with Class G-II ground water standards or ground water minimum criteria. Please refer to the attached table for these parameters.
- Ground water surface elevation contour maps were not submitted for water levels measured during the July 1, 2010 and September 9, 2010 initial sampling events.

Corrective Actions:

- Please provide report of results prepared by Pasco County Environmental Laboratory for the September 9, 2010 sampling event.
- Please coordinate with Pace Analytical to determine if the results for the July 1, 2010 and September 9, 2010 initial sampling events can be reported at lower detection limits to demonstrate compliance with ground water standards or minimum criteria. In the event that the laboratory can report at lower detection limits, please submit revised reports of results. For any parameter that cannot be reported at sufficiently lower detection limits, please conduct a supplemental sampling event using an appropriate analytical method and submit the results with the responses to these comments.
- Please provide ground water surface elevation contour maps for all wells at the facility for the July 1, 2010 and September 9, 2010 initial sampling events. In the event that water levels were not measured at all the required wells during the July 1, 2010 and September 9, 2010 initial sampling events, please conduct a supplemental round of ground water level measurements at "all active monitor wells" as referenced in Part #E.4.a., of the clarification memorandum attached to the Department's August 24, 2009 Cell A-4 construction post certification approval letter and submit a ground water surface elevation map using this data.

Response: A report of results prepared by Pasco County Environmental Laboratory for the September 9, 2010 sampling event was provided as one of the attachments in Candia Mulhern's e-mail dated March 15, 2011.

Sakina McKenzie at Pace Analytical Laboratory was contacted by Candia E. Mulhern from Pasco County Laboratory to determine if the results for the July 1, 2010 and September 9, 2010 initial sampling events associated with the ten new monitor wells can be reported at lower detection limits (DLs) to demonstrate compliance with ground water standards or minimum criteria. According to information from Pace Analytical Lab, the DLs reported for the method used to analyze the concentrations of the nine semi-volatile organic compounds with DLs that exceed Practical Quantitation Limits (PQLs) and/or Groundwater Criteria identified in the Summary of Inadequate Results table in Mr. Morris's letter were correct and cannot be reduced based on the data assimilated during the analyses that were performed. Therefore, a supplemental sampling event will be conducted by the Pasco County Laboratory to collect additional groundwater samples from the ten new monitor wells in accordance with the Department SOPs. The samples will be analyzed using appropriate methods to achieve the detection requirements associated with Groundwater Criteria or PQLs. Groundwater Sampling Logs (DEP Form #FD 9000-24), a Water Quality Monitoring Certification form (DEP Form #62-701.900(31), a report including the laboratory analytical report, a summary of results prepared by Pasco County Environmental Laboratory for this sampling event, and an EDD file of this report generated using an ADaPT-compatible format for this sampling event will be provided by Pasco County Laboratory. In addition, a ground water surface elevation contour map and a map of the Potentiometric Surface of the Floridan Aquifer generated using the static water level data collected from all wells at the facility during this sampling event will also be provided.

Static water level readings were not obtained from all wells at the facility prior to performing the July 1, 2010 and September 9, 2010 initial sampling events. Therefore, ground water surface elevation contour maps cannot be constructed for these dates using all wells at the facility. However, static water levels from all wells at the facility were collected on September 27, 2010 in association with another groundwater sampling event. A groundwater surface elevation map and a map of the Potentiometric Surface of the Floridan Aquifer generated using this data are provided as attachments in Candia Mulhern's e-mail dated March 15, 2011.

Comment:

4. Part #E.6.

Information Submitted:

- Appendix F provided the abandonment records for wells 2MW-20D, MW-11A, MW-11B and DMW-5.

Deficiency:
- None.

Corrective Actions:
- None requested.

Response: Acknowledged

Comment:
5. Part #E.7.

Information Submitted:
- Appendix G provided the report of results for the July 1, 2010 and September 9, 2010 initial sampling events.

Deficiency:
- The exceedances of the ground water standard reported for pH, arsenic, iron and TDS, the exceedance of the ground water minimum criterion reported for 3- & 4-methyl phenols, and the exceedance of the purging criterion for dissolved oxygen were not discussed. Please refer to the attached table for the concentrations reported for these parameters. No indication of whether a resampling event will be conducted to confirm the exceedances reported for these parameters was provided.

Corrective Actions:
- Please clarify if a resampling event will be conducted for parameters reported to exceed ground water standards or ground water minimum criteria or if the results of the July 1, 2010 and September 9, 2010 initial sampling events are considered to be representative of ground water quality of the facility. If a resampling event will be conducted, please submit the results of the resampling event with the responses to these comments.

Response: Although the exceedance of the groundwater standard reported for pH in monitor well 4MW-27 in the groundwater sample collected on July 1, 2010 was confirmed when the well was sampled again on September 29, 2010, when the well was re-sampled on December 1, 2010, the pH was reported to be 6.96 S.U. The pH of 6.96 S.U. is within the 6.5 – 8.5 S.U. secondary drinking water standard range established in Chapter 62-550 F.A.C. Groundwater Sampling Logs (DEP Form #FD 9000-24), and a Water Quality Monitoring Certification form (DEP Form #62-701.900(31) completed by Pasco County Laboratory for these sampling events are provided as attachments in Candia Mulhern's e-mail dated March 15, 2011.

Although exceedances of the groundwater standard were reported for arsenic in monitor wells 2MW-25D and 4MW-27 in the groundwater samples collected on September 9, 2010 and July 1, 2010, respectively, when the wells were sampled again on September 29, 2010, arsenic was only

detected at an estimated concentration of 0.0091 mg/L in the groundwater sample from 2MW-25D and was not detected (the method detection limit for arsenic for both sampling events was 0.005 mg/L) in the groundwater sample from 4MW-27. Groundwater Sampling Logs (DEP Form #FD 9000-24), the laboratory report, ADaPT-compatible EDD files, and a Water Quality Monitoring Certification form (DEP Form #62-701.900(31) completed by Pasco County Laboratory for the September 29, 2010 sampling event are provided as attachments in Candia Mulhern's e-mail dated March 15, 2011.

The exceedance of the groundwater standard reported for TDS in monitor wells 2MW-27D and 2MW-25D in the groundwater samples collected on July 1, 2010 and September 9, 2010, respectively, are consistent with the anticipated configuration of the TDS plume associated with adjacent Shady Hills WWTP south of the Pasco County Resource Recovery facility. Although the concentration of TDS detected in the groundwater sample collected from 2MW-27 (460 mg/L) on September 29, 2010 was slightly below the groundwater standard (500 mg/L), the concentration of TDS detected in the groundwater sample collected from 2MW-25D (504 mg/L) on September 29, 2010 remained slightly above the groundwater standard. Groundwater Sampling Logs (DEP Form #FD 9000-24), and a Water Quality Monitoring Certification form (DEP Form #62-701.900(31) completed by Pasco County Laboratory for the September 29, 2010 sampling event are provided as attachments in Candia Mulhern's e-mail dated March 15, 2011. Copies of the laboratory report and ADaPT-compatible EDD files presenting the results of the groundwater sampling performed on September 29, 2010 for these wells are also provided as attachments in Candia Mulhern's e-mail dated March 15, 2011.

The exceedance of the groundwater standard reported for iron in monitor well 2MW-25D in the groundwater sample collected on July 1, 2010 was confirmed when the well was sampled again on September 29, 2010. Based on this information, it is surmised that the high iron concentration is representative of groundwater quality of the interval monitored by this well at this location. A groundwater Sampling Log (DEP Form #FD 9000-24), and a Water Quality Monitoring Certification form (DEP Form #62-701.900(31) completed by Pasco County Laboratory for the September 29, 2010 sampling event are provided as attachments in Candia Mulhern's e-mail dated March 15, 2011. Copies of the laboratory report and ADaPT-compatible EDD files presenting the results of the groundwater sampling performed on September 29, 2010 for these wells are also provided as attachments in Candia Mulhern's e-mail dated March 15, 2011.

An estimated concentration of 7.8 µg/L of 3- & 4-methyl phenols was detected in the groundwater sample collected from monitor well 2MW-25D on September 9, 2010. This concentration exceeds the groundwater criterion of 3.4 µg/L. When the well is re-sampled (as discussed in the response to Comment #3), the groundwater sample will additionally be analyzed for 3- & 4-methyl phenols to verify the results of the September 9, 2010 sampling event. A Groundwater Sampling Log (DEP Form #FD 9000-24), a Water Quality Monitoring

Certification form (DEP Form #62-701.900(31), a report including the laboratory analytical report, a summary of results prepared by Pasco County Environmental Laboratory for this sampling event, and an EDD file of this report generated using an ADaPT-compatible format for this sampling event will be provided by Pasco County Laboratory.

The dissolved oxygen reading recorded during the purging of monitor well 4MW-27D prior to collecting the groundwater sample on July 1, 2010, exceeded the purging criterion, however, three dissolved oxygen readings were recorded during the purging to confirm the stability of the dissolved oxygen exceedance. A groundwater Sampling Log (DEP Form #FD 9000-24) and a Water Quality Monitoring Certification form (DEP Form #62-701.900(31) completed by Pasco County Laboratory for the July 1, 2010 sampling event are provided as attachments in Candia Mulhern's e-mail dated March 15, 2011.

Comment:
6. Part #E.10.a.

Information Submitted:

- Appendix G provided the report of results for the July 1, 2010 and September 9, 2010 initial sampling events.

Deficiency:

- Appendix G did not include the results of the July 1, 2010 and September 9, 2010 initial sampling events as an EDD report in a format that allows the analytical results to be uploaded into the Department's database.

Corrective Actions:

- Please submit the results of the July 1, 2010 and September 9, 2010 initial sampling events [and the results of any resampling event conducted at the facility for parameters reported at elevated detection limits or parameters reported to exceed ground water standards/minimum criteria/purging criteria] as an EDD using an ADaPT-compatible format.

Response: The results of the July 1, 2010 and September 9, 2010 initial sampling events, presented in EDD files generated using an ADaPT-compatible format, are provided as attachments in Candia Mulhern's e-mail dated March 15, 2011.

Sincerely,

David R. Rojas, P.G.
Environmental Scientist
Camp Dresser & McKee Inc.

cc: Aamod Sonawane, CDM
John Power (Pasco County)

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MAR 23 2011
SOUTHWEST DISTRICT TAMPA

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Attachment 1

Cover Letter – Table 3

DEP Form # 62-701.900(2)
Form Title Certification of Construction Completion
Effective Date May 19, 1994

DEP Application No. _____
(Filled by DEP)

Florida Department of Environmental Protection
Twin Towers Office Bldg. • 2600 Blair Stone Road • Tallahassee, FL 32399-2400

Certification of Construction Completion of a Solid Waste Management Facility

DEP Construction Permit No: PA87-23 County: Pasco

Name of Project: West Pasco Class I Landfill Cell A-4 Construction

Name of Owner: Pasco County

Name of Engineer: Aamod Sonawane, CDM

Type of Project: Construction of 20-acre Cell A-4 for ash disposal from RRF. Cell includes a double liner system with leachate collection & leak detection, leachate pumping stations, & stormwater system.

Cost: Estimate $ 9,300,000.00 Actual $ 5,088,683.76

Site Design: Quantity: 250 ton/day Site Acreage: 20 Acres

Deviations from Plans and Application Approved by DEP: The construction of this project was completed in general conformance with the approved plans and specifications by FDEP, dated August 24, 2009. Deviations from the approved plans are clouded on the record drawings and are noted on Table 3 in the cover letter.

Address and Telephone No. of Site: Pasco County Resource Recovery Facility (RRF)
14230 Hays Road, Spring Hill, Florida, 34610. Telephone No.: (727) 856-0119

Name(s) of Site Supervisor: John Power

Date Site inspection is requested: January 7, 2011

This is to certify that, with the exception of any deviation noted above, the construction of the project has been completed in substantial accordance with the plans authorized by Construction

Permit No. PA87-23 :Dated: August 24, 2009

Date: March 23, 2011

Signature of Professional Engineer

AAMOD S. SONAWANE LICENSED No 62526 STATE OF FLORIDA PROFESSIONAL ENGINEER

Northwest District
160 Governmental Center
Pensacola, FL 32501-5794
850-595-8360

Northeast District
7825 Baymeadows Way, Ste. B200
Jacksonville, FL 32256-7590
904-448-4300

Central District
3319 Maguire Blvd., Ste. 232
Orlando, FL 32803-3767
407-894-7555

Southwest District
3804 Coconut Palm Dr.
Tampa, FL 33619
813-744-6100

South District
2295 Victoria Ave., Ste. 364
Fort Myers, FL 33901-3881
941-332-6975

Southeast District
400 North Congress Ave.
West Palm Beach, FL 33401
561-681-6600

Table 3 below summarizes the design changes noted on the Record Drawings.

Table 3 – Design Modifications

Description of Modifications	Sheets
Sheets C-16, C-17, C-18, C-19, CD-6, E-1, E-2, E-3, E-4, and E-5 have been added.	Cover Page
The east storm water culvert was shifted to the west to avoid conflict with the leachate forcemain.	C-1
The south side stormwater culvert was shifted to the south so that there would be no conflict with the existing gas main.	C-1
The fence was installed along the south side of the cell in lieu of installing a paved road and a gate.	C-1
The interim berm in sub-cell 4 was added to capture the stormwater so that it would not be treated as leachate.	C-2
The driveway to the leachate pump station was modified to allow tanker truck access so pumping could be performed during the unlikely scenario where the leachate loading station is offline due to maintenance or repair work.	C-2 & CD-5
The stormwater piping was modified so that the stormwater from sub-cells 4, 5, 6 is pumped to the north side of Cell A-4 and the stormwater from sub-cells 1, 2, 3 is pumped to the south side of Cell A-4.	C-2
A fence was added between the road and the new cell along the south and west sides.	C-2
The route of the leachate force main was slightly modified to avoid conflict with the existing gas main.	C-2
The depths of the primary lift station, manhole, secondary lift station, and associated pipe inverts were modified because the limestone stratum was found to be shallower than expected.	C-2 & M-1
The 4" leachate suction line that runs from the leachate storage tank to the leachate loading station was replaced with an 8" leachate suction line.	C-3
The 60-mil primary liner was welded directly to the 8" HDPE pipe replacing the SS clamp and the closed cell neoprene sponge.	CD-1 (Detail H)
Detail M was modified to have a constant top elevation of 53 feet for intermediate cell separation berm.	CD-2 (Detail M)
In lieu of local sand, the sand drainage layer was used in the construction of the intermediate berms.	CD-3 (Detail J)
The table for the groundwater monitoring wells was modified to reflect the as-built information.	CD-4
The 3 inch stormwater force-main and the sump pumps' electrical cords were installed without the carrier pipe.	CD-5 (Details A & C)

The locations of the primary and secondary lift stations' control panels and transformers were added to Detail E.	CD-5 Detail E
A layer of geocomposite was installed under the stormwater sump and gravel face, instead of the sacrificial textured 60-mil liner and 8 oz geotextile.	CD-5 (Detail C)
A fourth float switch was installed for the primary leachate pumping station to start the second pump in an unlikely event when one pump cannot keep up with the leachate entering the pump station.	M-1 (Section 1)
Three float switches (pump off, pump on, high alarm) were installed in the secondary lift station manhole to replace the original float switch.	M-1 (Detail J)

Attachment 2

Technical Specification 00900

Section 00900

Pasco County, Florida
West Pasco County Landfill Expansion
Construction Quality Assurance Manual

Introduction

This Construction Quality Assurance (CQA) Manual is divided into five sections:

Section 1.0 Defines the roles, terms and responsibilities of all parties involved in the installation of the lining system.

Section 2.0 Addresses the communications between the involved parties.

Section 3.0 Addresses geomembrane manufacturing and delivery.

Section 4.0 Addresses the documentation and certification of the lining system.

Section 5.0 Addresses the testing, execution and field quality control of the various lining system components.

Attachment 1 Geomembrane Quality Control Documentation Forms

Attachment 2 HDPE Material Properties

Section 1
Definitions and Responsibilities

1.1 Terms of Reference

1.1.1 Purpose

This CQA Manual addresses the quality assurance and quality control of the installation of flexible membrane liner systems, which include natural and geosynthetic products used for constructing waste disposal landfills, surface impoundments or other installations as specified by the OWNER and/or ENGINEER. This CQA Manual therefore delineates the quality procedures and standards for production and installation.

This CQA Manual reflects the requirements of the Hazardous and Solid Waste Amendments of 1984 to the Resource Conservation and Recovery Act (RCRA).

All costs associated with sampling, testing, retesting and repair of the lining system materials shall be paid by the appropriate party, in accordance with the contract documents and specifications.

1.1.2 Quality Assurance and Quality Control

Individual project personnel roles are shown in **Table 1-1**. In the context of this CQA Manual, quality assurance and quality control are defined as follows:

Quality Assurance - A planned and systematic pattern of all means and actions designed to provide adequate confidence that items or services meet contractual and regulatory requirements and will perform satisfactorily in service.

Quality Control - Those actions which provide a means to measure and regulate the characteristics of an item or service to meet contractual and regulatory requirements.

In the context of linear production and installation:

Quality assurance refers to means and actions employed by the geosynthetic manufacturer to assure conformity of the lining system production and installation with the CQA Manual drawings and specifications.

Quality control refers to those actions taken by the MANUFACTURER, Fabricator and Installer to ensure that the materials and the workmanship meet the requirements of the plans and specifications.

TABLE 1-1

PROJECT PERSONNEL RESPONSIBILITIES

Party	Definition	Responsibilities	Qualifications	Reports To
CONTRACTOR	Construct project in accordance with plans and specifications	Page 1-4	Licensed in Florida	OWNER
Contractor's Representative (CR)	Assigned by the CONTRACTOR to act as the Contractor's Representative onsite	Page 1-5	Prior and similar experience	CONTRACTOR
ENGINEER	Assigned by OWNER for preparation of the total site design including plans and specifications for the lining system and to provide services during construction	Page 1-6	Registered professional engineer in Florida	OWNER
Engineer's Field Representative (EFR)	Assigned by the ENGINEER for observing and documenting activities related to QA for production and installation of the geosynthetic system	Page 1-6	Prior and similar experience	ENGINEER and OWNER
Installation Supervisor (IS)	Provided by geosynthetic Installer to provide supervision and guidance to the installation crews	Page 1-9	Managed installation of 2,000,000 ft^2 of geosynthetic material	CR, and CONTRACTOR
Installer	Firm responsible for installation of the geosynthetic products	Page 1-10	Five similar completed facilities totalling 2,000,000 ft^2 and certified by the geosynthetic manufacturer	CR and CONTRACTOR
MANUFACTURER	Firm responsible for production of geosynthetic materials	Page 1-13	Identified on pages 1-14, 1-15 and 1-16	CR and CONTRACTOR
Quality Assurance Laboratory (QAL)	Assigned by OWNER to conduct required testing activities	Page 1-15	Experience in testing in accordance with ASTM, FTMS and NSF	EFR and OWNER

1.1.3 Lining Materials

The materials comprising the lining system include drainage media, geomembranes, geotextiles, and drainage nets. For the purposes of this document, the term "geosynthetic" is applied to materials manufactured from synthetic polymers (such as geomembranes, geotextiles, drainage nets and geogrids).

For the purposes of this document, the term "geomembrane" is applied to flexible membrane liners. More specifically "geomembrane" refers to synthetic liners, with either a smooth surface or textured surface for increased friction. High density polyethylene (HDPE) membranes shall be used on this project.

Geomembranes are the key components of the lining system, therefore, none of the geomembrane requirements contained herein should be compromised in any way. Geotextiles, drainage nets and granular solids are used in combination for leachate collection and conveyance systems.

The quality assurance of a geosynthetic liner system is addressed herein in its entirety, including all stages from manufacture to installation. The quality assurance of soils is discussed only in relation to the interaction of the soils with the geosynthetics.

1.1.4 Scope of Quality Assurance and Quality Control

The scope of this CQA Manual includes the quality assurance applicable to manufacturing, shipment, handling, storage onsite, and installation of all geosynthetics. In particular, full-time quality assurance during the installation of geomembranes and the installation of other geosynthetics is essential.

This CQA Manual does not address design guidelines or selection of geomembranes and other geosynthetics (which includes compatibility between the geosynthetic and contained material). These items are addressed in the plans and specifications.

1.1.5 Units

In this CQA Manual, all properties and dimensions are expressed in U.S. units, with "equivalent" SI units in parentheses. It should be noted that the conversion is typically accurate only within ten percent. In cases of conflict or clarification, the U.S. units shall be deemed to govern.

1.1.6 References

The CQA Manual includes references to test procedures of the American Society for Testing Materials (ASTM), and the Geosynthetic Research Institute, GRI Standard GM13. Recognizing the changing nature of the above standards and the geosynthetic industry at large, this CQA Manual is subject to periodic revision.

1.2 Definitions, Qualifications, Responsibilities of Parties

The parties discussed in this section are associated with the ownership, design, manufacture, transportation, installation, and quality assurance of the liner system. The definitions, qualifications, and responsibilities of these parties are outlined in the following subsections.

1.2.1 Contractor

1.2.1.1 Definition

The CONTRACTOR is the firm(s) or corporation(s) with which the OWNER has entered into agreement to construct the project.

1.2.1.2 Responsibilities

The CONTRACTOR is responsible for all submittals by the MANUFACTURER and the Installer as required by the specifications. The CONTRACTOR is also responsible for scheduling and coordination of the required work with the MANUFACTURER and the Installer to complete the project. The CONTRACTOR shall provide a representative at all times during any construction activity onsite. The CONTRACTOR is responsible for furnishing as-built drawings and a copy of complete documentation for the construction of the liner system. The CONTRACTOR is also responsible for daily updating of the design drawings onsite and for any and all deviations from these drawings. All deviations must be initialed as approved by the Engineer's Field Representative onsite.

1.2.1.3 Qualifications

The CONTRACTOR shall be qualified to perform all aspects of work required to successfully construct the project. The CONTRACTOR shall be registered in the state where the project is located and shall demonstrate prior related experience. The CONTRACTOR shall have completed three similar projects.

1.2.2 Contractor's Representative

1.2.2.1 Definition

The Contractor's Representative is a qualified individual assigned by the CONTRACTOR to represent him/her onsite at all times during all construction activity.

1.2.2.2 Responsibilities

The Contractor's Representative is responsible for coordinating and supervising his/her crew and subcontractors' work onsite. The Contractor's Representative is responsible for making sure that the construction activities are conducted in accordance with the plans and specifications. The Contractor's Representative is responsible for pointing out to the Engineer's Field Representative any discrepancies between the plans and specifications and the field conditions. The Contractor's Representative is responsible for attending all meetings held on the project. The Contractor's Representative is responsible for keeping a daily log of all construction

activities onsite. The Contractor's Representative is responsible for proposing alternative methods, where necessary, to the Engineer's Field Representative for approval and signature, as required in Section 1.2.1.2.

1.2.2.3 Qualifications

The Contractor's Representative shall be a qualified individual who is able to perform all the tasks associated with the construction activities. The Contractor's Representative shall demonstrate prior experience in this type of construction. The Contractor's Field Representative shall have the authority to direct and instruct his/her crew and subcontractors.

1.2.3 Engineer

1.2.3.1 Definition

The ENGINEER is the individual and/or firm responsible for the preparation of the total site design, including plans and specifications for the lining system. The ENGINEER can also be the firm responsible for providing engineering services during construction.

1.2.3.2 Responsibilities

The ENGINEER is responsible for performing the engineering design and preparing the associated drawings and specifications for the lining system. The ENGINEER is responsible for approving all design and specification changes and making design clarifications necessitated during construction of the lining system. The ENGINEER is responsible for reviewing and approving shop drawings submitted by the CONTRACTOR. As-built drawings with supporting documents shall be submitted to the permitting agency for final project certification. The ENGINEER will attend the pre-construction and all progress meetings outlined in this manual. ENGINEER shall be responsible for reviewing the qualifications submittal of the installer and MANUFACTURER. ENGINEER shall be responsible for preparing the final certification report.

1.2.3.3 Qualifications

The ENGINEER shall be a professional engineer registered by the State of Florida. The ENGINEER shall be familiar with geosynthetics (including detailed geosynthetic design methods and procedures) and all applicable regulatory requirements.

1.2.4 Engineer's Field Representative

1.2.4.1 Definition

The Engineer's Field Representative is a qualified individual assigned by the ENGINEER's firm to be responsible for observing and documenting activities related to the quality assurance of the production and installation of the geosynthetic system, soil subgrade, soil drainage layers on behalf of the OWNER.

1.2.4.2 Responsibilities

The Engineer's Field Representative is responsible for observing and documenting activities related to the quality assurance of the production, handling, storage, and installation of the liner system. The Engineer's Field Representative is responsible for implementation of this CQA Manual and coordination of the Quality Assurance Laboratory. The Engineer's Field Representative is also responsible for providing input and documentation to ENGINEER for *preparing a final sealed certification report that will be submitted to the appropriate permitting* agency. The Engineer's Field Representative shall record all field activities on the appropriate form included in Attachment 1.

The specific duties of the Engineer's Field Representative personnel are as follows:

a. Reviews all design drawings and specifications.

b. Reviews other site-specific documentation, including proposed layouts, and MANUFACTURER's and Installer's literature.

c. Develops a site-specific addendum for quality assurance of geosynthetics, if necessary.

d. Administers the geosynthetic portions of the CQA Manual, e.g., assigns and manages all geosynthetic quality assurance personnel, reviews all field reports, and provides engineering review of all quality assurance related issues.

e. Reviews all changes to design drawings and specifications as issued by the ENGINEER.

f. Acts as the onsite (resident) representative of the OWNER.

g. Attends all quality assurance related meetings, e.g., resolution, pre-construction, daily, weekly.

h. Reviews all MANUFACTURER and Installer certifications and documentation and makes appropriate recommendations.

i. Reviews the Installer's personnel qualifications for conformance with those qualifications pre-approved for work onsite.

j. Reviews the calibration certification of the onsite tensiometer, if applicable.

k. Reviews all daily reports, logs and photographs.

l. Notes any onsite activities that could result in damage to the liner system.

m. Reports to the ENGINEER, and logs in the daily report, and any relevant observations.

n. Prepares his/her own daily report.

o. Prepares a daily summary of the quantities of geosynthetics installed that day.

p. Prepares the daily reports of the liner system quality assurance activities.

q. Oversees the marking, packaging and shipping of all laboratory test samples.

r. Reviews the results of laboratory testing.

s. Reports of any unapproved deviations from the CQA Manual and the Technical Specifications.

t. Provides input and documentation to ENGINEER for preparing the final certification report.

u. Monitors, logs, photographs and/or documents all geosynthetic installation operations. Photographs shall be taken routinely of critical areas during installation sequence.

v. Monitors the following operations for all lining system materials:

1) Material delivery

2) Unloading and onsite transport and storage

3) Sampling for conformance testing

4) Deployment operations

5) Joining and/or seaming operations

6) Condition of panels as placed

7) Visual inspection by walkover

8) Repair operations

w. Monitors and documents the geomembrane seaming operations, including:

1) Pre-weld seams

2) Seam preparation

3) Seaming

4) Nondestructive seam testing

5) Sampling for destructive seam testing

6) Destructive seam testing

7) Appropriate log for seaming and patching destructive testing

8) Field tensiometer testing

9) Laboratory sample marking

10) Repair operations

x. Documents any onsite activities that could result in damage to the lining system. Any problems noted shall be reported as soon as possible to the ENGINEER.

y. Review and sign subgrade surface acceptance certificates prior to installation of GCL.

1.2.4.3 Qualifications

Engineer's Field Representative shall be experienced with the implementation and preparation of quality assurance documentation including: quality assurance forms, reports, material certifications, and manuals; and shall have 5 years of prior experience with geosynthetics installation.

1.2.5 Installation Supervisor

1.2.5.1 Definition

The Installation Supervisor is the individual provided and assigned by the Installer to be his/her field representative to provide supervision and guidance to the geosynthetic products installation crew.

1.2.5.2 Responsibilities

The Installation Supervisor is responsible for coordinating the seaming and installation of the geosynthetic products. The Installation Supervisor is responsible for providing supervision and guidance to the installation crew. The Installation Supervisor is responsible for obtaining samples for field testing and for coordinating testing activities with the Contractor's Representative and Engineer's Field Representative. The Installation Supervisor is responsible for keeping a daily log of all activities related to geosynthetic products installation and testing and for attending all related project meetings. These daily installation logs are in addition to and independent of daily logs prepared by EFR.

1.2.5.3 Qualifications

The Installation Supervisor must be qualified based on previously demonstrated experience, management ability, and authority. The Installation Supervisor shall have previously managed the installation of at least a total of 2,000,000 ft2 of geosynthetic products using the same type of seaming apparatus to be used at the site.

1.2.6 Installer

1.2.6.1 Definition

The Installer is the firm responsible for installation of the geosynthetic products. In the context of this manual, the Installer is the MANUFACTURER or an approved installer trained and certified to install the MANUFACTURER's geomembrane.

1.2.6.2 Responsibilities

The Installer shall be responsible for field handling, storing, deploying, seaming, temporary restraining and all other aspects of the geosynthetics installation. The Installer shall be responsible for submittal of the documentation listed in Section 1.2.6.4.

1.2.6.3 Qualifications

The Installer shall be certified to install the MANUFACTURER's geomembrane material. The Installer shall be pre-qualified and approved by the ENGINEER. The Installer shall be able to provide qualified personnel to meet the demands of the project. The Installer will be required to provide an Installation Supervisor. The installer shall have the prior experience as specified in Table 1-1.

1.2.6.4 Submittals

Pre-qualification: To be considered for pre-qualification, the Installer shall submit the following information before the installation to ENGINEER for approval:

a. Corporate background and information

b. Description of installation capabilities:

1) Information on equipment (numbers and types), and personnel (number of site managers, number of crews).

2) Average daily production anticipated.

3) Samples of field geomembrane seams and a list of minimum values for geomembrane seam properties.

c. A list of at least five completed facilities, totaling a minimum of 2,000,000 ft2 for which the Installer has installed geosynthetics. For each installation, the following information shall be provided:

1) Name and purpose of facility, its location, and date of installation.

2) Name of OWNER, project manager, designer, MANUFACTURER, fabricator (if any), and name of contact at the facility who can discuss the project.

3) Name and qualifications of the superintendent(s) of the Installer's crew(s).

4) Type of geosynthetic, and surface area installed.

5) Type of seaming and type of seaming apparatus used.

6) Duration of installation.

7) Available information on the performance of the lining system and the facility.

d. The Installer's quality control manual.

e. A copy of a letter of recommendation supplied by the geomembrane MANUFACTURER.

Pre-installation: Prior to commencement of the installation, the Installer must submit to the Engineer's Field Representative:

a. Resume of the Installation Supervisor to be assigned to this project, including dates and duration of employment.

b. A panel layout drawing showing the installation layout identifying field seams as well as any variance or additional details which deviate from the engineering drawings. The layout shall be adequate for use as a construction plan and shall include dimensions, details, etc.

c. Installation schedule.

d. A list of personnel performing field seaming operations along with pertinent experience information.

e. All geosynthetic quality control certificates as required by this CQA Manual (unless submitted directly to the Engineer's Field Representative by the MANUFACTURER).

f. Certification that extrudate to be used is composed of the same resin as the geomembrane to be used.

g. Subgrade surface acceptance certificates for approval before the installation of GCL.

This documentation shall be reviewed by the Installer before installation of the geosynthetic begins.

Installation: During the installation, the Installer shall be responsible for the submission of subgrade surface acceptance certificates for each area to be covered by the lining system, signed by the Installation Supervisor.

Completion: Upon completion of the installation, the Installer shall submit:

a. The warranty obtained from the MANUFACTURER.

b. The installation warranty.

c. As-built drawing clearly delineating seams, repairs, and location of destructive samples.

1.2.7 Manufacturer

1.2.7.1 Definition

The MANUFACTURER is the firm or corporation responsible for production of the geosynthetic material to be used for the project. The MANUFACTURER is responsible for the condition of the geosynthetic until the material is accepted by the Engineer's Field Representative upon delivery. The MANUFACTURER shall produce a consistent product meeting the project specifications, and shall provide quality control documentation for the project specified herein.

1.2.7.2 Responsibilities

Each MANUFACTURER is responsible for the production of its geosynthetic product. In addition, each MANUFACTURER is responsible for the condition of the geosynthetic until the material is accepted by the Engineer's Field Representative upon delivery. Each MANUFACTURER shall produce a consistent product meeting the project specifications. Each MANUFACTURER shall provide quality control documentation for its product as specified in this CQA Manual.

1.2.7.3 Qualifications

Prior to shipment of any material, each MANUFACTURER shall be pre-qualified by the ENGINEER. Each MANUFACTURER shall provide sufficient production capacity and qualified personnel to meet the demands of the project as identified in the specification Section 02776 "High Density Polyethylene Geomembrane Liner" under item 1.03. Each MANUFACTURER shall have an internal quality control program for its product that meets the specified requirements.

Pre-qualification: Each MANUFACTURER shall meet the following requirements and submit the following information to be considered for pre-qualification:

a. Corporate background and information

b. Manufacturing capabilities:

1) Information on plant size, equipment, personnel, number of shifts per day, and capacity per shift.

2) A list of material properties including certified test results, to which are attached geosynthetic samples.

3) A list of at least 10 completed landfill or surface impoundment facilities totaling a minimum of 3,000,000 ft2 for which the MANUFACTURER has manufactured a geosynthetic product. For each facility, the following information shall be provided:

a) Name and purpose of facility, its location and date of installation.

b) Name of OWNER, project manager, designer, fabrication (if any) and installer.

c) Type of geosynthetic, and the surface area of installed geosynthetic.

d) Available information on the performance of the lining system and the facility.

c. The MANUFACTURER's quality control manual, including a description of the quality control laboratory.

d. The warranty obtained from the MANUFACTURER.

e. The installation warranty.

f. The Manufacturer's Field Installation Quality Control Manual. As a minimum, the manual shall contain procedures and recommendations for the following:

1) Geomembrane deployment

2) Field panel placement

3) Geomembrane field seaming

4) Seam testing (destructive, nondestructive for field and laboratory settings)

5) Repair of defects

g. The origin (supplier's name and production plant) and identification (brand name and number) of resin used to manufacture the product.

Pre-installation: Prior to the installation of any geosynthetic material, each MANUFACTURER must submit to the ENGINEER all quality control documentation required by the appropriate

section of this CQA Manual. This documentation shall be reviewed and approved by the ENGINEER before installation can begin.

1.2.8 Quality Assurance Laboratory

1.2.8.1 Definition

The Quality Assurance Laboratory is a firm, independent from the CONTRACTOR, MANUFACTURER, and Installer, responsible for conducting tests on samples of geosynthetics obtained from the site.

1.2.8.2 Responsibilities

The Quality Assurance Laboratory shall be responsible for conducting the appropriate laboratory tests as directed by the ENGINEER and in accordance with the project plans and specifications. The test procedures shall be done in accordance with the test methods outlined in Section 3.0 of this CQA Manual. The Quality Assurance Laboratory shall be responsible for providing tests results as outlined in Section 1.2.8.4. The Quality Assurance Laboratory shall also be responsible for soil testing as specified in Section 5.1.2.1.g of this manual.

1.2.8.3 Qualifications

The Quality Assurance Laboratory shall have experience in testing geosynthetics and be familiar with American Society for Testing and Materials (ASTM) and other applicable test standards. The Quality Assurance Laboratory shall be capable of providing verbal results of destructive seam tests within 24 hours of receipt of test samples and shall maintain that standard throughout the installation.

1.2.8.4 Submittals

The Quality Assurance Laboratory shall FAX all destructive seam test results to the ENGINEER in written form within 24 hours of receipt of test samples. Written test results shall be in an easily readable format and include references to the standard test methods used.

Section 2
Communication between Involved Parties

2.1 Communication

To guarantee a high degree of quality during construction and assure a final product that meets all the project plans and specifications, open channels of communication are essential. This section discusses appropriate lines of communication and describes necessary meetings.

2.1.1 Lines of Communication

All lines of communication shall go through the Engineer's Field Representative who, in turn, will direct the necessary course of action.

2.1.2 Pre-Construction Meeting

A pre-construction meeting shall be held before any construction activity begins. The meeting shall be attended by the OWNER, ENGINEER, Engineer's Field Representative, Contractor's Representative, and Installer.

Specific topics considered for this meeting include review of the project documents for any modifications and/or additions. In addition, the responsibilities of each party should be reviewed and understood clearly. The construction strategy and proposed starting date should be discussed.

2.1.3 Progress Meetings

Progress meetings between the Engineer's Field Representative, Contractor's Representative, Installation Supervisor, and any other concerned parties shall be held at least weekly or more frequently as deemed necessary. This meeting shall discuss current progress, planned activities for the next week, issues requiring resolution, and any new business or revisions to the work. The Engineer's Field Representative shall log any problems, decisions, or questions arising at this meeting in his/her weekly report. If any matter remains unresolved at the end of this meeting, the Engineer's Field Representative shall be responsible for the resolution of the matter and the communication of the decision to the appropriate parties.

Section 3
Geomembrane Manufacturing and Delivery

3.1 Manufacturing

3.1.1 Raw Material

The raw material shall be first quality resin containing no more than 2 percent clean recycled polymer by weight, and meeting the following specifications.

For HDPE:

Specific Gravity (ASTM D792 Method A or ASTM D1505): > .932 Melt Index (ASTM D1238 Condition 190/2.16): 1 g/10 min. Formulated Sheet Density shall be 0.9410g/ml or higher.

Quality control testing shall be carried out by the MANUFACTURER to demonstrate that the product meets this specification and Paragraph 2.01.A.1 of Specification Section 02776.

Prior to liner delivery and installation, the MANUFACTURER shall provide the ENGINEER with the following information:

a. The origin (resin supplier's name, resin production plant), identification (brand name, number) and production date of the resin;

b. A copy of the quality control certificates issued by the resin supplier noting results of density and melt index;

c. Reports on the tests conducted by the MANUFACTURER to verify the quality of the resin used to manufacture the geomembrane rolls assigned to the considered facility [these tests should include specific gravity (ASTM D792 Method A or ASTM D1505) and melt index (ASTM D1238 Condition 190/2.16);

d. Reports on the tests conducted by the MANUFACTURER to verify the quality of the sheet. The tests shall be conducted for the properties specified above and in Section 3.1.3.

3.1.2 Geomembrane Manufacturing

Prior to liner delivery and installation, the MANUFACTURER shall provide the ENGINEER with the following:

a. A properties sheet including, at a minimum, all specified properties, measured using test methods indicated in the specification section 02776, or equivalent;

b. The ENGINEER shall verify that:

   1) The property values certified by the geosynthetic manufacturer meet all of the specifications; and

2) The measurements of properties by the geosynthetic manufacturer are properly documented, and that the test methods used are acceptable.

3.1.3 Rolls

After receipt of material, the MANUFACTURER shall provide the ENGINEER with one quality control certificate for every roll of geosynthetic provided. The quality control certificate shall be signed by the MANUFACTURER's responsible party. The quality control certificate shall include at a minimum:

a. Roll numbers and identification; and

b. Results of quality control tests. As a minimum, ASTM test methods shall be used to test for thickness, density, tensile strength, carbon black content, carbon black dispersion, and tear resistance.

3.2 Delivery, Storage and Handling

3.2.1 Delivery and Handling

a. The geosynthetic products shall be packaged and shipped by appropriate means to prevent damage of the material. The CONTRACTOR is responsible for off-loading and storage of the geosynthetic. The CONTRACTOR is responsible for replacing damaged or unacceptable material. Geosynthetic products shall be carefully off-loaded before any product is unwrapped. For off-loading, appropriate equipment with a cloth sling shall be used.

b. No off-loading shall be performed unless the OWNER or Engineer's Field Representative is present. Damage during off-loading shall be documented by the Engineer's Field Representative. All damaged products must be separated from the undamaged products until the proper disposition of that material has been determined by the Engineer's Field Representative.

c. The geosynthetic products shall be stored so as to be protected from light, puncture, dirt, grease, water, moisture, mud, mechanical abrasions and excessive heat that may damage the geosynthetic material. The rolls shall be stored on a prepared level surface (not wooden pallets) without sharp edges and shall not be stacked more than two rolls high (rolls shall be limited to maximum 5-foot diameter).

3.2.2 Storage

The delivered material shall be stored in a location (or several locations) such that onsite transportation and handling are minimized. Storage space shall be protected from theft, vandalism, passage of vehicles, and shall be adjacent to the area to be lined.

Section 4
Documentation and Certification

4.1 Documentation

The documentation of the lining system installation is an important factor to ensure the successful construction and performance of the installed system. The testing and the documentation shall be performed as described in Section 5.0 and all related activities shall be recorded on the appropriate forms.

4.2 As-built Drawings

After the installation and completion of all construction activities, as-built drawings shall be prepared by the Installer and submitted to the ENGINEER. The as-built drawings shall include survey of accepted subgrade, final survey (sand layer), combining vertical and horizontal controls, by a professional land surveyor to verify that all contours and elevations are in accordance with the plans submitted in support of the permit application. The horizontal control shall be tied to the state plane coordinates system. The as-built drawings shall also verify piping construction and elevations according to the drawings.

4.3 Certification

A certification report shall be prepared by the ENGINEER and submitted to the permitting agency certifying the construction of the landfill. A copy of the report shall be forwarded to the OWNER. The report, at a minimum, shall include.

a. Certification letter stating that construction activities were conducted in accordance with the plans and specifications submitted to the permitting agency in support of the permit application.

b. Description and location of the site.

c. Description of the construction activities.

d. Description of the location, frequency and results of all the testing conducted during construction including a comprehensive geomembrane destructive testing and seam testing report, non-destructive testing, trial welds, and repairs.

e. Description of steps and methods followed to report and retest the failed areas and results of the retesting.

f. A copy of the as-built drawings.

g. A copy of all the forms completed during construction activities.

h. Panel layout drawings, information on deviations from plan, and photos.

The report shall be sealed by a registered professional engineer and submitted to the permitting agency for approval.

Section 5
Testing, Execution and Field Quality Control

5.1 High Density Polyethylene (HDPE) Geomembrane Liner

5.1.1 Testing

5.1.1.1 Conformance Testing

a. Conformance testing shall be performed by an independent Quality Assurance Laboratory retained by the OWNER. The Quality Control Laboratory will obtain samples from the delivered material in presence of Engineer's Field Representative, and mark the machine direction and identification number. Samples shall be taken at the rate of one sample per lot, but shall be minimum one conformance test per 100,000 square feet of material. A lot is defined as a group of consecutively numbered rolls from the same manufacturing line. This sampling frequency may be increased as deemed necessary by the Engineer's Field Representative. The samples shall be taken across the entire roll width and shall not include the first 3 feet.

   The following conformance tests shall be conducted at the laboratory:

   1) Thickness (ASTM D751)

   2) Density (ASTM D792)

   3) Tensile properties (ASTM D638)

   4) Tear resistance (ASTM D1004)

   5) Carbon black control (ASTM D1603)

   6) Carbon black dispersion (ASTM D3015)

b. These conformance tests shall be performed in accordance with Attachment 2.

c. All conformance test results shall be reviewed by the Engineer's Field Representative and accepted or rejected, prior to the placement of the geomembrane. All test results shall meet, or exceed, the property values listed in Attachment 2. In case of failing test results, the MANUFACTURER may request that another sample be retested by the Quality Assurance Laboratory with the MANUFACTURER's technical representative present during the testing procedures. The MANUFACTURER may also have the sample retested at the MANUFACTURER's own expense at two different laboratories approved by the OWNER. If both laboratories report passing results, the material shall be accepted. If both laboratories do not report passing results, all geomembrane material from the lot representing the failing sample will be considered out of specification and rejected.

5.1.2 Execution

5.1.2.1 Subgrade Preparation

a. Subgrade preparation shall be accomplished as specified in Section 5.6.

b. The surface of the subgrade shall be smooth, uniform, free from sudden changes in grade (such as vehicular ruts), rocks, stones, debris and deleterious materials. During actual placing and seaming of the GCL, the subgrade shall be kept free of all standing water. If the subgrade below the GCL becomes wet and unstable, it shall be dried and recompacted.

c. All fill shall consist of well graded material that is free of organic, trash, clayballs, and other deleterious material that could damage the GCL. The upper six (6) inches of the finished subgrade shall not contain stones or debris larger than one half (1/2) inch. The subgrade shall have no sudden sharp or abrupt changes in grade.

d. The subgrade shall have a minimum uncompacted thickness of eighteen (18) inches. The subgrade shall be compacted to 95 percent standard Proctor density to provide an unyielding foundation for the GCL.

e. The subgrade shall be protected from desiccation, flooding and freezing. Protection, if required, may consist of a thin plastic protective cover (or other material, as approved by the ENGINEER) that is installed over the completed subgrade until placement of the GCL begins. Subgrades found to have desiccation cracks greater than one half (1/2) inch in width or depth, or which exhibit swelling, heaving, or other similar conditions, shall be replaced or reworked.

f. The subgrade shall be approved by the ENGINEER and the GCL installer before the liner is installed.

g. The subgrade shall be tested for compaction by an independently certified soil testing laboratory that is retained by the OWNER. The density of the subgrade shall be tested at least twice per acre for the soils that are in place, and shall achieve 95 percent standard compaction. Where additional soils will be added, the compaction testing shall be performed every 15,000 square feet of lift. The density shall be tested using ASTM test method D-2922 or D-2937. If any portion of either area fails the compaction test, the failed soils shall either be replaced or the moisture content shall be adjusted and the failed portion shall be recompacted as required. The reworked portion shall be tested for the minimum compaction requirement.

h. The results of the tests shall be recorded on a standard format form that is supplied by the soil testing company, and this form shall be submitted to the ENGINEER.

i. Before the GCL installation begins, the CONTRACTOR and his/her registered surveyor shall verify the following in writing and submit the written verification to the Engineer's Field Representative:

   1) Lines and grades are in conformance with the drawings and specifications.

2) The surface area to be lined has been rolled and compacted, free of irregularities and abrupt changes in grade.

EFR will verify that the subgrade has been adequately rolled and compacted, and is free of irregularities and abrupt grade change.

The Installer and EFR shall sign a subgrade certificate of acceptance prior to the installation of the lining material.

5.1.2.2 Anchor Trench

a. Engineer's Field Representative shall record information on anchor trench construction in his/her daily report. The anchor trench shall be constructed in accordance with plans and specifications.

b. Slightly rounded corners shall be provided in the trench to avoid sharp bends in the geomembrane.

c. The anchor trench shall be adequately drained to prevent water ponding and softening of adjacent soils. The anchor trench shall be backfilled with local fill material and compacted to 95 percent standard Proctor density, ASTM D698.

d. The amount of trench open at any time shall be limited to one day of geomembrane installation capacity. The anchor trench shall be backfilled at the end of each day's operation. No open anchor trenches shall be allowed to remain unfilled overnight.

e. Backfilling of the anchor trench shall be conducted when the geomembrane is in its most contracted (taut) state.

f. Care shall be taken when backfilling and compacting the trenches to prevent any damage to the lining material.

5.1.2.3 Geomembrane Placement

No geomembrane placement shall proceed without the presence of the Engineer's Field Representative.

a. Weather Conditions: Geomembrane placement shall not proceed at an ambient temperature below 40 degrees Fahrenheit (F) or above 104 degrees F unless otherwise authorized, in writing, by the Engineer's Field Representative. Geomembrane placement shall not be performed during precipitation, excessive moisture, in an area of ponded water, or excessive winds so as not to adversely affect the geomembrane installation.

b. Method of Placement

1) Each panel of the geomembrane shall be rolled out and installed in accordance with the approved shop drawings prepared by the CONTRACTOR. The layout shall be designed to keep field joining of the geomembrane to a minimum and consistent with proper methods of HDPE geomembrane installation.

2) Geomembrane rolls shall be placed using proper spreader and rolling bars with cloth slings. If a sheet must be replaced a distance greater than its width, a slip sheet shall be used.

3) The Engineer's Field Representative shall inspect each panel for damage and/or defects after placement and prior to seaming. Defective or damaged panels shall be replaced or repaired, as approved by the Engineer's Field Representative.

4) The Installer shall not drag the geomembrane sheets on rough soil subgrades.

5) All geomembrane shall be anchored as shown on the drawings and consistent with MANUFACTURER's recommendations.

6) Personnel working on the geomembrane shall not smoke, wear damaging shoes or involve themselves in any activity that may damage the geomembrane.

7) All edges of the geomembrane shall be properly weighted to avoid uplift due to wind.

8) Vehicular traffic across the geomembrane shall not be allowed.

9) All damage shall be recorded, repaired, and located on the as built drawings.

10) When tying into existing geomembrane, all excavation of previously installed liner shall be performed by hand to prevent damage.

11) The geomembrane shall be kept free of debris, unnecessary tools and materials.

12) The panel shall be placed such that the seam will be oriented along the slope.

c. Liner Boots

1) HDPE boots or shrouds shall be furnished and installed where indicated on the drawings. The boots shall be of the same material as the geomembrane.

2) The geomembrane end of the boots shall terminate in a skirt section suitable for welding to the geomembrane. The overlap between the boot and the geomembrane shall be approximately 18 inches. The boot shall be welded to the geomembrane as previously specified herein.

3) Boots and shrouds shall fit snugly around the pipe. Prefabricated material shall be designed to fit site-specific conditions for the intended slope and size of pipe.

4) Neoprene sponge rubber gasket shall be used between the boot or shroud and the pipe with a stainless steel clamp. An HDPE sacrificial sheet shall be used between the boot or shroud and the clamp for protection.

5) For pipes larger than 4 inches in diameter, a second clamp shall be used. The fastener of the second clamp shall be located on the opposite side of the pipe from the first clamp, to compensate for uneven pressure and elongation.

5.1.2.4 Seaming Weather Conditions

a. Normal Weather Conditions

1) The normal required weather conditions for seaming are:

a) Ambient temperature higher than 40 degrees F and lower than 104 degrees F.

b) No precipitation or other excessive moisture, such as fog or dew.

c) No excessive winds.

2) These weather conditions shall be fulfilled during the seaming process.

b. Cold Weather Conditions

1) If the ambient temperature is below 40 degrees F, the following conditions shall be met to ensure a quality seaming process:

a) Preheating the surface of the geomembrane to achieve normal temperature range.

b) Preheating may be waived by the Engineer's Field Representative if the Installer demonstrates that satisfactory welds of equivalent quality may be obtained without preheating at the expected temperature of installation.

c) Preheating devices shall be approved by the MANUFACTURER.

d) Care shall be taken to assure that surface temperatures are not lowered below the minimum required surface temperature for welding due to winds.

e) Additional destructive test samples shall be taken at the discretion of the Engineer's Field Representative.

f) Test seams shall be performed under the same ambient temperature conditions as the actual seams.

c. Warm Weather Conditions

1) If the ambient temperature is above 104 degrees F, no seaming of geomembrane shall be permitted unless the Installer can demonstrate, to the satisfaction of the Engineer's Field Representative, that geomembrane seam quality is not adversely impacted.

2) Test seams shall be performed under the same ambient temperature conditions as the actual seams.

3) Additional destructive tests shall be taken at the discretion of the Engineer's Field Representative.

5.1.2.5 Field Seams

a. Individual panels of geomembrane shall be laid out and overlapped by a minimum of 4 inches prior to welding. The area to be welded shall be cleaned and prepared in accordance with the quality control welding procedures as specified in Section 5.1.2.6.

b. Single or double track hot wedge fusion welder shall be used for straight welds.

c. Extrusion welder shall be used for cross seam tees, patches and repairs and penetration boots.

d. The welding equipment used shall be capable of continuously monitoring and controlling the temperatures in the zone of contact where the machine is actually fusing the geomembrane material so as to ensure that changes in environmental conditions will not affect the integrity of the weld.

e. No "fish mouths" shall be allowed within the seam area. Where "fish mouths" occur, the material shall be cut, overlapped and a patch fusion weld shall be applied. All welds upon completion of the work shall be tightly bonded. Any geomembrane area showing injury due to excessive scruffing, puncture, or distress from any cause shall be replaced or repaired with an additional piece of geomembrane. The number of patches per 100 foot length shall not exceed five. If more than five patches per 100 foot length are necessary, then the entire 100-foot length of seam shall be removed. Further welding shall cease at this time and the Engineer's Field Representative shall be notified.

f. All seams shall have a seam number that corresponds with the panel layout numbers. The numbering system shall be used in the development of the as built drawings. Seam numbers shall be derived from the combination of the two panel numbers that are to be welded together.

g. All fusion welded "T" seams (i.e., the result of the geomembrane panels placed perpendicular to each other) shall be double welded where possible. The extrusion process shall be used for the second weld.

h. All extrudate shall be dirt free, dry and protected from damage.

i. If an extrusion welder is stopped for longer than one minute, it shall be purged to remove heat degraded extrudate. All purged extrudate shall be placed on a sacrificial sheet and disposed of.

j. All seams constructed on sloped surfaces shall be vertical seams. Vertical seams are the seams, which are perpendicular to the toe of the slope.

k. All vertical panels placed on sloped surfaces shall extend 5 feet inward from the toe of slope or edge of trench.

l. All end seams shall be staggered a minimum of 5 feet in length between contiguous panels.

m. To prevent moisture buildup during fusion welding, the Engineer's Field Representative shall determine when it is necessary to place a movable protective layer of plastic (rub sheet) directly below each overlap of geomembrane during seaming operations.

n. If required or determined by the Engineer's Field Representative, a firm substrate shall be provided by using a flat board or similar hard surface directly under the seam overlap to achieve proper support during seaming operations.

o. All seams shall extend to the outer perimeter edge of the anchor trench.

p. All factory seams, field seams and repair welds shall meet seam strength requirements specified in Attachment 2.

5.1.2.6 Field Quality Control

a. Start-up weld testing

1) A test weld 3 feet long from each welding machine shall be run upon the beginning of each shift and every four hours thereafter, under the same conditions as exist for the geomembrane welding. The test weld shall be marked with date, ambient temperature and welding machine number. A tensiometer, provided by the Installer, shall be required to be onsite before and during geomembrane installation for the purpose of testing samples. Specimens of weld 1 inch wide shall be cut from the test weld and tested onsite for shear and peel strength in accordance with Attachment 2. No welder may start work until the sample weld has been approved by the Engineer's Field Representative.

2) Test seams shall be performed under the same conditions as the actual seams and shall be at least 3 feet long and 1 foot wide after seaming. Test seam for welding shall be cut out of the geomembrane rolls.

b. Nondestructive Seam Testing

1) The Installer shall perform nondestructive test on all field seams over their full length. The purpose of this test is to assure continuity and integrity of the seams. Vacuum and air pressure tests shall be used for nondestructive testing. The vacuum test shall be used for extrusion welds and single track hot wedge welds. The air pressure test shall be used for double track hot wedge welds.

2) Vacuum Testing -- equipment for testing single wedge fusion seams and extrusion seams shall be composed of the following:

a) A vacuum box assembly consisting of a rigid housing, a transparent viewing window, a soft rubber gasket attached to the bottom, porthole or valve assembly and a vacuum gage.

b) A vacuum tank and pump assembly equipped with a pressure controller and pipe connections.

c) A rubber pressure/vacuum hose with fittings and connections.

d) A plastic bucket and wide paint brush.

e) A soapy solution.

f) The following procedures shall be followed by the Installer:

- Excess sheet overlap shall be trimmed away.
- Clean the window, gasket surfaces and check for leaks.
- Energize the vacuum pump and reduce the tank pressure to approximately 5 psi.
- Wet a strip of geomembrane approximately 12 by 48 inches (length of box) with the soapy solution.
- Place the box over the wetted area and compress.
- Close the bleed valve and open the vacuum valve.
- Ensure that a leak tight seal is created.
- For a minimum period of 10 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.
- If no bubbles appear after ten seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum of 3 inch overlap and repeat the process.
- All areas where soap bubbles appear shall be marked and repaired in accordance with Paragraph 5.1.2.7 and then retested.
- If the seam cannot be tested prior to final installation, the seaming operations shall be observed by the Engineer's Field Representative for uniformity and completeness.

3) Air Pressure Testing (for double track fusion seams only)--the following procedures apply to processes that produce a double seam with an enclosed space. Equipment for testing double fusion seams shall be composed of the following:

a) An air pump equipped with pressure gage capable of generating and sustaining a pressure between 25 and 30 psi and mounted on a cushion to protect the geomembrane.

b) A manometer equipped with a sharp hollow needle, or other approved pressure feed device.

c) The following procedures shall be followed by the Installer.

- Seal both ends of the seam to be tested.

- Insert needle or other approved pressure feed device into the tunnel created by the double wedge fusion weld.
- Energize the air pump to a pressure between 25 and 30 psi, close valve and sustain pressure for at least five minutes.
- If loss of pressure exceeds 4 psi, or pressure does not stabilize, locate faulty area, repair in accordance with Paragraph 5.1.2.7 and retest.
- Remove needle or other approved pressure feed device and seal.

c. Destructive Seam Testing--destructive seam testing shall be performed in accordance with the following.

1) Concept -- the purpose of the destructive testing is to evaluate seam strength properties. A minimum of one test sample shall be obtained per 500 feet of performed seam length. The location of samples shall be determined by the Engineer's Field Representative. Selection of such locations may be prompted by suspicion of overheating, contamination, or other potential cause that may adversely impact the welds. Sampling shall be performed by the Installer. Testing of field samples shall be performed by the Installer in the presence of the Engineer's Field Representative.

2) Sampling Procedures

a) Samples shall be cut by the Installer at locations chosen by the Engineer's Field Representative as the seaming progresses.

b) The seams shall not be covered by another material before they have been tested and accepted by Engineer's Field Representative.

c) Upon obtaining each sample, assign a number to the sample and mark it accordingly.

d) Record sample location on layout drawing.

e) Record purpose of the sample, statistical routine or suspicious weld area.

f) Holes in the geomembrane resulting from destructive seam testing shall be immediately repaired in accordance with Paragraph 5.1.2.7.

d. Size and Disposition of Samples

1) The sample for laboratory testing shall be 12 inches wide by 36 inches long with the seam centered lengthwise. The sample shall be cut into three parts and distributed as follows:

a) One portion to the Installer for optional laboratory testing, 12 inches by 12 inches.

b) One portion for Quality Assurance Laboratory testing, 12 inches by 12 inches.

c) One portion to the Engineer's Field Representative for archive storage or retesting purposes, 12 inches by 12 inches.

e. Quality Assurance Laboratory Test

1) The Engineer's Field Representative shall package and ship destructive test samples to the independent Quality Assurance Laboratory.

2) Laboratory tests shall include shear and peel strength tests. The minimum acceptable values obtained in these tests shall be in accordance with Attachment 2.

3) At least five specimens shall each be tested for shear and peel strength. A passing test shall meet the minimum required values in all five specimens tested for each method.

4) The Quality Assurance Laboratory shall conduct peel and sheer testing on both tracks of the weld sample.

5) The Quality Assurance Laboratory shall provide verbal test results to the Engineer's Field Representative no more than 24 hours after they receive the samples. The Engineer's Field Representative shall review the laboratory results as soon as they become available.

f. Procedures for Destructive Test Failure

1) The following procedures shall apply whenever a sample fails a destructive test. The Installer has two options:

a) The Installer can repair the entire length of the seam between any two passing test locations in accordance with Paragraph 5.1.2.7.

b) Two new samples shall be taken at a minimum of 10 feet on each side of the original failed sample. These samples shall be sent to the Quality Assurance Laboratory for testing. Subsequent failure of test samples shall cause the testing to move further down the seam until the extent of the faulty seam has been determined.

2) All acceptable repaired seams shall be bound by two passing locations from which samples passing laboratory destructive tests have been taken. In cases where repaired seam exceeds 150 feet, a sample taken from the zone in which the seam has been repaired must pass destructive testing. Repairs shall be made in accordance with Paragraph 5.1.2.7.

3) The Quality Assurance Laboratory shall document all actions taken in conjunction with destructive test failures.

5.1.2.7 Repair Procedures

a. Any portion of the geomembrane exhibiting signs of defect, failing a destructive or a nondestructive test shall be repaired. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be made by the Engineer's Field Representative.

b. The repair procedures available include:

1) Patching, used to repair large holes, tears, undispersed raw materials and contamination by foreign matter.

2) Spot welding or seaming, used to repair small tears, pinholes, or other minor, localized defects.

3) Capping, used to repair large lengths of failed seams.

4) Removing bad seam and replacing with a strip of new material welded in place.

c. For any repair method, the following provisions shall be satisfied:

1) Surfaces of the geomembrane which are to be repaired using extrusion methods shall be abraded no more than one hour prior to the repair.

2) All surfaces shall be clean and dry at the time of the repair.

3) All seaming equipment used in repairing procedures shall be qualified.

4) All patches and caps shall extend at least 4 inches beyond the edge of the defect.

5) All patches shall have rounded corners.

d. Repair Verification

1) Each repair shall be numbered and logged by the Installer. Each repair shall be nondestructively tested using the methods described in Paragraph 5.1.2.6 b., as appropriate. Repairs which pass the nondestructive test shall be taken as an indication of an adequate repair. Repairs more than 150 feet long may be of sufficient length to require destructive test sampling, at the discretion of the Engineer's Field Representative. A failed test indicates that the repair shall be redone and retested until passing test results are achieved. The Engineer's Field Representative shall observe all nondestructive testing of repairs. The Installer shall record the number of each repair, date and test outcome.

5.1.2.8 Wrinkles

a. Wrinkles that remain in the sheet as a result of temperature expansion or uneven surface preparation may need removal as determined by the Engineer's Field Representative in consideration of applied loads on the wrinkle. Should the wrinkle need removing, the lower down-slope edge of the wrinkle shall be cut, overlapped and repaired as described in 5.1.2.7. Both ends of the wrinkle repair shall be patched. Caution must be taken in removing any wrinkles. Wrinkles are needed to allow for future contraction of the geomembrane, especially in cold weather.

5.1.2.9 Construction Equipment

a. Construction equipment or vehicles with steel tracks shall not be permitted on the geomembrane. Vehicles with rubber tires may be allowed in accordance with the

MANUFACTURER's recommendation. Other equipment such as portable generators and power centers shall be permitted if the support apparatus is protected from damaging the liner, and if care is taken to prevent leaking lubricants from damaging the geomembrane.

5.1.2.10 Disposal of Waste Material

a. Upon completion of installation, the CONTRACTOR shall remove and dispose of all trash, waste material and equipment used in connection with the performed work and shall leave the premises in a condition that is neat and acceptable to the Engineer's Field Representative.

5.1.3 Specifications

The HDPE material specifications are provided in Attachment 2 to this CQA Manual and Specification Section 02776.

5.2 Clay Liner (NOT USED)

5.3 Geocomposite

5.3.1 Testing

Conformance testing of the delivered geocomposite materials shall be conducted in accordance with the following:

5.3.1.1 Conformance Testing

a. Conformance testing shall be performed by an independent Quality Assurance Laboratory approved by the OWNER. The Quality Assurance Technician, in the presence of the Engineer's Field Representative, will obtain samples from the delivered material, mark the machine direction and identification number.

   Samples shall be taken at the rate of one sample per lot, but minimum one conformance test per 100,000 square feet of material. A lot is defined as a group of consecutively numbered rolls from the same manufacturing line. This sampling frequency may be increased as deemed necessary by the Engineer's Field Representative. The samples shall be taken across the entire roll width and shall not include the first 3 feet. The following conformance tests shall be conducted at the laboratory:

   1) Density (ASTM D1505)

   2) Carbon Black Content (ASTM D1603)

   3) Mass Per Unit Area (ASTM D3776)

   4) Thickness (ASTM D5199)

   5) Transmissivity (ASTM D4716)

   6) Tensile Strength (ASTM D5035)

b. All conformance test results shall be reviewed by the OWNER's Representative and/or the Engineer's Field Representative accepted or rejected, prior to the deployment of the

geocomposite. All test results shall meet, or exceed, the property values listed in the specifications. In case of failing test results, the CONTRACTOR may request that another sample be retested by the Quality Assurance Laboratory with MANUFACTURER's technical representative present during the testing procedures. The CONTRACTOR may also have the sample retested at two different laboratories approved by the OWNER. If both laboratories report passing results, the material shall be accepted. If both laboratories do not report passing results, all material from the lot representing the failing sample will be considered out of specification and rejected. The MANUFACTURER reserves the right to obtain additional samples from rolls immediately before and after the failing roll or as directed by the Engineer's Field Representative and have them tested. If these rolls pass, then only the failing roll will be rejected. If they fail, then the entire lot will be rejected.

5.3.2 Execution

5.3.2.1 Preparation

a. General

1) Preparation of the underlying liner material shall be in accordance with the applicable section.

2) The underlying material shall be inspected by the CONTRACTOR and EFR prior to installation of the geocomposite.

5.3.2.2 Installation

a. Panel Placement

1) Care shall be taken to keep the geocomposite clean and free from debris prior to installation. If the geocomposite is not clean, it must be washed prior to installation.

2) To ensure that the geocomposite is not damaged in any way, the following shall be complied with during installation:

a) Geocomposite shall be anchored into a trench as shown on the drawings.

b) On slopes, the geocomposite shall be secured and rolled down the slope in such a manner as to continually keep the geocomposite sheet in tension. If necessary, the geocomposite shall be positioned by hand after being unrolled to minimize wrinkles.

c) In the presence of wind, all geocomposite shall be weighted with sandbags or by other approved means. Such sandbags shall be installed during placement and shall remain until replaced with cover material. The sandbags must be removed prior to cover material placement.

d) Geocomposite shall not be welded to geomembrane.

e) Geocomposite shall only be cut using scissors or other cutting tools approved by the MANUFACTURER that will not damage the underlying geosynthetics. Care shall be taken not to leave tools on the geocomposite.

f) Necessary precautions shall be taken to prevent damage to underlying layers during placement of the geocomposite.

g) During placement of geocomposite care shall be taken not to entrap in the drainage net dirt or excessive dust that could cause clogging of the drainage system and/or stones that could damage the adjacent geomembrane. If dirt or excessive dust is entrapped in the geocomposite , it should be hosed clean prior to placement of the next material on top of it. In this regard, care shall be taken in handling the sandbags, to prevent rupture or damage of the sandbag.

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b. Field Seams and Overlaps

1) The following requirements shall be met during installation of the geocomposite:

a) Adjacent rolls shall be overlapped by at least 6 inches.

b) Overlaps shall be secured by tying. Tying can be achieved by plastic fasteners or polymer braid. Tying devices shall be in contrast color for easy inspection. Metallic devices are not allowed.

c) Tying shall be every 1 foot along the slope, every 6 inches in the anchor trench and every 6 inches along end to end seams on the base of the landfill. Tying shall be every 6-in along side-to-side seams, two rows with double ties with a minimum strength of 120 lbs, on the base of the landfill.

d) No horizontal seams shall be allowed on side slopes.

e) In the corners of the side slopes where overlaps between perpendicular geocomposite strips are required, an extra layer of geocomposite shall be unrolled along the slope, on top of the previously installed geocomposite from top to bottom of the slope.

f) When more than one layer of geocomposite is installed, joints shall be staggered.

g) The machine direction of the primary geocomposite layer shall be placed at 90 degrees from the machine direction of the secondary geocomposite layer.

5.3.2.3 Field Quality Control

a. Two duplicate documentation files for panel placement shall be maintained. One shall be maintained by the CONTRACTOR and the other by the Engineer's Field Representative. At the end of each work week the files shall be updated and checked to assure that all copies of pertinent project information are included in each file. The CONTRACTOR shall submit daily copies of the documentation to the Engineer's Field Representative.

b. Any holes or tears in the geocomposite shall be repaired by placing a patch extending 1 foot beyond the edges of the hole or tear. The patch shall be secured to the original geocomposite by placing ties every 6 inches. All repairs and patches shall be approved by the Engineer's Field Representative.

c. Damage to the geocomposite occurring during the placement of the material overlying the geocomposite shall be repaired immediately.

d. Upon completion of installation, the CONTRACTOR shall remove and dispose of all trash, waste material and equipment used in connection with the performed work and shall leave the premises in a condition that is neat and acceptable to the Engineer's Field Representative.

5.3.3 Specifications

The minimum specifications for the geocomposite material are:

PROPERTIES	MINIMUM AVERAGE VALUES	TEST METHOD
GEOCOMPOSITE		
Transmissivity: Metal plate/geocomposite/metal plate gradient = 0.02 @ 10,000 psf 100 hour seat time	$1.6x10^{-3}$ m^2/sec	ASTM D4716
Peel Adhesion	1.0 lb/in	GRI GC-7
GEONET		
Polymer Composition	97% polyethylene by weight	
Density	0.940 g/cc	ASTM D1505
Melt Index (Max.) condition 190/2.16	1.0 g/10 minutes (max)	ASTM D1238
Carbon Black Content	2 percent	ASTM D4218
Nominal Thickness	300 mil	ASTM D5199
Transmissivity metal plate/geonet/metal plate gradient = 2% @ 10,000 psf 100 hours seat time	8E-03 m^2/sec	ASTM D4716
Tensile Strength	75 lbs/in	ASTM D5035

The composite drainage net shall have a minimum in place transmissivity (steel plate/sand/composite net/geomembrane/steel plate, i= 0.02 @10,000 lbs, 100 hour seat time) of at least $1.6x10^{-3}$ m^2/sec.

5.4 Geotextile Fabrics

5.4.1 Testing

The conformance testing of the delivered geotextile fabric materials shall be conducted in accordance with the following:

5.4.1.1 Conformance Testing

a. Conformance testing shall be performed by an independent Quality Assurance Laboratory approved by the OWNER. Engineer's Field Representative shall obtain samples from the delivered material, mark the machine direction and identification number. The Quality Assurance Technician, in the presence of the Engineer's Field Representative, will obtain samples from the delivered material, mark the machine direction and identification number. Samples shall be taken at the rate of one sample per lot, but minimum one conformance test

per 100,000 square feet of material. A lot is defined as a group of consecutively numbered rolls from the same manufacturing line. This sampling frequency may be increased as deemed necessary by the Engineer's Field Representative. The samples shall be taken across the entire roll width and shall not include the first 3 feet. This sampling frequency may be increased as deemed necessary by the Engineer's Field Representative. The samples shall be taken across the entire roll width and shall not include the first 3 feet. The following conformance tests shall be conducted at the laboratory.

1) Mass per unit area (ASTM D3776)

2) Mullen burst strength (ASTM D3786)

3) Puncture resistance (ASTM D3787)

4) Grab tensile (ASTM D4632)

5) Permittivity (ASTM D4491)

6) Apparent opening size (ASTM D4751)

7) Grab Elongation (ASTM D4632)

b. All conformance test results shall be reviewed by the Engineer's Field Representative and accepted or rejected, prior to the deployment of the geotextile. All test results shall meet, or exceed, the property values listed in the specifications.

c. The MANUFACTURER reserves the right to obtain additional samples from rolls immediately before and after the failing roll or as directed by the Engineer's Field Representative and have them tested. If these rolls pass, then only the failing roll will be rejected. If they fail, then the entire lot will be rejected.

5.4.2 Execution

5.4.2.1 Installation

a. Panel Placement

1) The geotextile shall be installed as shown on the drawings and in accordance with the MANUFACTURER's recommendations and approved shop drawings. Each panel, in accordance with the approved panel layout, shall have an identification number corresponding to adjacent roll numbers.

2) No mechanical equipment shall be driven directly on top of the geotextile.

3) Soil cover shall be placed with mechanical equipment; however, no mechanical equipment shall be allowed directly on top of the geotextile material. Equipment shall be driven on pre deposited material.

4) Soil cover shall be brought to the work area with earth carrying equipment, deposited on the previously spread soil cover, then pushed onto the uncovered portion of the

fabric with graders or bulldozers. This operation shall be repeated until the total area is covered.

5) Soil cover for the side slopes of the geotextile shall be placed at the bottom and pushed up so as to reduce any tension on the geotextile.

6) Damage to the geotextile occurring during the placement of soil cover shall be repaired immediately.

7) All fabric installation shall be completely covered at the end of each work day unless otherwise approved by the Engineer's Field Representative.

b. Field Seaming

1) The seams shall be overlapped a minimum of 6 inches.

2) The geotextile panels shall be sewn together. The thread used to sew the panels shall be as approved by the MANUFACTURER.

5.4.2.2 Field Quality Control

a. Two duplicate documentation files for panel placement shall be maintained. One shall be maintained by the CONTRACTOR and the other by the Engineer's Field Representative. At the end of each work week the files shall be updated and checked to assure that all copies of pertinent project information are included in each file. The CONTRACTOR shall submit daily copies of the documentation to the Engineer's Field Representative.

b. Prior to placement of the soil cover, the geotextile installation and related work shall be inspected by the Engineer's Field Representative. All work in the system therein being inspected shall be complete, clean and ready for use. All work shall meet the requirements as to line, grade, cleanliness and workmanship, as determined by the Engineer's Field Representative.

c. All discrepancies shall be noted and repaired. Final acceptance of the system shall be contingent upon the approval of the Engineer's Field Representative.

d. Upon completion of installation, the CONTRACTOR shall remove and dispose of all trash, waste material and equipment used in connection with the performed work and shall leave the premises in a neat condition acceptable to the Engineer's Field Representative.

5.4.3 Specifications

The minimum specifications for the geotextile fabrics are shown on **Table 5-1**.

Table 5-1

Unit weight	6 oz/yd^2	ASTM D5261
Grab Tensile	170 lbs	ASTM D4632
Mullen Burst	315 lbs/in2	ASTM D3786
Puncture Resistance	90 lbs	ASTM D4833

AOS	70 sieve	ASTM 4751
Flow Rate	110 gal/min-ft^2	ASTM 4491

5.5 Granular Fill Material

5.5.1 Testing

The conformance testing of the delivered granular fill materials shall be conducted in accordance with the following:

5.5.1.1 Conformance Testing

a. Granular Fill Material

1) Conformance testing shall be performed by the Quality Assurance Laboratory on samples from each source of granular fill material to assure compliance with the specifications. The following tests shall be performed on the samples prior to placement:

a) Sieve Analysis (ASTM D422)

b) Specific Gravity (ASTM D854)

c) Laboratory Density Permeability Relationship

d) Organic Content

e) Soil Classification (ASTM D2488)

f) Carbonate Content (ASTM D4373)

b. Coarse Aggregate

1) Gradation analysis shall be performed by the Quality Assurance Laboratory on samples from each source of the coarse aggregate to assure compliance with the specifications.

5.5.2 Execution

5.5.2.1 Granular Fill Placement

a. After installation completion and acceptance of the liner system and related work activities, place the granular fill material to thickness and area extend as shown on the drawings.

b. During the placement of the granular fill material, no construction equipment shall be allowed directly on the geocomposite and any damage shall be repaired immediately in accordance with the specifications.

c. Care shall be taken to protect the geomembrane liner. Sand ramps shall be provided at down slopes and in other heavily traveled areas. Only large radius turns by the loader and other equipment shall be permitted, as sharp turns may damage the liner.

d. Granular materials shall not be placed over a fold in the geocomposite.

e. The sand layer shall be compacted by proof rolling with a smooth drum roller. The final grade shall be laid to elevations as shown on the drawings. The sand layer shall be compacted to obtain the required permeability in accordance with the plans and specifications.

f. Sand shall be placed on the side slopes starting at the toe of the slope and working toward the top of the berm.

g. Drainage layer material can only be spread when the geomembrane is taut or stretched evenly over the base of the landfill. The drainage layer material shall not be spread when the geomembrane is elongated due to higher daytime temperatures and exposure to sun. The CONTRACTOR must make provisions to cover the geomembrane under non-elongated conditions

h. The moisture content of the sand material shall be at or slightly above the optimum moisture content for the sand being utilized during the entire time when the roller is working on the sand. If, in the opinion of the Engineer's Field Representative, the sand is too dry for proper compaction, the CONTRACTOR shall spray the sand with a sufficient quantity of clean water to bring the sand layer to the proper moisture content. No compactive effort shall be made if the sand is significantly saturated.

i. The sand surface must be made smooth and free from ruts or indentations at the end of any working day when significant precipitation is forecast and/or at the completion of the compaction operations in that area in order to prevent saturation of the sand material.

j. Trenches for the leachate collection pipes shall be excavated within the granular fill where shown on the drawings. The CONTRACTOR shall exercise special care not to disturb or damage the geomembrane. If a backhoe is used to construct the trench, a rubber modification section shall be installed on the bucket to protect the geomembrane. All areas of the liner damaged shall be immediately repaired as directed by the Engineer's Field Representative.

k. The leachate piping shall be installed, and shall be backfilled with coarse aggregate to the depth and width shown on the drawings. Care shall be taken during backfilling of the pipe to assure the pipe will not be crushed or otherwise damaged. The geotextile fabric shall then be overlapped at least 8 inches over the coarse aggregate.

l. Following construction of the leachate piping, the granular fill material shall be brought to final grade and compacted as specified herein.

5.5.2.2 Field Quality Control

a. Samples shall be taken for every 5,000 cubic yards of in place granular fill material. The sand layer thickness shall be measured periodically throughout the day during construction to confirm that the thickness of the installed material is in accordance with the drawings. The sand layer thickness shall be checked on a 100-foot grid. The samples shall be taken by the Quality Assurance Technician and the following tests shall be performed on the samples by the Quality Assurance Laboratory:

1) Relative Density of Cohesionless soils (ASTM D4254)

2) Nuclear Density and Moisture Content (ASTM 3017)

3) Sand Layer Thickness (ASTM D2992)

b. Any sample or area tested shall be rejected, removed and replaced if it does not meet the requirements of the technical specifications. Reconstructed areas shall have feathered, overlapping edges that tie into adjacent fill material.

c. Upon completion of installation, the CONTRACTOR shall remove and dispose of all trash, waste material and equipment used in connection with the performed work, and shall leave the premises in a condition that is neat and acceptable to the Engineer's Field Representative.

5.6 Liner Subgrade

5.6.1 Subgrade Preparation

a. The subgrade shall be examined by the ENGINEER and proofrolled to detect soft or loose soils. Proofrolling shall be accomplished with a vibratory steel drum roller capable of delivering no less than 50,000 lbs of dynamic force or equipment subject to ENGINEER approval. A minimum of 5 passes each at walking speed shall be required in two perpendicular directions.. Based on observation during the proofrolling operation, the ENGINEER reserves the right to select the number and direction of passes to be used. Any unsuitable soils encountered at subgrade elevation shall be removed and replaced as directed by the ENGINEER.

5.6.2 Liner Subgrade Placement (NOT USED)

5.6.3 Field Quality Control

a. The following test shall be conducted on the completed portions of the liner subgrade.

Test	Method	Frequency
Density	ASTM D2937	1/10,000 S.F./lift

b. All holes made as a result of the depth measurement shall be completely filled by the CONTRACTOR with liner subgrade soil at no additional cost, as instructed by the ENGINEER.

c. The CONTRACTOR shall use liner subgrade soil, as instructed by the ENGINEER to backfill and repair the holes in the liner subgrade where samples were obtained at no extra cost.

d. Any sample or area tested shall be rejected, removed and replaced if it does not meet the requirements of the technical specifications. Reconstructed areas shall have feathered, overlapping edges that tie into adjacent liner subgrade areas.

e. The CONTRACTOR's Representative shall observe the thickness of loose liner subgrade lifts continuously during placement. If grade stakes are used they shall be made of flat bottom PVC pipes with bright colored flags.

f. The CONTRACTOR shall submit a survey plan with final elevation of top of liner subgrade for ENGINEER's approval.

5.7 Geosynthetic Clay Liner

5.7.1 Testing

5.7.1.1 Conformance Testing

Conformance testing shall be performed by the Quality Assurance Laboratory on samples from the GCL to assure compliance with the specifications. The following tests shall be performed on the samples:

a. Bentonite Swell Index (ASTM D5890)

b. Bentonite Fluid Loss (ASTM D5891)

c. Bentonite Mass/Area (ASTM D5993)

d. GCL Grab Strength (ASTM D4632)

e. GCL Peel Strength (ASTM D4632)

f. GCL Index Flux (ASTM D5887)

g. GCL Permeability (ASTM D5084)

h. GCL Hydrated Internal Shear Strength (ASTM D5321)

5.7.2 Execution

5.7.2.1 Subgrade Preparation

a. Preparation of the subbase shall be accomplished as specified in Section 5.6.

b. The Engineer's Field Representative and the Contractor's Representative shall inspect and approve the subbase before installation of the GCL can proceed. It shall be the CONTRACTOR's responsibility to properly prepare and maintain the subgrade in a smooth, uniform and compacted condition during installation of the liner.

c. If the subgrade is damaged during GCL installation, the CONTRACTOR shall restore, recompact and test the area and have the Quality Assurance Technician retest the subgrade prior to installing the GCL.

d. As part of the GCL system, the GCL will be placed directly on top of the compacted subgrade. During actual placing and seaming of the GCL, the subgrade shall be kept free of all standing water.

e. Before the GCL installation begins, the CONTRACTOR and the installer shall verify and sign off on the following:

1) Lines and grades are in conformance with the design drawings and Specifications, verified by a field survey.

2) The surface area to be lined has been rolled and compacted, free of irregularities and abrupt changes in grade.

5.7.2.2 Anchor Trench

a. The anchor trench shall be constructed as shown on the design drawings and as specified herein. Slightly rounded corners shall be provided in the trench to avoid sharp bends in the GCL.

b. The anchor trench shall be adequately drained to prevent water ponding and softening to adjacent soils. The anchor trench shall be backfilled with common fill and compacted to 95 percent of standard proctor density, ASTM D698.

c. The amount of trench open at any time shall be limited to one day of GCL installation capacity. The anchor trench shall be backfilled and compacted at the end of each day in accordance with the Specifications.

5.7.2.3 GCL Placement

a. Weather Conditions

1) GCL placement shall not proceed during precipitation, excessive moisture, in an area of ponded water, or excessive winds.

b. Method of Placement

1) Placement of the GCL shall be conducted in accordance with the MANUFACTURER's recommendations and with the directions provided herein. Any deviations from these procedures must be pre-approved by the ENGINEER.

2) Each panel of the GCL shall be rolled out and installed in accordance with the approved shop drawings prepared by the CONTRACTOR. The layout shall be designed to keep field joining of the GCL to a minimum and consistent with proper methods of GCL installation.

3) GCL rolls shall be placed using proper spreader and rolling bars with chain or cloth slings. If a sheet must be replaced a distance greater than its width, a slip or rub sheet shall be used.

4) The EFR shall inspect each panel, after placement and prior to seaming, for damage and/or defects. Defective or damaged panels shall be replaced or repaired, as approved by the ENGINEER.

5) The installer shall avoid dragging the GCL sheets on rough soil subgrades.

6) All GCL shall be anchored as shown on the Drawings and consistent with MANUFACTURER's recommendations. Seams shall be perpendicular to the toe of slope at all times.

7) The GCL shall be properly weighted to avoid uplift due to wind.

8) Vehicular traffic across the GCL shall not be allowed unless approved by the ENGINEER.

9) All damage shall be recorded and located in the as built drawings.

10) The GCL shall be kept free of debris, unnecessary tools and materials. In general, the GCL area shall remain neat in appearance.

11) Equipment necessary to perform the installation (generators, compressors, etc) shall have a scrap Geomembrane sheet placed underneath to protect the installed GCL from possible damage.

12) In the opinion of the ENGINEER, any seam, or edge of GCL material exposed for more than 24 hours or considered partially hydrated when seaming occurs shall receive a 3-foot overlap (rainlap) from the adjourning GCL panel.

13) The CONTRACTOR shall only work on an area that can be completed in one working day. Completion shall be defined as the full installation and anchoring of the GCL liner and placement of the specified liners or cover soils. Upon completing placement of bentonite panels in any area, the HDPE geomembrane shall be immediately installed over bentonite panels. The HDPE liner shall be covered with a minimum of one foot of approved cover soil within 48 hours of placement.

14) The minimum allowable size for a GCL "panel" shall be 120 square feet.

15) The GCL shall not get wet before or during installation. The GCL mat shall not be installed during periods of any precipitation. If a precipitation event occurs after the installation of a bentonite mat panel, but prior to covering with an HDPE panel, thin film plastic sheeting may be used to cover and to temporarily protect the bentonite mat from moisture if approved by the ENGINEER.

16) During the bentonite geocomposite installation, an agent or representative of the MANUFACTURER shall provide on site assistance and instruction to the CONTRACTOR and resident engineer regarding product application techniques as required.

17) The CONTRACTOR shall only place a quantity of GCL that he can satisfactory cover in the same day. Under no circumstances will the ENGINEER allow the GCL mat to be exposed to the elements overnight.

18) For protection and proper performance, no machinery or equipment shall be allowed on the bentonite mat, unless previously approved by the ENGINEER and MANUFACTURER. A low tire pressure vehicle (i.e., all terrain vehicles) may be used to

install the HDPE over the bentonite mat if the bentonite mat is dry, if approved by the ENGINEER and MANUFACTURER. Vehicles, machinery, or equipment shall be operated to avoid abrupt stops, starts, or turns.

19) GCL panels shall be placed with the non-woven geotextile slide facing down. On sloped areas exceeding a steepness of 4H:1V, the long dimension of all panels shall be oriented parallel to the slope. Panels should be placed from the highest elevation to the lowest within the area to be lined, to facilitate drainage in the event of precipitation. Panels shall be placed free of tension or stress yet without wrinkles or folds. It is not permissible to stretch the GCL in order to fit a designated area. Panels shall not be dragged across the subgrade into position except where necessary to obtain the correct overlap for adjacent panels.

20) When covering GCL installed on sloped areas steeper than 4H:1V, the cover material should be pushed upslope to minimize tension on the GCL.

21) Any leading edge of panels left uncovered shall be protected at the end of the working day with a waterproof sheet which is adequately secured with sandbags and other ballast.

c. Liner Penetrations

1) GCL aprons or shrouds shall be furnished and installed where indicated on the Drawings. The aprons shall be of the same material as the GCL.

2) Aprons and shrouds shall fit snugly around the pipe.

3) For any penetrations or structures the mat will contact, a small notch (approximately 3 inches wide and 8 inches deep) shall be cut against the edge of the subgrade area. The mat shall be brought up to the edge of the structure and trimmed to fit into the notch. The CONTRACTOR shall then hand-apply a pure bead of bentonite into half the notch. The mat shall then be inserted into the notch, with the remaining volume of the notch refilled with the pure bentonite and compacted.

5.7.2.4 Field Seams

a. Individual panels of GCL shall be laid out and overlapped by a minimum of 24-inches for end seams and or minimum of 12-inches for side seams prior to seaming. The area to be seamed shall be cleaned and prepared prior to placement of granular bentonite.

b. All seams shall have a seam number that corresponds with the panel layout numbers. The numbering system shall be used in the development of the record drawings. Seam numbers shall be derived from the combination of the two panel numbers that are to be seamed.

c. Seam areas or runs shall also be flat and clear of any large rocks, debris, or ruts. Contacting surfaces shall be clean and clear of dirt or native soil with all edges pulled tight to maximize contact and to smooth out any wrinkles or creases. Overlaps shall be a minimum of 12 inches and verified by QA/QC personnel.

d. Seams shall be augmented with granular bentonite to ensure seam integrity. Granular bentonite shall be dispersed evenly from the panel edge to the lap line at a minimum rate of 1/4 pound per lineal foot continuously along all seams or overlap areas. Accessory bentonite shall be of the same type as the material within the composite liner itself.

e. All seams constructed on sloped surfaces shall be vertical seams.

f. On gently sloping areas (gentler than 4H:1V) where seams may be placed across the slope, overlaps should be "shingled" so as to prevent flow into the seam.

5.7.2.5 Field Quality Control

a. Testing

1) Field Quality Control will be the responsibility of the EFR. Testing will be for the parameters listed in Table A.

b. Repair Procedures

1) Any portion of the GCL exhibiting signs of defect shall be repaired. The following procedure should be used to repair these areas. The final decision as to the appropriate repair procedure shall be made by the ENGINEER.

Large rips or tears shall be repaired by completely exposing the affected area, removing all foreign objects or soil, and by then placing a patch over the damage, with a minimum overlap of 12 inches on all edges. Accessory bentonite shall be placed between the patch and the repaired material at a rate of 1/4 pound per lineal foot of edge, spread in a 6-inch width. The above procedures shall also be implemented if a rip or tear occurs on a sloped surface. In this instance, the edges of the patch shall be fastened to the repaired liner with construction adhesive, in addition to the bentonite-enhanced seam.

c. Repair Verification

1) Each repair shall be numbered and logged by the EFR. The EFR shall observe all nondestructive testing of repairs. The EFR shall record the number of each repair, date and test outcome.

5.7.2.6 Disposal of Waste Material

a. Upon completion of installation, the CONTRACTOR shall dispose of all trash, waste material and equipment used in connection with the performed work and shall leave the premises in a neat and acceptable condition. Waste materials shall be disposed according to local, state, and federal regulations after completion of installations.

Table A

Bentonite Certified Properties

Material Property	Test Method	Test Frequency, ft^2 (m^2)	Required Values
Bentonite Swell Index[1]	ASTM D5890	1 per 50 tonnes	24 mL/2g min.
Bentonite Fluid Loss[1]	ASTM D5891	1 per 50 tonnes	18 mL max.
Bentonite Mass/Area[2]	ASTM D5993	40,000 ft^2 (4,000 m^2)	0.75 lb/ft^2 (3.6 kg/m^2)
GCL Grab Strength[3]	ASTM D4632	200,000 ft^2 (20,000 m^2)	90 lbs (396 N)
GCL Peel Strength[3]	ASTM D4632	40,000 ft^2 (4,000 m^2)	15 lbs (66 N)
GCL Index Flux[4]	ASTM D5887	Every Lot	$1x10^{-8}$ $m^3/m^2/sec$
GCL Permeability[4]	ASTM D5084	Weekly	$5x10^{-9}$ cm/sec
GCL Hydrated Internal Shear Strength[5]	ASTM D6243	Every Lot	See Note 5

Notes:

1. Bentonite property tests performed at CETCO's bentonite processing facility before shipment to CETCO's GCL production facilities.
2. Bentonite mass/area reported at 0 percent moisture content.
3. All tensile testing is performed in the machine direction, with results as minimum average roll values unless otherwise indicated.
4. Index flux and permeability testing with desired distilled/deionized water at 80 psi (551 kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. Reported value is equivalent to 925 gal/acre/day. This flux value is equivalent to a permeability of 5x10-9 cm/sec for typical GCL thickness. This flux value should not be used for equivalency calculations unless the gradients used represent field conditions. A flux test using gradients that represent field conditions must be performed to determine equivalency. The last 20 weekly values prior the end of the production date of the supplied GCL may be provided.
5. CONTRACTOR shall submit for approval results of direct shear testing on the bentonite mat and on the interface between the GCL and the HDPE geomembrane in accordance with ASTM D6243. The tests shall consist of at least 3 separate shear tests run at normal stresses of 1, 2 and 3 psi. The tests shall be run performed on GCL sample hydrated a minimum of 24 hours under the normal stress at which the sample is to be sheared. Shearing shall occur at horizontal displacement rates no greater than 0.004 in/min to ensure that drained conditions are established everywhere on the shear plane during shearing. Results of shear tests shall include determination of the internal shear strength of the GCL and the interface strength between the GCL and the HDPE GCL. The internal shear strength of the GCL and the two interfaces shall have a peak interface friction angle of greater than 14 degrees.

Attachment 1
Geomembrane Quality Control Documentation Forms

The following forms are included and shall be completed by the responsible party as shown on the forms.

Form No.	Title
CQC - 100	Liner Project QC Log
CQC - 101	Subgrade Surface Acceptance
CQC - 102	Receiving QC Log
CQC - 103	Personnel QC Log
CQC - 104	Daily Panel Placement QC Log
CQC - 105	Daily Seaming QC Log
CQC - 106	Daily QC Report Pre-weld Testing
CQC - 107	Daily QC Report Earthen Cover
CQC - 108	Seam Inspection Log

FORM CQC - 100
LINER PROJECT QC LOG
(One sheet per project)

PROJECT NAME: _____

PROJECT NUMBER: _____ INSTALLATION DATE: _____

PROJECT LOCATION: _____

PROJECT OWNER: _____

ADDRESS: _____

CONTACT: _____ PHONE: _____

ENGINEERING FIRM: _____

ADDRESS: _____

CONTACT: _____ PHONE: _____

GENERAL CONTRACTOR: _____

ADDRESS: _____

CONTACT: _____ PHONE: _____

SPECIFIED LINER MATERIALS: _____ THICKNESS & TYPE: _____

SUPPLIER OF LINER MATERIALS: _____

ADDRESS: _____

CONTACT: _____ PHONE: _____

MATERIAL CERTIFICATION RECEIVED: _____

DATE: _____ ACCEPTED: _____

FABRICATOR OF MATERIAL: _____

INSTALLER OF MATERIAL: _____

QC INSPECTION FIRM: _____

ADDRESS: _____

CONTACT: _____ PHONE: _____

LINER TESTING LABORATORY: _____

ADDRESS: _____

CONTACT: _____PHONE:_____

FORM CQC - 101
SUBGRADE SURFACE ACCEPTANCE
(One sheet per project)

PROJECT NAME: _____ DATE: _____ PROJECT NUMBER: _____

EARTH CONTRACTOR: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

SUPERINTENDENT OF PROJECT: _____ PHONE: _____

GEOMEMBRANE INSTALLER: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

SUPERINTENDENT OF PROJECT: _____ PHONE: _____

CERTIFICATE OF ACCEPTANCE
OF SUBGRADE SOIL BY INSTALLER

I the undersigned, duly authorized representative of _____
do hereby accept the soil surface as being acceptable for the placement of a geomembrane liner.

_____ _____ _____ _____
Name Signature Title Date

Certificate Accepted by Inspector (EFR) - Company: _____

_____ _____ _____ _____
Name Signature Title Date

QC INSPECTOR: _____

SITE SUPERVISOR: _____

INSTALLING SUPERVISOR: _____

Use back for comments.

FORM CQC - 102
RECEIVING QC LOG
(One sheet per truck)

PROJECT NAME: _____

DATE: _____ TIME: _____ PROJECT NUMBER: _____

TRUCKERS ID: _____

NO. OF PIECES ON BOARD: _____ AGREE WITH PACKING LIST? _____

CONDITION OF PACKAGING: _____

VERIFY PROPER MATERIALS: _____ VERIFY PROPER THICKNESS: _____

IDENTIFY PANEL NUMBERS: _____

_____

IDENTIFY ACCESSORIES *(adhesive, battens, boots, etc.)*: _____

_____

IDENTIFY DAMAGED ITEMS: _____

_____

TYPE OF UNLOADING EQUIPMENT USED: _____

CONDITION: _____

OPERATOR: _____

COMMENTS: _____

_____

STORAGE AREA

CONDITION *(surface)*: _____

LOCATION TO PLACEMENT AREA: _____

MATERIAL PROPERLY COVERED: _____

WEATHER

CONDITIONS: _____ TEMP: _____

QC INSPECTOR: _____

SITE SUPERVISOR: _____

Use back for other comments.

FORM CQC - 103
PERSONNEL QC LOG
(Installation & field seaming personnel)
(One sheet per mobilization or change of personnel)

PROJECT NAME: _____

DATE: _____ PROJECT NUMBER: _____

SAFETY MEETING CONDUCTED ON MATERIALS HANDLING: _____

GIVEN BY: _____ DATE: _____

SUPERINTENDENT OF INSTALLATION: _____

SEAMING CREW PERSONNEL

#1 CREW LEADER: _____ HELPER: _____

#2 CREW LEADER: _____ HELPER: _____

#3 CREW LEADER: _____ HELPER: _____

#4 CREW LEADER: _____ HELPER: _____

#5 CREW LEADER: _____ HELPER: _____

#6 CREW LEADER: _____ HELPER: _____

#7 CREW LEADER: _____ HELPER: _____

#8 CREW LEADER: _____ HELPER: _____

OTHER CREW MEMBERS

NAME: _____ NAME: _____

NAME: _____ NAME: _____

NAME: _____ NAME: _____

SIGNED: _____
QC Inspector

FORM CQC - 104
DAILY PANEL PLACEMENT QC LOG
(Placement of panels for seaming)
(One sheet per day of placement)

PROJECT NAME: _____

DATE: _____ PROJECT NUMBER: _____

WEATHER: TEMPERATURE _____

CONDITION: RAIN SNOW CLOUDY SUNNY

ACTUAL HOURS WORKED: _____

NUMBER OF CREW *(crew leader)*: _____

OTHER ACTIVITIES *(placement of sand bags, etc.)*: _____

TYPE OF PLACEMENT EQUIPMENT: _____

OPERATOR: _____

CONDITION: _____

NUMBER OF PANELS PLACED: _____ TOTAL S.F. PLACED: _____

PANEL ID NOS: _____

_____

_____

_____

_____

COMMENT ON SITE CONDITION:

_____

_____

_____

LINEAL FEET OF ANCHOR TRENCH DUG: _____ ACCEPTED: _____

SIGNED: _____
QC Inspector

FORM CQC - 105
DAILY SEAMING QC LOG
(Field seaming of panels)
(One sheet seaming crew per day)

PROJECT NAME: _____

DATE: _____ PROJECT NUMBER: _____

WEATHER: TEMPERATURE _____

CONDITION: RAIN SNOW CLOUDY SUNNY

ACTUAL HOURS WORKED: Start _____ Stop _____

NAME OR NUMBER OF CREW *(crew leader)*: _____

TOTAL LINEAL FEET OF FIELD SEAM SEALED: _____

SEAMS WIDTH MINIMUM: 2-INCH BOND AREA: _____ HARD WORKING SURFACE: ___

TOTAL LINEAL FEET OF FIELD SEAM TESTED *(nondestructive)*: _____

(method): _____

NUMBER OF SEAM REPAIRS REQUIRED *(list locations here and on as-built)*:

_____

NUMBER OF OTHER REPAIRS REQUIRED *(list locations here and on as-built)*:

_____

NUMBER OF SEAM SAMPLES MADE OR CUT FOR DESTRUCTIVE TESTING *(list locations here and on as-built)*: _____

_____

DESCRIPTION OF OTHER WORK PERFORMED TODAY *(boots & battens, anchors, etc.)*:

_____

_____

_____

_____

SIGNED: _____
QC Inspector

FORM CQC - 106
DAILY QC REPORT
PRE-WELD TESTING
(Field seam test sample)
(One sheet per sample)

PROJECT NAME: _____

DATE: _____ TIME: _____ PROJECT NUMBER: _____

TIME SAMPLE MADE AND OR CUT: _____

CREW IDENTIFICATION: _____

SAMPLE IDENTIFICATION: _____

MACHINE ID: _____ MACHINE TEMP (□F) _____ MACHINE SPEED _____

WEATHER AT TIME SEAM SAMPLE WAS MADE: TEMPERATURE _____

CONDITION: RAIN SNOW CLOUDY SUNNY

FIELD TEST

SHEAR RESULT: _____ PEEL RESULT: _____

#1 _____ #1 _____

#2 _____ #2 _____

#3 _____ #3 _____

#4 _____ #4 _____

#5 _____ #5 _____

SIGNED: _____
QC Inspector

FORM CQC - 107
DAILY QC REPORT
EARTHEN COVER
(Placement of earthen cover)
(One sheet per day)

PROJECT NAME: _____

DATE:_____ PROJECT NUMBER: _____

WEATHER: TEMPERATURE: _____

CONDITION: RAIN SNOW CLOUDY SUNNY

ACTUAL HOURS WORKED: _____

TYPE OF EQUIPMENT USED FOR HAULING: _____

YPE OF EQUIPMENT USED FOR SPREADING: _____

CONDITION OF EARTHEN FILL: _____

COMMENTS: _____

_____

DAMAGE TO LINER REPORT

LOCATION: _____ SITE: _____

CAUSED BY: _____

REPAIRED BY: _____

TESTED BY: _____

LOCATION: _____ SITE: _____

CAUSED BY: _____

REPAIRED BY: _____

TESTED BY: _____

LOCATION: _____ SITE: _____

CAUSED BY: _____

REPAIRED BY: _____

TESTED BY: _____

SIGNED: _____

QC Inspector

FORM C - 108
SEAM INSPECTION LOG
(Field seaming of panels)

PROJECT NAME: _____

DATE: _____ PROJECT NUMBER: _____

WEATHER: TEMPERATURE - _____

CONDITION:_____ RAIN _____ SNOW _____ CLOUDY _____ SUNNY _____

INSTALLER: _____ WELDING TECHNICIAN: _____

WELDING METHOD: _____ TESTING METHOD: _____

A. Air Pressure Testing Method

New Test or Retest	Start Time	Start Pressure (psi)	End Time	End Pressure (psi)	Length (feet)	Pressure Loss (psi)	Approved (Y/N)

B. Vacuum Box Testing Method

Location	Length	Approved (Y/N)

C. Seam Repairs (patches/cap strips)

Repair Number	Defect Type	Repair

DESCRIPTION OF OTHER WORK PERFORMED:

_____

_____

_____

SEAM LOCATION AND DETAIL:

SIGNED: _____

QC Inspector

Attachment 2
HDPE Material Properties

TABLE A1
MATERIAL PROPERTIES
HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE
TEXTURED SHEET

				Specified Thickness (mil)						Min. Testing
Property	**Unit**	**Value**	**Test Method**	**30**	**40**	**60**	**80**	**100**	**120**	**Frequency**
Thickness	Mil	min. ave.	ASTM D1593							
-Nominal	Mil			30	40	60	80	100	120	per roll
-Lowest Individual	Mil			27	36	54	72	90	100	per roll
-Asperity Height	Mil	min. ave.	GRI GM 12	10	10	10	10	10	10	every 2nd roll
Density	g/ml	min.	ASTM D1505/D792	0.940	0.940	0.940	0.940	0.940	0.940	200,000 lb
Tensile Properties	lb/in	min. ave.	ASTM D638 Type IV							20,000 lb
-Yield Stress	lb/in			63	84	126	168	210	252	
-Break Stress	lb/in			45	60	90	120	150	180	
-Yield Elongation	%			12	12	12	12	12	12	
-Break Elongation	%			100	100	100	100	100	100	
Tear Resistance	Lb	min. ave.	ASTM D1004	21	28	42	56	70	84	45,000 lb
Puncture Resistance	Lb	min. ave.	ASTM D4883	45	60	90	120	150	180	45,000 lb
Stress Crack Resistance	Hr.	min.	ASTM D5397 (APP.)	300	300	300	300	300	300	per GRI, GM 10
Carbon Black Content	%	range	ASTM D1603	2-3	2-3	2-3	2-3	2-3	2-3	20,000 lb
Carbon Black Dispersion		category	ASTM D5596	9 in 1 or 2 1 in 3	9 in 1 or 2 1 in 3	9 in 1 or 2 1 in 3	9 in 1 or 2 1 in 3	9 in 1 or 2 1 in 3	9 in 1 or 2 1 in 3	45,000 lb
Oxidative Induction Time		min. ave.								200,000 lb
-Standard OIT, or	Minutes		ASTM D3895	100	100	100	100	100	100	
-High Pressure OIT			ASTM D5885	400	400	400	400	400	400	
Oven Aging @ 85C			ASTM D5721							
-Standard OIT, or	% retained after 90 days	min. ave.	ASTM D3895	55	55	55	55	55	55	per formulation
-High Pressure OIT	% retained after 90 days	min. ave.	ASTM D5885	80	80	80	80	80	80	
UV Resistance			GM 11							
-High Pressure OIT	% retained after 1600 hrs	min ave.	ASTM D5885	50	50	50	50	50	50	per formulation

[1]Testing methods and procedures shall be in accordance with GRI, GM13 document.

TABLE A2
FACTORY AND FIELD SEAMS PROPERTIES
HIGH DENSITY POLYETHYLENE (HDPE) GEOMEMBRANE
TEXTURED SHEET

				SPECIFIED THICKNESS (mil)					
PROPERTY	**UNIT**	**VALUE**	**TEST METHOD[1]**	**30**	**40**	**60**	**80**	**100**	**120**
Bonded Shear Strength	lb/in	min.	ASTM D638 Type V	60	80	120	160	200	240
Seam Peel Adhesion									
- Fusion	lb/in	min.	ASTM D638 V	49	65	95	130	162	196
- Extrusion	lb/in	min.	ASTM D638 V	39	52	78	104	130	157

[1]Testing methods and procedures shall be in accordance with GRI, GM13 document.

Attachment 3

Replacement Pages for Appendix B – Tab 5 (Universal Reports SA#1 to SA#46)

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Project No.: 0810.1000004.000
Report No.: SA#1
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: North Center **Date Sampled:** 1/8/2010
Date Tested: 1/20/2010 **Tested By:** RB
Description Light Brown sand

Dry Weight of total sample: 323.9

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.2	0.06%	99.94%	80 - 95
40	9.7	2.99%	97.01%	60 - 80
60	75.9	23.43%	76.57%	30 - 55
100	239.3	73.88%	26.12%	0 - 15
200	322.2	99.48%	0.52%	5 MAX
pan	323.9	100.00%	0.00%	

Specific Gravity :	2.61	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	0.42%	**ASTM D2974**
Hydraulic Conductivity:	1.23E-03	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.60%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#2
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Ser. Kimba Ct. **Date Sampled:** 1/8/2010
Date Tested: 1/20/2010 **Tested By:** RB
Description Brown sand

Dry Weight of total sample: 285.3

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.5	0.18%	99.82%	85 - 100
20	0.6	0.21%	99.79%	80 - 95
40	6.7	2.35%	97.65%	60 - 80
60	49.2	17.25%	82.75%	30 - 55
100	197	69.05%	30.95%	0 - 15
200	284.4	99.68%	0.32%	5 MAX
pan	285.3	100.00%	0.00%	

Specific Gravity:	2.61	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	0.56%	**ASTM D2974**
Hydraulic Conductivity:	5.49E-03	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.30%	**ASTM D1140**
Sieve Anaylsis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#3
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Northeast
Date Sampled: 1/8/2010
Date Tested: 1/20/2010
Tested By: RB
Description Light Brown Sand

Dry Weight of total sample: 278.2

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	2.4	0.86%	99.14%	**100**
10	3.5	1.26%	98.74%	**85 - 100**
20	3.8	1.37%	98.63%	**80 - 95**
40	11.6	4.17%	95.83%	**60 - 80**
60	72.6	26.10%	73.90%	**30 - 55**
100	215.2	77.35%	22.65%	**0 - 15**
200	277.4	99.71%	0.29%	**5 MAX**
pan	278.2	100.00%	0.00%	

Specific Gravity:	2.62	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	0.34%	**ASTM D2974**
Hydraulic Conductivity:	5.54E-03	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.20%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#4
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Northwest
Date Sampled: 1/8/2010
Date Tested: 1/20/2010
Tested By: RB
Description Light Brown Sand

Dry Weight of total sample: 313.4

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	**100**
10	0	0.00%	100.00%	**85 - 100**
20	0.2	0.06%	99.94%	**80 - 95**
40	9.5	3.03%	96.97%	**60 - 80**
60	68	21.70%	78.30%	**30 - 55**
100	214.8	68.54%	31.46%	**0 - 15**
200	310.3	99.01%	0.99%	**5 MAX**
pan	313.4	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	0.18%	**ASTM D2974**
Hydraulic Conductivity:	1.31E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.70%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#5
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: South Center
Date Sampled: 1/8/2010
Date Tested: 1/20/2010
Tested By: RB
Description Light Brown Sand

Dry Weight of total sample: 313.8

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	**100**
10	0	0.00%	100.00%	**85 - 100**
20	0.1	0.03%	99.97%	**80 - 95**
40	10.2	3.25%	96.75%	**60 - 80**
60	74.4	23.71%	76.29%	**30 - 55**
100	227	72.34%	27.66%	**0 - 15**
200	312.3	99.52%	0.48%	**5 MAX**
pan	313.8	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	0.28%	**ASTM D2974**
Hydraulic Conductivity:	7.38E-03	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.80%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#6
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Southeast
Date Sampled: 1/8/2010
Date Tested: 1/20/2010
Tested By: RB
Description Light Brown Sand

Dry Weight of total sample: 308.8

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	**100**
10	0	0.00%	100.00%	**85 - 100**
20	0.2	0.06%	99.94%	**80 - 95**
40	11.8	3.82%	96.18%	**60 - 80**
60	82	26.55%	73.45%	**30 - 55**
100	226.7	73.41%	26.59%	**0 - 15**
200	306.7	99.32%	0.68%	**5 MAX**
pan	308.8	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	0.43%	**ASTM D2974**
Hydraulic Conductivity:	2.05E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.80%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#7
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Southwest
Date Sampled: 1/8/2010
Date Tested: 1/20/2010
Tested By: RB
Description Light Brown Sand

Dry Weight of total sample: 290.3

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.3	0.10%	99.90%	80 - 95
40	11.2	3.86%	96.14%	60 - 80
60	77.3	26.63%	73.37%	30 - 55
100	220.5	75.96%	24.04%	0 - 15
200	289.1	99.59%	0.41%	5 MAX
pan	290.3	100.00%	0.00%	

Specific Gravity:	2.61	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	0.30%	**ASTM D2974**
Hydraulic Conductivity:	7.38E-03	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.70%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#8
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Ivory Tusk
Date Sampled: 1/8/2010
Date Tested: 1/20/2010
Tested By: RB
Description Light Brown Sand

Dry Weight of total sample: 297.3

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	**100**
10	0.3	0.10%	99.90%	**85 - 100**
20	0.4	0.13%	99.87%	**80 - 95**
40	4.5	1.51%	98.49%	**60 - 80**
60	38.4	12.92%	87.08%	**30 - 55**
100	192.3	64.68%	35.32%	**0 - 15**
200	295.8	99.50%	0.50%	**5 MAX**
pan	297.3	100.00%	0.00%	

Specific Gravity:	2.62	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	0.23%	**ASTM D2974**
Hydraulic Conductivity:	1.23E-03	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.20%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: *SA#9*
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Stockpile #2 **Date Sampled:** 2/8/2010
Date Tested: 2/11/2010 **Tested By:** RB
Description Dark grey sand

Dry Weight of total sample: 297.3

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.3	0.10%	99.90%	85 - 100
20	0.4	0.13%	99.87%	80 - 95
40	4.5	1.51%	98.49%	60 - 80
60	38.4	12.92%	87.08%	30 - 55
100	192.3	64.68%	35.32%	0 - 15
200	295.8	99.50%	0.50%	5 MAX
pan	297.3	100.00%	0.00%	

Specific Gravity:	2.64	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	2.17%	**ASTM D2974**
Hydraulic Conductivity:	3.03E-03	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	4.80%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#10
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Stockpile #3 **Date Sampled:** 2/18/2010
Date Tested: 2/19/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 329.27

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	**100**
10	0.6	0.18%	99.82%	**85 - 100**
20	2.7	0.82%	99.18%	**80 - 95**
40	15.1	4.59%	95.41%	**60 - 80**
60	85.1	25.85%	74.15%	**30 - 55**
100	231.4	70.28%	29.72%	**0 - 15**
200	312.6	94.94%	5.06%	**5 MAX**
pan	329.27	100.00%	0.00%	

Specific Gravity;	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	0.75%	**ASTM D2974**
Hydraulic Conductivity:	1.58E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	4.90%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#11
Date: 11/15/2010

Client:	RIPA		
Project:	West Pasco Landfill		
Sample #:	Stockpile# 1	**Date Sampled:**	4/19/2010
Date Tested:	4/21/2010	**Tested By:**	RB
Description	Light Brown Sand		
Proctor #:	PR#6		
Dry Weight of total sample:		270.3	

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.4	0.15%	99.85%	80 - 95
40	9.2	3.40%	96.60%	60 - 80
60	66.2	24.49%	75.51%	30 - 55
100	197.7	73.14%	26.86%	0 - 15
200	269.2	99.59%	0.41%	5 MAX
pan	270.3	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	0.70%	**ASTM D2974**
Hydraulic Conductivity:	1.2E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	3.50%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#12
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Stockpile# 2 **Date Sampled:** 4/19/2010
Date Tested: 4/21/2010 **Tested By:** RB
Description Light Brown Sand
Proctor #: PR#7
Dry Weight of total sample: 289.5

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.1	0.03%	99.97%	80 - 95
40	11	3.80%	96.20%	60 - 80
60	73.2	25.28%	74.72%	30 - 55
100	214.1	73.96%	26.04%	0 - 15
200	288.2	99.55%	0.45%	5 MAX
pan	289.5	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	0.70%	**ASTM D2974**
Hydraulic Conductivity:	1.27E-02	***cm/sec***
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.90%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#13
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Serengeti Screened Pile 1 **Date Sampled:** 5/10/2010
Date Tested: 5/13/2010 **Tested By:** RB
Description Tan Sand

Dry Weight of total sample: 271.5

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.1	0.04%	99.96%	80 - 95
40	5.6	2.06%	97.94%	60 - 80
60	43.4	15.99%	84.01%	30 - 55
100	183.2	67.48%	32.52%	0 - 15
200	270.7	99.71%	0.29%	5 MAX
pan	271.5	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	0.3%	**ASTM D2974**
Hydraulic Conductivity:	1.51E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.10%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#14
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Screened Pile 3 **Date Sampled:** 5/10/2010
Date Tested: 5/13/2010 **Tested By:** RB
Description Tan Sand

Dry Weight of total sample: 302

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.1	0.03%	99.97%	80 - 95
40	9.6	3.18%	96.82%	60 - 80
60	71.2	23.58%	76.42%	30 - 55
100	221.3	73.28%	26.72%	0 - 15
200	300.9	99.64%	0.36%	5 MAX
pan	302	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.49E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	3.00%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#15
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Stockpile #2 **Date Sampled:** 5/20/2010
Date Tested: 5/28/2010 **Tested By:** RB
Description Tan Sand

Dry Weight of total sample: 276.3

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.3	0.11%	99.89%	80 - 95
40	9.7	3.51%	96.49%	60 - 80
60	69.9	25.30%	74.70%	30 - 55
100	209.8	75.93%	24.07%	0 - 15
200	275.6	99.75%	0.25%	5 MAX
pan	276.3	100.00%	0.00%	

Specific Gravity:	2.64	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.58E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	3.20%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#16
Date: 11/15/2010

Client: RIPA
Project: West Pasco Landfill
Sample #: Stockpile #1 **Date Sampled:** 5/20/2010
Date Tested: 5/28/2010 **Tested By:** RB
Description Tan Sand

Dry Weight of total sample: 267.4

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.3	0.11%	99.89%	80 - 95
40	9.6	3.59%	96.41%	60 - 80
60	69.3	25.92%	74.08%	30 - 55
100	201.6	75.39%	24.61%	0 - 15
200	266.7	99.74%	0.26%	5 MAX
pan	267.4	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.6%	**ASTM D2974**
Hydraulic Conductivity:	1.46E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	3.30%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#17
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Serengeti Pile 3 **Date Sampled:** 5/25/2010
Date Tested: 6/2/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 308.6

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.2	0.06%	99.94%	80 - 95
40	7	2.27%	97.73%	60 - 80
60	50.8	16.46%	83.54%	30 - 55
100	217.7	70.54%	29.46%	0 - 15
200	307.6	99.68%	0.32%	5 MAX
pan	308.6	100.00%	0.00%	

Specific Gravity:	2.61	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.5%	**ASTM D2974**
Hydraulic Conductivity:	8.47E-03	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.9%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#18
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Serengeti Pile 2 **Date Sampled:** 5/25/2010
Date Tested: 6/2/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 305.1

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.1	0.03%	99.97%	85 - 100
20	0.3	0.10%	99.90%	80 - 95
40	7.8	2.56%	97.44%	60 - 80
60	51.6	16.91%	83.09%	30 - 55
100	214.7	70.37%	29.63%	0 - 15
200	304.3	99.74%	0.26%	5 MAX
pan	305.1	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.08E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.9%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#19
Date: 11/15/2010

Client:	RIPA	**Project # :**	0810.1000004.0000
Project:	Pasco Co. Res. - Ash Cell A-4	**Report # :**	SA#19
Sample #:	On-site Pile 3	**Date Sampled:**	5/25/2010
Date Tested:	6/2/2010	**Tested By:**	RB
Description	Light brown sand		

Dry Weight of total sample: 292.1

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	**100**
10	0.3	0.10%	99.90%	**85 - 100**
20	0.4	0.14%	99.86%	**80 - 95**
40	9.8	3.36%	96.64%	**60 - 80**
60	69.1	23.66%	76.34%	**30 - 55**
100	213.4	73.06%	26.94%	**0 - 15**
200	290.8	99.55%	0.45%	**5 MAX**
pan	292.1	100.00%	0.00%	

Specific Gravity:	2.62	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.5%	**ASTM D2974**
Hydraulic Conductivity:	8.08E-03	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	3.2%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#20
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Serengeti Pile 1 **Date Sampled:** 5/25/2010
Date Tested: 6/2/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 289.4

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.2	0.07%	99.93%	85 - 100
20	0.3	0.10%	99.90%	80 - 95
40	5.9	2.04%	97.96%	60 - 80
60	44.5	15.38%	84.62%	30 - 55
100	196.4	67.86%	32.14%	0 - 15
200	288.6	99.72%	0.28%	5 MAX
pan	289.4	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.5%	**ASTM D2974**
Hydraulic Conductivity:	1.16E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.2%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#21
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #4 **Date Sampled:** 6/8/2010
Date Tested: 6/15/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 304.6

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	**100**
10	0	0.00%	100.00%	**85 - 100**
20	0.1	0.03%	99.97%	**80 - 95**
40	7.3	2.40%	97.60%	**60 - 80**
60	53	17.40%	82.60%	**30 - 55**
100	204.9	67.27%	32.73%	**0 - 15**
200	298.7	98.06%	1.94%	**5 MAX**
pan	304.6	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.2%	**ASTM D2974**
Hydraulic Conductivity:	1.44E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.6%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#22
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #6 **Date Sampled:** 6/8/2010
Date Tested: 6/15/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 306.09

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.4	0.13%	99.87%	85 - 100
20	0.5	0.16%	99.84%	80 - 95
40	7.2	2.35%	97.65%	60 - 80
60	52.3	17.09%	82.91%	30 - 55
100	204.4	66.78%	33.22%	0 - 15
200	300.5	98.17%	1.83%	5 MAX
pan	306.09	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.2%	**ASTM D2974**
Hydraulic Conductivity:	1.12E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.6%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#23
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #5 **Date Sampled:** 6/8/2010
Date Tested: 6/15/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 314.07

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.2	0.06%	99.94%	85 - 100
20	0.3	0.10%	99.90%	80 - 95
40	6.6	2.10%	97.90%	60 - 80
60	52.8	16.81%	83.19%	30 - 55
100	212.6	67.69%	32.31%	0 - 15
200	306.9	97.72%	2.28%	5 MAX
pan	314.07	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.2%	**ASTM D2974**
Hydraulic Conductivity:	1.24E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.8%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#24
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #7 **Date Sampled:** 6/18/2010
Date Tested: 6/22/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 309.37

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.3	0.10%	99.90%	80 - 95
40	6.9	2.23%	97.77%	60 - 80
60	52.2	16.87%	83.13%	30 - 55
100	207	66.91%	33.09%	0 - 15
200	305	98.59%	1.41%	5 MAX
pan	309.37	100.00%	0.00%	

Specific Gravity:	2.62	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.3%	**ASTM D2974**
Hydraulic Conductivity:	9.74E-03	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	0.8%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#25
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #8 **Date Sampled:** 6/18/2010
Date Tested: 6/22/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 302.62

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.2	0.07%	99.93%	80 - 95
40	6.6	2.18%	97.82%	60 - 80
60	49.9	16.49%	83.51%	30 - 55
100	198.7	65.66%	34.34%	0 - 15
200	298	98.47%	1.53%	5 MAX
pan	302.62	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.04E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.0%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#26
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #9 **Date Sampled:** 6/23/2010
Date Tested: 6/25/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 311.91

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	1.3	0.42%	99.58%	85 - 100
20	3.1	0.99%	99.01%	80 - 95
40	11.1	3.56%	96.44%	60 - 80
60	57.9	18.56%	81.44%	30 - 55
100	209.8	67.26%	32.74%	0 - 15
200	307	98.43%	1.57%	5 MAX
pan	311.91	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.10E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.0%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#27
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #10 **Date Sampled:** 6/28/2010
Date Tested: 6/30/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 295.6

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.3	0.10%	99.90%	80 - 95
40	7	2.37%	97.63%	60 - 80
60	51.1	17.29%	82.71%	30 - 55
100	201.5	68.17%	31.83%	0 - 15
200	294.4	99.59%	0.41%	5 MAX
pan	295.6	100.00%	0.00%	

Specific Gravity:	2.61	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.5%	**ASTM D2974**
Hydraulic Conductivity:	1.22E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	3.0%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#28
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #11 **Date Sampled:** 7/2/2010
Date Tested: 7/8/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 304.2

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.1	0.03%	99.97%	80 - 95
40	5.3	1.74%	98.26%	60 - 80
60	43.5	14.30%	85.70%	30 - 55
100	187.5	61.64%	38.36%	0 - 15
200	297.1	97.67%	2.33%	5 MAX
pan	304.2	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.26E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.1%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#29
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #12 **Date Sampled:** 7/9/2010
Date Tested: 7/13/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 317.95

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.1	0.03%	99.97%	85 - 100
20	0.2	0.06%	99.94%	80 - 95
40	6.5	2.04%	97.96%	60 - 80
60	46.7	14.69%	85.31%	30 - 55
100	203.5	64.00%	36.00%	0 - 15
200	311.4	97.94%	2.06%	5 MAX
pan	317.95	100.00%	0.00%	

Specific Gravity:	2.64	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.44E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.8%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#30
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #13 **Date Sampled:** 7/13/2010
Date Tested: 7/14/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 306.51

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.2	0.07%	99.93%	80 - 95
40	6.1	1.99%	98.01%	60 - 80
60	44.7	14.58%	85.42%	30 - 55
100	188.6	61.53%	38.47%	0 - 15
200	299.6	97.75%	2.25%	5 MAX
pan	306.51	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.5%	**ASTM D2974**
Hydraulic Conductivity:	1.39E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.9%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#31
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #14 **Date Sampled:** 7/16/2010
Date Tested: 7/19/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 302.2

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.9	0.30%	99.70%	85 - 100
20	1.1	0.36%	99.64%	80 - 95
40	7.8	2.58%	97.42%	60 - 80
60	46.2	15.29%	84.71%	30 - 55
100	187.1	61.91%	38.09%	0 - 15
200	295.8	97.88%	2.12%	5 MAX
pan	302.2	100.00%	0.00%	

Specific Gravity:	2.61	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.51E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.8%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#32
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #15 **Date Sampled:** 7/21/2010
Date Tested: 7/22/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 319.32

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.5	0.16%	99.84%	85 - 100
20	0.7	0.22%	99.78%	80 - 95
40	7.8	2.44%	97.56%	60 - 80
60	53.5	16.75%	83.25%	30 - 55
100	204.4	64.01%	35.99%	0 - 15
200	314.9	98.62%	1.38%	5 MAX
pan	319.32	100.00%	0.00%	

Specific Gravity:	2.62	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.51E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.3%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#33
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #15 **Date Sampled:** 7/21/2010
Date Tested: 7/22/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 319.32

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.5	0.16%	99.84%	85 - 100
20	0.7	0.22%	99.78%	80 - 95
40	7.8	2.44%	97.56%	60 - 80
60	53.5	16.75%	83.25%	30 - 55
100	204.4	64.01%	35.99%	0 - 15
200	314.9	98.62%	1.38%	5 MAX
pan	319.32	100.00%	0.00%	

Specific Gravity:	2.62	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.51E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.3%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#34
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #16 **Date Sampled:** 7/26/2010
Date Tested: 7/27/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 298.18

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.2	0.07%	99.93%	80 - 95
40	5.5	1.84%	98.16%	60 - 80
60	41.5	13.92%	86.08%	30 - 55
100	180.7	60.60%	39.40%	0 - 15
200	292.3	98.03%	1.97%	5 MAX
pan	298.18	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.51E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.6%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#35
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #17 **Date Sampled:** 7/28/2010
Date Tested: 7/29/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 297.8

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.2	0.07%	99.93%	80 - 95
40	6.1	2.05%	97.95%	60 - 80
60	41.5	13.94%	86.06%	30 - 55
100	188.7	63.36%	36.64%	0 - 15
200	289.4	97.18%	2.82%	5 MAX
pan	297.8	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.44E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.6%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#36
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #18 **Date Sampled:** 8/2/2010
Date Tested: 8/3/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 294.6

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.3	0.10%	99.90%	80 - 95
40	7.4	2.51%	97.49%	60 - 80
60	56.4	19.14%	80.86%	30 - 55
100	211.5	71.79%	28.21%	0 - 15
200	288.1	97.79%	2.21%	5 MAX
pan	294.6	100.00%	0.00%	

Specific Gravity:	2.54	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.6%	**ASTM D2974**
Hydraulic Conductivity:	1.51E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.0%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#37
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Pile #19 **Date Sampled:** 8/9/2010
Date Tested: 8/12/2010 **Tested By:** RB
Description Light brown sand

Dry Weight of total sample: 303.6

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.1	0.03%	99.97%	80 - 95
40	7.6	2.50%	97.50%	60 - 80
60	53.3	17.56%	82.44%	30 - 55
100	203.6	67.06%	32.94%	0 - 15
200	295.1	97.20%	2.80%	5 MAX
pan	303.6	100.00%	0.00%	

Specific Gravity:	2.62	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.5%	**ASTM D2974**
Hydraulic Conductivity:	1.51E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.4%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#38
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Screened Pile A **Date Sampled:** 8/12/2010
Date Tested: 8/6/2010 **Tested By:** RB
Description Brown sand

Dry Weight of total sample: 303.9

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.2	0.07%	99.93%	85 - 100
20	0.6	0.20%	99.80%	80 - 95
40	1.3	0.43%	99.57%	60 - 80
60	4.8	1.58%	98.42%	30 - 55
100	57	18.76%	81.24%	0 - 15
200	263.5	86.71%	13.29%	5 MAX
pan	303.9	100.00%	0.00%	

Specific Gravity:	2.57	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.5%	**ASTM D2974**
Hydraulic Conductivity:	7.39E-03	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	10.6%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#39
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Screened Pile B **Date Sampled:** 8/17/2010
Date Tested: 8/18/2010 **Tested By:** RB
Description Tan sand

Dry Weight of total sample: 280.66

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.5	0.18%	99.82%	80 - 95
40	9.1	3.24%	96.76%	60 - 80
60	44.8	15.96%	84.04%	30 - 55
100	173.5	61.82%	38.18%	0 - 15
200	273.4	97.41%	2.59%	5 MAX
pan	280.66	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.5%	**ASTM D2974**
Hydraulic Conductivity:	2.04E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	0.7%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#40
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Screened Pile C **Date Sampled:** 8/17/2010
Date Tested: 8/18/2010 **Tested By:** RB
Description Tan Sand

Dry Weight of total sample: 262.09

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.4	0.15%	99.85%	85 - 100
20	0.7	0.27%	99.73%	80 - 95
40	4.9	1.87%	98.13%	60 - 80
60	46.2	17.63%	82.37%	30 - 55
100	170.2	64.94%	35.06%	0 - 15
200	254.8	97.22%	2.78%	5 MAX
pan	262.09	100.00%	0.00%	

Specific Gravity:	2.64	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.5%	**ASTM D2974**
Hydraulic Conductivity:	7.83E-03	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	0.6%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#41
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Screened Pile 20 **Date Sampled:** 8/12/2010
Date Tested: 8/16/2010 **Tested By:** RB
Description Brown sand

Dry Weight of total sample: 220.5

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.2	0.09%	99.91%	80 - 95
40	7.6	3.45%	96.55%	60 - 80
60	42.5	19.27%	80.73%	30 - 55
100	144.9	65.71%	34.29%	0 - 15
200	210.6	95.51%	4.49%	5 MAX
pan	220.5	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.6%	**ASTM D2974**
Hydraulic Conductivity:	1.51E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	3.2%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#42
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Screened Pile 21 **Date Sampled:** 8/16/2010
Date Tested: 8/17/2010 **Tested By:** CH
Description Brown sand

Dry Weight of total sample: 259.4

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0.3	0.12%	99.88%	85 - 100
20	0.8	0.31%	99.69%	80 - 95
40	7.9	3.05%	96.95%	60 - 80
60	46.8	18.04%	81.96%	30 - 55
100	172.1	66.35%	33.65%	0 - 15
200	255.3	98.42%	1.58%	5 MAX
pan	259.4	100.00%	0.00%	

Specific Gravity:	2.62	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.7%	**ASTM D2974**
Hydraulic Conductivity:	1.42E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.6%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#43
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Source B / Pile 1 **Date Sampled:** 8/23/2010
Date Tested: 8/24/2010 **Tested By:** CH
Description Light Brown sand

Dry Weight of total sample: 245.9

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.2	0.08%	99.92%	80 - 95
40	7.8	3.17%	96.83%	60 - 80
60	40.6	16.51%	83.49%	30 - 55
100	149.9	60.96%	39.04%	0 - 15
200	239.2	97.28%	2.72%	5 MAX
pan	245.9	100.00%	0.00%	

Specific Gravity:	2.61	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.3%	**ASTM D2974**
Hydraulic Conductivity:	1.12E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.4%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#44
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Source B / Pile 2 **Date Sampled:** 8/23/2010
Date Tested: 8/24/2010 **Tested By:** CH
Description Light Brown sand

Dry Weight of total sample: 245.9

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.2	0.08%	99.92%	80 - 95
40	7.8	3.17%	96.83%	60 - 80
60	40.6	16.51%	83.49%	30 - 55
100	149.9	60.96%	39.04%	0 - 15
200	239.2	97.28%	2.72%	5 MAX
pan	245.9	100.00%	0.00%	

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MAR 23 2011
Southwest District

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.3%	**ASTM D2974**
Hydraulic Conductivity:	1.24E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	2.4%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#45
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Source B / Pile 3 **Date Sampled:** 8/26/2010
Date Tested: 8/26/2010 **Tested By:** CH
Description Light Brown sand

Dry Weight of total sample: 278

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.4	0.14%	99.86%	80 - 95
40	5	1.80%	98.20%	60 - 80
60	29.4	10.58%	89.42%	30 - 55
100	155.9	56.08%	43.92%	0 - 15
200	273.3	98.31%	1.69%	5 MAX
pan	278	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.3%	**ASTM D2974**
Hydraulic Conductivity:	1.24E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.7%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

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Project No.: 0810.1000004.000
Report No.: SA#46
Date: 11/15/2010

Client: RIPA
Project: Pasco Co. Res. - Ash Cell A-4
Sample #: Source B / Pile 4 **Date Sampled:** 8/30/2010
Date Tested: 8/31/2010 **Tested By:** CH
Description Light Brown sand

Dry Weight of total sample: 301.7

SIEVE SIZE	ACCUM. WEIGHT	PERCENT RETAINED	PERCENT PASSING	Range
4	0	0.00%	100.00%	100
10	0	0.00%	100.00%	85 - 100
20	0.2	0.07%	99.93%	80 - 95
40	6	1.99%	98.01%	60 - 80
60	34.4	11.40%	88.60%	30 - 55
100	170.3	56.45%	43.55%	0 - 15
200	297	98.44%	1.56%	5 MAX
pan	301.7	100.00%	0.00%	

Specific Gravity:	2.63	**ASTM D854**
Carbonate Content :	0%	**ASTM D4373**
Organic Content :	.4%	**ASTM D2974**
Hydraulic Conductivity:	1.02E-02	**cm/sec**
Soil Classification :	SP	**ASTM D2488**
200 Wash :	1.4%	**ASTM D1140**
Sieve Analysis:	Results Above	**ASTM D422**

Attachment 4

Daily Reports

CDM

DAILY PROGRESS REPORT

Report No.: 87 Days elapsed NTP *Date: 2-10-2010*

Project: West Pasco County Class I Landfill, Construction of Cell A-4

Project No.: 6104-46136

Contractor: Ripa & Associates LLC. Onsite Manager Dan Dyer

Contract Time 330 Days
Notice to Proceed: November 16, 2009 Substantial Completion Date: September 12, 2010
Final Completion Date- October 12, 2010
Extensions of time granted: none
Days Elapsed 87 Day Wednesday
Weather: P/Cloudy am/pm, upper 40's to 50's,.
Visitors:_

ACTIVITIES

Ripa is on site, with gate guard. Dan is coordinating Leachate Plant demolition, Verizon relocate (still no show), trailer set up permanent power gets drop pole other pending as is phone lines. Loader operator is operating the screen with mixed soil, excavator is loading two-three off road truck hauls with cuttings from A-2 slope, PM continue A-3 tie in, haul to west berm. Two dozer with grading system are windrowing stripping soil. Proof rolling continues in west area with 2 rollers. Screen from Cat is operational with mix material. Mechanic continues working on water wagon broken axle.

Overstreet Paving crew is not on site.

EC electric crew is on site at about 09:30 for job trailer power set up, set drop pole and run conduit to boxes on trailers.

Faulkner Engineering is not on site.

Marolf Environmental is not on site.

SLS is not on site.

Florida Design Company is not on site.

Simmons Land Clearing is on site about 07:30, loader, box blade, and grader remove existing road base material at leachate plant area after finishing asphalt removal, PM hit 1" galvanized line.

Comanco has not moved onto site. DPO paperwork in progress.

MANPOWER

Ripa: 1 Supervisor, 1 working foreman, 7 operators and 1 gate guard.
EC electric 2
Faulkner 0 tech
SLS 0 personnel
Florida Design:
Florida Gas Transmission 0 personnel.
Marolf fence crew 0 personnel
Simmons: 3 on site

OTHER SUBCONSULTANTS/ INSPECTION STAFF

Universal was not on site.

EQUIPMENT

Ripa has (1) pick-up truck, Off road trucks 1 Cat 725 with one departing, replaced by 740, and JD 250D, Komatsu PC 400 LC excavator, 950H loader, JD 750H lgp dozer, Cat D5 dozer, water wagon, Sakai SV 505 D roller joins with the Simmons roller proof rolling.

Simmons has a Komatsu WA 320 loader, , a JD 570 B grader, Cat grader departs AM, IR 100D roller being used by Ripa, Dynapac roller, Power Broom.

DELIVERIES

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NOTES

The 7M 50' x 50' building drawing is orientated the wrong way, it will have to be rotated 90 degrees.

Ripa continues proof rolling with two rollers, the entire cell will be proof rolled per spec., Foreman was confused about areas being excavated to grade only needing finish rolling, rolling is going well in a sequenced fashion.

Discussion on site with Alan, Rick Mortenson, and field staff about well drilling procedures, JCM gets Dave Rojas on cell phone speaker phone, activities to move forward next week.

There are discussions about topsoil and fill material, definitions and use. A loader operator used some topsoil in a berm, it was observed by the County, and brought to everyone's attention, Ripa to correct.

Numerous emails were exchanged trying to get the geosynthetics DPO agreement moving, it should be on the Feb. 9 agenda.

A water wagon is to be on site Monday to water the haul routes.

Several discussions are had concerning GCL in the office, calls to Comanco and Precision, sample origin and submittal are in question, Comanco says GCL was submitted weeks ago, JCM looks through the files and the log, no record. Ripa found the submittals in their office and has sent them to CDM. Panel placement diagram discussions continue.

Several discussions with Florida Gas Transmission Pipeline representative while on site, he does not want heavy equipment parked on the line, or vibratory roller running near it. He compromises on Verizon relocation, he would prefer the force main not cross the gas line, if it does he wants written notification to the office ahead of time. The RCP over the gas line is an issue.

EC electric was on site for conduit installation in the Maint. Bldg. but submittal on conduit not yet approved, JCM informed Ripa on Friday "Contractor is advancing at his own risk"; Alan acknowledged. Thursday 1-14-10 crew finishes connecting generator power to the trailers, then installs conduit in the parking area.

Dave Rojas, Dan Dyer, and JCM go over well relocation just east of the Maint. Bldg. JCM gives a copy of the well report to Alan in the meeting to forward to their well driller.

Two staff members from Ripa come look at the site, working on the erosion control submittal. Alan states in the meeting that the erosion control plan has been subbed out to a firm in Orlando.

Verizon representative tells Dan they are available to rerun cable as soon as electrician runs the conduit. Monday AM Dan says CDM should have conduit submittal. Conduit is in place, Verizon to run the relocation line on Monday 2-1-10.

Alan Taylor sent an email about additional cost to abandon water well, Road and Bridge abandoned the well when they moved out, Ron says with SWFWMD presence.

Haul road from Shady Hills Blvd to the site paved road is operational, it does have base material between the storm pond area and Shady Hills Road apron area after topsoil is stripped off.

Resident Project Representative: JCM (on site 07:39-4:02) .

CDM

DAILY PROGRESS REPORT

Report No.: 88 Days elapsed NTP *Date: 2-11-2010*

Project: West Pasco County Class I Landfill, Construction of Cell A-4

Project No.: 6104-46136

Contractor: Ripa & Associates LLC. Onsite Manager Dan Dyer

Contract Time 330 Days
Notice to Proceed: November 16, 2009 Substantial Completion Date: September 12, 2010
Final Completion Date- October 12, 2010
Extensions of time granted: none
Days Elapsed 88 Day Thursday
Weather: P/Cloudy am/pm, upper 30's to 50's,.
Visitors: Dave Rojas on site for well drilling.

ACTIVITIES

Ripa is on site, with gate guard. Dan is coordinating Leachate Plant demolition, Verizon relocate (still no show), trailer set up permanent power gets drop pole other pending as is phone lines. Loader operator is operating the screen with mixed soil, excavator is loading two-three off road truck hauls with A-2 cut slope material, 3 PM start loading and hauling screened common fill to cell as common fill. Two dozer with grading system are windrowing stripping soil. Proof rolling continues in west and north area with 2 rollers. Screen from Cat is operational with mix material. Mechanic finishes working on water wagon broken axle in the PM, now running again.

Overstreet Paving crew is not on site.

Mortenson Drill rig on site for monitoring wells by Maintenance building.

EC electric crew is not on site.

Faulkner Engineering is not on site.

Marolf Environmental is not on site.

SLS is not on site.

Florida Design Company is not on site.

Simmons Land Clearing is on site about 07:30, loader, box blade, and grader remove existing road base material at leachate plant and haul to stockpile, Low boy picks up root rake and Simmon's roller.

Comanco has not moved onto site. DPO paperwork in progress.

MANPOWER

Ripa: 1 Supervisor, 1 working foreman, 6 operators and 1 gate guard.
EC electric 0
Mortenson 3
Faulkner 0 tech
SLS 0 personnel
Florida Design:

Florida Gas Transmission 0 personnel.
Marolf fence crew 0 personnel
Simmons: 4 on site

OTHER SUBCONSULTANTS/ INSPECTION STAFF
Universal was not on site.

EQUIPMENT
Ripa has (1) pick-up truck, Off road trucks 1 Cat 725 with one departing, replaced by 740, and JD 250D, Komatsu PC 400 LC excavator, 950H loader, JD 750H lgp dozer, Cat D5 dozer, water wagon, Sakai SV 505 D roller joins with the Simmons roller proof rolling.

Simmons has a Komatsu WA 320 loader, , a JD 570 B grader, Cat grader departs AM, IR 100D roller being used by Ripa, Dynapac roller, Power Broom.

DELIVERIES

NOTES
There is a soil meeting with John Power to discuss where the soil cut on site is going to be used, County thought they would have more "topsoil" for their use. Ripa is screening mixed soil and using as common fill.

Excavation along A-2 tie-in continued during soil meeting, some damage to existing liner edge.

The 7M 50' x 50' building drawing is orientated the wrong way, it will have to be rotated 90 degrees. 4 PM 2-11-10 7M new design for leachate building is out.

Ripa continues proof rolling with two rollers, the entire cell will be proof rolled per spec., Foreman was confused about areas being excavated to grade only needing finish rolling, rolling is going well in a sequenced fashion.

Discussion on site with Alan, Rick Mortenson, and field staff about well drilling procedures, JCM gets Dave Rojas on cell phone speaker phone, activities to move forward next week.

There are discussions about topsoil and fill material, definitions and use. A loader operator used some topsoil in a berm, it was observed by the County, and brought to everyone's attention, Ripa to correct.

Numerous emails were exchanged trying to get the geosynthetics DPO agreement moving, it should be on the Feb. 9 agenda.

Several discussions are had concerning GCL in the office, calls to Comanco and Precision, sample origin and submittal are in question, Comanco says GCL was submitted weeks ago, JCM looks through the files and the log, no record. Ripa found the submittals in their office and has sent them to CDM. Panel placement diagram discussions continue.

Several discussions with Florida Gas Transmission Pipeline representative while on site, he does not want heavy equipment parked on the line, or vibratory roller running near it. He compromises on Verizon relocation, he would prefer the force main not cross the gas line, if it does he wants written notification to the office ahead of time. The RCP over the gas line is an issue.

EC electric was on site for conduit installation in the Maint. Bldg. but submittal on conduit not yet approved, JCM informed Ripa on Friday "Contractor is advancing at his own risk"; Alan acknowledged. Thursday 1-14-10 crew finishes connecting generator power to the trailers, then installs conduit in the parking area.

Dave Rojas, Dan Dyer, and JCM go over well relocation just east of the Maint. Bldg. JCM gives a copy of the well report to Alan in the meeting to forward to their well driller.

Two staff members from Ripa come look at the site, working on the erosion control submittal. Alan states in the meeting that the erosion control plan has been subbed out to a firm in Orlando.

Verizon representative tells Dan they are available to rerun cable as soon as electrician runs the conduit. Monday AM Dan says CDM should have conduit submittal. Conduit is in place, Verizon to run the relocation line on Monday 2-1-10.

Alan Taylor sent an email about additional cost to abandon water well, Road and Bridge abandoned the well when they moved out, Ron says with SWFWMD presence.

Haul road from Shady Hills Blvd to the site paved road is operational, it does have base material between the storm pond area and Shady Hills Road apron area after topsoil is stripped off.

Resident Project Representative: JCM (on site 07:39-4:24) .

CDM

DAILY PROGRESS REPORT

Report No.: 89 Days elapsed NTP *Date: 2-12-2010*

Project: West Pasco County Class I Landfill, Construction of Cell A-4

Project No.: 6104-46136

Contractor: Ripa & Associates LLC. Onsite Manager Dan Dyer

Contract Time 330 Days
Notice to Proceed: November 16, 2009 Substantial Completion Date: September 12, 2010
Final Completion Date- October 12, 2010
Extensions of time granted: none
Days Elapsed 89 Day Friday
Weather: Cloudy am/pm, mid 40's to 50's, AM drizzle turns to on and off rain, .75" for day.
Visitors: Alan drops off new project schedule.

ACTIVITIES

Ripa is on site, with gate guard. Dan is coordinating Leachate Plant demolition, Verizon relocate (still no show), trailer set up permanent power has drop pole other pending as is phone lines. Loader operator is operating the screen with mixed soil, excavator is loading two-three off road truck hauling screened common fill to cell as common fill on the east middle floor dozer with grading system, second dozer is idle. Proof rolling continues in southwest corner area with roller. Screen from Cat is operational with mix material. Water wagon is operational but not needed. Open cab operators shut down by lunch, the rest of the crew by 1:45.

Overstreet Paving crew is not on site.

Mortenson Drill rig on site for monitoring wells by Maintenance building.

EC electric crew is not on site.

Faulkner Engineering is not on site.

Marolf Environmental is not on site.

SLS is not on site.

Florida Design Company is not on site.

Simmons Land Clearing is on site about 07:30, loader, box blade, and grader remove existing road base material at leachate plant and haul to stockpile, Low boy picks up root rake and Simmon's roller.

Comanco has not moved onto site. DPO paperwork in progress.

MANPOWER

Ripa: 1 Supervisor, 1 working foreman, 6 operators and 1 gate guard.
EC electric 0
Mortenson 0
Faulkner 0 tech
Florida Design:
Florida Gas Transmission 0 personnel.

Marolf fence crew 0 personnel
Simmons: 3 on site, depart early due to rain, by 11 AM.

OTHER SUBCONSULTANTS/ INSPECTION STAFF
Universal was not on site.

EQUIPMENT
Ripa has (1) pick-up truck, Off road trucks 1 Cat 725 with one departing, replaced by 740, and JD 250D, Komatsu PC 400 LC excavator, 950H loader, JD 750H lgp dozer, Cat D5 dozer, water wagon, Sakai SV 505 D roller joins with the Simmons roller proof rolling.

Simmons has a Komatsu WA 320 loader, , a JD 570 B grader, Cat grader departs AM, IR 100D roller being used by Ripa, Dynapac roller, Power Broom.

DELIVERIES

NOTES

Ripa continues proof rolling with a roller, the entire cell will be proof rolled per spec., Foreman was confused about areas being excavated to grade only needing finish rolling, rolling is going well in a sequenced fashion.

Discussion on site with Alan, Rick Mortenson, and field staff about well drilling procedures, JCM gets Dave Rojas on cell phone speaker phone, activities to move forward next week.

Several discussions are had concerning GCL in the office, calls to Comanco and Precision, sample origin and submittal are in question, Comanco says GCL was submitted weeks ago, JCM looks through the files and the log, no record. Ripa found the submittals in their office and has sent them to CDM. Panel placement diagram discussions continue.

Several discussions with Florida Gas Transmission Pipeline representative while on site, he does not want heavy equipment parked on the line, or vibratory roller running near it. He compromises on Verizon relocation, he would prefer the force main not cross the gas line, if it does he wants written notification to the office ahead of time. The RCP over the gas line is an issue.

EC electric was on site for conduit installation in the Maint. Bldg. but submittal on conduit not yet approved, JCM informed Ripa on Friday "Contractor is advancing at his own risk"; Alan acknowledged. Thursday 1-14-10 crew finishes connecting generator power to the trailers, then installs conduit in the parking area.

Verizon representative tells Dan they are available to rerun cable as soon as electrician runs the conduit. Monday AM Dan says CDM should have conduit submittal. Conduit is in place, Verizon to run the relocation line on Monday 2-1-10.

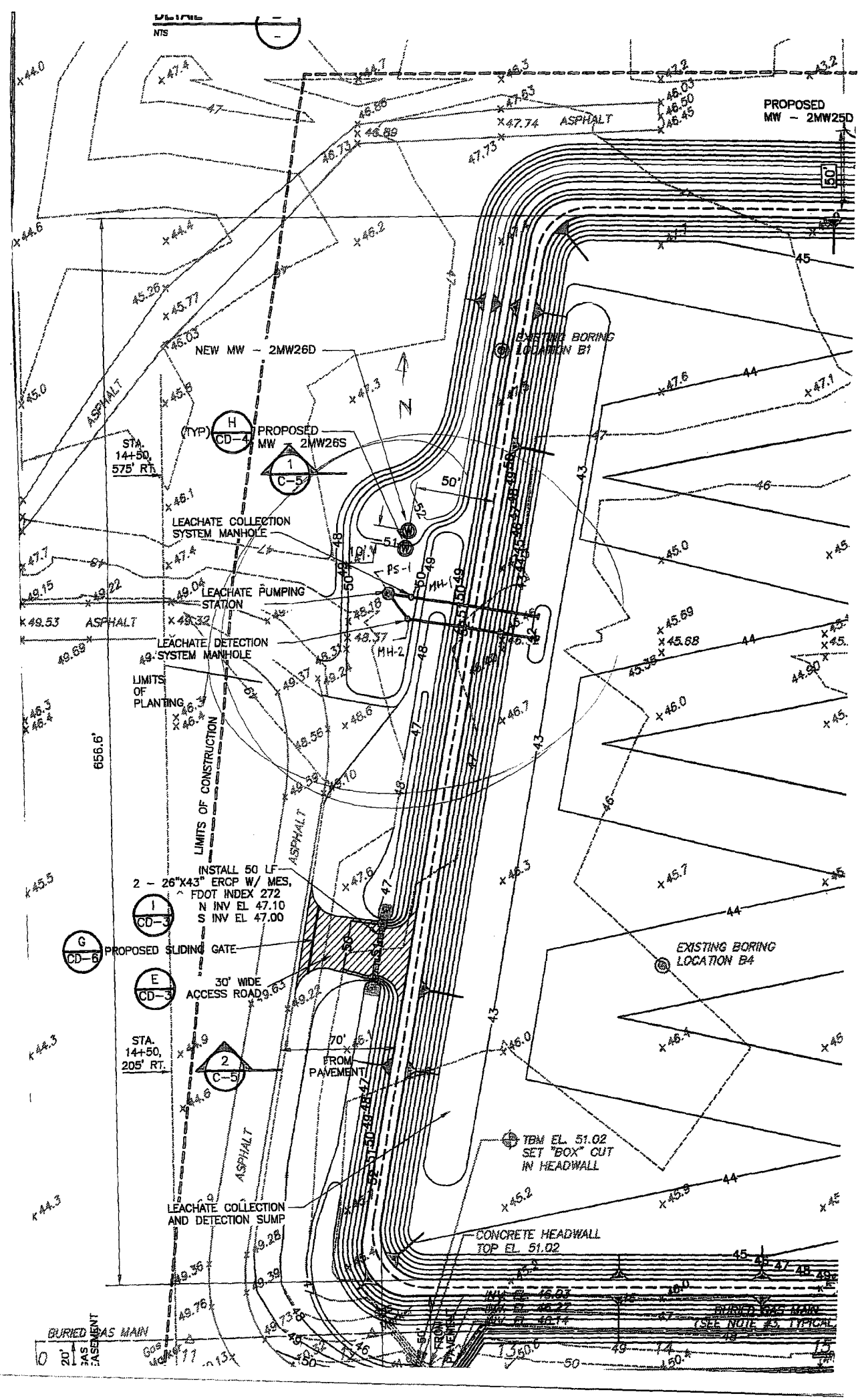
Alan Taylor sent an email about additional cost to abandon water well, Road and Bridge abandoned the well when they moved out, Ron says with SWFWMD presence.

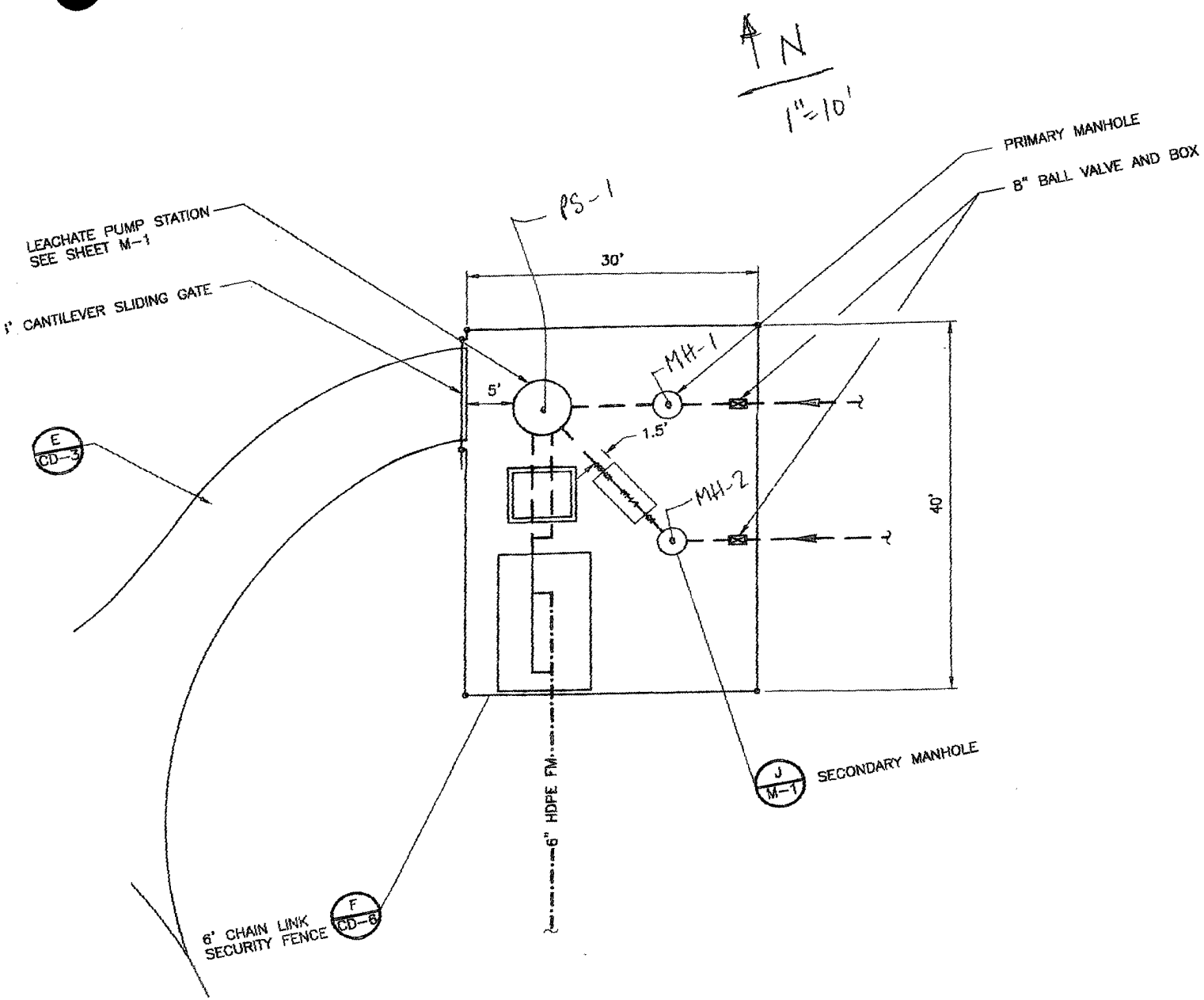
Haul road from Shady Hills Blvd to the site paved road is operational, it does have base material between the storm pond area and Shady Hills Road apron area after topsoil is stripped off.

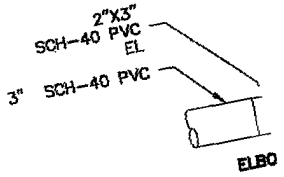
Resident Project Representative: JCM (on site 07:36-1:58) .

Attachment 5

Boring Logs for PS-1, MH-1, and MH-2


PROPOSED MW – 2MW25D
NEW MW – 2MW26D
PROPOSED MW – 2MW26S
(TYP) H CD-4
1 C-5
STA. 14+50, 575' RT.
LEACHATE COLLECTION SYSTEM MANHOLE
LEACHATE PUMPING STATION
PS-1
MH-1
MH-2
LEACHATE DETECTION SYSTEM MANHOLE
LIMITS OF PLANTING
LIMITS OF CONSTRUCTION
656.6'
INSTALL 50 LF 2 – 26"X43" ERCP W/ MES, FDOT INDEX 272
N INV EL 47.10
S INV EL 47.00
I CD-3
G CD-6 PROPOSED SLIDING GATE
E CD-3 30' WIDE ACCESS ROAD
STA. 14+50, 205' RT.
2 C-5
70' FROM PAVEMENT
EXISTING BORING LOCATION B1
EXISTING BORING LOCATION B4
TBM EL. 51.02 SET "BOX" CUT IN HEADWALL
CONCRETE HEADWALL TOP EL. 51.02
LEACHATE COLLECTION AND DETECTION SUMP
ASPHALT
BURIED GAS MAIN
BURIED GAS MAIN (SEE NOTE #3, TYPICAL)
20' GAS EASEMENT
50'
N


N
1"=10'
PS-1
30'
LEACHATE PUMP STATION
SEE SHEET M-1
CANTILEVER SLIDING GATE
PRIMARY MANHOLE
8" BALL VALVE AND BOX
MH-1
MH-2
5'
1.5'
40'
E
CD-3
6" HDPE FM
J
M-1
SECONDARY MANHOLE
6' CHAIN LINK
SECURITY FENCE
F
CD-6


2"X3"
SCH-40 PVC
EL
3" SCH-40 PVC
ELBO

ST

LEACHATE PUMP STATION

MEI PROJECT NO.: _____

PROJECT NAME: PASCO COUNTY LANDFILL

PROJECT LOCATION: ASH CELL A-1

DRILLED BY: CR/GM START DATE: 2-15-10

LOGGED BY: CMR END DATE: _____

BORING NUMBER: PS-1

GROUND ELEVATION AT STAKE: ~~48.00~~ +47 +/-

OFFSET DISTANCE AND DIRECTION FROM STAKE: _____

CHANGE IN GROUND ELEVATION: _____

▽ _____ AT TIME OF DRILLING IN OFFSET HA ▽ _____ DELAYED ____ HRS.

MEI MORTENSEN ENGINEERING, INC. SPT LOG

DEPTH	N PER 6"	N ASTM	N CONTS	SAMPLE #	DESCRIPTION OF SOIL	REMARKS / OBSERVATIONS
					GRY-BRN. F.SA. (0.0 - 1.0) ± FILL?	(3)
					LGT. BRN. F.SA. (1.0 - 4.0)	— 1.0
						(2) ▽ - DRY TO 10.0'
4.0	3/3					
6.0	3/4	7		1	LGT. BRN. F.SA.	
	4/4					
	5/7	12		2	LGT. BRN. F.SA.	
8.0	7/6					
	8/9	17		3	LGT. BRN. F.SA.	
10.0						
						— 12.0
13.5	10					(5)
	5/5			4	(A) BRN CLAYEY SAND (TOP)	— 14.5
15.0					(B) GRN-GRY SANDY CLAY (BOTTOM 0.5')	(7)
						BOTTOM OF PS FOUNDATION SLAB elev. +27.5 (MSL)
18.5	3	9				
	3/3			5	(A) GRN - BRN - ORNG MOTTLED SANDY CLAY w/ SAND SEAMS (TOP)	
20.0					(B) GRN-ORNG SANDY CLAY w/ L.S. FRAGS (BOTTOM 0.5') & L.S. Fragments	
						— 20.5 100% L.O.C. @ 20.5'
23.5	10					(8) (per Sheet M-1)
	25/30	55		6	WEATHERED L.S.	
25.0						
28.5	5					
	15/4	19		7	WEATHERED L.S.	
30.0						

T.O.B. DEPTH: 30.0' L.O.C.: 100%

BAGS CEMENT/BENTONITE: _____

GROUTED BOREHOLE: YES

E:\DRAW\SPT-LOG SHEET REV 10-11-07.dwg, Model, 2/11/2010 9:00:58 AM

COLLECTION M.H.

MEI PROJECT NO.: _____

PROJECT NAME: PASCO COUNTY LANDFILL

PROJECT LOCATION: ASH-CELL A-1

DRILLED BY: CR/GM START DATE: 2-15-10

LOGGED BY: CNR END DATE: _____

BORING NUMBER: MH-1 (PRIMARY M.H.)

GROUND ELEVATION AT STAKE: ~~47~~ 00 + 46 +/-

OFFSET DISTANCE AND DIRECTION FROM STAKE: _____

CHANGE IN GROUND ELEVATION: _____

▽ _____ AT TIME OF DRILLING IN OFFSET HA ▽ _____ DELAYED ____ HRS.

MEI MORTENSEN ENGINEERING, INC. SPT LOG

DEPTH	N PER 6"	N ASTM	N CONT'S	SAMPLE #	DESCRIPTION OF SOIL	REMARKS / OBSERVATIONS
					LGT. BRN. F. SA. (0.0 - 4.0)	(2) ▽ - DRY TO 6.0'
4.0	4 4				LGT. BRN. F. SA.	
6.0	4 6	10		1		— 6.0
	5 4				(A) BRN. SILTY TO SL. CLAYEY F. SA. (TOP 1.0')	(5)
	4 7	11		2	(B) GRN-RED-ORNG SANDY CLAY (BOTTOM)	— 7.0
8.0	5 7					(6)
	9 14	23		3	GRY-ORNG SANDY CLAY	— 8.0
10.0						(7)
13.5	3					BOTTOM OF MANHOLE SLAB elev + 28 (+/-)
15.0	3 4	7		4	GRN. CLAY	(7)
						— 100% L.O.C. @ 17.0'
						* SANDY SEAMS
18.5	3	21			(A) GRN-ORNG CLAYEY SA. TO SANDY CLAY (TOP)	19.5
20.0	12 9			5	(B) L.S. (BOTTOM 0.5')	(8)
23.5	5					(per Sheet M-1)
25.0	15 29	44		6	WEATHERED L.S.	
						— DRILLED CHUNKY 25.0' - 28.5'
28.5						— HOLE CAVED IN @ 18.0'
30.0				7		

T.O.B. DEPTH: 28.5 L.O.C.: 100% L.O.C.

BAGS CEMENT/BENTONITE: _____

GROUTED BOREHOLE: YES

E:\DRAW\SPT-LOG SHEET REV 10-11-07.dwg, Model, 2/11/2010 9:00:58 AM

DETECTION M.H

MEI PROJECT NO.: _____

PROJECT NAME: PASCO COUNTY LANDFILL

PROJECT LOCATION: ASH CELL A-1

DRILLED BY: CR/GM START DATE: 2-15-10

LOGGED BY: CMR END DATE: _____

BORING NUMBER: MH-2 (SECONDARY M.H.)

GROUND ELEVATION AT STAKE: ~~48.00~~ +47 +/-

OFFSET DISTANCE AND DIRECTION FROM STAKE: _____

CHANGE IN GROUND ELEVATION: _____

▽ _____ AT TIME OF DRILLING IN OFFSET HA ▽ _____ DELAYED ____ HRS.

MEI MORTENSEN ENGINEERING, INC.

SPT LOG

DEPTH	N PER 6"	N ASTM	N CONTS	SAMPLE #	DESCRIPTION OF SOIL	REMARKS / OBSERVATIONS
					DRK. GRY F.SA. (0.0-1.5) * FILL	(3)
					LGT. BRN. F.SA. (1.5-4.0)	—1.5
						(2)
4.0	3/3				LGT. BRN. F.SA.	
6.0	4/4	8		1		
	5/6					
	11/9	20		2	LGT. BRN. F. SA.	—8.0
8.0	7/7					
	12/10			3	GRY-BRN-ORNG. MOTTED SILTY TO SL. CLAYEY F. SA.	(5)
10.0		22				
						—12.0
13.5	2					(7)
	12/25	37		4	(A) GRN CLAY (TOP 0.75')	—14.25
15.0					(B) WEATHERED L.S. (BOTTOM 0.75')	(8)
					BOTTOM OF MANHOLE SLAB	
					← 100% L.O.C. @ 16.5'	
					elev. +28 (+/-)	
18.5	5					
	4/11	15		5	WEATHERED L.S. w/ CLAY SEAM @ TIP OF SPOON	
20.0						(8)
23.5	9					
	11/23			6	WEATHERED L.S.	
25.0		34				(8)
					-50 BLOWS FOR 6-INCHES (50/6")	
28.5	50/-	50+		7	WEATHERED L.S.	
30.0						

(per Sheet M-1)

T.O.B. DEPTH: 29.0' L.O.C.: 100%

BAGS CEMENT/BENTONITE: _____

GROUTED BOREHOLE: YES

MEI STANDARD LEGEND (REVISED, 8/08)

LEGEND

1. Gray to dark gray fine SAND to slightly silty fine SAND, trace organics (SP/SP-SM) (A-3)

2. White to light brown fine SAND to silty fine SAND (SP/SP-SM/SM) (A-3)

3. Brown or gray fine SAND to silty fine SAND (SP/SP-SM/SM) (A-3)

4. Dark brown to reddish brown or black slightly silty fine SAND to silty fine SAND (SP-SM/SM) (A-3)

5. Gray or brown silty to slightly clayey fine SAND (SM/SM-SC) (A-2-4)

6. Gray or brown clayey SAND (SC) (A-2-6)

7. Gray or brown to gray-green sandy CLAY to CLAY (CL/CH) (A-7-6)

8. White or light gray weathered LIMESTONE

9. Light gray to gray or tan cemented SILT to clayey SILT (ML/MH)

10. Dark brown to black sandy and organic MUCK (PT) (A-8)

11. Dark gray to dark brown organic laden silty SAND, with significant roots (SM-PT) (A-8)

12. White to light gray or light brown slightly silty fine SAND to silty fine SAND, with significant shell fragments, cemented shell fragments and some calcareous/limestone fragments

13. Dark gray to black clayey SAND to sandy CLAY with varying organic content (SC/CL)

Groundwater level, June 2006

SP — *Unified Soil Classification group symbol as determined by visual review*

A-3 — AASHTO Soil Classification group symbol as determined by visual review and/or based on most probable correlation to the USCS

N — SPT "N" value in blows/foot

WH — Fell under weight of rod & hammer

Attachment 6

Calculations for Primary and Secondary Leachate Pump Stations

Pump Capacity Calculation for Primary Leachate Pump Station

1.0 Purpose/Objective

The objective of these calculations is to demonstrate that the pumping capacity of the primary leachate pump station has not been impacted by the change to the bottom elevation of the pump station during construction from the design elevation provided in the approved drawings.

2.0 Procedure

1. Determine the static head per the original design elevations and the actual elevations. The static head is the difference between the the discharge elevation at the leachate storage tank and the elevation of the float switch for "pump on".
2. Calculate the total head of the system per the static head and friction losses.
3. Compare the results to determine the impact to the pumping capacity.

3.0 Assumptions

Design of pump was based on 175 gpm at 60 feet of total head.

Total Head = Static Head + Friction Losses

The friction losses at 175 gpm remain the same for both scenarios because the force-main has not changed.

Friction_Losses := 16.64ft

4.0 Calculations

Pumping capacity per original Design Drawings

1. The leachate forcemain discharges into the leachate storage tank at an elevation of 79.36 feet. The elevation of the "pump on" float switch is 36.0 feet.
Hence, the static head is as follows:

Static_Head_1 := 79.36ft − 36ft = 43.36 ft

2. The total head is equal to the sum of the static head and the friction losses.

Total_Head_1 := Static_Head_1 + Friction_Losses = 60 ft

Pumping capacity per Record Drawings

1. The leachate forcemain discharges into the leachate storage tank at an elevation of 79.36 feet. The elevation of the "pump on" float switch is 39.50 feet.
Hence, the static head is as follows:

$$Static_Head_2 := 79.36ft - 39.5ft = 39.86\,ft$$

2. The total head is equal to the sum of the static head and the friction losses.

$$Total_Head_2 := Static_Head_2 + Friction_Losses = 56.5\,ft$$

5.0 Conclusions/Results

Therefore, since the elevation change during construction, as noted in the Record Drawings, results in a lower Total Head (56.5 ft < 60 ft), the pump will operate at a higher capacity than the original design condition.

Primary Pump Station - Pump Cycle Time

1.0 Purpose/Objective

The objective of the pump cycle time calculation is to demonstrate that the primary leachate pump station will perform as expected.

2.0 Procedure

1. Solve for cycle time using the storage volume of the primary leachate lift station and the pump capacity.
2. Compare calculated cycle time to the minimum recommended cycle time.

3.0 References/Data Sources

1. Section 3 - Centrifugal Pumps and Pumping Hydraulics, CDM Hydraulic Guidelines.
2. Sanitary and Industrial Wastewater Collection - Pumping Stations and Force Mains, Army TM 5-814-2, Departments of the Army and the Air Force, March 1985.

4.0 Assumptions/Definitions

1. Pump provided: 7.5 HP (175 gpm at 60 feet of total head)
2. Based on Figure 3-7 of the attached CDM Hydraulic Guidelines and Table 5-1 of the attached Army TM 5-814-2, the pump should have a minimum cycle time of 10 minutes.
3. From Specification 11306-1, pump capacity is 175 gpm.
4. The storage volume is the volume between the "pump on" float switch and the "pump off" float switch.
5. Cycle time refers to the time between pump starts.

5.0 Calculations

1. Solve for cycle time using the formula (3c) from the attached CDM hydraulic guidelines:

EQ. 1 $$Storage_Volume_(ft^3) = \frac{Cycle_Time(\min) \times Pump_Capacity(gpm)}{30}$$

Rearrange the above formula to solve for cycle time:

EQ. 2 $$Cycle_Time(\min) = \frac{Storage_Volume(ft^3) \times 30}{Pump_Capacity(gpm)}$$

Calculate the storage volume of the primary leachate lift station:

EQ. 3 $$Storage_Volume(ft^3) = [Pump_on(ft) - Pump_off(ft)] \times (Wet_Well_Diameter)^2 \times \frac{\pi}{4}$$

Calculate using values from Record Drawings:

Pump_On := 39.50 ft

Pump_Off := 36.39 ft

Wet_Well_Diameter := 6 ft

Storage_Volume := (Pump_On – Pump_Off) • $(Wet_Well_Diameter)^2 \bullet \frac{\pi}{4}$

Storage_Volume = 87.9 ft^3

Insert the above calculated storage volume into Equation 2 to calculate cycle time:

Pump_Capacity := 175 gpm

$$Cycle_Time := \frac{(Storage_Volume) \bullet 30}{Pump_Capacity} = 15.1 \text{ min}$$

6.0 Conclusions/Results

The cycle time for the primary leachate pump station is calculated to be 15.1 minutes, which is greater than the recommended minimum cycle time of 10 minutes. Therefore, it is acceptable.

Pump Capacity Calculation for Secondary Leachate Pump Station

1.0 Purpose/Objective

The objective of these calculations is to demonstrate that the pumping capacity of the secondary leachate pump station has not been impacted by the change to the bottom elevation of the pump station during construction from the design elevation provided in the approved drawings.

2.0 Procedure

1. Determine the static head per the original design elevations and the actual elevations. The static head is the elevation difference between discharge elevation at the pump station and the elevation of the float switch for "pump on".
2. Calculate the total head of the system per the static head and dynamic head.
3. Compare the results to determine the impact to the pumping capacity.

3.0 Assumptions/Definitions

1. Design of pump was based on 30 gpm at 16 feet of total head.
2. Pumping capacity is inversely related to total operating head.
3. Total Head (ft) = Static Head (ft) + Dynamic Head (ft)
4. Dynamic head is based on pipe diameter, material, fittings, etc. Piping and fitting have not changed from the design drawings to the record drawings and therefore the dynamic head is the same for each condition. We can assume that Dynamic Head = 1.
5. Static Head (ft) = Discharge Elevation (ft) - Intake Elevation (ft)
6. Discharge elevation is the same for both design drawings and record drawings (~44 feet).

4.0 Calculations

Pumping capacity per original Design Drawings

1. Calculate static head:

Intake_Elevation := 29ft

Discharge_Elevation := 44ft

Static_Head_1 := Discharge_Elevation – Intake_Elevation = 15 ft

2. The total head is equal to the sum of the static head and the dyanmic head.

Dynamic_Head := 1ft

Total_Head_1 := Static_Head_1 + Dynamic_Head = 16 ft

Pumping capacity per Record Drawings

1. Calculate static head:

Intake_Elevation_2 := 36.49ft

Discharge_Elevation = 44 ft

Static_Head_2 := Discharge_Elevation – Intake_Elevation_2 = 8 ft

2. The total head is equal to the sum of the static head and the friction losses.

Total_Head_2 := Static_Head_2 + Dynamic_Head = 9 ft

5.0 Conclusions/Results

Therefore, since the elevation change during construction, as noted in the Record Drawings, results in a lower Total Head (9 ft < 16 ft), the pump will operate at a higher capacity than the original design condition.

Secondary Pump Station - Pump Cycle Time

1.0 Purpose/Objective

The objective of the pump cycle time calculation is to demonstrate that the secondary leachate pump station will perform as expected.

2.0 Procedure

1. Solve for cycle time using the storage volume of the secondary leachate lift station and the pump capacity.
2. Compare calculated cycle time to the minimum required cycle time.

3.0 References/Data Sources

1. Section 3 - Centrifugal Pumps and Pumping Hydraulics, CDM Hydraulic Guidelines.
2. Sanitary and Industrial Wastewater Collection - Pumping Stations and Force Mains, Army TM 5-814-2, Departments of the Army and the Air Force, March 1985.

4.0 Assumptions/Definitions

1. Pump provided: 0.4 HP (30 gpm at 16 feet of total head)
2. Based on Figure 3-7 of the attached CDM Hydraulic Guidelines and Table 5-1 of the attached Army TM 5-814-2, the pump should have a minimum cycle time of 10 minutes.
3. From Specification 11306-1, pump capacity is 30 gpm.
4. The storage volume is the volume between the "pump on" float switch and the "pump off" float switch.
5. Cycle time refers to the time between pump starts.

5.0 Calculations

1. Solve for cycle time using the formula (3c) from the attached CDM hydraulic guidelines:

EQ. 1 $$Storage_Volume_(ft^3) = \frac{Cycle_Time(\min) \times Pump_Capacity(gpm)}{30}$$

Rearrange the above formula to solve for cycle time:

EQ. 2 $$Cycle_Time(\min) = \frac{Storage_Volume(ft^3) \times 30}{Pump_Capacity(gpm)}$$

Calculate the storage volume of the primary leachate lift station:

EQ. 3 $$Storage_Volume(ft^3) = [Pump_on(ft) - Pump_off(ft)] \times (Wet_Well_Diameter)^2 \times \frac{\pi}{4}$$

Calculate using values from Record Drawings:

Pump_On := 38.0 ft

Pump_Off := 36.49 ft

Wet_Well_Diameter := 4 ft

$$Storage_Volume := (Pump_On - Pump_Off) \bullet (Wet_Well_Diameter)^2 \bullet \frac{\pi}{4}$$

Storage_Volume = 19 ft^3

Insert the above calculated storage volume into Equation 2 to calculate cycle time:

Pump_Capacity := 30 gpm

$$Cycle_Time := \frac{(Storage_Volume) \bullet 30}{Pump_Capacity} = 19 \quad min$$

6.0 Conclusions/Results

The cycle time for the secondary leachate pump station is calculated to be 19 minutes, which is greater than the minimum cycle time of 10 minutes. Therefore, it is acceptable.

casing includes a water priming chamber and suction check valve. These units are of relatively small capacity, however, they can be set a distance of up to 20 ft vertically above the suction well water surface. The actual suction lift capability varies from 12 to 20 ft depending upon the size and characteristics of the pump, temperature of the fluid, and the elevation above sea level. Suction piping must be air tight. Self-priming pumps are available to handle either clean water or wastewater. They are often used as dewatering pumps in installations where it is desirable to have the pump mounted above the wet-well level. These pumps are also finding a niche in shallow wastewater pumping station applications.

3.4.3 Centrifugal Submersible Pumps

A submersible pump is a centrifugal pump that is installed with a submersible motor. The pump and motor are close coupled and the motor is capable of operating in a dry pit or submerged in water. Submersible vertical turbine pumps are discussed under the vertical turbine pump section. This section is devoted to centrifugal submersible pumps. An example of a wastewater submersible pump is shown on Figure 3-6.

The submersible pump is available in a relatively wide range of head-discharge characteristics and, depending upon the impeller design, may be used to pump water, stormwater, wastewater, and some diluted sludges. Nonclog impellers are available for wastewater service. In many instances, a submersible units can be used as a replacement for the conventional vertical wet-pit pump or to increase the capacity of an existing pump station by placing it in the existing wet well. For ease of maintenance and to ensure a tight connection to the discharge piping, these units may be mounted on vertical rails with a lifting chain/cable arranged so that they can be readily lifted out of the wet well for maintenance and repair. Fully explosion-proof electrical and mechanical devices (including non-sparking chain) are recommended for all but clean water applications.

The smaller units are used extensively for sump pump applications and the larger nonclog units have been used in sewage lift pumps. Careful consideration must be given to their less-than-optimum design life, maintenance difficulties, and harsh operating conditions.

Dry-pit installation of submersible units have been used in a number of applications to provide fail-safe operation in case of emergency flooding. The potential for cooling problems (especially with lower and variable speeds), and the potential need for an auxiliary cooling system using clean water must be considered.

3.5 Suction Well Design

The suction well sizing and layout are of key importance in providing for good pump operation.

3.5.1 Suction Well Sizing

The suction well should provide enough storage volume to prevent excessive pump starts, especially for the lead pump, i.e., first pump on, and especially in the case of fixed speed pumps. Adequate storage for each pump can be calculated from the following equation:

$$V = \frac{tQ}{30} \qquad (3c)$$

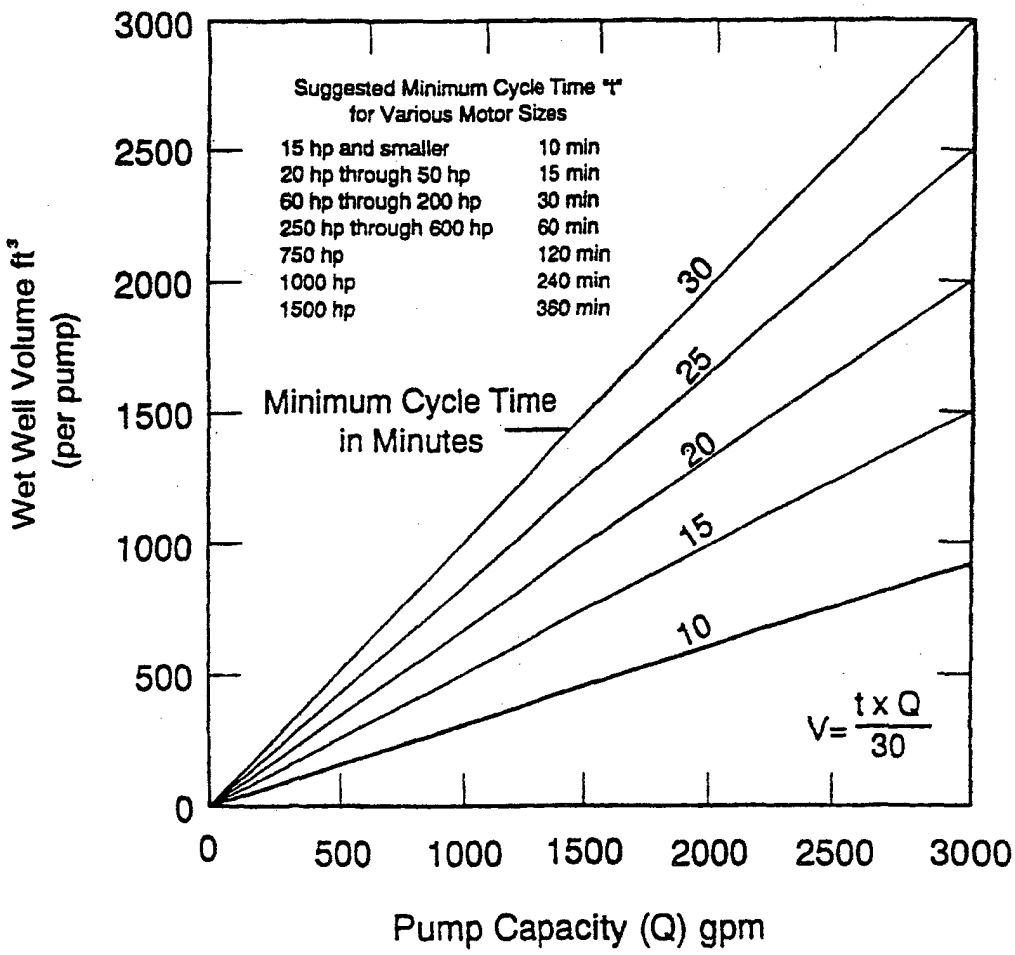


Figure 3-7
Typical Minimum Motor Cycle Times

Where:
- V = storage volume (ft^3)
- t = minimum allowable cycle time (minutes)
- Q = maximum contributing capacity of the pump (gpm) (at minimum speed for variable speed pumps)

The cycle time refers to the time between pump starts. The minimum cycle time occurs when the influent rate into the suction well is equal to one-half the pumping rate. If the minimum cycle time is too small, then the number of starts per hour may be high enough to overheat and damage the pump motor and/or starter, or cause the motor to stop in the normal case where thermal overload protection is provided. The motor manufacturer and the electrical function group should be consulted regarding the allowable number of starts within a certain time period that the motor and starter can endure without damage or tripping off. Alternating the lead pump, use of variable speeds, slow starting, etc., can help. The plot of equation (3c), together with some typical minimum values of "t" for motors of various sizes, is shown on Figure 3-7.

The required volume for a multiple-pump pumping station is not a cumulative value for the total number of pumps in question, rather the required volume for all pumps overlap. The start and stop level for each pump must be separated by a distance sufficient to prevent simultaneous starting and stopping of the pumps. Often, 3 to 6 in is all that is needed to separate the control points. Therefore, the total required volume is the volume for the largest capacity pump and the sum of the volumes associated with separating the control levels.

For variable speed pumping, the required suction well storage volume is smaller because the capacity of a variable speed pump at minimum speed is smaller. Also, variable frequency drives can be designed to minimuze overheating caused by cycling.

If properly selected, one or more variable speed pumps will discharge at approximately the same rate as the inflow into the wet-well. Wet-well level variation is, therefore, required mainly for controlling the pumps. A minimum volume is required for pump submergence.

Another consideration in some situations may be whether or not the incoming sewer or supply pipe can be used as a fluid storage area, thus decreasing the required suction well size.

3.5.2 Suction Well Layout

For vertical turbine and other similar pumps, the suction well layout and design must conform to designs that promote the proper delivery of flow to the pump. References for suction well design and layout include guidelines from the Hydraulic Institute (HI) and from the British Hydromechanics Research Association (BHRA). Failure to properly design and lay out the suction well could result in vortex formation leading to loss of pump capacity and pump damage. In all cases, the approach to the pump suction should be designed to eliminate turbulence, provide equal distribution of flow to all pumps, and allow proper submergence of the inlet to prevent vortexing.

Frequently, suction wells are subjected to free-falling flow. Much air, however, can be entrained by virtue of the free-falling liquid. This can cause problems such as loss of pump capacity or of pump prime. Therefore, if possible, the free-fall condition should be eliminated, or at least minimized. If

SANITARY AND INDUSTRIAL WASTEWATER COLLECTION-- PUMPING STATIONS AND FORCE MAINS

DEPARTMENTS OF THE ARMY AND THE AIR FORCE
MARCH 1985

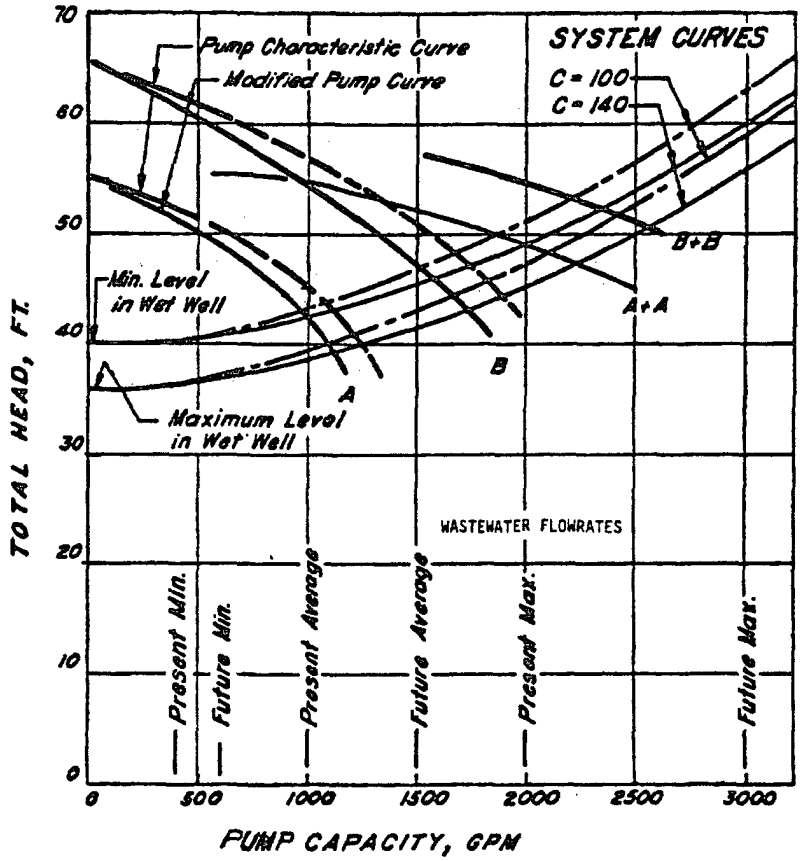


Figure 5-2. Typical pump-system curves.

5-3. Wet well design

a General. Wet wells will be constructed at pumping stations for the purpose of storing wastewater flows prior to pump operation. The storage volume required depends upon the method of pump operation, i.e., whether pumps are constant, adjustable or variable speed. In addition to providing adequate storage volume, wet wells will be designed to (1) allow for proper pump and level controls, (2) maintain sufficient submergence of the pump suction inlet, (3) prevent excessive deposition of solids, and (4) provide ventilation of incoming sewer gases. In smaller stations, bar racks or comminuting devices may be installed within the wet well in order to reduce costs. Overflows from wet wells are prohibited in all cases.

b Storage volume. If pumps are of constant or adjustable speed type, the wet well volume must be large enough to prevent short cycling of pump motors. For pumps driven by varible speed drives, the storage volume may be small provided pumping rates closely match the incoming flowrates. The volume required for the wet well will be computed with the following formula:

$$V = tq/4$$

where

V = required volume in gallons between start and stop elevations for a single pump, or a single speed step increase for adjustable or variable speed operation

t = minimum time in minutes of one pumping cycle (time between successive pump starts), or time required for a speed or capacity change, and

q = pumping capacity, or increment in capacity where one or more pumps are operating and an additional pump is started, or where pump speed is increased, in gallons per minute

Constant or adjustable speed pumps driven by squirrel-cage induction motors will be designed for minimum cycle times as shown in the following table.

Table 5-1. Minimum pump cycle times.

More size, bhp	t, minutes
Less than 20	10 to 15
20 to 100	15 to 20
100 to 250	20 to 30
Over 250	as recommended by manufacturer

The storage volume calculated for small stations (capacities less than 700 gpm) which utilize two identical constant speed pumps, may be reduced one half by providing a control circuit to automatically alternate the pumps. The storage volume required for variable speed pumps will be based on providing sufficient time for a change in capacity when a pump is started or stopped. When a pump is started, the motor must be ramped to the desired speed, and the pumps already in operation must be reduced in speed. The time required for this is usually less than 1 minute. A considerable amount of storage is normally available in large sewers which serve stations utilizing variable speed pumps. This volume may be considered in design by calculating backwater curves for the various operating levels. The maximum retention time in the wet well will not exceed 30 minutes to prevent septicity.

c. Suction pipe connections. Pump suction piping will be selected to provide a velocity of 4 to 6 feet per second. Pipe should be one or two sizes larger than the pump suction nozzle. Vertical pumps installed in a dry well which is adjacent to the wet well, will be fitted with a 90 degree suction elbow, followed by an eccentric reducer and a gate valve. The suction line will be extended through the wall into the wet well, and terminated with either a 90 or 45 degree flared elbow, or an elbow with a flared fitting. The most commonly used piping arrangements are illustrated in figure 5-3, where D is the diameter of the flared inlet, and S is the submergence depth.

Adequate submergence of the suction inlet is critical to prevent air from being drawn in by vortexing. Minimum required submergence depths are given in table 5-2 as a function of velocity. The net positive suction head (NPSH) will also be considered when determining S. See paragraph 5-2c (2).

Table 5-2. Required submergence depth to prevent vortexing.

Velocity at diameter D, fps	S, feet
2	1.0
4	2.6
5	3.4
6	4.5
7	5.7
8	7.1

Larger, conventional type pump stations will normally be constructed with wet wells divided into two or more sections, or compartments, so that a portion of the station can be taken out of service for inspection or maintenance. Each compartment will have individual suction pipes, and will be interconnected with slide or sluice gates. The floor of the wet well will be level from the wall to a point 12 to 18 inches beyond the outer edge of the suction bell, and then will be sloped upward at a minimum 1:1 slope.

5-4. Pump controls and instrumentation

a. General. Instrumentation at a pumping station includes automatic and manual controls used to sequence the operation of pumps, and alarms for indicating malfunctions in the pumping system. Automatic control of pumps will usually be based on the liquid level in the wet well. Paragraph 4-4 contains a discussion of the various modes of pump operation, pump control systems, and a description of level detection devices. Manual control of pumps is always required in order to operate the pumps during emergencies, for maintenance purposes, or when automatic systems fail. Manual override will be set to bypass the low level cut-off, but not the low level alarm.

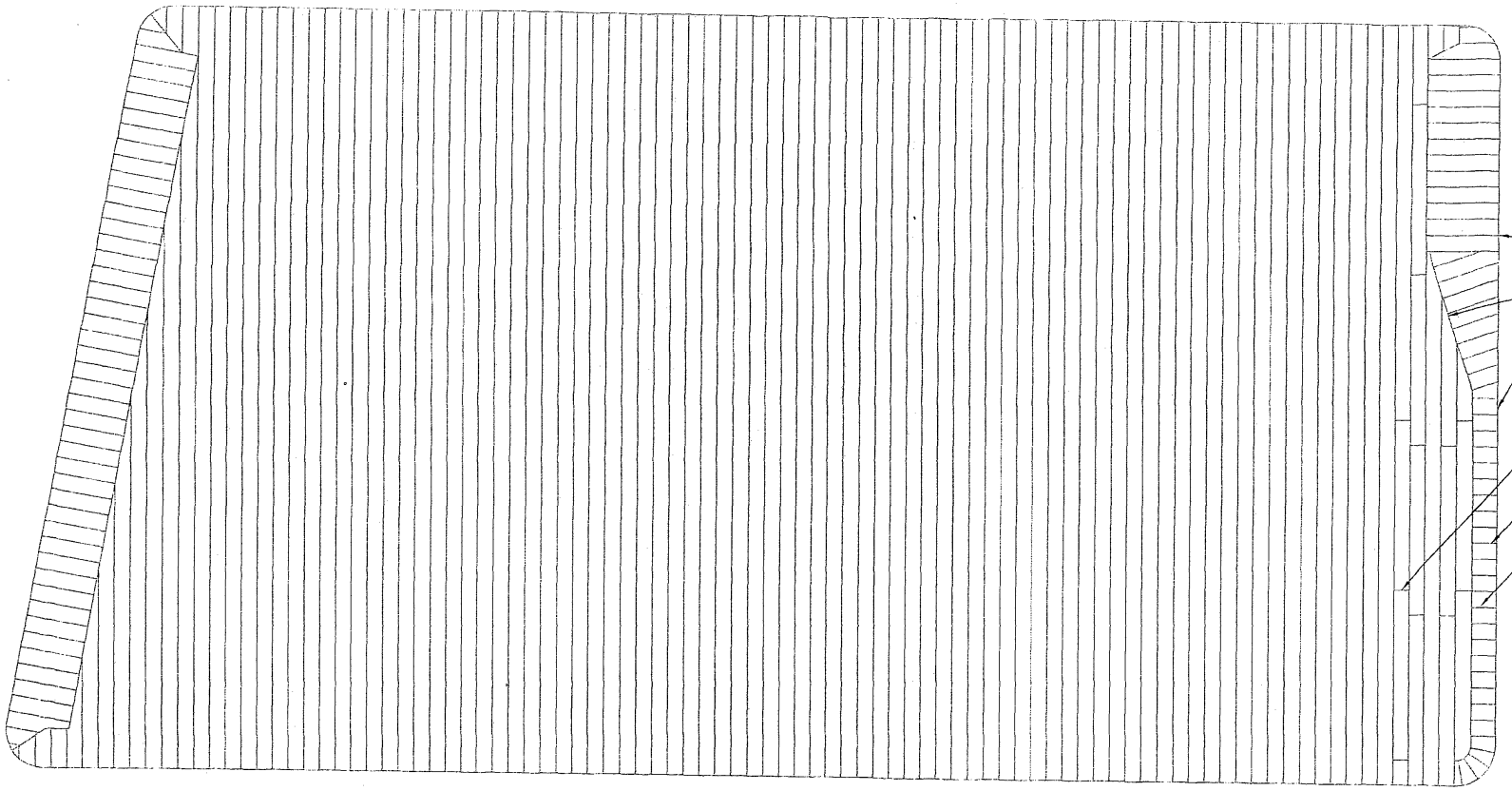
b. Selection of control points. A control range of at least 3.0 feet is required between maximum and minimum liquid levels in the wet well. A minimum of 6 inches will be required between pump control points used to start and stop successive pumps, or to change pump speeds. For small stations, the control range may be less, however control points will not be set closer than 3 inches.

(1) Constant or adjustable speed pumps require simple on-off switches to start or stop pumps, or to change from one speed step to the next.

(2) Variable speed pumps require a more complex control arrangement. The two basic types of level control for variable speed operation are (a) variable level, and (b) constant level. For variable level control, a narrow band of control points is established in the wet well. Pump speed is then adjusted in steps by the level detection system (usually a bubbler tube) as the level varies. Pumps operate at maximum

Attachment 7

GCL Proposed Panel Placement Drawing



FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
MAR 23 2011
SOUTHWEST DISTRICT
TAMPA

NOTE:
END SEAMS THROUGHOUT PROJECT
SEAM LOCATION DETERMINED BY
PLACEMENT OF FIRST PANEL DEPLOYED
AND ACTUAL PANEL LENGTH
SEAM LOCATION MAY VARY
NOT ALL END SEAMS ARE SHOWN
GCL DIMENTIONS 15'X150'

REVISIONS	ASH CELL A-4 GCL PROPOSED PANEL PLACEMENT	WEST PASCO CLASS I LANDFILL PASCO COUNTY, FLORIDA

NOTE:
THIS PROPOSED PANEL LAYOUT IS FOR GENERAL CONCEPTUAL PURPOSES ONLY. ACTUAL PANEL LAYOUT MAY VARY WITH CONSIDERATIONS TO SUIT ACTUAL FIELD CONDITIONS, I.E. CONSTRUCTION SEQUENCING, PREVAILING WIND CONDITIONS, SEAM MINIMIZATION, COMPLETED LINED AREA, SUBGRADE PROTECTION, ECT.

COMANCO®
ENVIRONMENTAL CORPORATION
4301 STERLING COMMERCE DR.
PLANT CITY, FL 33566-7372
TELEPHONE: (813) 988-8829
FAX: (813) 496-7305

DRAWN BY: WDS	CHKD. BY: SH	DWG. NO: 1
DATE: 12-16-09	APPRVD. BY: DR	
PLOT SCALE: 1" = 100'	FILE NAME: PASCO COUNTY CELL A-4	
PROJECT NO.: 03083171		

Attachment 8

Revised pages for Primary and Secondary Destruct Sample Log in Section 8

West Pasco Class I
Cell A - 4 Construction
Destruct Sample Log

Date: _____ Area: Cell West #2 Material: 60 mil HDPE Secondary Text

CAP _____

Sample #	Location	Machine Number	Seamer I.D.	Mach. Temp. and Setting	Peel PPI	Shear PPI	Sent to Lab
DS 39	S90 S91 450's.	W047	RO	850/8			4-16-10
DS 40	S91 S95 350's.	W091	DL	800/15			
DS 41	S91 S92 Butt 156's.	W047	RO	850/8			
DS 42	S95 S96 400's	W075		800/15			
DS 43	S96 S98 450's.	W091	DL	800/15			
DS 44	S99 S100 500's.	W075	S.M	800/15			
DS 45	S100 S101 Butt 155's	W047	RO	850/8			4-21-10
DS 46	S100 S103 250's	W075	S.M.	800/15			
DS 47	S104 S106 400's	W047	R.O.	850/8			
DS 48	S105 S108 500's	W091	D.L.	800/15			
DS 49	S109 S108 Butt 590's	W091	D.L.	800/15			
DS 50	S108 S110 350's	W075	S.M.	800/15			
DS 51	S110 S111 Butt @153	WE-091	DL	800x15			5-5-10
DS 52	S110 S112 250's	WE-040	RO	850x8			
DS 53	S112 S113 Butt 186's	WE-068	SM	800x16			
DS 54	S112 S114 600's	WE-068	SM	800x16			
DS 55	S114 S115 Butt 153's	WE-040	RO	850x8			
DS 56	S114 S117 250's	WE-091	DL	800x15			
DS 57	S117 S118 Butt 127'	WE-040	RO	850x8			
DS 58	S117 S119 300's	WE-068	SM	800x16			
DS 59	S119 - S122 200's	WE-091	DL	800x15			
DS 60	S120 S123 50's	WE-040	RO	850x8			
DS 61	S122 S124 550's	WE-068	SM	800x16			
DS 62	S124 S125 Butt 152	WE-068	SM	800x16			
DS 63	S124 S127 580's	WE-091	DL	800x15			*
5/11/10 DS 64	S127 S129 @ 300's	WE-068	SM	800x16			5/12/10
DS 65	S129 S137 Butt 185	WE-040	RO	850x8			
DS 66	S129 S130 @ 400's	WE 091	DL	800x15			
DS 67	S138 S139 @ 100's	WE 068	SM	800x16			
DS 68	S131 S132 @ 250's	WE-040	RO	850x8			
DS 69	S132 S141 @ 170's	WE 091	DL	800x15			
DS 70	S133 S141 Butt 193	WE040	RO	850x8			
DS 71	S133 S135 @ 450's	WE068	SM	800x16			
DS 72	S135 S136 @ 400's	WE091	DL	800x15			
DS 73	S142 S144 @ 50's	WE068	SM	800x16			
5/12/10 DS 74	S136 S145 @ 350's	WE040	RO	850x8			
DS 75	S145 S147 @ 500's	WE068	SM	800x16			
DS 76	S146 ~~S142~~ Butt 520's	WE068	SM	800x16			

Tracking Destruct Samples will be marked "B" for before, and "A" for after.

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West Pasco Class I
Cell A - 4 Construction
Destruct Sample Log Primary

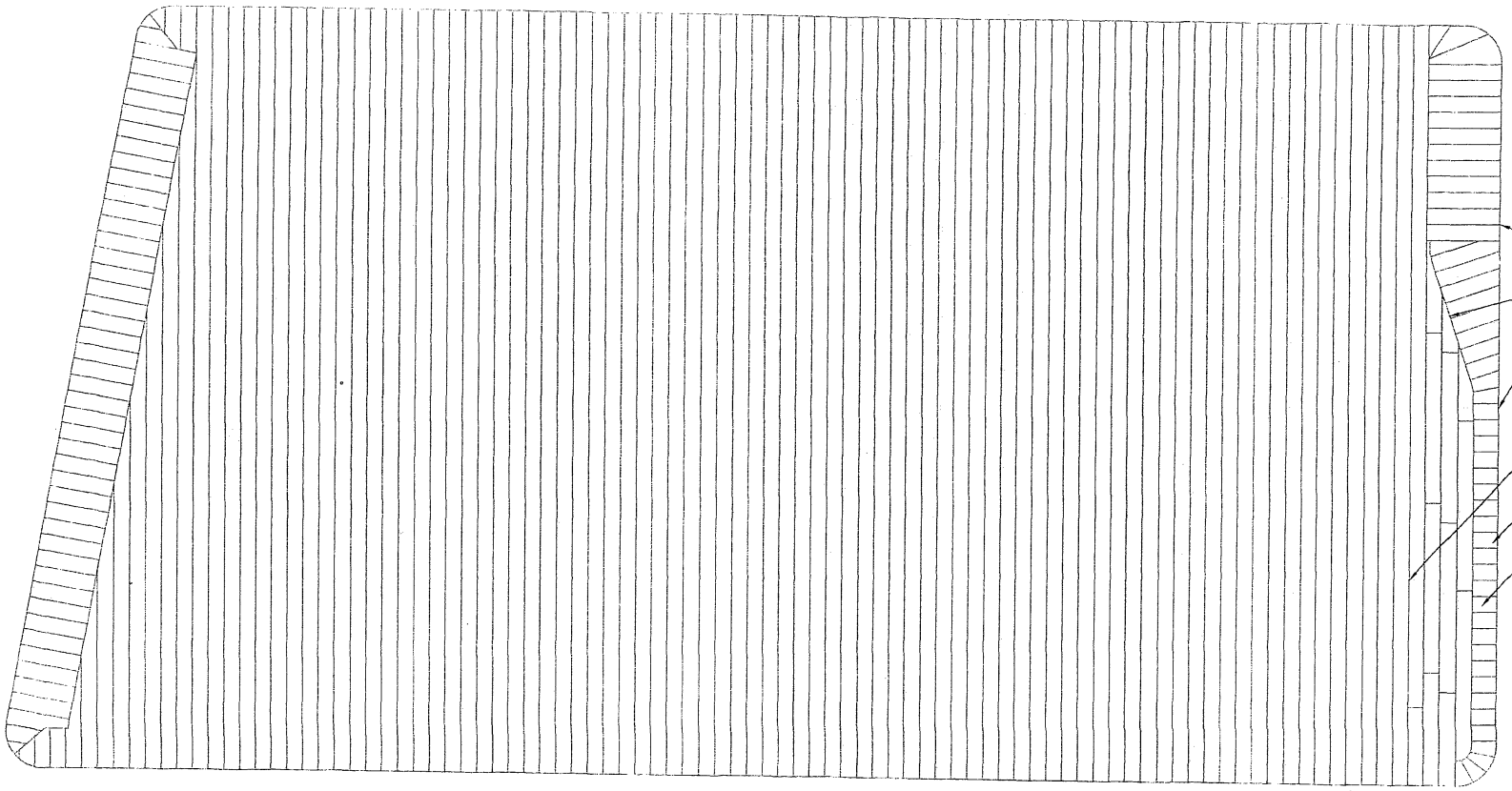
Date:		Area:		Material: 60 MIL HDPE TEXT			
CAP							
Sample #	Location	Machine Number	Seamer I.D.	Mach. Temp. and Setting	Peel PPI	Shear PPI	Sent to Lab
DP 38	P85-P87@RS's	WE 068	SM	800 x 16			5-3-10
DP 39	P89-P93 @ 400's	WE 040	RO	850 x 9			5-5-10
DP 40	P93-P95@ 250's	WE091	DL	800 x 15			5-5-10
DP 41	~~P94 BTT~~ P97@400's	WE 068	SM	800 x 16			5-11-10
DP 42	P97-P98 BUTT 156's	WE091	DL	800 x 15			
DP 43	P97-P99@ 300's	WE 040	RO	850 x 8			
DP 44	P99-P103@ 500's	WE091	DL	800 x 15			
DP 45	P103-P105@550's	WE068	SM	800 x 16			
DP 46	P105-P104 BUTT 127's	WE040	RO	850 x 8			
DP 47	P105-P107@450's	WE 091	DL	800 x 15			
DP 48	P107-P111@ 400's	WE040	RO	850 x 8			
DP 49	P111-P110 BUTT 165's	WE 068	SM	800 x 16			
DP 50	P110-P113@100's	WE068	SM	800 x 16			
DP 51	P112-P116@200's	WE068	SM	800 x 16			
DP 52	P115-P114 BUTT 148's	WE040	RO	850 x 8			
DP 53	P116-P117 @300's	WE 091	DL	800 x 15			
DP 54	P117-P120@400's	WE 068	SM	800 x 16			
DP 55	P120-P119 BUTT 153's	WE091	DL	800 x 15			
DP 56	P120-P122@250's	WE 091	DL	800 x 15			
DP 57	P122-P124@600's	WE 040	RO	850 x 8			
DP 58	P124-P125 BUTT 151's	WE068	SM	800 x 16			
DP 55B	P120-P122@148's	WE091	DL	800 x 15			5-17-10
DP 55A	P119-P122@144's	WE091	DL	800 x 15			5-17-10
DP 59	P124-P126@200's	WE 068	SM	800 x 16			5-19-10
DP 60	P125-P132@50's	WE096	DL	800 x 15			
DP 61	P132-P133@100's	WE096	DL	800 x 15			
DP 62	P127-P128@250's	WE068	SM	800 x 16			
DP 63	P133-P135@100's	WE096	DL	800 x 15			
DP 64	P135 P136@ 50's	WE068	SM	800 x 16			
DP 65	P128 P129@450's	WE096	DL	800 x 15			
DP 66	P129 P131@400's	WE068	SM	800 x 16			
DP 67	P137 P138@100's	WE068	SM	800 x 16			
DP 68	P138 P142@50's	WE096	DL	800 x 15			
DP 69	P139 P141@250's	WE 068	SM	800 x 16			
DP 70	P141 P143@350's	WE 068	SM	800 x 15			5-21-10
DP 71	P143 P144@400's	WE096	DL	800 x 15			
DP 72	P144 P148@450's	WE 068	SM	800 x 15			
DP 73	P148 P149@550's	WE096	DL	800 x 15			

Tracking Destruct Samples will be marked "B" for before, and "A" for after.

C:\Liner Forms\PasDestruct.xls

Attachment 9

Geocomposite Proposed Panel Placement Drawings for Primary and Secondary Layers



FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

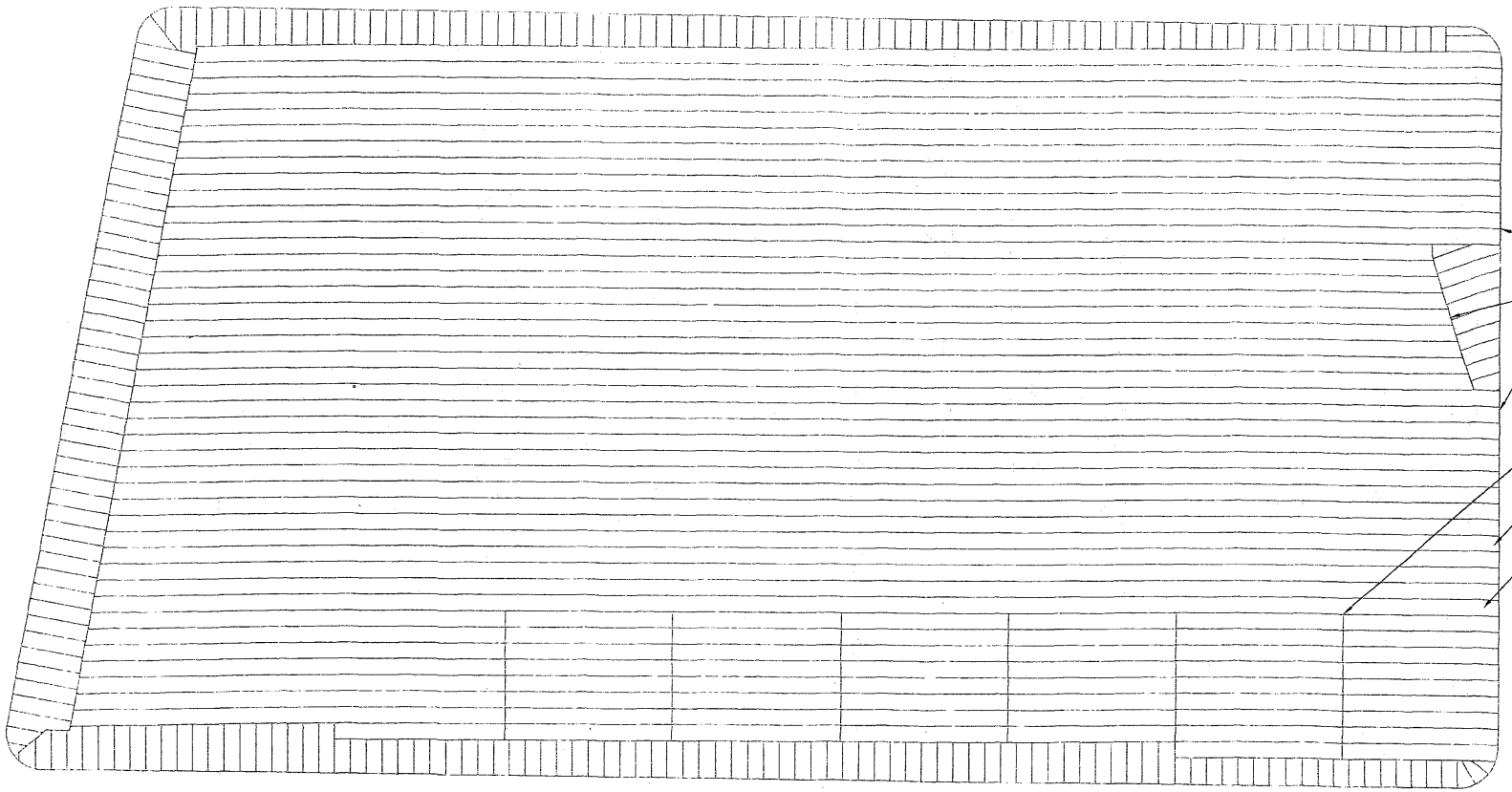
MAR 23 2011

SOUTHWEST DISTRICT TAMPA

NOTE:
END SEAMS THRUGHOUT PROJECT
SEAM LOCATION DETERMINED BY
PLACEMENT OF FIRST PANEL DEPLOYED
AND ACTUAL PANEL LENGTH
SEAM LOCATION MAY VARY
NOT ALL END SEAMS ARE SHOWN
DS COMPOSITE DIMENTIONS 15 X150'

REVISIONS	ASH CELL A-4 DS GEOCOMPOSITE PROPOSED PANEL PLACEMENT SECONDARY	WEST PASCO CLASS I LANDFILL PASCO COUNTY,FLORIDA	NOTE: THIS PROPOSED PANEL LAYOUT IS FOR GENERAL CONCEPTUAL PURPOSES ONLY. ACTUAL PANEL LAYOUT MAY VARY WITH CONSIDERATIONS TO SUIT ACTUAL FIELD CONDITIONS, I.E. CONSTRUCTION SEQUENCING, PREVAILING WIND CONDITIONS, SLOPE INTERFACE, COMPLETED LINED AREA, SUBGRADE PROTECTION, ECT.	COMANCO® ENVIRONMENTAL CORPORATION 4301 STERLING COMMERCE DR. PLANT CITY, FL 33566-7372 TELEPHONE: (813) 988-8829 FAX: (813) 496-7305

DRAWN BY: WDS	CHKD. BY: SH	DWG. NO:
DATE: 12-16-09	APPRVD. BY: DR	1
PLOT SCALE: 1" = 100'	FILE NAME: PASCO COUNTY CELL A-4	
PROJECT NO.: 03083171		



FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
MAR 23 2011
SOUTHWEST DISTRICT TAMPA

NOTE:
END SEAMS THROUGHOUT PROJECT
SEAM LOCATION DETERMINED BY
PLACEMENT OF FIRST PANEL DEPLOYED
AND ACTUAL PANEL LENGTH
SEAM LOCATION MAY VARY
NOT ALL END SEAMS ARE SHOWN
DS COMPOSITE DIMENTIONS 15'X150'

REVISIONS	ASH CELL A-4 DS GEOCOMPOSITE PROPOSED PANEL PLACEMENT PRIMARY	WEST PASCO CLASS I LANDFILL PASCO COUNTY,FLORIDA	NOTE: THIS PROPOSED PANEL LAYOUT IS FOR GENERAL CONCEPTUAL PURPOSES ONLY. ACTUAL PANEL LAYOUT MAY VARY WITH CONSIDERATIONS TO SUIT ACTUAL FIELD CONDITIONS, I.E. CONSTRUCTION SEQUENCING, PREVAILING WIND CONDITIONS, SEAM ORIENTATION, COMPLETED LINED AREA, SUBGRADE PROTECTION, ECT.	COMANCO® ENVIRONMENTAL CORPORATION 4301 STERLING COMMERCE DR. PLANT CITY, FL 33566-7372 TELEPHONE: (813) 988-8829 FAX: (813) 496-7305

DRAWN BY: WDS	CHKD. BY: SH	DWG. NO:
DATE: 12-16-09	APPRVD. BY: DR	1
PLOT SCALE: 1" = 100'	FILE NAME: PASCO COUNTY CELL A-4	
PROJECT NO.: 03083171		

Attachment 10

Revised Reports DP-82 to DP-87 from Appendix A (Precision Report)

Precision Geosynthetic Laboratories International

GAI-LAP
Initial: CVZ #:0.13
DATE: 07/20/2010

Rajendra Vaidya
Camp Dresser & McKee
1715 N. Westshore Blvd., Suite 875
Tampa, FL 33607

Dear Mr. Vaidya:

Thank you for consulting Precision Geosynthetic Laboratories (PGLI) for your material testing needs.

Enclosed is the ***final*** laboratory report for the Seam testing of six (6) 60mil HDPE seam samples.

PROJECT NAME: Pasco Landfill Construction Ash Cell A-4

REFERENCE PGL JOB NO.: G100848

DATE RECEIVED: July 20, 2010 **DATE REPORTED:** July 20, 2010

SAMPLES SENT BY: A. Taylor, Ripa & Associates

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PGL CONTROL NUMBER
DP-82 P144/P148	68364
DP-83 P148/P149	68365
DP-84 P179/P177	68366
DP-85 P177/P178	68367
DP-86 P192/P191	68368
DP-87 P200/P199	68369

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D6392	Shear Bond Strength
ASTM D6392	Peel Bond Adhesion

TEST CONDITIONS: The samples were conditioned for a minimum of one hour in the laboratory at 22 ± 2°C (71.6 ± 3.6°F) and at 60 ± 10% relative humidity prior to test.

TEST RESULTS: The test results are summarized in Tables 1 to 3.

PRECISION GEOSYNTHETIC LABORATORIES INTERNATIONAL

Carmelo V. Zantua
Technical/Laboratory Director

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material. The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself. It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. ***Failed seam samples are kept for two (2) years and good seam samples are disposed of after two (2) weeks.*** On the other hand, should you need us to keep them at longer time, please advise us in writing.

TABLE 1.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Camp Dresser & McKee** | MATERIAL: **60mil HDPE SEAM** | QC'd By: _____

PROJECT: **Pasco Lf Construction Ash Cell A-4** | SEAM TYPE: **Fusion Weld** | TEST METHOD: ASTM D6392

DATE REC'D: **20-Jul-10** | PGL JOB #: **G100848** | DATE REPORT: 20-Jul-10

Crosshead Speed: 2 in/min		SHEAR EVALUATION				Crosshead Speed: 2 in/min	PEEL EVALUATION			
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)
DP-82	**68364**	190	> 50%	BRK		1 Outside	141	0	SE1	
P144/P148		192	> 50%	BRK		2 Outside	140	0	SE1	
		193	> 50%	BRK		3 Outside	139	0	SE1	
		188	> 50%	BRK		4 Outside	142	0	SE1	
		190	> 50%	BRK		5 Outside	150	0	SE1	
						AVG:	**142**			95
						STD. DEV.	**4**			
						1 Inside	151	0	SE1	
						2 Inside	150	0	SE1	
						3 Inside	153	0	SE1	
						4 Inside	150	0	SE1	
						5 Inside	151	0	SE1	
	AVG.	**191**			120	**AVG:**	**151**			95
	STD. DEV.	**2**				STD. DEV.	**1**			
DP-83	**68365**	190	> 50%	BRK		1 Outside	150	0	SE1	
P148/P149		188	> 50%	BRK		2 Outside	150	0	SE1	
		188	> 50%	BRK		3 Outside	153	0	SE1	
		191	> 50%	BRK		4 Outside	155	0	SE1	
		180	> 50%	BRK		5 Outside	155	0	SE1	
						AVG:	**153**			95
						STD. DEV.	**2**			
						1 Inside	153	0	SE1	
						2 Inside	154	0	SE1	
						3 Inside	155	0	SE1	
						4 Inside	154	0	SE1	
						5 Inside	143	0	SE1	
	AVG:	**187**			120	**AVG:**	**152**			95
	STD. DEV.	**4**				STD. DEV.	**5**			

BREAK DESCRIPTION (ASTM D6392 FUSION):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM.
AD-BRK	BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
SIP	SEPARATION IN THE PLANE OF THE SHEET.

EXTRUSION:

AD1	ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.
AD2	ADHESION FAILURE.
AD-WLD	BREAK THROUGH THE FILLET.
SE1	BREAK AT BOTTOM EDGE OF SEAM.
SE2	BREAK AT TOP EDGE OF SEAM.
SE3	BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)
BRK1	BREAK IN BOTTOM SHEETING.
BRK2	BREAK IN TOP SHEETING.
AD-BRK	BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
HT	BREAK AT EDGE OF HOT TACK
SIP	SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

TABLE 2.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Camp Dresser & McKee** | MATERIAL: **60mil HDPE SEAM** | QC'd By:

PROJECT: **Pasco Lf Construction Ash Cell A-4** | SEAM TYPE: **Fusion Weld** | TEST METHOD: ASTM D6392

DATE REC'D: **20-Jul-10** | PGL JOB #: **G100848** | DATE REPORT: 20-Jul-10

Crosshead Speed: 2 in/min		SHEAR EVALUATION				Crosshead Speed: 2 in/min	PEEL EVALUATION			
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)
DP-84	**68366**	188	> 50%	BRK		1 Outside	141	0	SE1	
P179/P177		188	> 50%	BRK		2 Outside	150	0	SE1	
		190	> 50%	BRK		3 Outside	152	0	SE1	
		184	> 50%	BRK		4 Outside	152	0	SE1	
		188	> 50%	BRK		5 Outside	141	0	SE1	
						AVG:	**147**			95
						STD. DEV.	**6**			
						1 Inside	140	0	SE1	
						2 Inside	143	0	SE1	
						3 Inside	143	0	SE1	
						4 Inside	147	0	SE1	
						5 Inside	150	0	SE1	
	AVG.	**187**			120	**AVG:**	**145**			95
	STD. DEV.	**2**				STD. DEV.	**4**			
DP-85	**68367**	187	> 50%	BRK		1 Outside	150	0	SE1	
P177/P178		188	> 50%	BRK		2 Outside	152	0	SE1	
		187	> 50%	BRK		3 Outside	153	0	SE1	
		180	> 50%	BRK		4 Outside	142	0	SE1	
		186	> 50%	BRK		5 Outside	142	0	SE1	
						AVG:	**148**			95
						STD. DEV.	**5**			
						1 Inside	142	0	SE1	
						2 Inside	142	0	SE1	
						3 Inside	148	0	SE1	
						4 Inside	150	0	SE1	
						5 Inside	151	0	SE1	
	AVG:	**186**			120	**AVG:**	**147**			95
	STD. DEV.	**3**				STD. DEV.	**4**			

BREAK DESCRIPTION (ASTM D6392 FUSION):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM.
AD-BRK	BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
SIP	SEPARATION IN THE PLANE OF THE SHEET.

EXTRUSION:

AD1	ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.
AD2	ADHESION FAILURE.
AD-WLD	BREAK THROUGH THE FILLET.
SE1	BREAK AT BOTTOM EDGE OF SEAM.
SE2	BREAK AT TOP EDGE OF SEAM.
SE3	BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)
BRK1	BREAK IN BOTTOM SHEETING.
BRK2	BREAK IN TOP SHEETING.
AD-BRK	BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
HT	BREAK AT EDGE OF HOT TACK
SIP	SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

TABLE 3.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **Camp Dresser & McKee**
PROJECT: **Pasco Lf Construction Ash Cell A-4**
DATE REC'D: **20-Jul-10**

MATERIAL: **60mil HDPE SEAM**
SEAM TYPE: **Fusion Weld**
PGL JOB #: **G100848**

QC'd By: _____
TEST METHOD: ASTM D6392
DATE REPORT: 20-Jul-10

Crosshead Speed: 2 in/min		SHEAR EVALUATION				Crosshead Speed: 2 in/min	PEEL EVALUATION			
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in width)	% Elongation	Locus of Break	PROJECT SPEC. (lb/in width)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in width)	% INCURSION (%)	LOCUS OF BREAK	PROJECT SPEC. (lb/in width)
DP-86	**68368**	188	> 50%	BRK		1 Outside	150	0	SE1	
P192/P191		190	> 50%	BRK		2 Outside	141	0	SE1	
		188	> 50%	BRK		3 Outside	147	0	SE1	
		188	> 50%	BRK		4 Outside	148	0	SE1	
		189	> 50%	BRK		5 Outside	142	0	SE1	
						AVG:	**146**			95
						STD. DEV.	**4**			
						1 Inside	150	0	SE1	
						2 Inside	151	0	SE1	
						3 Inside	150	0	SE1	
						4 Inside	153	0	SE1	
						5 Inside	142	0	SE1	
	AVG.	**189**			120	**AVG:**	**149**			95
	STD. DEV.	**1**				STD. DEV.	**4**			
DP-87	**68369**	188	> 50%	BRK		1 Outside	142	0	SE1	
P200/P199		189	> 50%	BRK		2 Outside	147	0	SE1	
		192	> 50%	BRK		3 Outside	143	0	SE1	
		191	> 50%	BRK		4 Outside	140	0	SE1	
		192	> 50%	BRK		5 Outside	150	0	SE1	
						AVG:	**144**			95
						STD. DEV.	**4**			
						1 Inside	152	0	SE1	
						2 Inside	151	0	SE1	
						3 Inside	153	0	SE1	
						4 Inside	147	0	SE1	
						5 Inside	150	0	SE1	
	AVG:	**190**			120	**AVG:**	**151**			95
	STD. DEV.	**2**				STD. DEV.	**2**			

BREAK DESCRIPTION (ASTM D6392 FUSION):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM.
AD-BRK	BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
SIP	SEPARATION IN THE PLANE OF THE SHEET.

EXTRUSION:

AD1	ADHESION FAILURE. SPECIMENS DELAMINATED UNDER THE BEAD.
AD2	ADHESION FAILURE.
AD-WLD	BREAK THROUGH THE FILLET.
SE1	BREAK AT BOTTOM EDGE OF SEAM.
SE2	BREAK AT TOP EDGE OF SEAM.
SE3	BREAK AT BOTTOM EDGE OF SEAM (for PEEL only)
BRK1	BREAK IN BOTTOM SHEETING.
BRK2	BREAK IN TOP SHEETING.
AD-BRK	BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
HT	BREAK AT EDGE OF HOT TACK
SIP	SEPARATION IN THE PLANE OF THE SHEET.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

Attachment 11

Revised Transmissivity Test Results (7) from Appendix A (Precision Report)

Precision Geosynthetic Laboratories

March 19, 2010

Rajendra Vaidya
Camp Dresser & Mckee
1715 N. Westshore Blvd., Suite 875
Tampa, FL 33607

RE: ***Pasco Lf Construction Ash Cell A-4***

Dear Mr. Vaidya:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the ***final*** laboratory report for the testing of three (3) Double-Sided Geocomposite samples specified on the proceeding sheets which were received on March 9, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. ***Retained conformance samples are disposed of after one (1) month.*** On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Carmelo V. Zantua
Technical/Laboratory Director

Enclosure: (Job No. G100141)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: *Camp Dresser & Mckee*
PROJECT: *Pasco Lf Construction Ash Cell A-4*

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G100141)

MATERIAL DESCRIPTION: Double- Sided Geocomposites

SAMPLED BY: PGL @ GSE, SC

DATE RECEIVED: March 9, 2010 **DATE REPORTED:** March 19, 2010

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PGL CONTROL NUMBER
R#131335690 L#C100110A02	
Geocomposite	64901
Geonet	64904
R#131335726 L#CB20011504	
Geocomposite	64902
Geonet	64905
R#131335770 L#CB20011504	
Geocomposite	64903
Geonet	64906

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
Geocomposite	
ASTM D3776	Mass Per Unit Area
ASTM D4716	Transmissivity
Geonet	
ASTM D1505	Density
ASTM D1238	Melt Flow Index
ASTM D1603	Carbon Black Content
ASTM D5199	Thickness
ASTM D5035	Tensile Strength
ASTM D4716	Transmissivity
ASTM E1131	Compositional Analysis by Thermogravimetry

TEST CONDITIONS: The samples were conditioned for a minimum of one hour in the laboratory at 22 $\pm$ 2°C (71.6 $\pm$ 3.6°F) and at 60 $\pm$ 10% relative humidity prior to test.

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TEST RESULTS:

The test results are summarized in Tables 1 to 3.

PRECISION GEOSYNTHETIC LABORATORIES

GAI-LAP

Initial: CVZ #:0.13

DATE: 03/19/2010

Carmelo V. Zantua
Technical/Laboratory Director

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **3/19/2010**
Client Sample ID: **R#131335690 L#C100110A02**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100141**
PGL Control No.: **64901**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT:	**C#64904**															
ASTM D5199	Thickness (mils)															
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
	Loading time: 5sec Specimen Size: 4" x 4"															
		312	308	310	313	308	308	311	310	310	311	310	2	308	313	300
ASTM D1505	Density (grams/ cm.^{3})															
		0.9554	0.9554	0.9554								0.9554	0.0000	0.9554	0.9554	0.9400
ASTM D1238	Melt Flow Index (grams/ 10 minutes)															
Procedure A	*Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*															
		0.3278	0.3267	0.3281								0.3275	0.0007	0.3267	0.3281	1.0 max
ASTM D1603	Carbon Black Content (percent)															
		2.39	2.37									2.38	0.02	2.37	2.39	
ASTM D5035	Tensile Strength (lbs./in.)															
	Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
	Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
	Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
	MD	95	100	99	95	98						97	2	95	100	75
	TD	25	26	27	30	31	29	29	30			28	2	25	31	
	Apparent Elongation @ Maximum Load															
	MD	33	29	32	28	30						30	2	28	33	
	TD	96	99	94	104	102	104	100	100			100	4	94	104	
ASTM E1131*	Compositional Analysis by Thermogravimetry (%)															
	POLYMER	CARBON	ASH													
	97.52	2.38	0.10													
	Note: Polymer is composed of polyethylene with no other types of plastics detected.															

Continued on next page

*-Sub out
MD - MACHINE DIRECTION
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DC#1984 Record#265*

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TABLE 1.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **3/19/2010**
Client Sample ID: **R#131335690 L#C100110A02**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100141**
PGL Control No.: **64901**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*															
	Temperature of Test Water: 20.2 ^{0}C Specimen Size: 12" x 14"															
	Transmissivity (m.^{2}/ sec.)															
	MD **3.45E-02**											**3.45E-02**				**8 x 10^{-3}**
	Flow Rate (gal/min)															
	MD **3.35**											**3.35**				
	Transmissivity (gal/min/ft)															
	MD **166.44**											**166.44**				
	Test Set-Up:						***Thickness :***	*312*	***mils (Before)***							
	Plate _____						***Thickness :***	*304*	***mils (After)***							
	Geonet *XXXXXX*															
	Plate _____															
GEOCOMPOSITE:																
ASTM D3776	Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
	Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1 ^{0}C (70+/-2 ^{0}F)															
		0.395	**0.394**	**0.394**								**0.394**	**0.000**	**0.394**	**0.395**	
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*															
	Temperature of Test Water: 20.2 ^{0}C Specimen Size: 12" x 14"															
	Transmissivity (m.^{2}/ sec.)															
	MD **8.99E-03**											**8.99E-03**				**1.6 x 10^{-3}**
	Transmissivity (gal./ min./ ft.)															
	MD **43.43**											**43.43**				
	Flow Rate (gal./ min)															
	MD **0.87**											**0.87**				
	Test Set-Up:						***Thickness :***	*410*	***mils (Before)***							
	Plate _____						***Thickness :***	*338*	***mils (After)***							
	Geocomposite *XXXXXX*															
	Plate _____															

End of Table 1

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

*-Sub out
MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION
DC#1984 Record#265

ISO 9001 - 2000

TABLE 2.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **3/19/2010**
Client Sample ID: **R#131335726 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100141**
PGL Control No.: **64902**

METHOD DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT: C#64902															
ASTM D5199 Thickness (mils)															
Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
Loading time: 5sec Specimen Size: 4" x 4"	308	310	311	308	312	312	310	312	308	311	310	2	308	312	300
ASTM D1505 Density (grams/ $cm.^3$)	0.9549	0.9549	0.9549								0.9549	0.0000	0.9549	0.9549	0.9400
ASTM D1238 Melt Flow Index (grams/ 10 minutes)															
Procedure A *Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190° C and 2.16kg load.*	0.2989	0.2972	0.2997								0.2986	0.0013	0.2972	0.2997	1.0 max
ASTM D1603 Carbon Black Content (percent)	2.35	2.35									2.35	0.00	2.35	2.35	
ASTM D5035 Tensile Strength (lbs./in.)															
Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
MD	97	94	103	104	100						100	4	94	104	75
TD	28	29	26	27	31	30	29	30			29	2	26	31	
Apparent Elongation @ Maximum Load															
MD	33	30	37	34	32						33	3	30	37	
TD	99	95	93	99	102	103	104	102			100	4	93	104	
GEOCOMPOSITE:															
ASTM D3776 Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1° C (70+/-2° F)															
	0.394	0.396	0.396								0.396	0.001	0.394	0.396	

Continued on next page

MD - MACHINE DIRECTION
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DC#1984 Record#265

ISO 9001 - 2000

TABLE 2.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **3/19/2010**
Client Sample ID: **R#131335726 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100141**
PGL Control No.: **64902**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs* *Temperature of Test Water: 20.2^0 C Specimen Size: 12" x 14"*															
	Transmissivity (m.^{2}/ sec.)															
	MD **9.29E-03**											9.29E-03				1.6 x 10^{-3}
	Transmissivity (gal./ min./ ft.)															
	MD **44.85**											44.85				
	Flow Rate (gal./ min)															
	MD **0.90**											0.90				

Test Set-Up:
Plate _____
Geocomposite *XXXXXX*
Plate _____

Thickness : *412* ***mils (Before)***
Thickness : *335* ***mils (After)***

End of Table 2

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MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION
DC#1084 Record#265

TABLE 3.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **3/19/2010**
Client Sample ID: ***R#131335770 L#CB20011504***
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100141**
PGL Control No.: **64903**

	SPECIMENS														Proj.
	1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Specs. MARV
METHOD DESCRIPTION															
GEONET COMPONENT: **C#64903**															
ASTM D5199 Thickness (mils)															
Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
Loading time: 5sec Specimen Size: 4" x 4"															
	308	309	310	311	308	321	318	316	312	310	312	5	308	321	300
ASTM D1505 Density (grams/ $cm.^3$)															
	0.9544	0.9544	0.9544								0.9544	0.0000	0.9544	0.9544	0.9400
ASTM D1238 Melt Flow Index (grams/ 10 minutes)															
Procedure A *Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190° C and 2.16kg load.*															
	0.3090	0.3081	0.3086								0.3086	0.0005	0.3081	0.3090	1.0 max
ASTM D1603 Carbon Black Content (percent)															
	2.48	2.45									2.47	0.02	2.45	2.48	
ASTM D5035 Tensile Strength (lbs./in.)															
Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
MD	94	95	99	100	103						98	4	94	103	75
TD	27	30	30	31	27	27	29	31			29	2	27	31	
Apparent Elongation @ Maximum Load															
MD	29	30	30	34	34						31	2	29	34	
TD	96	99	104	102	94	97	99	100			99	3	94	104	
GEOCOMPOSITE:															
ASTM D3776 Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1° C (70+/-2° F)															
	0.404	0.404	0.406								0.405	0.001	0.404	0.406	

Continued on next page

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION
DC#1984 Record#265

ISO 9001 - 2000

TABLE 3.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **3/19/2010**
Client Sample ID: **R#131335770 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100141**
PGL Control No.: **64903**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity	*Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*														
		Temperature of Test Water: 20.1 °C Specimen Size: 12" x 14"														
	Transmissivity (m.²/ sec.)															
	MD **8.36E-03**											**8.36E-03**				**1.6 x 10^{-3}**
	Transmissivity (gal./ min./ ft.)															
	MD **40.40**											**40.40**				
	Flow Rate (gal./ min)															
	MD **0.81**											**0.81**				

Test Set-Up:

Plate _____

Geocomposite *XXXXXX*

Plate _____

Thickness : *408* ***mils (Before)***

Thickness : *326* ***mils (After)***

End of Table 3

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION
DC#1984 Record#265

ISO 9001 - 2000

Precision Geosynthetic Laboratories

March 29, 2010

Rajendra Vaidya
Camp Dresser & Mckee
1715 N. Westshore Blvd., Suite 875
Tampa, FL 33607

RE: ***Pasco Lf Construction Ash Cell A-4***

Dear Mr. Vaidya:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the ***final*** laboratory report for the testing of three (3) Double-Sided Geocomposite samples specified on the proceeding sheets which were received on March 9, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

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It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. ***Retained conformance samples are disposed of after one (1) month.*** On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Carmelo V. Zantua
Technical/Laboratory Director

Enclosure: (Job No. G100142)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: *Camp Dresser & Mckee*
PROJECT: *Pasco Lf Construction Ash Cell A-4*

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G100142)

MATERIAL DESCRIPTION: Double- Sided Geocomposites

SAMPLED BY: PGL @ GSE, SC

DATE RECEIVED: March 9, 2010 **DATE REPORTED:** March 29, 2010

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PGL CONTROL NUMBER
R#131335809 L# CB20011504	
Geocomposite	64907
Geonet	64910
R#131335848 L#CB20011504	
Geocomposite	64908
Geonet	64911
R#131335888 L#CB20011504	
Geocomposite	64909
Geonet	64912

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
Geocomposite	
ASTM D3776	Mass Per Unit Area
ASTM D4716	Transmissivity
Geonet	
ASTM D1505	Density
ASTM D1238	Melt Flow Index
ASTM D1603	Carbon Black Content
ASTM D5199	Thickness
ASTM D5035	Tensile Strength
ASTM D4716	Transmissivity
ASTM E1131	Compositional Analysis by Thermogravimetry

TEST CONDITIONS: The samples were conditioned for a minimum of one hour in the laboratory at 22 $\pm$ 2°C (71.6 $\pm$ 3.6°F) and at 60 $\pm$ 10% relative humidity prior to test.

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TEST RESULTS:

The test results are summarized in Tables 1 to 3.

PRECISION GEOSYNTHETIC LABORATORIES

GAI-LAP

Initial: CVZ #:0.13

DATE: 03/29/2010

Carmelo V. Zantua
Technical/Laboratory Director

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE
MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee
PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **3/29/2010**
Client Sample ID: **R#131335809 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100142**
PGL Control No.: **64907**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT:	**C#64910**															
ASTM D5199	Thickness (mils)															
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
	Loading time: 5sec Specimen Size: 4" x 4"															
		309	312	312	321	316	315	318	319	317	318	316	4	309	321	300
ASTM D1505	Density (grams/ $cm.^3$)															
		0.9547	0.9547	0.9547								0.9547	0.0000	0.9547	0.9547	0.9400
ASTM D1238	Melt Flow Index (grams/ 10 minutes)															
Procedure A	*Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*															
		0.3619	0.3620	0.3678								0.3639	0.0034	0.3619	0.3678	1.0 max
ASTM D1603	Carbon Black Content (percent)															
		2.34	2.32									2.33	0.01	2.32	2.34	
ASTM D5035	Tensile Strength (lbs./in.)															
	Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
	Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
	Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
	MD	103	100	96	95	95						98	4	95	103	75
	TD	29	30	32	29	29	31	30	27			29	1	27	32	
	Apparent Elongation @ Maximum Load															
	MD	34	34	32	32	33						33	1	32	34	
	TD	99	107	102	94	99	104	102	94			100	5	94	107	
ASTM E1131*	Compositional Analysis by Thermogravimetry (%)															
	POLYMER	CARBON	ASH													
	97.64	2.40	0.00													
	Note: Polymer is composed of polyethylene with no other types of plastics detected.															

Continued on next page

*-Sub out
MD - MACHINE DIRECTION
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DC#1984 Record#265

ISO 9001 - 2000

TABLE 1
MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **3/29/2010**
Client Sample ID: **R#131335809 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100142**
PGL Control No.: **64907**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs* *Temperature of Test Water: 20.3° C Specimen Size: 12" x 14"*															
	Transmissivity ($m.^2$/ sec.)															
	MD **3.67E-02**											3.67E-02				8×10^{-3}
	Flow Rate (gal/min)															
	MD **3.57**											3.57				
	Transmissivity (gal/min/ft)															
	MD **177.28**											177.28				
	Test Set-Up: ***Thickness :*** 316 ***mils (Before)***															
	Plate ***Thickness :*** 308 ***mils (After)***															
	Geonet XXXXXX															
	Plate															
GEOCOMPOSITE:																
ASTM D3776	Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
	Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1° C (70+/-2° F)															
	0.406 **0.408** **0.410**											0.408	0.002	0.406	0.410	
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs* *Temperature of Test Water: 20.2° C Specimen Size: 12" x 14"*															
	Transmissivity ($m.^2$/ sec.)															
	MD **8.94E-03**											8.94E-03				1.6×10^{-3}
	Transmissivity (gal./ min./ ft.)															
	MD **43.20**											43.20				
	Flow Rate (gal./ min)															
	MD **0.87**											0.87				
	Test Set-Up: ***Thickness :*** 411 ***mils (Before)***															
	Plate ***Thickness :*** 334 ***mils (After)***															
	Geocomposite XXXXXX															
	Plate															

End of Table 1

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

*-Sub out
MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION
DC#1984 Record#265*

TABLE 2.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **3/29/2010**
Client Sample ID: **R#131335848 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100142**
PGL Control No.: **64908**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT:	**C#64911**															
ASTM D5199	Thickness (mils)															
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
	Loading time: 5sec Specimen Size: 4" x 4"															
		308	310	312	315	320	316	320	321	316	320	316	5	308	321	300
ASTM D1505	Density (grams/ $cm.^3$)															
		0.9544	0.9544	0.9544								0.9544	0.0000	0.9544	0.9544	0.9400
ASTM D1238	Melt Flow Index (grams/ 10 minutes)															
Procedure A	*Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^{0}C and 2.16kg load.*															
		0.3481	0.3490	0.3461								0.3477	0.0015	0.3461	0.3490	1.0 max
ASTM D1603	Carbon Black Content (percent)															
		2.28	2.29									2.29	0.01	2.28	2.29	
ASTM D5035	Tensile Strength (lbs./in.)															
	Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
	Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
	Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
	MD	106	110	99	103	104						104	4	99	110	75
	TD	29	26	27	32	30	29	26	26			28	2	26	32	
	Apparent Elongation @ Maximum Load															
	MD	34	34	32	34	34						34	1	32	34	
	TD	99	93	99	101	102	103	99	94			99	4	93	103	
GEOCOMPOSITE:																
ASTM D3776	Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
	Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1^{0}C (70+/-2^{0}F)															
		0.396	0.398	0.402								0.399	0.003	0.396	0.402	

Continued on next page

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION
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ISO 9001 - 2000
CAL-LAP ACCREDITED PERRY JOHNSON REGISTRARS, INC. UKAS

TABLE 2.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **3/29/2010**
Client Sample ID: **R#131335848 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100142**
PGL Control No.: **64908**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity	*Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*														
		Temperature of Test Water: 20.2° C Specimen Size: 12" x 14"														
	Transmissivity (m.²/ sec.)															
	MD **8.18E-03**											**8.18E-03**				**1.6 x 10⁻³**
	Transmissivity (gal./ min./ ft.)															
	MD **39.49**											**39.49**				
	Flow Rate (gal./ min)															
	MD **0.79**											**0.79**				

Test Set-Up:
Plate _____
Geocomposite *XXXXXX*
Plate _____

Thickness : *406* ***mils (Before)***
Thickness : *324* ***mils (After)***

End of Table 2

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

MD - MACHINE DIRECTION
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DC#1984 Record#265

TABLE 3.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **3/29/2010**
Client Sample ID: **R#131335888 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100142**
PGL Control No.: **64909**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT:	**C#64912**															
ASTM D5199	Thickness (mils)															
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
	Loading time: 5sec Specimen Size: 4" x 4"															
		310	312	308	310	312	308	312	312	316	312	311	2	308	316	300
ASTM D1505	Density (grams/ $cm.^3$)															
		0.9551	0.9551	0.9551								0.9551	0.0000	0.9551	0.9551	0.9400
ASTM D1238	Melt Flow Index (grams/ 10 minutes)															
Procedure A	*Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*															
		0.3401	0.3420	0.3411								0.3411	0.0010	0.3401	0.3420	1.0 max
ASTM D1603	Carbon Black Content (percent)															
		2.28	2.28									2.28	0.00	2.28	2.28	
ASTM D5035	Tensile Strength (lbs./in.)															
	Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
	Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
	Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
	MD	94	96	95	100	101						97	3	94	101	75
	TD	28	30	30	31	29	29	28	25			29	2	25	31	
	Apparent Elongation @ Maximum Load															
	MD	29	29	33	35	35						32	3	29	35	
	TD	97	99	104	102	99	97	99	96			99	3	96	104	
GEOCOMPOSITE:																
ASTM D3776	Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
	Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1^0 C (70+/-2^0 F)															
		0.394	0.395	0.396								0.395	0.001	0.394	0.396	

Continued on next page

MD - MACHINE DIRECTION
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DC#1984 Record#265

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CAL-LAP ACCREDITED PERRY JOHNSON REGISTRARS, INC. UKAS

TABLE 3.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **3/29/2010**
Client Sample ID: **R#131335888 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100142**
PGL Control No.: **64909**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs* *Temperature of Test Water: 20.3^{0}C Specimen Size: 12" x 14"*															
	Transmissivity (m.^{2}/ sec.)															
	MD **8.48E-03**											**8.48E-03**				**1.6 x 10^{-3}**
	Transmissivity (gal./ min./ ft.)															
	MD **40.95**											**40.95**				
	Flow Rate (gal./ min)															
	MD **0.83**											**0.83**				

Test Set-Up:
Plate _____
Geocomposite *XXXXXX*
Plate _____

Thickness : *408* ***mils (Before)***
Thickness : *327* ***mils (After)***

End of Table 3

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

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DC#1984 Record#265

Precision Geosynthetic Laboratories

April 5, 2010

Rajendra Vaidya
Camp Dresser & Mckee
1715 N. Westshore Blvd., Suite 875
Tampa, FL 33607

RE: ***Pasco Lf Construction Ash Cell A-4***

Dear Mr. Vaidya:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the ***final*** laboratory report for the testing of three (3) Double-Sided Geocomposite samples specified on the proceeding sheets which were received on March 9, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. ***Retained conformance samples are disposed of after one (1) month.*** On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Carmelo V. Zantua
Technical/Laboratory Director

Enclosure: (Job No. G100143)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: *Camp Dresser & Mckee*
PROJECT: *Pasco Lf Construction Ash Cell A-4*

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G100143)

MATERIAL DESCRIPTION: Double- Sided Geocomposites

SAMPLED BY: PGL @ GSE, SC

DATE RECEIVED: March 9, 2010 **DATE REPORTED:** April 5, 2010

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PGL CONTROL NUMBER
R#131335926 L# CB20011504	
Geocomposite	64913
Geonet	64916
R#131335972 L#CB20011504	
Geocomposite	64914
Geonet	64917
R#131336011 L#CB20011501	
Geocomposite	64915
Geonet	64918

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
Geocomposite	
ASTM D3776	Mass Per Unit Area
ASTM D4716	Transmissivity
Geonet	
ASTM D1505	Density
ASTM D1238	Melt Flow Index
ASTM D1603	Carbon Black Content
ASTM D5199	Thickness
ASTM D5035	Tensile Strength
ASTM D4716	Transmissivity
ASTM E1131	Compositional Analysis by Thermogravimetry

TEST CONDITIONS: The samples were conditioned for a minimum of one hour in the laboratory at 22 ± 2°C (71.6 ± 3.6°F) and at 60 ± 10% relative humidity prior to test.

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TEST RESULTS:

The test results are summarized in Tables 1 to 3.

PRECISION GEOSYNTHETIC LABORATORIES

GAI-LAP

Initial: CVZ #:0.13

DATE: 04/05/2010

Carmelo V. Zantua
Technical/Laboratory Director

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **4/5/2010**
Client Sample ID: **R#131335926 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100143**
PGL Control No.: **64913**

METHOD DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT: C#64916															
ASTM D5199 Thickness (mils)															
Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
Loading time: 5sec Specimen Size: 4" x 4"	312	316	320	317	316	320	312	308	311	310	314	4	308	320	300
ASTM D1505 Density (grams/ $cm.^3$)	0.9544	0.9544	0.9544								0.9544	0.0000	0.9544	0.9544	0.9400
ASTM D1238 Melt Flow Index (grams/ 10 minutes)															
Procedure A *Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*	0.3201	0.3199	0.3200								0.3200	0.0001	0.3199	0.3201	1.0 max
ASTM D1603 Carbon Black Content (percent)	2.31	2.29									2.30	0.01	2.29	2.31	
ASTM D5035 Tensile Strength (lbs./in.)															
Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
MD	100	106	104	99	97						101	4	97	106	75
TD	28	28	30	30	26	27	27	31			28	2	26	31	
Apparent Elongation @ Maximum Load															
MD	29	36	34	33	33						33	2	29	36	
TD	98	106	102	101	99	102	107	110			103	4	98	110	
GEOCOMPOSITE:															
ASTM D3776 Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1^0 C (70+/-2^0 F)	0.394	0.396	0.395								0.395	0.001	0.394	0.396	

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MD - MACHINE DIRECTION
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DC#1984 Record#265

ISO 9001 - 2000

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **4/5/2010**
Client Sample ID: **R#131335926 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100143**
PGL Control No.: **64913**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity	*Tested at Normal Pressure : 10.000 psf, Gradient: 0.02 , Seating Time: 100 hrs*														
		Temperature of Test Water: 20.4 ^{0}C Specimen Size: 12" x 14"														
	Transmissivity	(m.^{2}/ sec.)														
	MD **9.38E-03**											**9.38E-03**				**1.6 x 10^{-3}**
	Transmissivity	(gal./ min./ ft.)														
	MD **45.29**											**45.29**				
	Flow Rate	(gal./ min)														
	MD **0.91**											**0.91**				

Test Set-Up:

Plate _____

Geocomposite *XXXXXX*

Plate _____

Thickness : *416* ***mils (Before)***

Thickness : *333* ***mils (After)***

End of Table 1

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

MD - MACHINE DIRECTION
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DC#1984 Record#265

TABLE 2.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **4/5/2010**
Client Sample ID: **R#131335972 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100143**
PGL Control No.: **64914**

	SPECIMENS													Proj.
	1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Specs. MARV
METHOD DESCRIPTION															
GEONET COMPONENT: **C#64917**															
ASTM D5199 Thickness (mils)															
Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure≈ 2kPA or 0.29psi).															
Loading time: 5sec Specimen Size: 4" x 4"															
	312	309	308	311	315	316	320	316	315	316	314	4	308	320	300
ASTM D1505 Density (grams/ $cm.^3$)															
	0.9549	0.9549	0.9549								0.9549	0.0000	0.9549	0.9549	0.9400
ASTM D1238 Melt Flow Index (grams/ 10 minutes)															
Procedure A *Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*															
	0.3341	0.3360	0.3401								0.3367	0.0031	0.3341	0.3401	1.0 max
ASTM D1603 Carbon Black Content (percent)															
	2.32	2.30									2.31	0.01	2.30	2.32	
ASTM D5035 Tensile Strength (lbs./in.)															
Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
MD	103	106	104	104	106						104	1	103	106	75
TD	32	31	29	29	30	31	30	32			30	1	29	32	
Apparent Elongation @ Maximum Load															
MD	30	35	34	35	35						34	2	30	35	
TD	104	102	107	113	107	107	114	102			107	4	102	114	
GEOCOMPOSITE:															
ASTM D3776 Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1^0 C (70+/-2^0 F)															
	0.397	0.398	0.400								0.398	0.001	0.397	0.400	

Continued on next page

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **4/5/2010**
Client Sample ID: **R#131335972 L#CB20011504**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100143**
PGL Control No.: **64914**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity	*Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*														
		Temperature of Test Water: 20.3 ^{0}C Specimen Size: 12" x 14"														
	Transmissivity (m.^{2}/ sec.)															
	MD **9.85E-03**											9.85E-03				1.6 x 10^{-3}
	Transmissivity (gal./ min./ ft.)															
	MD **47.59**											47.59				
	Flow Rate (gal./ min)															
	MD **0.96**											0.96				

Test Set-Up:

Plate _____

Geocomposite *XXXXXX*

Plate _____

Thickness : *420* ***mils (Before)***

Thickness : *339* ***mils (After)***

End of Table 2

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

MD - MACHINE DIRECTION
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TABLE
MATERIAL PRO[illegible]IES
CLIENT: Camp Dresser & Mckee
PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **4/5/2010**
Client Sample ID: **R#131336011 L#CB20011501**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100143**
PGL Control No.: **64915**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT:	**C#64918**															
ASTM D5199	Thickness (mils)															
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
	Loading time: 5sec Specimen Size: 4" x 4"															
		310	316	311	308	312	310	312	320	312	315	313	4	308	320	300
ASTM D1505	Density (grams/ cm.^{3})															
		0.9551	0.9551	0.9551								0.9551	0.0000	0.9551	0.9551	0.9400
ASTM D1238	Melt Flow Index (grams/ 10 minutes)															
Procedure A	*Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*															
		0.3436	0.3411	0.3401								0.3416	0.0018	0.3401	0.3436	1.0 max
ASTM D1603	Carbon Black Content (percent)															
		2.43	2.43									2.43	0.00	2.43	2.43	
ASTM D5035	Tensile Strength (lbs./in.)															
	Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
	Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
	Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
	MD	104	108	98	95	100						101	5	95	108	75
	TD	26	30	30	31	31	29	29	29			29	2	26	31	
	Apparent Elongation @ Maximum Load															
	MD	34	35	33	30	33						33	2	30	35	
	TD	96	99	101	101	104	90	99	94			98	4	90	104	
ASTM E1131*	Compositional Analysis by Thermogravimetry (%)															
	POLYMER	CARBON	ASH													
	97.38	2.51	0.11													
	Note: Polymer is composed of polyethylene with no other types of plastics detected.															

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TABLE 3

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/9/2010**
Date Reported: **4/5/2010**
Client Sample ID: ***R#131336011 L#CB20011501***
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100143**
PGL Control No.: **64915**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*															
	Temperature of Test Water: 20.2 ^{0}C Specimen Size: 12" x 14"															
	Transmissivity ($m.^2$/ sec.)															
	MD **3.50E-02**											**3.50E-02**				**8 x 10^{-3}**
	Flow Rate (gal/min)															
	MD **3.40**											**3.40**				
	Transmissivity (gal/min/ft)															
	MD **169.19**											**169.19**				
	Test Set-Up:						***Thickness :***	***308***	***mils (Before)***							
	Plate						***Thickness :***	***296***	***mils (After)***							
	Geonet ***XXXXXX***															
	Plate															
GEOCOMPOSITE:																
ASTM D3776	Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
	Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1 ^{0}C (70+/-2 ^{0}F)															
	0.410	**0.404**	**0.406**									**0.406**	**0.003**	**0.404**	**0.410**	
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*															
	Temperature of Test Water: 20.2 ^{0}C Specimen Size: 12" x 14"															
	Transmissivity ($m.^2$/ sec.)															
	MD **9.26E-03**											**9.26E-03**				**1.6 x 10^{-3}**
	Transmissivity (gal./ min./ ft.)															
	MD **44.70**											**44.70**				
	Flow Rate (gal./ min)															
	MD **0.90**											**0.90**				
	Test Set-Up:						***Thickness :***	***416***	***mils (Before)***							
	Plate						***Thickness :***	***334***	***mils (After)***							
	Geocomposite ***XXXXXX***															
	Plate															

End of Table 3

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

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Precision Geosynthetic Laboratories

April 12, 2010

Rajendra Vaidya
Camp Dresser & Mckee
1715 N. Westshore Blvd., Suite 875
Tampa, FL 33607

RE: ***Pasco Lf Construction Ash Cell A-4***

Dear Mr. Vaidya:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the ***final*** laboratory report for the testing of three (3) Double-Sided Geocomposite samples specified on the proceeding sheets which were received on March 23, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. ***Retained conformance samples are disposed of after one (1) month.*** On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Carmelo V. Zantua
Technical/Laboratory Director

Enclosure: (Job No. G100203)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: *Camp Dresser & Mckee*
PROJECT: *Pasco Lf Construction Ash Cell A-4*

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G100203)

MATERIAL DESCRIPTION: Double- Sided Geocomposites

SAMPLED BY: PGL @ GSE, SC

DATE RECEIVED: March 23, 2010 **DATE REPORTED:** April 12, 2010

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PGL CONTROL NUMBER
R#131336798 L#CAA610252	
Geocomposite	65131
Geonet	65134
R#131336840 L#CAA610252	
Geocomposite	65132
Geonet	65135
R#131336879 L#CAA610252	
Geocomposite	65133
Geonet	65136

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
Geocomposite	
ASTM D3776	Mass Per Unit Area
ASTM D4716	Transmissivity
Geonet	
ASTM D1505	Density
ASTM D1238	Melt Flow Index
ASTM D1603	Carbon Black Content
ASTM D5199	Thickness
ASTM D5035	Tensile Strength
ASTM D4716	Transmissivity
ASTM E1131	Compositional Analysis by Thermogravimetry

TEST CONDITIONS: The samples were conditioned for a minimum of one hour in the laboratory at 22 ± 2°C (71.6 ± 3.6°F) and at 60 ± 10% relative humidity prior to test.

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TEST RESULTS:

The test results are summarized in Tables 1 to 3.

PRECISION GEOSYNTHETIC LABORATORIES

GAI-LAP

Initial: CVZ #:0.13

DATE: 04/12/2010

Carmelo V. Zantua
Technical/Laboratory Director

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE 1

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/23/2010**
Date Reported: **4/12/2010**
Client Sample ID: **R#131336798 L#CAA610252**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100203**
PGL Control No.: **65131**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT:	**C#65134**															
ASTM D5199	Thickness (mils)															
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
	Loading time: 5sec Specimen Size: 4" x 4"															
		317	317	315	308	311	310	312	311	312	314	313	3	308	317	300
ASTM D1505	Density (grams/ $cm.^3$)															
		0.9556	0.9556	0.9556								0.9556	0.0000	0.9556	0.9556	0.9400
ASTM D1238	Melt Flow Index (grams/ 10 minutes)															
Procedure A	*Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*															
		0.3135	0.3141	0.3120								0.3132	0.0011	0.3120	0.3141	1.0 max
ASTM D1603	Carbon Black Content (percent)															
		2.51	2.51									2.51	0.00	2.51	2.51	
ASTM D5035	Tensile Strength (lbs./in.)															
	Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
	Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
	Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
	MD	99	100	98	94	96						97	2	94	100	75
	TD	30	30	31	30	29	26	31	30			30	1	26	31	
	Apparent Elongation @ Maximum Load															
	MD	30	30	31	30	30						30	0	30	31	
	TD	102	100	100	104	94	99	101	106			101	4	94	106	
ASTM E1131*	Compositional Analysis by Thermogravimetry (%)															
	POLYMER	CARBON	ASH													
	97.53	2.42	0.05													
	Note: Polymer is composed of polyethylene with no other types of plastics detected.															

Continued on next page

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TABLE 1

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/23/2010**
Date Reported: **4/12/2010**
Client Sample ID: **R#131336798 L#CAA610252**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100203**
PGL Control No.: **65131**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*															
	Temperature of Test Water: 20.3 ^{0}C Specimen Size: 12" x 14"															
	Transmissivity (m^2/ sec.)															
	MD **3.40E-02**											**3.40E-02**				8×10^{-3}
	Flow Rate (gal/min)															
	MD **3.30**											**3.30**				
	Transmissivity (gal/min/ft)															
	MD **164.00**											**82.00**				
	Test Set-Up:															
	Plate _____															
	Geonet *XXXXXX*															
	Plate _____															
	Thickness : *310* ***mils (Before)***															
	Thickness : *304* ***mils (After)***															
GEOCOMPOSITE:																
ASTM D3776	Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
	Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1 ^{0}C (70+/-2 ^{0}F)															
	0.396 **0.394** **0.395**											**0.395**	**0.001**	**0.394**	**0.396**	
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*															
	Temperature of Test Water: 20.3 ^{0}C Specimen Size: 12" x 14"															
	Transmissivity (m^2/ sec.)															
	MD **9.23E-03**											**9.23E-03**				1.6×10^{-3}
	Transmissivity (gal./ min./ ft.)															
	MD **44.58**											**44.58**				
	Flow Rate (gal./ min)															
	MD **0.90**											**0.90**				
	Test Set-Up:															
	Plate _____															
	Geocomposite *XXXXXX*															
	Plate _____															
	Thickness : *415* ***mils (Before)***															
	Thickness : *333* ***mils (After)***															

End of Table 1

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/23/2010**
Date Reported: **4/12/2010**
Client Sample ID: **R#131336840 L#CAA610252**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100203**
PGL Control No.: **65132**

METHOD DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT: **C#64902**															
ASTM D5199 Thickness (mils)															
Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
Loading time: 5sec Specimen Size: 4" x 4"	310	312	310	311	312	315	316	312	312	316	312	2	310	316	300
ASTM D1505 Density (grams/ $cm.^3$)	0.9561	0.9561	0.9561								0.9561	0.0000	0.9561	0.9561	0.9400
ASTM D1238 Melt Flow Index (grams/ 10 minutes)															
Procedure A *Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190 ^{0}C and 2.16kg load.*	0.3011	0.3060	0.3090								0.3054	0.0040	0.3011	0.3090	1.0 max
ASTM D1603 Carbon Black Content (percent)	2.50	2.53									2.51	0.02	2.50	2.53	
ASTM D5035 Tensile Strength (lbs./in.)															
Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
MD	98	95	96	100	103						98	3	95	103	75
TD	27	27	30	31	30	32	31	27			29	2	27	32	
Apparent Elongation @ Maximum Load															
MD	33	29	32	30	31						31	2	29	33	
TD	93	99	100	101	104	101	104	95			100	4	93	104	
GEOCOMPOSITE:															
ASTM D3776 Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1 ^{0}C (70+/-2 ^{0}F)	0.396	0.396	0.396								0.396	0.000	0.396	0.396	

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/23/2010**
Date Reported: **4/12/2010**
Client Sample ID: **R#131336840 L#CAA610252**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100203**
PGL Control No.: **65132**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*															
	Temperature of Test Water: 20.4 ^{0}C Specimen Size: 12" x 14"															
	Transmissivity ($m.^{2}$/ sec.)															
	MD **9.53E-03**											9.53E-03				1.6 x 10^{-3}
	Transmissivity (gal./ min./ ft.)															
	MD **46.03**											46.03				
	Flow Rate (gal./ min)															
	MD **0.93**											0.93				

Test Set-Up:

Plate _____

Geocomposite *XXXXXX*

Plate _____

Thickness : *418* ***mils (Before)***

Thickness : *335* ***mils (After)***

End of Table 2

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

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TABLE 3.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/23/2010**
Date Reported: **4/12/2010**
Client Sample ID: **R#131336879 L#CAA610252**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100203**
PGL Control No.: **65133**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT:	**C#64903**															
ASTM D5199	Thickness (mils)															
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
	Loading time: 5sec Specimen Size: 4" x 4"															
		313	316	315	312	311	311	308	311	312	314	312	2	308	316	300
ASTM D1505	Density (grams/ cm.^{3})															
		0.9507	0.9507	0.9507								0.9507	0.0000	0.9507	0.9507	0.9400
ASTM D1238	Melt Flow Index (grams/ 10 minutes)															
Procedure A	*Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*															
		0.2981	0.3001	0.3011								0.2998	0.0015	0.2981	0.3011	1.0 max
ASTM D1603	Carbon Black Content (percent)															
		2.50	2.53									2.51	0.02	2.50	2.53	
ASTM D5035	Tensile Strength (lbs./in.)															
	Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
	Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
	Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
	MD	103	104	99	99	100						101	2	99	104	75
	TD	31	29	31	30	29	32	29	27			30	2	27	32	
	Apparent Elongation @ Maximum Load															
	MD	33	29	31	31	31						31	1	29	33	
	TD	104	94	102	101	99	105	99	94			100	4	94	105	
GEOCOMPOSITE:																
ASTM D3776	Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
	Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1^0 C (70+/-2^0 F)															
		0.406	0.406	0.406								0.406	0.000	0.406	0.406	

Continued on next page

MD - MACHINE DIRECTION
TD - TRANSVERSE DIRECTION
DC#1984 Record#265

ISO 9001 - 2000

TABLE 3.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/23/2010**
Date Reported: **4/12/2010**
Client Sample ID: **R#131336879 L#CAA610252**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100203**
PGL Control No.: **65133**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*															
	Temperature of Test Water: 20.4 ^{0}C Specimen Size: 12" x 14"															
	Transmissivity ($m.^2$/ sec.)															
	MD **8.76E-03**											8.76E-03				1.6 x 10^{-3}
	Transmissivity (gal./ min./ ft.)															
	MD **42.29**											42.29				
	Flow Rate (gal./ min)															
	MD **0.85**											0.85				

Test Set-Up:
Plate _____
Geocomposite *XXXXXX*
Plate _____

Thickness : *407* ***mils (Before)***
Thickness : *330* ***mils (After)***

End of Table 3

By accepting the data and results presented on this report, the Client agrees to limit the liability of *Precision Geosynthetic* Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

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DC#1984 Record#265

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Precision Geosynthetic Laboratories

April 29, 2010

Rajendra Vaidya
Camp Dresser & Mckee
1715 N. Westshore Blvd., Suite 875
Tampa, FL 33607

RE: ***Pasco Lf Construction Ash Cell A-4***

Dear Mr. Vaidya:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the ***final*** laboratory report for the testing of three (3) Double-Sided Geocomposite samples specified on the proceeding sheets which were received on March 23, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. ***Retained conformance samples are disposed of after one (1) month.*** On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Carmelo V. Zantua
Technical/Laboratory Director

Enclosure: (Job No. G100205)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: *Camp Dresser & Mckee*
PROJECT: *Pasco Lf Construction Ash Cell A-4*

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G100205)

MATERIAL DESCRIPTION: Double- Sided Geocomposites

SAMPLED BY: PGL @ GSE, SC

DATE RECEIVED: March 23, 2010 **DATE REPORTED:** April 29, 2010

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PGL CONTROL NUMBER
R#131337042 L#CAA610252	
Geocomposite	65143
Geonet	65146
R#131337081 L#CAA610251	
Geocomposite	65144
Geonet	65147
R#131337120 L#CAA610251	
Geocomposite	65145
Geonet	65148

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
Geocomposite	
ASTM D3776	Mass Per Unit Area
ASTM D4716	Transmissivity
Geonet	
ASTM D1505	Density
ASTM D1238	Melt Flow Index
ASTM D1603	Carbon Black Content
ASTM D5199	Thickness
ASTM D5035	Tensile Strength
ASTM D4716	Trasmissivity
ASTM E1131	Compositional Analysis by Thermogravimetry

TEST CONDITIONS: The samples were conditioned for a minimum of one hour in the laboratory at 22 $\pm$ 2°C (71.6 $\pm$ 3.6°F) and at 60 $\pm$ 10% relative humidity prior to test.

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TEST RESULTS:

The test results are summarized in Tables 1 to 3.

PRECISION GEOSYNTHETIC LABORATORIES

GAI-LAP

Initial: CVZ #:0.13

DATE: 04/29/2010

Carmelo V. Zantua
Technical/Laboratory Director

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/23/2010**
Date Reported: **4/29/2010**
Client Sample ID: **R#131337042 L#CAA610252**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100205**
PGL Control No.: **65143**

METHOD DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT: C#65146															
ASTM D5199 Thickness (mils)															
Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
Loading time: 5sec Specimen Size: 4" x 4"	311	312	316	312	313	310	310	312	316	315	313	2	310	316	300
ASTM D1505 Density (grams/ $cm.^3$)	0.9558	0.9558	0.9558								0.9558	0.0000	0.9558	0.9558	0.9400
ASTM D1238 Melt Flow Index (grams/ 10 minutes)															
Procedure A *Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*	0.2998	0.2978	0.2985								0.2987	0.0010	0.2978	0.2998	1.0 max
ASTM D1603 Carbon Black Content (percent)	2.45	2.43									2.44	0.01	2.43	2.45	
ASTM D5035 Tensile Strength (lbs./in.)															
Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
MD	103	106	105	100	110						105	4	100	110	75
TD	31	29	29	31	29	30	29	28			29	1	28	31	
Apparent Elongation @ Maximum Load															
MD	33	29	29	33	32						31	2	29	33	
TD	104	97	96	104	90	106	97	95			99	5	90	106	
GEOCOMPOSITE:															
ASTM D3776 Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1^0 C (70+/-2^0 F)	0.394	0.394	0.396								0.395	0.001	0.394	0.396	

Continued on next page

MD - MACHINE DIRECTION
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DC#1984 Record#265

ISO 9001 - 2000
CAL-LAP ANSI-RAB ACCREDITED PERRY JOHNSON REGISTRARS, INC. UKAS

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/23/2010**
Date Reported: **4/29/2010**
Client Sample ID: **R#131337042 L#CAA610252**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100205**
PGL Control No.: **65143**

		SPECIMENS														Proj.
		1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min.	Max	Specs.
METHOD	**DESCRIPTION**															**MARV**
ASTM D4716	Transmissivity	*Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*														
		Temperature of Test Water: 20.3 ^{0}C Specimen Size: 12" x 14"														
	Transmissivity (m.^{2}/ sec.)															
	MD **1.03E-02**											**1.03E-02**				**1.6 x 10^{-3}**
	Transmissivity (gal./ min./ ft.)															
	MD **49.87**											**49.87**				
	Flow Rate (gal./ min)															
	MD **1.00**											**1.00**				

Test Set-Up:

Plate _____

Geocomposite ***XXXXXX***

Plate _____

Thickness : ***428*** ***mils (Before)***

Thickness : ***336*** ***mils (After)***

End of Table 1

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

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DC#1984 Record#265

ISO 9001 - 2000

TABLE 2.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/23/2010**
Date Reported: **4/29/2010**
Client Sample ID: **R#131337081 L#CAA610251**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100205**
PGL Control No.: **65144**

		SPECIMENS														Proj.
		1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Specs. MARV
METHOD	**DESCRIPTION**															
GEONET COMPONENT:	**C#65147**															
ASTM D5199	Thickness (mils)															
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
	Loading time: 5sec Specimen Size: 4" x 4"															
		312	314	310	311	310	320	315	314	315	312	313	3	310	320	300
ASTM D1505	Density (grams/ $cm.^3$)															
		0.9554	0.9554	0.9554								0.9554	0.0000	0.9554	0.9554	0.9400
ASTM D1238	Melt Flow Index (grams/ 10 minutes)															
Procedure A	*Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*															
		0.3081	0.3090	0.3060								0.3077	0.0015	0.3060	0.3090	1.0 max
ASTM D1603	Carbon Black Content (percent)															
		2.38	2.36									2.37	0.01	2.36	2.38	
ASTM D5035	Tensile Strength (lbs./in.)															
	Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
	Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
	Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
	MD	98	97	94	94	95						95	2	94	98	75
	TD	30	31	29	29	30	27	32	30			30	1	27	32	
	Apparent Elongation @ Maximum Load															
	MD	28	31	30	30	31						30	1	28	31	
	TD	97	104	94	95	97	94	102	101			98	4	94	104	
GEOCOMPOSITE:																
ASTM D3776	Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
	Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1^0 C (70+/-2^0 F)															
		0.404	0.404	0.406								0.405	0.001	0.404	0.406	

Continued on next page

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TABLE 2.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/23/2010**
Date Reported: **4/29/2010**
Client Sample ID: **R#131337081 L#CAA610251**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100205**
PGL Control No.: **65144**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs* *Temperature of Test Water: 20.2^0 C Specimen Size: 12" x 14"*															
	Transmissivity ($m.^2$/ sec.)															
	MD **1.07E-02**											**1.07E-02**				**1.6 x 10^{-3}**
	Transmissivity (gal./ min./ ft.)															
	MD **51.56**											**51.56**				
	Flow Rate (gal./ min)															
	MD **1.04**											**1.04**				

Test Set-Up:

Plate _____

Geocomposite *XXXXXX*

Plate _____

Thickness : *432* ***mils (Before)***

Thickness : *343* ***mils (After)***

End of Table 2

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

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DC#1984 Record#265

TAB
MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/23/2010**
Date Reported: **4/29/2010**
Client Sample ID: **R#131337120 L#CAA610251**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100205**
PGL Control No.: **65145**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT:	**C#65148**															
ASTM D5199	Thickness (mils)															
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
	Loading time: 5sec Specimen Size: 4" x 4"															
		309	310	312	308	315	316	310	316	318	312	312	3	308	318	300
ASTM D1505	Density (grams/ $cm.^3$)															
		0.9561	0.9561	0.9561								0.9561	0.0000	0.9561	0.9561	0.9400
ASTM D1238	Melt Flow Index (grams/ 10 minutes)															
Procedure A	*Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*															
		0.3111	0.3098	0.3095								0.3101	0.0009	0.3095	0.3111	1.0 max
ASTM D1603	Carbon Black Content (percent)															
		2.40	2.43									2.41	0.02	2.40	2.43	
ASTM D5035	Tensile Strength (lbs./in.)															
	Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
	Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
	Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
	MD	98	98	103	101	104						101	3	98	104	75
	TD	27	30	29	27	27	31	30	31			29	2	27	31	
	Apparent Elongation @ Maximum Load															
	MD	30	30	30	31	32						30	1	30	32	
	TD	99	93	95	97	95	107	104	102			99	5	93	107	
ASTM E1131*	Compositional Analysis by Thermogravimetry (%)															
	POLYMER	CARBON	ASH													
	97.00	2.86	0.14													
	Note: Polymer is composed of polyethylene with no other types of plastics detected.															

Continued on next page

*-Sub out
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DC#1984 Record#265

ISO 9001 - 2000

TABLE
MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee
PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/23/2010**
Date Reported: **4/29/2010**
Client Sample ID: **R#131337120 L#CAA610251**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100205**
PGL Control No.: **65145**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs* *Temperature of Test Water: 20.5°C Specimen Size: 12" x 14"*															
	Transmissivity (m^2/ sec.)															
	MD **3.58E-02**											**3.58E-02**				8×10^{-3}
	Flow Rate (gal/min)															
	MD **3.50**											**3.50**				
	Transmissivity (gal/min/ft)															
	MD **172.91**											**172.91**				
	Test Set-Up: ***Thickness :*** *311* ***mils (Before)***															
	Plate ***Thickness :*** *299* ***mils (After)***															
	Geonet *XXXXXX*															
	Plate															
GEOCOMPOSITE:																
ASTM D3776	Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
	Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1°C (70+/-2°F)															
		0.407	**0.406**	**0.406**								**0.406**	**0.001**	**0.406**	**0.407**	
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs* *Temperature of Test Water: 20.2°C Specimen Size: 12" x 14"*															
	Transmissivity (m^2/ sec.)															
	MD **9.26E-03**											**9.26E-03**				1.6×10^{-3}
	Transmissivity (gal./ min./ ft.)															
	MD **44.72**											**44.72**				
	Flow Rate (gal./ min)															
	MD **0.90**											**0.90**				
	Test Set-Up: ***Thickness :*** *420* ***mils (Before)***															
	Plate ***Thickness :*** *333* ***mils (After)***															
	Geocomposite *XXXXXX*															
	Plate															

End of Table 3

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

*-Sub out
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DC#1984 Record#265

ISO 9001 - 2000

Precision Geosynthetic Laboratories

May 5, 2010

Rajendra Vaidya
Camp Dresser & Mckee
1715 N. Westshore Blvd., Suite 875
Tampa, FL 33607

RE: ***Pasco Lf Construction Ash Cell A-4***

Dear Mr. Vaidya:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the ***final*** laboratory report for the testing of one (1) Double-Sided Geocomposite sample specified on the proceeding sheet which was received on March 29, 2010.

It shall be noted that the samples tested are believed to be true representatives of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material.

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims arising out of the use of this data to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself.

It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. ***Retained conformance samples are disposed of after one (1) month.*** On the other hand, should you need us to keep them at longer time, please advise us in writing.

Should you have any questions or if we may be of further service to you, please do not hesitate to contact us at telephone number: 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Carmelo V. Zantua
Technical/Laboratory Director

Enclosure: (Job No. G100221)

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

Precision Geosynthetic Laboratories

CLIENT: ***Camp Dresser & Mckee***
PROJECT: ***Pasco Lf Construction Ash Cell A-4***

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. G100221)

MATERIAL DESCRIPTION: Double- Sided Geocomposite

SAMPLED BY: PGL @ GSE, SC

DATE RECEIVED: March 29, 2010 **DATE REPORTED:** May 5, 2010

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PGL CONTROL NUMBER
R#131337592 L#CAB610840	
Geocomposite	65214
Geonet	65215

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
Geocomposite	
ASTM D3776	Mass Per Unit Area
ASTM D4716	Transmissivity
Geonet	
ASTM D1505	Density
ASTM D1238	Melt Flow Index
ASTM D1603	Carbon Black Content
ASTM D5199	Thickness
ASTM D5035	Tensile Strength
ASTM D4716	Trasmissivity
ASTM E1131	Compositional Analysis by Thermogravimetry

TEST CONDITIONS: The sample was conditioned for a minimum of one hour in the laboratory at 22 ± 2°C (71.6 ± 3.6°F) and at 60 ± 10% relative humidity prior to test.

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TEST RESULTS:

The test results are summarized in Table 1.

PRECISION GEOSYNTHETIC LABORATORIES

GAI-LAP

Initial: CVZ #:0.13

DATE: 05/05/2010

Carmelo V. Zantua
Technical/Laboratory Director

1160 North Gilbert Street, Anaheim, CA. 92801, Tel# 714-520-9631, Fax#714-520-9637

TABLE 1
MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee
PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/29/2010**
Date Reported: **5/5/2010**
Client Sample ID: **R#131337592 L#CAB610840**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100221**
PGL Control No.: **65214**

		SPECIMENS														
		1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs.
METHOD	**DESCRIPTION**															**MARV**
GEONET COMPONENT:	**C#65215**															
ASTM D5199	Thickness (mils)															
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
	Loading time: 5sec Specimen Size: 4" x 4"															
		311	316	315	314	308	312	312	318	314	316	314	3	308	318	300
ASTM D1505	Density (grams/ $cm.^3$)															
		0.9556	0.9556	0.9556								0.9556	0.0000	0.9556	0.9556	0.9400
ASTM D1238	Melt Flow Index (grams/ 10 minutes)															
Procedure A	*Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*															
		0.3661	0.3659	0.3648								0.3656	0.0007	0.3648	0.3661	1.0 max
ASTM D1603	Carbon Black Content (percent)															
		2.44	2.38									2.41	0.04	2.38	2.44	
ASTM D5035	Tensile Strength (lbs./in.)															
	Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
	Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
	Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
	MD	113	115	111	113	119						114	3	111	119	75
	TD	31	29	29	31	28	27	29	31			29	1	27	31	
	Apparent Elongation @ Maximum Load															
	MD	35	34	37	40	45						38	4	34	45	
	TD	94	94	99	104	94	99	102	100			98	4	94	104	
ASTM E1131*	Compositional Analysis by Thermogravimetry (%)															
		POLYMER		CARBON		ASH										
		97.41		2.50		0.09										
	Note: Polymer is composed of polyethylene with no other types of plastics detected.															

Continued on next page

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TABLE 1
MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee
PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **3/29/2010**
Date Reported: **5/5/2010**
Client Sample ID: **R#131337592 L#CAB610840**
Material Description: **Double-Sided Geocomposite**

QC'd By: **Byeo**
PGL Job No.: **G100221**
PGL Control No.: **65214**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*															
	Temperature of Test Water: 20.2^0 C Specimen Size: 12" x 14"															
	Transmissivity (m.^{2}/ sec.)															
	MD **3.53E-02**											3.53E-02				8 x 10^{-3}
	Flow Rate (gal/min)															
	MD **3.43**											3.43				
	Transmissivity (gal/min/ft)															
	MD **170.70**											170.70				
	Test Set-Up:					***Thickness :*** 308 ***mils (Before)***										
	Plate					***Thickness :*** 236 ***mils (After)***										
	Geonet XXXXXX															
	Plate															
GEOCOMPOSITE:																
ASTM D3776	Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
	Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1^0 C (70+/-2^0 F)															
	0.427	**0.423**	**0.439**									0.430	0.008	0.423	0.439	
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*															
	Temperature of Test Water: 20.5^0 C Specimen Size: 12" x 14"															
	Transmissivity (m.^{2}/ sec.)															
	MD **9.68E-03**											9.68E-03				1.6 x 10^{-3}
	Transmissivity (gal./ min./ ft.)															
	MD **46.76**											46.76				
	Flow Rate (gal./ min)															
	MD **0.95**											0.95				
	Test Set-Up:					***Thickness :*** 427 ***mils (Before)***										
	Plate					***Thickness :*** 336 ***mils (After)***										
	Geocomposite XXXXXX															
	Plate															

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

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GAI-LAP

Initial: CVZ #:0.13

DATE: 08/10/2010

Rajendra Vaidya
Camp Dresser & McKee
1715 N. Westshore Blvd., Suite 875
Tampa, FL 33607

Dear Mr. Vaidya:

Thank you for consulting Precision Geosynthetic Laboratories (PGL) for your material testing needs.

Enclosed is the ***final*** laboratory report for the conformance testing of one (1) 300mil Double-Sided Geocomposite sample.

PROJECT NAME: G100950

REFERENCE PGL JOB NO.: Pasco Landfill Construction Ash Cell 4-A

DATE RECEIVED: *August 2, 2010* **DATE REPORTED:** *August 10, 2010*

SAMPLES SENT BY: GSE, SC

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PGL CONTROL NUMBER
R#131347460 L#CB10061602	
Geocomposite	68916
Geonet	68917

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
Geonet Component	
ASTM D1505	Density
ASTM D1238	Melt Flow Index
ASTM D1603	Carbon Black Content
ASTM D5199	Thickness
ASTM D5035	Tensile Strength
ASTM D4716	Transmissivity
ASTM E1131	Compositional Analysis by Thermogravimetry
Geocomposite	
ASTM D3776	Mass Per Unit Area
ASTM D4716	Transmissivity

TEST CONDITIONS: The sample was conditioned for a minimum of one hour in the laboratory at 22 ± 2°C (71.6 ± 3.6°F) and at 60 ± 10% relative humidity prior to test.

TEST RESULTS: *The test results are summarized in Table 1.*

PRECISION GEOSYNTHETIC LABORATORIES

Carmelo V. Zantua
Technical/Laboratory Director

It shall be noted that the sample tested is believed to be true representative of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material. The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself. It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. ***Retained conformance samples are disposed of after one (1) month.*** On the other hand, should you need us to keep them at longer time, please advise us in writing.

TABL[redacted]
MATERIAL[redacted]PERTIES

CLIENT: Camp Dresser & Mckee
PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **8/2/2010**
Date Reported: **8/10/2010**
Client Sample ID: **R#131347460 L#CB10061602**
Material Description: **Double-Sided Geocomposite**

QC'd By: [redacted]
PGL Job No.: **G100950**
PGL Control No.: **68916**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
GEONET COMPONENT:	**C#68917**															
ASTM D5199	Thickness (mils)															
	Apparatus: Dead weight dial micrometer with 56.4mm (2.22in) dia presser foot and 509gm dead weight (equivalent pressure= 2kPA or 0.29psi).															
	Loading time: 5sec Specimen Size: 4" x 4"															
		320	316	321	310	310	312	310	315	317	318	315	4	310	321	300
ASTM D1505	Density (grams/ cm.^{3})															
		0.9549	0.9549	0.9549								0.9549	0.0000	0.9549	0.9549	0.9400
ASTM D1238	Melt Flow Index (grams/ 10 minutes)															
Procedure A	*Condition FR-190/2.16.Thin 0.1-0.25" specimen strips were charged to the cylinder at a test temperature of 190^0 C and 2.16kg load.*															
		0.3095	0.3101	0.3100								0.3099	0.0003	0.3095	0.3101	1.0 max
ASTM D1603	Carbon Black Content (percent)															
		2.51	2.50									2.50	0.01	2.50	2.51	
ASTM D5035	Tensile Strength (lbs./in.)															
	Specimens were tested as directed in Test Method D5035 using specimen Type 2C and Cut Strip Test Method.															
	Testing Machine Used: Instron Tensile Testing Machine With Constant Rate of Extension Max load: 400lbs / 1500lbs															
	Jaw faces: 1 1/2" x 2" Serrated / 2" x 4" Serrated															
	MD	93	90	93	90	93						92	2	90	93	75
	TD	23	23	24	24	23	24	25	25			24	1	23	25	
	Apparent Elongation @ Maximum Load															
	MD	33	32	33	30	31						32	2	30	33	
	TD	137	140	146	140	142	137	134	138			139	4	134	146	
ASTM E1131*	Compositional Analysis by Thermogravimetry (%)															
	POLYMER	CARBON	ASH													
	97.77	2.23	0.00													
	Note: Polymer is composed of polyethylene with no other types of plastics detected.															

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TAB[illegible]
MATERIAL[illegible]PERTIES

CLIENT: Camp Dresser & Mckee
PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **8/2/2010**
Date Reported: **8/10/2010**
Client Sample ID: **R#131347460 L#CB10061602**
Material Description: **Double-Sided Geocomposite**

QC'd By: [signature]
PGL Job No.: **G100950**
PGL Control No.: **68916**

		SPECIMENS														
		1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
METHOD	**DESCRIPTION**															
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*															
	Temperature of Test Water: 20.5^{0}C Specimen Size: 12" x 14"															
	Transmissivity (m.^{2}/ sec.)															
	MD **3.64E-02**											3.64E-02				8 x 10^{-3}
	Flow Rate (gal/min)															
	MD **3.56**											3.56				
	Transmissivity (gal/min/ft)															
	MD **175.73**											175.73				
	Test Set-Up:						***Thickness :*** 311 ***mils (Before)***									
	Plate						***Thickness :*** 298 ***mils (After)***									
	Geonet XXXXXX															
	Plate															
GEOCOMPOSITE:																
ASTM D3776	Mass per Unit Area (lbs/ ft^2) *Specimen Size: 4" x 8"*															
	Test was conducted as directed in OPTION C. All weighing tests were made in the standard atmosphere of 20+/1^{0}C (70+/-2^{0}F)															
	0.394	**0.396**	**0.399**									0.396	0.003	0.394	0.399	
ASTM D4716	Transmissivity *Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*															
	Temperature of Test Water: 20.5^{0}C Specimen Size: 12" x 14"															
	Transmissivity (m.^{2}/ sec.)															
	MD **9.71E-03**											9.71E-03				1.6 x 10^{-3}
	Transmissivity (gal./ min./ ft.)															
	MD **46.89**											46.89				
	Flow Rate (gal./ min)															
	MD **0.95**											0.95				
	Test Set-Up:						***Thickness :*** 420 ***mils (Before)***									
	Plate						***Thickness :*** 336 ***mils (After)***									
	Geocomposite XXXXXX															
	Plate															

End of Table 1

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

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Attachment 12

Geocomposite In-situ Transmissivity Test Results for Appendix A (Precision Report)

Precision Geosynthetic Laboratories International

Initial: CVZ #:0.13
DATE: 02/21/2011

Aamod Sonawane
Camp Dresser & McKee
1715 N. Westshore Blvd., Suite 875
Tampa, FL 33607

Dear Mr. Sonawane:

Thank you for consulting Precision Geosynthetic Laboratories (PGLI) for your material testing needs.

Enclosed is the ***final*** laboratory report for the conformance testing of one (1) Double-Sided Geocomposite sample.

PROJECT NAME: G110101

REFERENCE PGL JOB NO.: Pasco Landfill Construction Ash Cell 4-A

DATE RECEIVED: August 2, 2010 **DATE REPORTED:** February 21, 2011

SAMPLES SENT BY: GSE, SC

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PGL CONTROL NUMBER
R#131347460 L#CB10061602	68916

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D4716	Transmissivity

TEST CONDITIONS: The sample was conditioned for a minimum of one hour in the laboratory at 22 ± 2°C (71.6 ± 3.6°F) and at 60 ± 10% relative humidity prior to test.

TEST RESULTS: The test results are summarized in Table 1.

PRECISION GEOSYNTHETIC LABORATORIES INTERNATIONAL

Maria Espitia
Quality Assurance

Carmelo V. Zantua
Technical/Laboratory Director

It shall be noted that the sample tested is believed to be true representative of the material produced under the designation herein stated. In addition, the attached laboratory tests results are considered indicative only of the quality of samples/specimens that were actually tested. The appropriate test methods hereby employed are based on the current and accepted industry practices. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the intended final use and purpose of the material. The test data and all associated project information shall be held confidential and not to be reproduced and/or disclosed to other parties except in full and with prior written approval from pertinent entity duly authorized by the respective client or from the client itself. It is a policy of the company to keep physical records of each job for two (2) years commencing from the date of receipt of the samples and keep its corresponding electronic file for seven (7) years. ***Retained conformance samples are disposed of after one (1) month.*** On the other hand, *should you need us to keep them at longer time, please advise us in writing.*

TABLE 1.

MATERIAL PROPERTIES

CLIENT: Camp Dresser & Mckee

PROJECT: Pasco Lf Construction Ash Cell A-4

Date Received: **8/2/2010**
Date Reported: **2/21/2011**
Client Sample ID: **R#131347460 L#CB10061602**
Material Description: **Double-Sided Geocomposite**

QC'd By: Maria Espitia
PGL Job No.: **G110101**
PGL Control No.: **68916**

METHOD	DESCRIPTION	SPECIMENS 1	2	3	4	5	6	7	8	9	10	Avg.	Std. Dev.	Min	Max	Proj. Specs. MARV
ASTM D4716	Transmissivity	*Tested at Normal Pressure : 10,000 psf, Gradient: 0.02 , Seating Time: 100 hrs*														
		Temperature of Test Water: 20.5° C Specimen Size: 12" x 14"														
	Transmissivity (m.²/ sec.)															
	MD **8.93E-03**											**8.93E-03**				**1.6 x 10⁻³**
	Transmissivity (gal./ min./ ft.)															
	MD **43.11**											**43.11**				
	Flow Rate (gal./ min)															
	MD **0.87**											**0.87**				

Test Set-Up:

Plate _____

Sand C#65188 ++++++++

Geocomposite XXXXXX

Geomembrane C#64949 ---------

Plate _____

Thickness : 420 ***mils (Before)***

Thickness : 340 ***mils (After)***

By accepting the data and results presented on this report, the Client agrees to limit the liability of Precision Geosynthetic Laboratories from Client and all other parties for claims on issues, due to the use of this data, to the cost for the respective tests presented in this report; and the Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liabilities in excess of the aforementioned limit.

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Attachment 13

Revised Pages for Appendix E (Section C – Primary Destructive Sample Report)

Destruct Number	Location Information		Weld Date	Operator Name	Machine Number	Mach. Speed	Mach. Temp	Preheat Temp		Coupon 1 A	Coupon 1 B	Coupon 2 A	Coupon 2 B	Coupon 3 A	Coupon 3 B	Coupon 4 A	Coupon 4 B	Coupon 5 A	Coupon 5 B	Test Results
42	Nor: 1,468,261.80 Eas 319,024.20 Ele: 46.71	Seam No. 97/98	05/10/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	135	148	138	144	139	134	131	140	137	129	Pass
									Shear	158		145		142		155		149		
43	Nor: 1,468,118.40 Eas 319,015.44 Ele: 46.29	Seam No. 97/99	05/11/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	133	131	115	115	125	121	123	108	119	120	Pass
									Shear	158		147		160		156		150		
44	Nor: 1,467,917.40 Eas 318,994.78 Ele: 47.03	Seam No. 99/103	05/10/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	120	133	102	114	106	124	126	122	118	124	Pass
									Shear	161		147		159		156		149		
45	Nor: 1,467,868.20 Eas 318,973.56 Ele: 46.22	Seam No. 103/105	05/10/2010	SARBELIO	WE-A068	16	800	0	Peel	143	128	116	121	132	109	118	140	140	131	Pass
									Shear	162		149		165		165		156		
46	Nor: 1,468,291.50 Eas 318,959.16 Ele: 45.94	Seam No. 105/104	05/10/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	144	140	125	140	137	137	150	134	122	128	Pass
									Shear	171		151		162		165		155		
47	Nor: 1,467,967.90 Eas 318,950.40 Ele: 45.80	Seam No. 105/107	05/10/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	132	130	103	117	121	115	127	128	133	115	Pass
									Shear	172		159		165		163		159		
48	Nor: 1,468,021.60 Eas 318,928.06 Ele: 45.56	Seam No. 107/111	05/10/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	115	128	111	116	115	106	125	119	106	111	Pass
									Shear	164		148		155		154		155		
49	Nor: 1,468,250.40 Eas 318,916.94 Ele: 46.53	Seam No. 110/111	05/10/2010	SARBELIO	WE-A068	16	800	0	Peel	142	150	133	126	136	127	135	125	139	121	Pass
									Shear	153		144		153		147		143		
50	Nor: 1,468,318.20 Eas 318,905.00 Ele: 45.15	Seam No. 110/113	05/10/2010	SARBELIO	WE-A068	16	800	0	Peel	135	112	118	122	120	123	119	112	125	110	Pass
									Shear	158		138		147		151		147		
51	Nor: 1,468,219.00 Eas 318,883.90 Ele: 45.79	Seam No. 112/116	05/10/2010	SARBELIO	WE-A068	16	800	0	Peel	119	121	131	098	122	113	112	113	120	118	Pass
									Shear	151		127		151		149		144		
52	Nor: 1,468,271.00 Eas 318,869.12 Ele: 45.87	Seam No. 114/115	05/10/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	127	135	111	115	112	121	129	139	113	131	Pass
									Shear	148		130		155		150		144		
53	Nor: 1,468,117.90 Eas 318,862.12 Ele: 45.77	Seam No. 116/117	05/10/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	124	121	096	097	101	111	119	102	115	122	Pass
									Shear	144		142		150		146		141		
54	Nor: 1,468,019.20 Eas 318,840.62 Ele: 45.07	Seam No. 117/120	05/10/2010	SARBELIO	WE-A068	16	800	0	Peel	125	133	100	129	105	108	124	121	108	105	Pass
									Shear	148		141		144		137		145		
55	Nor: 1,468,264.50 Eas 318,828.22 Ele: 46.04	Seam No. 119/120	05/10/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	113	128	106	090	114	098	089	103	136	118	Fail
									Shear	144		139		131		137		137		
55B	Nor: 1,468,243.10 Eas 318,817.90 Ele: 45.12	Seam No. 120/122	05/10/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	129	116	114	135	131	124	131	146	119	139	Pass
									Shear	139		151		148		140		142		
55A	Nor: 1,468,274.10 Eas 318,817.72 Ele: 45.90	Seam No. 119/122	05/10/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	132	132	108	127	119	122	132	122	128	153	Pass
									Shear	157		147		143		148		137		

Destruct Number	Location Information		Weld Date	Operator Name	Machine Number	Mach. Speed	Mach. Temp	Preheat Temp		Coupon 1 A	Coupon 1 B	Coupon 2 A	Coupon 2 B	Coupon 3 A	Coupon 3 B	Coupon 4 A	Coupon 4 B	Coupon 5 A	Coupon 5 B	Test Results
	Nor: Eas Ele:																			
	Nor: Eas Ele:																			
	Nor: Eas Ele:																			
	Nor: Eas Ele:																			
56	Nor: 1,468,169.00 Eas 318,818.40 Ele: 44.61	Seam No. 120/122	05/10/2010	DANIEL LOPEZ	WE-A091	15	800	00	Peel Shear	121 159	119	124 143	126	113 140	110	131 155	125	119 142	120	Pass
57	Nor: 1,467,821.20 Eas 318,799.40 Ele: 44.74	Seam No. 122/124	05/10/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel Shear	113 160	123	116 139	100	107 145	112	122 147	113	145 141	109	Pass
58	Nor: 1,468,265.60 Eas 318,786.56 Ele: 45.86	Seam No. 124/125	05/10/2010	SARBELIO	WE-A068	16	800	0	Peel Shear	138 154	121	125 134	099	119 138	138	147 146	143	129 142	116	Pass
59	Nor: 1,468,220.90 Eas 318,774.50 Ele: 45.51	Seam No. 124/126	05/18/2010	SARBELIO	WE-A068	16	800	0	Peel Shear	116 151	125	101 128	125	106 147	109	108 146	115	096 145	113	Pass
60	Nor: 1,468,368.10 Eas 318,773.28 Ele: 45.16	Seam No. 125/132	05/18/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel Shear	124 157	133	111 135	117	114 148	119	108 147	119	102 144	122	Pass
61	Nor: 1,468,320.90 Eas 318,751.62 Ele: 44.73	Seam No. 132/133	05/18/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel Shear	121 156	121	098 142	106	104 143	120	115 149	113	101 147	120	Pass
62	Nor: 1,468,170.80 Eas 318,730.90 Ele: 44.32	Seam No. 127/128	05/18/2010	SARBELIO	WE-A068	16	800	0	Peel Shear	155 150	126	113 145	122	101 151	122	106 158	126	121 143	109	Pass
63	Nor: 1,468,319.50 Eas 318,729.94 Ele: 44.55	Seam No. 133/135	05/18/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel Shear	121 152	130	109 147	113	112 151	121	116 153	134	123 144	115	Pass
64	Nor: 1,468,369.60 Eas 318,707.94 Ele: 44.88	Seam No. 135/136	05/18/2010	SARBELIO	WE-A068	16	800	0	Peel Shear	114 147	103	103 133	122	113 139	098	123 141	128	099 131	126	Pass
65	Nor: 1,467,971.90 Eas 318,710.28 Ele: 44.83	Seam No. 128/129	05/18/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel Shear	137 159	124	125 148	120	122 158	107	140 159	118	120 148	120	Pass
66	Nor: 1,468,022.20 Eas 318,688.00 Ele: 44.58	Seam No. 129/131	05/18/2010	SARBELIO	WE-A068	16	800	0	Peel Shear	142 160	146	131 137	114	133 162	118	136 156	122	119 143	127	Pass
67	Nor: 1,468,323.00 Eas 318,664.75 Ele: 44.27	Seam No. 137/138	05/18/2010	SARBELIO	WE-A068	16	800	0	Peel Shear	129 155	137	123 146	114	126 148	127	130 156	122	111 149	134	Pass

Destruct Number	Location Information		Weld Date	Operator Name	Machine Number	Mach. Speed	Mach. Temp	Preheat Temp		Coupon 1 A	Coupon 1 B	Coupon 2 A	Coupon 2 B	Coupon 3 A	Coupon 3 B	Coupon 4 A	Coupon 4 B	Coupon 5 A	Coupon 5 B	Test Results
68	Nor: 1,468,371.80 Eas 318,642.47 Ele: 44.70	Seam No. 138/142	05/18/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	151	123	115	133	125	115	127	117	147	134	Pass
									Shear	160		146		157		159		145		
69	Nor: 1,468,173.20 Eas 318,643.66 Ele: 43.86	Seam No. 139/141	05/18/2010	SARBELIO	WE-A068	16	800	0	Peel	132	137	127	112	121	120	130	133	125	144	Pass
									Shear	155		147		156		155		148		
70	Nor: 1,468,073.10 Eas 318,621.84 Ele: 45.41	Seam No. 141/143	05/20/2010	SARBELIO	WE-A068	15	800	0	Peel	130	124	119	131	121	111	130	124	118	124	Pass
									Shear	163		148		163		161		158		
71	Nor: 1,468,028.20 Eas 318,600.56 Ele: 44.37	Seam No. 143/144	05/20/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	142	131	115	126	121	120	138	125	116	137	Pass
									Shear	170		154		158		168		156		
72	Nor: 1,467,977.60 Eas 318,579.22 Ele: 44.18	Seam No. 144/148	05/20/2010	SARBELIO	WE-A068	15	800	0	Peel	135	146	111	128	116	125	123	129	122	141	Pass
									Shear	162		164		157		161		153		
73	Nor: 1,467,878.50 Eas 318,558.72 Ele: 44.41	Seam No. 148/149	05/20/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	130	134	114	104	130	124	134	145	148	115	Pass
									Shear	168		155		158		163		154		
74	Nor: 1,467,823.00 Eas 318,537.84 Ele: 43.68	Seam No. 149/150	05/20/2010	SARBELIO	WE-A068	15	800	0	Peel	141	140	125	122	127	135	146	134	158	134	Pass
									Shear	160		151		158		160		151		
75	Nor: 1,467,971.00 Eas 318,513.66 Ele: 44.10	Seam No. 150/151	05/20/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	122	151	117	127	112	124	122	139	117	127	Pass
									Shear	160		154		155		156		153		
76	Nor: 1,467,921.90 Eas 318,492.53 Ele: 44.73	Seam No. 151/152	05/20/2010	SARBELIO	WE-A068	15	800	0	Peel	137	119	109	133	134	112	120	116	130	126	Pass
									Shear	160		154		144		155		167		
77	Nor: 1,467,872.90 Eas 318,471.66 Ele: 44.08	Seam No. 152/153	05/20/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	138	133	124	106	126	130	135	137	142	130	Pass
									Shear	163		153		154		149		155		
78	Nor: 1,467,821.40 Eas 318,438.60 Ele: 43.50	Seam No. 155/157	05/20/2010	SARBELIO	WE-A068	15	800	0	Peel	141	129	123	108	126	121	139	121	119	139	Pass
									Shear	161		149		153		154		156		
79	Nor: 1,468,020.20 Eas 318,455.44 Ele: 43.00	Seam No. 153/159	05/20/2010	SARBELIO	WE-A068	15	800	0	Peel	145	136	133	123	147	113	122	135	142	144	Pass
									Shear	164		156		149		160		158		
80	Nor: 1,467,799.80 Eas 318,389.72 Ele: 43.58	Seam No. 171/159	06/11/2010	SARBELIO	WE-A068	13	820	0	Peel	100	120	106	121	103	119	111	122	117	126	Pass
									Shear	170		173		168		163		160		
81	Nor: 1,467,949.80 Eas 318,419.34 Ele: 42.58	Seam No. 164/159	06/11/2010	DANIEL LOPEZ	WE-A096	12	800	0	Peel	100	106	104	110	108	105	110	113	113	106	Pass
									Shear	168		171		169		175		170		
82	Nor: 1,468,123.90 Eas 318,578.12 Ele: 44.55	Seam No. 144/148	07/14/2010	JOSE PALESTIANO	WE-A076	15	800	0	Peel	122	129	127	131	119	122	125	127	129	119	Pass
									Shear	187		191		185		179		182		
83	Nor: 1,468,124.60 Eas 318,556.06 Ele: 44.49	Seam No. 148/149	07/14/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	140	119	137	125	131	122	128	129	135	127	Pass
									Shear	189		179		185		180		183		

Attachment 14

Revised Pages for Appendix E (Section D Primary Seam Installation and Section F Primary As-Built)

COMANCO

Comanco Enviro[illegible]ntal Corporation
Repair Report

Reported By: ____ **Superintendent:** ____ **Job # :** 03083171

Project Name: Pasco County **Primary** **Cell** [x] **Pad** [ ]

Material Type: 60 MIL TEXTURED **Pond** [ ] **Other** ____

Job Description: cell A4

Damage Codes							
CR --Crease	BO --Burn Out	PB --Pipe Boot	CF --Custom Fit	SF Patch Material	Test Type	Abbrv.	Repair Types
DS --Destruct Sample	FS --Failed Seam	MatD --Material Defect	LL --Lost Lap		Vacuum	*S=South	C--Cap Strip
SI --Subgrade Irregularity	WR --Wrinkle	WS --Welder Restart	MD --Mechanical Damage		Air Pressure	*N=North	P--Patch
SJ --Seam Joint	AV --Airvent	RW --Roller Wrinkle	DO --Damage By Others	LF Welded	Spark	*W=West	B--Extrusion Bead
	AO --Add On	FM --Fishmouth	AT --Air test		Air Lance	*E=East	

Repair Number	Damage Code	Seam Number	Panel Number	Location	Repair Type	Patch (Feet)	Bead (Inches)	Date Welded	Operator Name	Machine Number	Test Type	Test Results	Date Complete
41	SJ	15-16	35		P	2 x 2		4.28.10	GRINO MORTINEZ	G-A061	VACUUM	PASS	4.29.10
42	SJ	16-17	35		P	2 x 2		1	1	1	1	1	1
43	DS-5	16-17			P	2 x 6		4.29.10	JOSE PALESTIANO	G-A080			4.30.10
44	SJ	17-19	35		P	2 x 2							4.29.10
45	SJ	17-18	19		P	2 x 2							1
46	SJ	18-19	20		P	2 x 2							4.30.10
47	SJ	19-20	35		P	2 x 2							
48	SJ	35-38	37		P	4 x 4							
49	SJ	20-21	35		P	2 x 2							
50	SJ	21-22	35		P	2 x 2							
51	SJ	22-23	35		P	2 x 2							
52	SJ	23-24	35		P	2 x 2							
53	SJ	24-25	35		P	2 x 2							
54	SJ	25-26	35		P	2 x 2							
55	SJ	26-27	35		P	2 x 2							
56	SJ	27-28	35		P	2 x 2							
57	SJ	28-29	35		P	2 x 2							
58	SJ	29-30	35		P	2 x 2							
59	SJ	30-31	35		P	2 x 2							
60	SJ	31-33	35		P	2 x 2							

COMANCO

Comanco Enviro[illegible]ntal Corporation
Repair Report

Page 13 of _____

Reported By: _____ **Superintendent:** _____ **Job # :** 03083171

Project Name: Pasco County **Primary** Cell [x] Pad [ ]

Material Type: 60 MIL TEXTURED Pond [ ] Other _____

Job Description: cell A4

Damage Codes					SF Patch Material	Test Type	Abbrv.	Repair Types
CR --Crease	FS --Failed Seam	MatD --Material Defect	LL --Lost Lap			Vacuum	*S=South	C--Cap Strip
DS --Destruct Sample	WR --Wrinkle	WS --Welder Restart	MD --Mechanical Damage			Air Pressure	*N=North	P--Patch
SI --Subgrade Irregularity	AV --Airvent	RW --Roller Wrinkle	DO --Damage By Others		LF Welded	Spark	*W=West	B--Extrusion Bead
SJ --Seam Joint	AO --Add On	FM --Fishmouth	AT --Air test			Air Lance	*E=East	

Repair Number	Damage Code	Seam Number	Panel Number	Location	Repair Type	Patch (Feet)	Bead (Inches)	Date Welded	Operator Name	Machine Number	Test Type	Test Results	Date Complete
241	SJ	113 115	114		P	2 x 4		5.11.10	CIRINO MARTINEZ	GA 9001	VAC	PASS	5.19.10
242	SJ	112 113	115		P	2 x 5							
243	SJ	115 116	112		P	3 x 4							
244	SJ	116 117	118		P	2 x 7							
245	AO		118		P	2 x 2							
246	SJ	115 116	118		P	2 x 5							
247	SJ	114 115	113		P	2 x 2		"					
248	SJ	118 119	120	122	C	3 x 22		5-17-10					5.17.10
249	BO	120 121			P	3 x 2		5.11.10					5.19.10
250	SJ	117 118	120		P	3 x 5		5.11.					
251	BO	117 122			P	2 x 5							5.20
252	BO	117 120			P	2 x 2							5.19.10
253	SJ	120 121	122		P	2 x 2							
254	BO	120 121			P	2 x 7							
255	SJ	121 122	124		P	2 x 2							
256	BO	121 124			P	2 x 4							
257	BO	121 124			P	2 x 2							
258	BO	124 124			P	2 x 3							
259	SJ	122 124	125		P	2 x 2							
260	SJ	122 123	125		P	3 x 4							

Rev 2-10-05

COMANCO

Comanco Enviro[illegible]ntal Corporation
Repair Report

Reported By: _____ **Superintendent:** _____ **Job # :** 03083171

Project Name: Pasco County

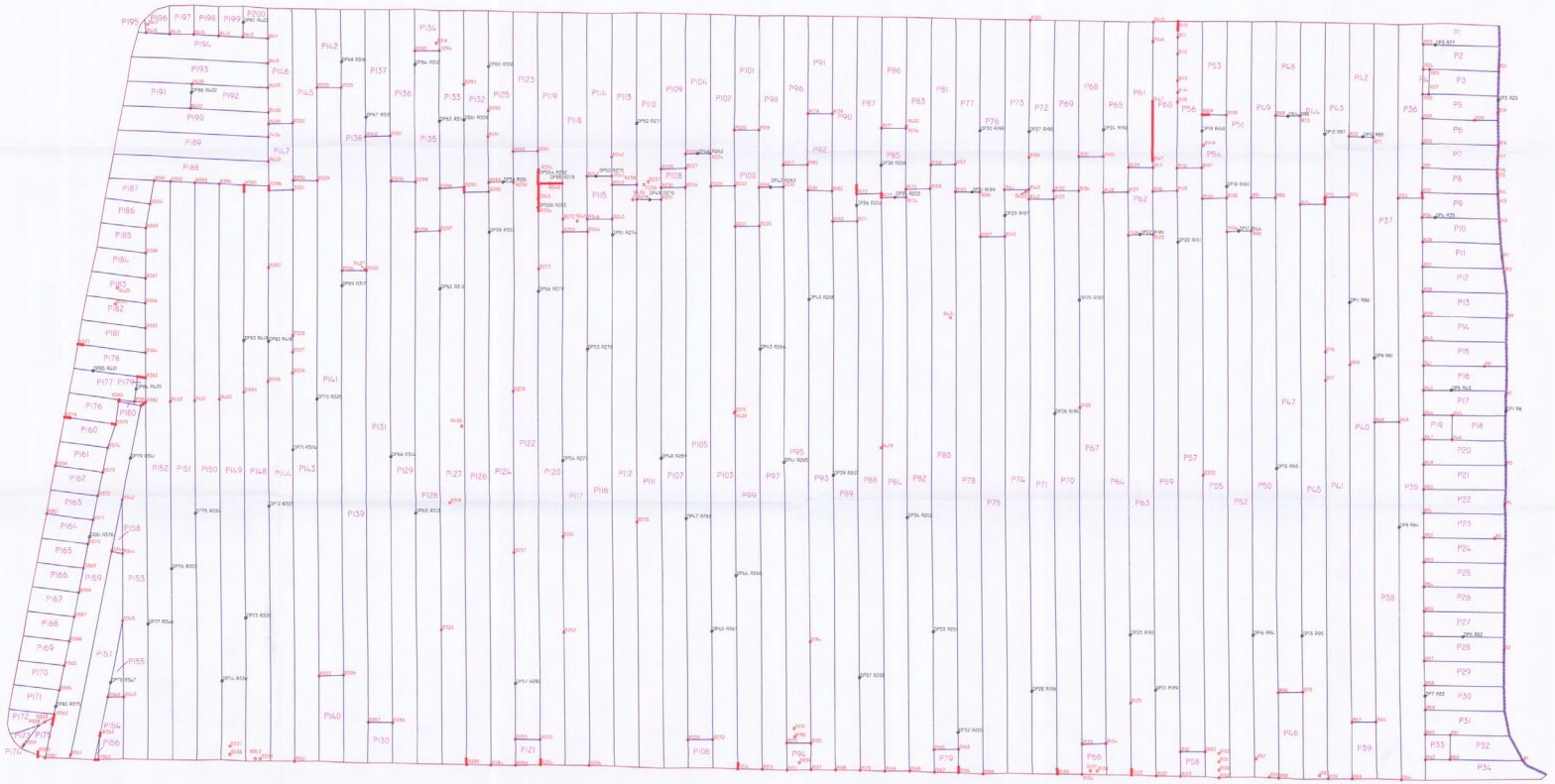
Material Type: 60 MIL TEXTURED

Primary Cell [x] Pad [ ] Pond [ ] Other _____

Job Description: cell A4

Damage Codes					SF Patch Material	Test Type	Abbrv.	Repair Types
CR --Crease	BO --Burn Out	PB --Pipe Boot	CF --Custom Fit			Vacuum	*S=South	C--Cap Strip
DS --Destruct Sample	FS --Failed Seam	MatD --Material Defect	LL --Lost Lap			Air Pressure	*N=North	P--Patch
SI --Subgrade Irregularity	WR --Wrinkle	WS --Welder Restart	MD --Mechanical Damage		LF Welded	Spark	*W=West	B--Extrusion Bead
SJ --Seam Joint	AV --Airvent	RW --Roller Wrinkle	DO --Damage By Others			Air Lance	*E=East	
	AO --Add On	FM --Fishmouth	AT --Air test					

Repair Number	Damage Code	Seam Number	Panel Number	Location	Repair Type	Patch (Feet)			Bead (Inches)	Date Welded	Operator Name	Machine Number	Test Type	Test Results	Date Complete
421	DS-85				P	2	x	6		7-15-10	CIRINO MTZ	ET-4061	Vacuum	Pass	7-15-10
422	DS-86	191 192			P	2	x	6		"	"	"	"	"	7-19-10
423	DS-87	197-200			P	2	x	6		"	"	"	"	"	"
424	PB		182		P		x				DUCT LOCATION				
425	PB		183		P	6	x	6		7-22-10	CIRINO MTZ	ET-4061	Vacuum	Pass	7-22-10
426	NO		127		P	2	x	3		7-21-10	"	"	"	"	7-21-10
427	LK	138		R-303	P	2	x	2		9-14-10	CIRINO MARTINEZ	ET-A061	"	"	9-14-10
428	LK	103		R-215	B		x		6	9-15-10	"	"	"	"	9-15-10
429	LK	88			P	1	x	1		9-16-10	"	"	"	"	9-16-10
430	LK	112			P	1	x	1		"	"	"	"	"	"
431	LK	80			P	1	x	1		"	"	"	"	"	"
432	LK	83		R-176	B		x		6	"	"	"	"	"	"
433	LK	74		R-143	B		x		6	9-17-10	"	"	"	"	9-17-10
							x								
							x								
							x								
							x								
							x								
							x							10	
							x								



LEGEND			
P	PANEL NUMBER	—	CAP
R	REPAIR NUMBER	○	PATCH
DP	PRIMARY DESTRUCTIVE TEST NUMBER	○	DESTRUCTIVE TEST
		⫶⫶⫶	EXTRUSION WELD

ASH CELL A-4
60 MIL TEXTURED
AS BUILT
PRIMARY

WEST PASCO CLASS I LANDFILL
PASCO COUNTY,FLORIDA

COMANCO®
ENVIRONMENTAL CORPORATION
4301 STERLING COMMERCE DR.
PLANT CITY, FL 33566-7372
TELEPHONE: (813) 988-8829
FAX: (813) 496-7305

DRAWN BY:	WDS	CHKD. BY:	SH
DATE:	7-20-10	APPRVD. BY:	DD
PLOT SCALE:	1" = 50'	FILE NAME:	PASCO COUNTY CELL A-4
PROJECT NO.:	03083171	DWG. NO:	1

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
MAR 23 2011
SOUTHWEST DISTRICT
TAMPA

Attachment 15

Revised Pages for Appendix E (Section C Secondary Destructive Test Report)

Destructive Sample Report

Job Number: 03083171
Job Name: West Pasco Ash
Peel Test Extrusion Minimum: 78.00 **PPI**

Cell: cell A4
Superintendent: Arnulfo Martinez
Peel Test Fusion Minimum: 95.00 **PPI**

Layer: Secondary
QC Technician: Carlos Lopez
Shear Test Minimum: 120.00 **PPI**

Destruct Number	Location Information		Weld Date	Operator Name	Machine Number	Mach. Speed	Mach. Temp	Preheat Temp		Coupon 1 A	Coupon 1 B	Coupon 2 A	Coupon 2 B	Coupon 3 A	Coupon 3 B	Coupon 4 A	Coupon 4 B	Coupon 5 A	Coupon 5 B	Test Results
1	Nor: 1,468,280.60 Eas 319,647.25 Ele: 56.41	Seam No. 6/7	04/08/2010	SARBELIO	WE-A052	8	800	0	Peel	143	137	145	133	140	140	145	132	138	141	Pass
									Shear	196		187		191		194		192		
2	Nor: 1,468,192.50 Eas 319,652.40 Ele: 56.97	Seam No. 11/12	04/08/2010	DANIEL LOPEZ	WE-A075	13	800	0	Peel	142	151	139	143	151	146	157	120	140	136	Pass
									Shear	192		196		189		191		194		
3	Nor: 1,468,128.10 Eas 319,620.84 Ele: 48.54	Seam No. 14/15	04/08/2010	RAFAEL ORDONEZ	WE--A047	8	800	0	Peel	137	134	130	132	137	131	132	128	130	131	Pass
									Shear	194		196		188		193		196		
4	Nor: 1,467,931.20 Eas 319,638.88 Ele: 48.70	Seam No. 24/25	04/08/2010	DANIEL LOPEZ	WE-A075	13	800	0	Peel	159	138	140	147	132	132	159	128	138	131	Pass
									Shear	191		197		190		189		195		
5	Nor: 1,467,756.00 Eas 319,640.97 Ele: 48.70	Seam No. 33/34	04/08/2010	DANIEL LOPEZ	WE-A075	12	800	0	Peel	175	136	147	166	129	163	162	171	140	152	Pass
									Shear	192		196		198		193		195		
6	Nor: 1,467,784.60 Eas 319,607.80 Ele: 48.40	Seam No. 35/32	04/09/2010	SARBELIO	WE-A052	8	800	000	Peel	143	134	150	136	147	135	138	143	137	131	Pass
									Shear	185		190		189		194		196		
7	Nor: 1,468,054.40 Eas 319,679.75 Ele: 51.24	Seam No. 19/19	04/08/2010	CIRINO MARTINEZ	ET-A061	0	500	480	Peel	134	000	115	000	149	000	130	000	128	000	Pass
									Shear	181		187		191		193		192		
8	Nor: 1,467,985.20 Eas 319,605.56 Ele: 47.35	Seam No. 22/35	04/08/2010	JOSE PALESTIANO	ET-A040	0	480	500	Peel	161	000	150	000	150	000	154	000	148	000	Pass
									Shear	176		174		170		181		179		
9	Nor: 1,468,109.80 Eas 319,583.72 Ele: 48.63	Seam No. 35/38	04/09/2010	DANIEL LOPEZ	WE-A075	14	800	0	Peel	139	164	126	161	132	141	142	157	125	164	Pass
									Shear	204		202		197		198		201		

Destruct Number	Location Information		Weld Date	Operator Name	Machine Number	Mach. Speed	Mach. Temp	Preheat Temp		Coupon 1 A	Coupon 1 B	Coupon 2 A	Coupon 2 B	Coupon 3 A	Coupon 3 B	Coupon 4 A	Coupon 4 B	Coupon 5 A	Coupon 5 B	Test Results
10	Nor: 1,467,911.40 Eas 319,562.90 Ele: 49.11	Seam No. 37/39	04/12/2010	SARBELIO	WE-A052	8	800	0	Peel	134	125	133	129	135	139	123	122	130	128	Pass
									Shear	207		203		212		199		199		
11	Nor: 1,468,061.00 Eas 319,540.22 Ele: 48.94	Seam No. 39/43	04/12/2010	DANIEL LOPEZ	WE-A075	15	800	0	Peel	136	145	130	168	136	149	132	136	149	134	Pass
									Shear	198		199		201		196		194		
12	Nor: 1,468,259.80 Eas 319,516.70 Ele: 48.59	Seam No. 44/47	04/12/2010	RAFAEL ORDONEZ	WE--A047	8	800	0	Peel	120	142	129	133	158	130	148	133	138	141	Pass
									Shear	196		190		198		194		200		
13	Nor: 1,468,297.60 Eas 319,551.47 Ele: 48.19	Seam No. 40/41	04/12/2010	SARBELIO	WE-A052	8	800	0	Peel	151	157	153	148	161	144	170	160	154	159	Pass
									Shear	190		197		191		194		189		
14	Nor: 1,467,962.80 Eas 319,497.20 Ele: 47.86	Seam No. 46/49	04/12/2010	SARBELIO	WE-A052	8	800	0	Peel	139	130	134	158	144	159	150	142	141	154	Pass
									Shear	206		199		197		201		195		
15	Nor: 1,467,765.90 Eas 319,477.47 Ele: 48.57	Seam No. 49/50	04/12/2010	DANIEL LOPEZ	WE-A075	15	800	0	Peel	146	143	135	146	167	162	158	161	140	152	Pass
									Shear	204		194		196		198		195		
16	Nor: 1,467,853.60 Eas 319,454.47 Ele: 47.78	Seam No. 50/52	04/12/2010	RAFAEL ORDONEZ	WE--A047	8	800	0	Peel	137	131	145	132	133	132	136	129	132	129	Pass
									Shear	191		192		196		198		195		
17	Nor: 1,468,311.80 Eas 319,450.53 Ele: 47.42	Seam No. 51/54	04/12/2010	RAFAEL ORDONEZ	WE--A047	8	800	0	Peel	145	148	136	147	152	146	140	143	147	136	Pass
									Shear	188		185		192		192		177		
18	Nor: 1,468,161.80 Eas 319,430.03 Ele: 47.10	Seam No. 53/52	04/12/2010	SARBELIO	WE-A052	8	800	0	Peel	133	132	130	123	132	129	127	144	130	123	Pass
									Shear	200		180		191		186		184		
19	Nor: 1,467,961.60 Eas 319,409.38 Ele: 46.96	Seam No. 53/57	04/13/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	138	130	135	133	129	127	131	134	130	128	Pass
									Shear	196		200		195		189		197		
20	Nor: 1,467,864.90 Eas 319,388.66 Ele: 47.28	Seam No. 57/58	04/13/2010	RAFAEL ORDONEZ	WE--A047	9	800	0	Peel	149	141	147	154	161	138	134	183	140	137	Pass
									Shear	193		185		192		185		195		
21	Nor: 1,468,310.90 Eas 319,384.56 Ele: 47.08	Seam No. 56/59	04/13/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	143	136	150	124	145	130	132	135	133	130	Pass
									Shear	192		184		199		185		201		
22	Nor: 1,468,111.60 Eas 319,365.12 Ele: 47.78	Seam No. 58/61	04/13/2010	SARBELIO	WE-A075	16	800	0	Peel	128	135	134	149	129	149	132	151	137	152	Pass
									Shear	183		175		181		174		186		
23	Nor: 1,467,963.10 Eas 319,344.44 Ele: 47.34	Seam No. 63/60	04/13/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	138	134	137	131	133	139	125	130	157	137	Pass
									Shear	186		174		186		186		174		
24	Nor: 1,467,864.00 Eas 319,323.50 Ele: 47.43	Seam No. 62/66	04/13/2010	RAFAEL ORDONEZ	WE--A047	9	800	0	Peel	154	135	129	130	143	136	151	136	156	143	Pass
									Shear	187		177		185		180		179		
25	Nor: 1,468,377.60 Eas 319,303.78 Ele: 47.67	Seam No. 64/65	04/13/2010	SARBELIO	WE-A075	16	800	0	Peel	158	139	157	139	145	154	139	149	140	149	Pass
									Shear	180		169		178		170		174		

Destruct Number	Location Information		Weld Date	Operator Name	Machine Number	Mach. Speed	Mach. Temp	Preheat Temp		Coupon 1 A	Coupon 1 B	Coupon 2 A	Coupon 2 B	Coupon 3 A	Coupon 3 B	Coupon 4 A	Coupon 4 B	Coupon 5 A	Coupon 5 B	Test Results
26	Nor: 1,468,258.40 Eas 319,305.97 Ele: 47.83	Seam No. 65/66	04/13/2010	RAFAEL ORDONEZ	WE--A047	9	800	0	Peel	146	159	149	157	159	155	152	142	145	157	Pass
									Shear	175		159		181		169		171		
27	Nor: 1,468,013.00 Eas 319,278.60 Ele: 47.04	Seam No. 67/69	04/13/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	135	142	134	126	143	126	118	126	139	138	Pass
									Shear	179		180		181		175		171		
28	Nor: 1,467,817.20 Eas 319,258.22 Ele: 46.74	Seam No. 70/71	04/14/2010	SARBELIO	WE-A075	15	800	0	Peel	139	131	129	140	140	132	135	124	140	126	Pass
									Shear	181		183		181		177		172		
29	Nor: 1,467,867.10 Eas 319,236.25 Ele: 47.15	Seam No. 71/74	04/14/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	134	129	132	130	138	136	132	142	136	133	Pass
									Shear	182		170		181		173		174		
30	Nor: 1,467,917.20 Eas 319,214.03 Ele: 47.77	Seam No. 74/75	04/14/2010	RAFAEL ORDONEZ	WE--A047	8	850	0	Peel	126	134	121	123	140	124	135	116	123	118	Pass
									Shear	178		173		182		173		174		
31	Nor: 1,468,251.60 Eas 319,220.34 Ele: 47.74	Seam No. 73/74	04/14/2010	SARBELIO	WE-A075	15	800	0	Peel	141	146	130	135	139	154	136	147	146	135	Pass
									Shear	167		160		165		163		160		
32	Nor: 1,468,312.00 Eas 319,188.20 Ele: 46.43	Seam No. 76/79	04/14/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	116	121	118	113	125	133	116	118	103	124	Pass
									Shear	156		162		183		158		152		
33	Nor: 1,468,273.90 Eas 319,166.47 Ele: 47.03	Seam No. 78/80	04/14/2010	RAFAEL ORDONEZ	WE--A047	8	850	0	Peel	126	131	123	124	132	131	127	128	123	122	Pass
									Shear	162		151		156		155		152		
34	Nor: 1,467,819.90 Eas 319,171.30 Ele: 46.20	Seam No. 78/81	04/14/2010	SARBELIO	WE-A075	15	800	0	Peel	130	128	126	129	134	131	133	139	140	138	Pass
									Shear	173		180		185		183		191		
35	Nor: 1,467,819.90 Eas 319,149.38 Ele: 46.16	Seam No. 81/82	04/14/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	137	131	132	138	141	142	138	145	139	149	Pass
									Shear	168		173		179		181		176		
36	Nor: 1,467,792.00 Eas 319,127.66 Ele: 46.60	Seam No. 82/86	04/14/2010	FRANCISCO	WE-A075	12	800	0	Peel	141	128	129	128	126	139	138	132	135	124	Pass
									Shear	175		155		176		166		170		
37	Nor: 1,467,869.80 Eas 319,105.20 Ele: 46.68	Seam No. 85/87	04/15/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	116	132	133	112	114	135	112	131	112	121	Pass
									Shear	164		158		167		166		164		
38	Nor: 1,467,818.90 Eas 319,083.94 Ele: 45.99	Seam No. 87/90	04/15/2010	SARBELIO	WE-A075	15	850	0	Peel	125	135	113	110	126	123	121	125	126	128	Pass
									Shear	164		161		166		161		158		
39	Nor: 1,467,964.50 Eas 319,060.84 Ele: 46.22	Seam No. 90/91	04/15/2010	RAFAEL ORDONEZ	WE--A047	8	850	0	Peel	144	135	137	125	126	121	116	128	128	125	Pass
									Shear	170		161		164		171		162		
40	Nor: 1,468,064.00 Eas 319,038.16 Ele: 46.74	Seam No. 91/95	04/15/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	129	135	126	114	130	123	125	129	131	127	Pass
									Shear	165		164		160		156		160		
41	Nor: 1,468,259.80 Eas 319,046.97 Ele: 46.85	Seam No. 91/92	04/15/2010	RAFAEL ORDONEZ	WE--A047	8	850	0	Peel	149	137	136	144	139	131	139	139	127	140	Pass
									Shear	161		141		151		158		160		

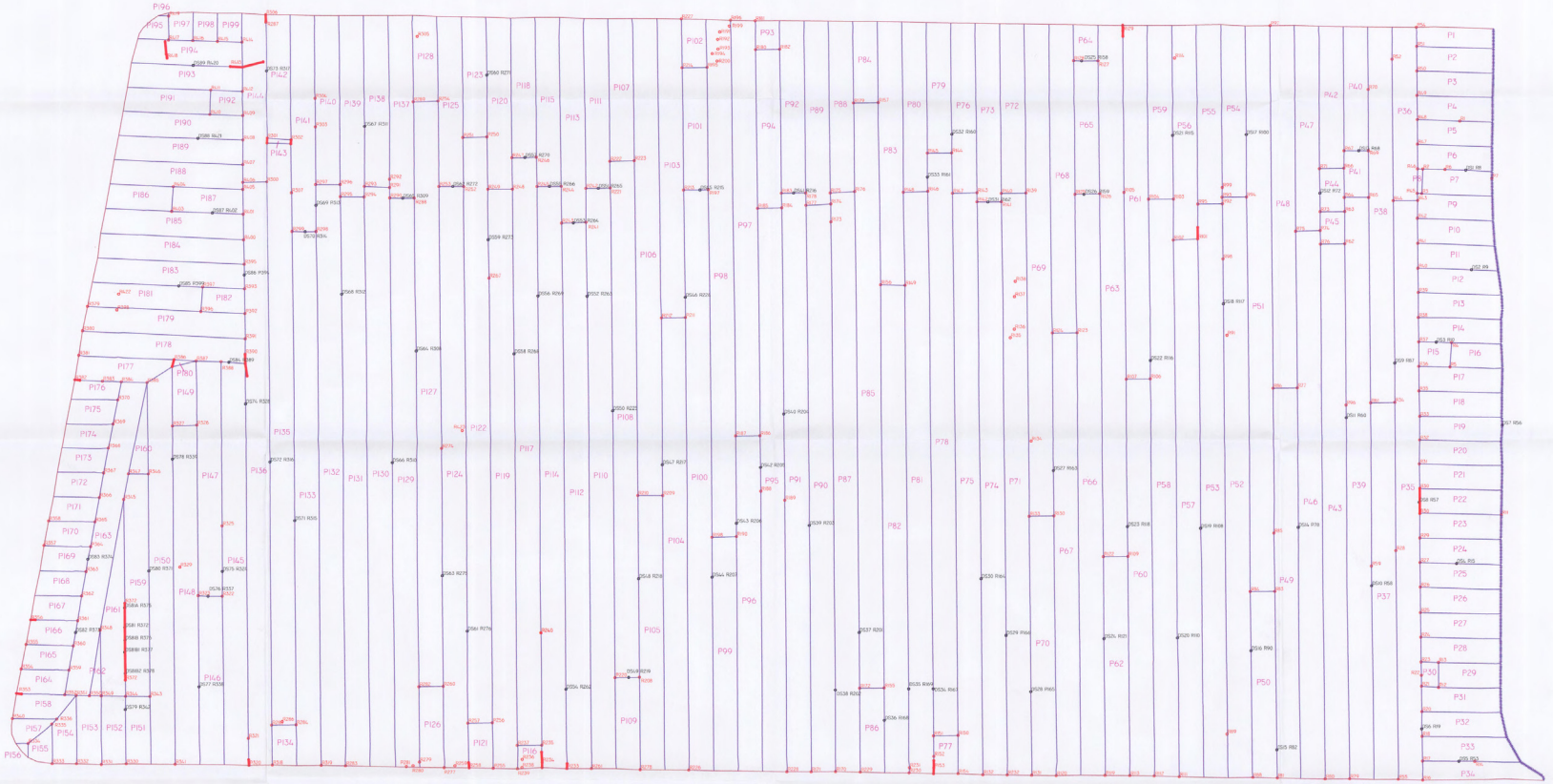
Destruct Number	Location Information	Seam No.	Weld Date	Operator Name	Machine Number	Mach. Speed	Mach. Temp	Preheat Temp		Coupon 1 A	Coupon 1 B	Coupon 2 A	Coupon 2 B	Coupon 3 A	Coupon 3 B	Coupon 4 A	Coupon 4 B	Coupon 5 A	Coupon 5 B	Test Results
42	Nor: 1,468,016.00 Eas 319,016.90 Ele: 45.36	95/96	04/15/2010	SARBELIO	WE-A075	15	800	0	Peel	143	132	121	140	127	131	124	128	138	130	Pass
									Shear	163		168		169		161		161		
43	Nor: 1,467,966.20 Eas 318,995.53 Ele: 45.61	96/98	04/15/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	113	132	131	126	125	127	123	117	122	120	Pass
									Shear	163		163		162		160		162		
44	Nor: 1,467,918.90 Eas 318,973.72 Ele: 46.70	100/99	04/15/2010	SARBELIO	WE-A075	15	800	0	Peel	133	127	112	129	145	147	121	129	143	133	Pass
									Shear	164		150		161		155		173		
45	Nor: 1,468,262.40 Eas 318,963.03 Ele: 46.03	101/100	04/15/2010	RAFAEL ORDONEZ	WE--A047	8	850	0	Peel	156	147	152	132	140	149	145	148	154	136	Pass
									Shear	185		184		195		166		187		
46	Nor: 1,468,167.50 Eas 318,949.97 Ele: 45.00	100/103	04/16/2010	SARBELIO	WE-A075	15	800	0	Peel	132	136	133	120	122	117	117	133	141	121	Pass
									Shear	177		171		175		175		160		
47	Nor: 1,468,018.60 Eas 318,929.47 Ele: 45.34	104/106	04/16/2010	RAFAEL ORDONEZ	WE--A047	8	850	0	Peel	127	126	136	128	137	138	140	132	131	132	Pass
									Shear	188		183		182		184		188		
48	Nor: 1,467,917.60 Eas 318,908.30 Ele: 46.37	105/108	04/16/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	124	138	126	139	136	137	126	125	124	129	Pass
									Shear	183		175		173		171		186		
49	Nor: 1,467,830.20 Eas 318,899.30 Ele: 45.02	108/109	04/16/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	143	138	143	139	155	138	148	136	141	137	Pass
									Shear	182		177		178		187		180		
50	Nor: 1,468,067.10 Eas 318,885.06 Ele: 46.32	108/110	04/16/2010	SARBELIO	WE-A075	15	800	0	Peel	140	159	129	133	160	136	131	122	141	110	Pass
									Shear	184		185		189		187		187		
51	Nor: 1,468,264.00 Eas 318,872.38 Ele: 46.02	110/111	04/16/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	130	119	134	122	143	130	124	124	144	126	Pass
									Shear	161		153		159		154		154		
52	Nor: 1,468,168.60 Eas 318,862.44 Ele: 44.97	110/112	05/04/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	132	124	104	119	143	121	135	117	132	118	Pass
									Shear	151		157		158		163		160		
53	Nor: 1,468,233.50 Eas 318,850.16 Ele: 45.98	112/113	05/04/2010	SARBELIO	WE-A068	16	800	0	Peel	127	143	135	131	127	137	134	135	154	145	Pass
									Shear	171		155		160		158		153		
54	Nor: 1,467,819.80 Eas 318,843.34 Ele: 45.11	112/114	05/04/2010	SARBELIO	WE-A068	16	800	0	Peel	147	140	136	143	130	132	146	129	136	127	Pass
									Shear	159		156		162		162		158		
55	Nor: 1,468,265.80 Eas 318,828.88 Ele: 46.15	115/114	05/04/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	130	122	135	130	140	136	127	127	145	129	Pass
									Shear	146		145		152		155		146		
56	Nor: 1,468,168.90 Eas 318,818.62 Ele: 44.70	114/117	05/04/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	115	110	114	117	136	134	126	118	117	110	Pass
									Shear	159		150		159		159		158		
57	Nor: 1,468,291.50 Eas 318,806.90 Ele: 45.36	118/117	05/04/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	118	136	135	129	130	137	139	128	139	143	Pass
									Shear	156		148		159		158		145		

Destruct Number	Location Information		Weld Date	Operator Name	Machine Number	Mach. Speed	Mach. Temp	Preheat Temp		Coupon 1 A	Coupon 1 B	Coupon 2 A	Coupon 2 B	Coupon 3 A	Coupon 3 B	Coupon 4 A	Coupon 4 B	Coupon 5 A	Coupon 5 B	Test Results
58	Nor: 1,468,117.60 Eas 318,797.20 Ele: 45.43	Seam No. 117/119	05/04/2010	SARBELIO	WE-A068	16	800	0	Peel	136	129	123	120	131	128	125	123	120	133	Pass
									Shear	157		150		152		154		153		
59	Nor: 1,468,218.80 Eas 318,774.20 Ele: 45.46	Seam No. 119/122	05/04/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	125	117	119	130	118	125	137	113	127	138	Pass
									Shear	157		145		155		155		152		
60	Nor: 1,468,365.20 Eas 318,773.00 Ele: 45.07	Seam No. 120/123	05/04/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	121	138	138	113	140	119	147	116	143	111	Pass
									Shear	153		148		160		151		153		
61	Nor: 1,467,871.10 Eas 318,755.30 Ele: 44.99	Seam No. 122/124	05/04/2010	SARBELIO	WE-A068	16	800	0	Peel	101	124	114	118	114	119	119	120	131	125	Pass
									Shear	145		143		146		143		145		
62	Nor: 1,468,265.60 Eas 318,742.44 Ele: 45.64	Seam No. 124/125	05/04/2010	SARBELIO	WE-A068	16	800	0	Peel	133	121	119	130	142	116	135	111	130	128	Pass
									Shear	152		148		153		138		147		
63	Nor: 1,467,920.10 Eas 318,733.06 Ele: 45.75	Seam No. 124/127	05/04/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	111	114	119	127	109	138	117	134	112	132	Pass
									Shear	150		145		152		146		150		
64	Nor: 1,468,120.10 Eas 318,709.72 Ele: 44.97	Seam No. 127/129	05/11/2010	SARBELIO	WE-A068	16	800	0	Peel	124	119	111	104	113	102	115	114	115	117	Pass
									Shear	179		166		178		173		168		
65	Nor: 1,468,255.10 Eas 318,697.84 Ele: 45.59	Seam No. 129/137	05/11/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	162	142	137	124	147	146	149	145	130	155	Pass
									Shear	176		165		177		162		165		
66	Nor: 1,468,020.40 Eas 318,688.56 Ele: 44.42	Seam No. 129/130	05/11/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	129	130	132	118	126	112	120	121	125	115	Pass
									Shear	155		156		163		165		159		
67	Nor: 1,468,319.10 Eas 318,664.25 Ele: 44.13	Seam No. 138/139	05/11/2010	SARBELIO	WE-A068	16	800	0	Peel	137	150	149	137	146	145	150	124	127	127	Pass
									Shear	180		166		187		175		169		
68	Nor: 1,468,170.50 Eas 318,643.40 Ele: 43.65	Seam No. 131/132	05/11/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	121	114	108	105	120	105	119	111	115	105	Pass
									Shear	170		158		159		164		160		
69	Nor: 1,468,249.00 Eas 318,620.53 Ele: 45.24	Seam No. 132/141	05/11/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	151	115	127	099	144	114	107	114	140	112	Pass
									Shear	176		158		158		170		158		
70	Nor: 1,468,225.90 Eas 318,610.75 Ele: 44.72	Seam No. 141/133	05/12/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	155	138	152	141	144	145	138	147	126	143	Pass
									Shear	177		159		173		173		158		
71	Nor: 1,467,968.90 Eas 318,601.28 Ele: 44.34	Seam No. 133/135	05/11/2010	SARBELIO	WE-A068	16	800	0	Peel	129	123	121	134	133	145	122	128	116	123	Pass
									Shear	168		159		166		159		159		
72	Nor: 1,468,021.10 Eas 318,579.10 Ele: 43.87	Seam No. 135/136	05/11/2010	DANIEL LOPEZ	WE-A091	15	800	0	Peel	156	143	133	137	139	142	150	130	137	138	Pass
									Shear	175		164		175		177		166		
73	Nor: 1,468,369.10 Eas 318,576.00 Ele: 44.22	Seam No. 142/144	05/11/2010	SARBELIO	WE-A068	16	800	0	Peel	143	140	097	129	142	138	133	143	126	135	Pass
									Shear	178		173		163		172		160		

Destruct Number	Location Information		Weld Date	Operator Name	Machine Number	Mach. Speed	Mach. Temp	Preheat Temp		Coupon 1 A	Coupon 1 B	Coupon 2 A	Coupon 2 B	Coupon 3 A	Coupon 3 B	Coupon 4 A	Coupon 4 B	Coupon 5 A	Coupon 5 B	Test Results
74	Nor: 1,468,073.60 Eas 318,556.72 Ele: 44.91	Seam No. 145/136	05/12/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	104	126	102	106	101	101	126	105	104	102	Pass
									Shear	149		128		135		136		132		
75	Nor: 1,467,924.10 Eas 318,535.80 Ele: 44.97	Seam No. 147/145	05/12/2010	SARBELIO	WE-A068	16	800	0	Peel	133	131	107	126	099	118	116	120	133	128	Pass
									Shear	154		144		144		148		140		
76	Nor: 1,467,902.20 Eas 318,522.97 Ele: 44.79	Seam No. 146/147	05/12/2010	SARBELIO	WE-A068	16	800	0	Peel	139	136	113	104	126	128	116	131	109	118	Pass
									Shear	141		129		125		140		136		
77	Nor: 1,467,822.10 Eas 318,514.78 Ele: 43.73	Seam No. 146/148	05/12/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	122	137	106	120	106	115	122	127	104	131	Pass
									Shear	150		123		132		145		138		
78	Nor: 1,468,023.60 Eas 318,491.30 Ele: 43.58	Seam No. 150/148	05/12/2010	SARBELIO	WE-A068	16	800	0	Peel	130	133	121	119	121	114	120	119	123	122	Pass
									Shear	153		139		134		143		135		
79	Nor: 1,467,802.00 Eas 318,448.88 Ele: 43.54	Seam No. 151/152	05/12/2010	RAFAEL ORDONEZ	WE-A040	8	850	0	Peel	153	129	114	124	137	121	146	124	139	121	Pass
									Shear	170		155		161		162		160		
80	Nor: 1,467,924.60 Eas 318,470.03 Ele: 44.32	Seam No. 150/159	05/13/2010	SARBELIO	WE-A068	16	800	0	Peel	125	116	131	113	132	125	128	120	117	104	Pass
									Shear	152		142		143		151		146		
81	Nor: 1,467,874.50 Eas 318,448.47 Ele: 43.90	Seam No. 159/161	05/13/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	132	114	095	115	088	113	115	097	102	111	Fail
									Shear	136		133		141		139		143		
81A	Nor: 1,467,892.00 Eas 318,448.38 Ele: 44.00	Seam No. 159/161	05/13/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	135	122	130	113	150	142	129	119	1133	141	Pass
									Shear	144		131		143		148		138		
81B	Nor: 1,467,863.10 Eas 318,448.60 Ele: 43.60	Seam No. 159/161	05/13/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	122	111	099	123	118	092	113	126	098	052	Fail
									Shear	145		138		141		151		142		
81B1	Nor: 1,467,852.60 Eas 318,448.40 Ele: 43.41	Seam No. 159/161	05/13/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	106	134	098	119	104	120	115	076	112	119	Fail
									Shear	148		142		145		135		144		
81B2	Nor: 1,467,833.90 Eas 318,448.90 Ele: 43.23	Seam No. 159/161	05/13/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	128	139	107	121	128	115	122	097	117	115	Pass
									Shear	139		133		144		145		139		
82	Nor: 1,467,870.20 Eas 318,404.38 Ele: 42.91	Seam No. 166/163	05/13/2010	SARBELIO	WE-A068	16	800	0	Peel	120	118	115	120	107	112	124	123	120	133	Pass
									Shear	148		131		139		145		139		
83	Nor: 1,467,935.00 Eas 318,415.50 Ele: 42.72	Seam No. 169/163	05/13/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	116	131	102	126	108	130	127	128	140	124	Pass
									Shear	143		130		128		141		128		
84	Nor: 1,468,110.50 Eas 318,541.80 Ele: 44.42	Seam No. 145/178	07/08/2010	SARBELIO	WE-A076	16	800	0	Peel	127	142	140	156	150	150	142	142	149	129	Pass
									Shear	171		180		175		187		179		
85	Nor: 1,468,178.00 Eas 318,496.97 Ele: 43.03	Seam No. 181/183	07/08/2010	RAFAEL ORDONEZ	WE-A040	10	850	0	Peel	141	146	136	149	141	136	132	129	128	120	Pass
									Shear	196		180		184		189		183		

Destruct Number	Location Information		Weld Date	Operator Name	Machine Number	Mach. Speed	Mach. Temp	Preheat Temp		Coupon 1 A	Coupon 1 B	Coupon 2 A	Coupon 2 B	Coupon 3 A	Coupon 3 B	Coupon 4 A	Coupon 4 B	Coupon 5 A	Coupon 5 B	Test Results
86	Nor: 1,468,187.60 Eas 318,555.66 Ele: 43.55	Seam No. 136/183	07/08/2010	SARBELIO	WE-A075	16	800	0	Peel	100	099	115	113	111	106	117	118	121	101	Pass
									Shear	180		189		179		180		182		
87	Nor: 1,468,242.60 Eas 318,527.16 Ele: 44.66	Seam No. 185/187	07/08/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	125	110	121	116	115	120	121	124	117	119	Pass
									Shear	200		184		187		183		189		
88	Nor: 1,468,308.80 Eas 318,514.22 Ele: 43.49	Seam No. 189/190	07/08/2010	RAFAEL ORDONEZ	WE-A040	10	850	0	Peel	136	145	135	146	149	145	145	140	129	129	Pass
									Shear	186		180		177		175		182		
89	Nor: 1,468,374.10 Eas 318,510.22 Ele: 43.97	Seam No. 193/194	07/08/2010	DANIEL LOPEZ	WE-A096	15	800	0	Peel	108	101	117	115	120	112	133	118	110	121	Pass
									Shear	175		185		179		173		180		

NORTH



LEGEND			
P	PANEL NUMBER	—	CAP
R	REPAIR NUMBER	○	PATCH
DS	SECONDARY DESTRUCTIVE TEST NUMBER	○	DESTRUCTIVE TEST
		++++	EXTRUSION WELD

ASH CELL A-4
60 MIL TEXTURED
AS BUILT
SECONDARY

WEST PASCO CLASS I LANDFILL
PASCO COUNTY,FLORIDA

COMANCO®
ENVIRONMENTAL CORPORATION
4301 STERLING COMMERCE DR.
PLANT CITY, FL 33566-7372
TELEPHONE: (813) 988-8829
FAX: (813) 496-7305

DRAWN BY: WDS	CHKD. BY: SH	DWG. NO:
DATE: 7-20-10	APPRVD. BY: DD	
PLOT SCALE: 1" = 50'	FILE NAME: PASCO COUNTY	

MAR 23 2011

Attachment 16

Replacement Pages for Appendix E (Section E Secondary Liner Repair Report and Section F Secondary As-Built)

COMANCO

Comanco Enviro[illegible]ntal Corporation
Repair Report

Reported By: _____ **Superintendent:** _____ **Job #:** 03083171

Project Name: Pasco County **Secondary** **Cell** [x] **Pad** [ ]

Material Type: 60 MIL TEXTURED **Pond** [ ] **Other** _____

Job Description: cell A4

Damage Codes				
CR --Crease	BO --Burn Out	PB --Pipe Boot	CF --Custom Fit	
DS --Destruct Sample	FS --Falled Seam	MatD --Material Defect	LL --Lost Lap	
SI --Subgrade Irregularity	WR --Wrinkle	WS --Welder Restart	MD --Mechanical Damage	
SJ --Seam Joint	AV --Airvent	RW --Roller Wrinkle	DO --Damage By Others	
	AO --Add On	FM --Fishmouth		

SF Patch Material	Test Type	Abbrv.	Repair Types
	Vacuum	*S=South	C--Cap Strip
	Air Pressure	*N=North	P--Patch
LF Welded	Spark	*W=West	B--Extrusion Bead
	Air Lance	*E=East	

Repair Number	Damage Code	Seam Number	Panel Number	Location	Repair Type	Patch (Feet)			Bead (Inches)	Date Welded	Operator Name	Machine Number	Test Type	Test Results	Date Complete
421	DS-28	189-190			P	2	x	6		7-8-10	CHRIS MATZ	GEMDEV	VACUUM	PASS	7-9-10
422	PB		181		P	.6	x	6		7-22-10	↓	↓	↓	↓	7-22-10
423	MD		124		P	2	x	2		7-21	↓	↓	↓	↓	7-21
							x								
							x								
							x								
							x								
							x								
							x								
							x								
							x								
							x								
							x								
							x								
							x								
							x								
							x								
							x								
							x								
							x								
							x								
							x								

Attachment 17

As-Built Survey

SURVEYOR'S REPORT

MAP OF RECORD SURVEY:

THE MAP AND REPORT ARE NOT FULL AND COMPLETE WITHOUT THE OTHER (SEE SHEET INDEX IN TITLE BLOCK)

LEGAL DESCRIPTION:

NOT APPLICABLE. THIS IS NOT A BOUNDARY SURVEY.

INTENT:

THE INTENT OF THIS RECORD SURVEY IS TO SHOW THE RELATIONSHIP OF FIELD MEASURED IMPROVEMENTS TO THE CONSTRUCTION PLANS REFERENCED IN DATA SOURCE 4.

ACCURACY:

1. THE ACCURACY STANDARD USED FOR THIS SURVEY, AS CLASSIFIED IN THE MINIMUM TECHNICAL STANDARDS (5J-17 FAC), IS "COMMERCIAL/HIGH RISK". THE MINIMUM RELATIVE DISTANCE ACCURACY FOR THIS TYPE OF SURVEY IS 1 FOOT IN 10,000 FEET. THE ACCURACY OBTAINED BY MEASUREMENT AND CALCULATION OF A CLOSED GEOMETRIC FIGURE WAS 1 FOOT IN 26,668 FEET.

2. PRIMARY CONTROL POINT POSITIONS FOR THIS SURVEY ARE CONTROL POINT #506 AND CONTROL POINT #507, AS SHOWN ON THE CONSTRUCTION PLANS REFERENCED IN DATA SOURCE 4, AND AS SHOWN ON THE MAP OF SURVEY. [SEE LIMITATION #11]

3. CONTROL ELEVATIONS FOR THIS SURVEY ARE BASED ON A LEVEL LOOP USING DIFFERENTIAL LEVELING TECHNIQUES. CLOSURES ACHIEVED IS 0.006' ERROR IN A 0.18 MILE LOOP LENGTH WHICH EXCEEDS THE MINIMUM ACCURACY REQUIREMENT CALCULATED AT A MAXIMUM MIS-CLOSURE OF 0.021 FEET. [SEE LIMITATION #12]

4. HORIZONTAL CONTROL MEASUREMENTS WERE MADE WITH A TRANSIT AND STEEL TAPE, OR DEVICES WITH EQUIVALENT OR HIGHER DEGREES OF ACCURACY.

DATA SOURCES:

1. THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CALCULATED BEARING BETWEEN CONTROL POINT #506 AND CONTROL POINT #507 [SEE LIMITATION #11], CALCULATED AS BEING S89°55'01"E, AS SHOWN ON THE MAP OF SURVEY.

2. HORIZONTAL COORDINATES (IN U.S. SURVEY FEET) FOR THIS SURVEY ARE BASED UPON THE SITE DATUM FOR THE CONSTRUCTION PLANS REFERENCED IN DATA SOURCE 4. CONTROL POINTS UTILIZED ARE SHOWN AS (a) CONTROL POINT #506, A FOUND 1/2" IRON ROD WITH AN ILLEGIBLE CAP (N=1,467,701.20', E=318,429.90'); and (b) CONTROL POINT #507, A FOUND 1/2" IRON ROD WITH AN ILLEGIBLE CAP (N=1,467,700.33', E=319,029.94'). [SEE LIMITATION #11]

3. ELEVATIONS ARE BASED ON SITE BENCHMARKS SHOWN ON THE CONSTRUCTION PLANS REFERENCED IN DATA SOURCE 4. SITE BENCHMARKS UTILIZED ARE SHOWN ON THE MAP OF SURVEY AS (a) "SITE TBM #1", A FOUND BOX CUT IN HEADWALL, ELEVATION 51.02'; and (b) "SITE TBM #2", A FOUND RAILROAD SPIKE SET IN A POWER POLE, ELEVATION 49.94'. [SEE LIMITATION #12]

4. THIS SURVEY WAS PREPARED WITH THE BENEFIT OF THAT CERTAIN SET OF CONSTRUCTION PLANS PREPARED BY CAMP, DRESSER & McKEE, INC. TITLED "WEST PASCO CLASS I LANDFILL CELL A-4", PROJECT NUMBER 6104-46136, LAST REVISED 6/29/2009, AND ELECTRONIC DRAWING FILE COPIES THEREOF. ALL SHADED BACK INFORMATION IS ACCORDING TO SAID ELECTRONIC DRAWING FILES AND HAS NOT BEEN MODIFIED BESIDES SHADING FOR UNDERLAY PURPOSES.

5. THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A TITLE COMMITMENT.

6. THIS SURVEY WAS PREPARED WITHTHE BENEFIT OF A RECORD SURVEY PREPARED BY FLORIDA DESIGN CONSULTANTS, INC., TITLED "PASCO COUNTY LANDFILL CELL A-4", JOB NUMBER 2009-70, LAST REVISED 12/21/2009.

7. EXISTING GROUND ELEVATIONS AT THE POINT OF EXISTING GAS LINE AND PROPOSED FORCEMAIN INTERSECTIONS AT THE SOUTHEAST AND SOUTHWEST CORNER OF THE SITE WERE PROVIDED BY THE CONTRACTOR ON 4/28/2010.

LIMITATIONS:

1. USE OF THIS SURVEY BY ANYONE OTHER THAN THOSE PREPARED FOR/CERTIFIED TO WILL BE THE RE-USERS SOLE RISK WITHOUT LIABILITY TO THE SURVEYOR.

2. THERE MAY BE ADDITIONAL EASEMENTS AND/OR RESTRICTIONS AFFECTING THIS PROPERTY THAT MAY OR MAY NOT BE FOUND IN THE PUBLIC RECORDS OF THIS COUNTY.

3. PRINTED DIMENSIONS SHOWN ON THE SURVEY SUPERSEDE SCALED DIMENSIONS. THERE MAY BE ITEMS DRAWN OUT OF SCALE TO GRAPHICALLY SHOW THEIR LOCATION.

4. CALCULATED (C) GEOMETRY SHOWN HEREON WAS CALCULATED USING FIELD LOCATED POINTS AND CERTAIN PUBLISHED DATA.

5. SHOWN ANYWHERE ON THIS SURVEY, THE WORD "CERTIFY" IS UNDERSTOOD TO BE AN EXPRESSION OF A PROFESSIONAL OPINION BASED UPON THE SURVEYOR'S BEST KNOWLEDGE, INFORMATION AND BELIEF, AND THAT IT THUS CONSTITUTES NEITHER A GUARANTEE NOR A WARRANTY.

6. THE SHADED BACK INFORMATION SHOWN ON THE MAP OF SURVEY (SEE DATA SOURCE 4) IS FOR INFORMATIONAL PURPOSES ONLY AND WAS NOT MODIFIED FROM IT'S ORIGINAL FORMAT BESIDES SHADING THE INFORMATION FOR UNDERLAY PURPOSES. ALL FEATURES SURVEYED BY FLORIDA DESIGN CONSULTANTS, INC. ARE SHOWN AS SOLID TEXT, LINES AND SYMBOLS WHICH IS NOT SHADED BACK.

7. THIS SURVEYOR CERTIFIES ONLY TO THE RECORD INFORMATION SHOWN ON THE MAP OF SURVEY. ALL SHADED BACK IMPROVEMENTS ARE PER THAT CERTAIN ELECTRONIC DRAWING FILE REFERENCED IN DATA SOURCE 4, AND WERE NOT FIELD VERIFIED EXCEPT AS SHOWN ON THE MAP OF SURVEY.

8. THE LOCATIONS OF THE UNDERGROUND UTILITIES AND/OR THEIR APPURTENANCES WERE PERFORMED BY A FIELD SURVEY AND ONLY LOCATED AS SHOWN ON THE MAP OF THE SURVEY. ONLY THE UNDERGROUND UTILITIES AND/OR THEIR APPURTENANCES WHICH WERE VISIBLE FROM GROUND LEVEL TO THE SURVEYOR ON THE ACTUAL DAY OF THE FIELD SURVEY WERE LOCATED AND MAPPED. NO EXCAVATIONS OR SUBSURFACE WORK EFFORTS OF ANY KIND WERE PERFORMED BY THE SURVEYOR TO VERIFY THE EXISTENCE OF ANY UNDERGROUND UTILITIES AND/OR THEIR APPURTENANCES. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES AND/OR THEIR APPURTENANCES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE GAS LINE SHOWN HEREON WAS LOCATED UTILIZING ABOVE GROUND GAS LINE MARKERS.

9. ALL BOUNDARY AND EASEMENT INFORMATION SHOWN HEREON IS SOLELY BASED UPON THOSE CERTAIN MAPS AND ELECTRONIC DRAWING FILES REFERENCED IN DATA SOURCE 4. FLORIDA DESIGN CONSULTANTS, INC. AND THE SURVEYOR AND MAPPER IN RESPONSIBLE CHARGE DOES NOT GUARANTEE THE VALIDITY OF SAID BOUNDARY INFORMATION OTHER THAN CONFORMATION TO SAID MAPS AND ELECTRONIC DRAWING FILES.

10. ORIGINAL FIELD WORK WAS COMPLETED ON 1/19/2010 AND IS CONTAINED IN FIELD BOOK 1526. FIELD WORK FOR REVISION 2 WAS COMPLETED ON 3/3/2010 AND IS CONTAINED IN FIELD BOOK 1526. FIELD WORK FOR REVISION 3 WAS COMPLETED ON 3/15/2010, IS CONTAINED IN FIELD BOOK 1526 AND IS LIMITED TO THE LINER EDGE AND PROPOSED FORCEMAIN LOCATION AS MARKED BY THE CONTRACTOR. FIELD WORK FOR REVISION 4 WAS COMPLETED ON 3/31/2010, IS CONTAINED IN FIELD BOOK 1526 AND IS LIMITED TO THE SPOT GRADES ON THE PROPOSED POND. FIELD WORK FOR REVISION 5 WAS COMPLETED ON 4/7/2010, IS CONTAINED IN FIELD BOOK 1526 AND IS LIMITED TO THE SPOT GRADES ON THE PROPOSED POND BEFORE THE LEACHATE SYSTEM WAS INSTALLED. FIELD WORK FOR REVISION 6 WAS COMPLETED ON 4/13/2010, IS CONTAINED IN FIELD BOOK 1526 AND IS LIMITED TO THE SPOT GRADES ON THE WEST 1/3 OF THE PROPOSED POND. FIELD WORK FOR REVISION 7 WAS COMPLETED ON 4/26/2010, IS CONTAINED IN FIELD BOOK 1526 AND IS LIMITED TO THE EXISTING 12" GAS LINE LOCATIONS AND DIMENSIONS TO THE PLAN FORCEMAIN FROM THE FIELD LOCATED EDGE OF PAVEMENT. REVISION 7 ALSO REMOVED THE PROPOSED FORCEMAIN LOCATION AS MARKED BY THE CONTRACTOR ADDED DURING REVISION 3. REVISION 8 IS LIMITED TO ADDING TIES TO THE GAS LINE AND EXISTING GROUND ELEVATION AT CROSSINGS (NO FIELD WORK PERFORMED). REVISION 9 IS LIMITED TO ADDING CROSSING DETAILS AT EAST AND WEST GAS LINE CROSSINGS (NO FIELD WORK PERFORMED). FIELD WORK FOR REVISION 10 COMMENCED ON 6/10/2010 AND WAS COMPLETED ON 7/8/2010. IS CONTAINED IN FIELD BOOK 1526 PAGES 70-73 AND IS LIMITED TO ADDING FORCEMAIN, LEACHATE DETECTION SYSTEM, LEACHATE COLLECTION SYSTEM LOCATIONS AND GROUND ELEVATIONS. FIELD WORK FOR REVISION 11 WAS PERFORMED ON 7/22/2010, IS CONTAINED IN FIELD BOOK 1526 PAGE 69 AND IS LIMITED TO ADDING LEACHATE SYSTEM AND STORM DRAIN PIPE LOCATIONS. FIELD WORK FOR REVISION 12 COMMENCED 8/26/2010 AND COMPLETED ON 10/19/2010, IS CONTAINED IN FIELD BOOK 1526 PAGES 68-61 AND IS LIMITED TO ADDING FORCEMAIN, WATER LINE, DRAINAGE STRUCTURES, LEACHATE SYSTEM, FINAL GROUND ELEVATIONS AND LIMITS OF SOD. FIELD WORK FOR REVISION 13 WAS PERFORMED ON 10/21/2010 AND IS LIMITED TO ADDING LIMITS OF SOD AT THE NORTHEAST CORNER. FIELD WORK FOR REVISION 14 WAS PERFORMED ON 11/5/2010 AND IS LIMITED TO ADDING SOD AREAS, LEACHATE SYSTEM, PARKING AND STORM DRAIN PIPE LOCATIONS. REVISION 15 IS LIMITED TO ADDING COORDINATES ON THE MONITORING WELLS AT THE CLIENTS REQUEST (NO FIELD WORK PERFORMED).

11. THERE WERE TWO CONTROL POINT #506's ACCORDING TO THE CONSTRUCTION PLANS REFERENCED IN DATA SOURCE 4 [SEE SHEET G-2 "EXISTING CONDITIONS, CONSTRUCTION LIMITS, AND MONITORING WELLS" OF SAID CONSTRUCTION PLANS FOR EXAMPLE]. THE EASTERN MOST CONTROL POINT LABELED AS CONTROL POINT #506 ON SAID CONSTRUCTION PLANS WAS RENUMBERED BY THIS SURVEYOR TO CONTROL POINT #507 FOR IDENTIFICATION PURPOSES ONLY.

12. FLORIDA DESIGN CONSULTANTS, INC. PERFORMED A LEVEL BENCH RUN FROM SITE TBM #1, THROUGH CONTROL POINTS #506 AND #507 (SEE LIMITATION #11), TO SITE TBM #2. IT WAS DISCOVERED THAT THE ELEVATION SHOWN ON THE CONSTRUCTION PLANS [SEE DATA SOURCE #4] FOR CONTROL POINT #506 IS NOT CONSISTENT WITH THE ELEVATIONS SHOWN FOR THE SITE BENCHMARKS UTILIZED AND CONTROL POINT #507. THE ELEVATION SHOWN FOR SAID CONTROL POINT #506 IS 51.59', BASED ON MEASUREMENTS BY THIS SURVEYOR THE ELEVATION OF SAID CONTROL POINT #506, UTILIZING THE BENCHMARKS AS PROVIDED, IS 50.38'. [SEE ACCURACY #3]

13. THE LOCATION OF AS-BUILT UNDERGROUND UTILITY LINES SHOWN HEREON IS BASED ON INFORMATION PROVIDED BY THE CONTRACTOR AND FIELD SURVEY EFFORTS. AS NOTED ABOVE THE UTILITY CONTRACTOR MARKED CONSTRUCTED UNDERGROUND UTILITY LINES WITH EITHER A P.V.C. STANDPIPE OR WOOD STAND WITH A DIMENSION MARKED TO THE TOP OF PIPE IN ORDER FOR THE SURVEYOR TO OBTAIN A HORIZONTAL AND VERTICAL LOCATION ON TOP OF THE CONSTRUCTED UTILITY LINE. THE PIPELINE WAS BACK FILLED PRIOR TO THE RECORD SURVEY EFFORT WITH NO VISIBLE EVIDENCE TO SUPPORT THE ACTUAL PIPELINE LOCATION. THE SURVEYOR MAKES NO GUARANTEE THAT THE STANDPIPE OR WOOD STAND PLACED BY THE CONTRACTOR WAS INSTALLED ACCURATELY ON TOP OF THE PIPE. THE UNDERSIGNED SURVEYOR MAKES NO GUARANTEE AS TO THE ACTUAL LOCATION OF ANY UNDERGROUND UTILITY LINES. TO AVOID DAMAGE TO EXISTING FACILITIES THE LOCATION OF EXISTING PIPELINES MUST BE VERIFIED PRIOR TO ANY EXCAVATION OR UNDERGROUND CONSTRUCTION ACTIVITIES BY USING GOOD CONSTRUCTION PRACTICES AND CONTACTING SUNSHINE STATE ONE CALL IN ACCORDANCE WITH FLORIDA STATUTES 553.851(1979).

BOUNDARY INCONSISTENCIES:

NOT APPLICABLE. THIS IS NOT A BOUNDARY SURVEY.

APPARENT PHYSICAL USE:

THE SUBJECT PROPERTY IS PART OF A SOLID WASTE LANDFILL, IS UNDER CONSTRUCTION AND CONTAINS IMPROVEMENTS NOT SHOWN ON THE MAP OF SURVEY.

EASEMENTS/RIGHT-OF-WAY:

NOT APPLICABLE. THIS IS NOT A BOUNDARY SURVEY.

PREPARED FOR:

RIPA & ASSOCIATES, INC.

CERTIFIED TO:

RIPA & ASSOCIATES, INC.

SURVEYOR AND MAPPER IN RESPONSIBLE CHARGE:

DENNIS BOGGS
PROFESSIONAL SURVEYOR AND MAPPER
LICENSE NUMBER LS 6069
STATE OF FLORIDA

ABBREVIATIONS LEGEND

AC	= Acres	FN&TT	= Found Nail and Tin Tab	℄	= Property Line
A/C	= Air Conditioner	FOP	= Found Open End Iron Pipe	PLS	= Professional Land Surveyor
ADW	= Asphalt Driveway	FPB	= Electric Power Box	POB	= Point of Beginning
ADS	= Advance Drainage Systems	FPC	= Electric Power Company	POC	= Point of Commencement
ASPH	= Asphalt	FPP	= Found Pinched Iron Pipe	POL	= Point on Line
B/C	= Back of Curb	FRRS	= Found Railroad Spike	PRM	= Permanent Reference Monument
BCCM	= Board of County Commissioners Minutes Book	FT	= Feet	PSM	= Professional Surveyor and Mapper
BFPD	= Back Flow Prevention Device	F/T	= Fence Tie	PT	= Point of Tangency \ Point
BLDG	= Building	FXC	= Found X-cut	PVC	= Polyvinyl Chloride Pipe
BNDY	= Boundary	G/A	= Guy Wire Anchor	(R)	= Recorded Data
BO	= Blow Off Valve	GE	= Grade Elevation	RCP	= Reinforced Concrete Pipe
(C)	= Calculated Data	GI	= Grade Inlet	RLS	= Registered Land Surveyor
C/C	= Covered Concrete	GV	= Gas Valve	RNG	= Range
CCCL	= Coastal Construction Control Line	IE	= Invert Elevation	R/W	= Right of Way
CCR	= Certified Corner Record	INV	= Invert	S	= South
CDW	= Concrete Driveway	LB	= Corporate Certification Number	(S)	= Survey Data (See Data Source 5)
CI	= Curb Inlet	LCS	= Leachate Collection System	SCM	= Set Concrete Monument, 4"x4", PRM LB 6707
℄	= Center Line	LDS	= Leachate Detection System	SCM(W)	= Set Concrete Monument, 4"x4", FDC LB 6707 WITNESS PT
CLF	= Chain Link Fence	LF	= Linear Feet	SEC	= Section
CM	= Concrete Monument	LP	= Light Pole	SHW	= Seasonal High Water Elevation
CMP	= Corrugated Metal Pipe	LS	= Licensed Surveyor	SIR	= Set 5/8"Iron Rod and Cap, FDC LB 6707
CO	= Clean out	M&S	= Masonry	SIR(W)	= Set 5/8"Iron Rod and Cap, FDC LB 6707 WITNESS PT
CONC	= Concrete	MES	= Mitered End Section	SMH	= Sanitary Manhole
COR	= Corner	MH	= Manhole	SN&D	= Set Nail and Disk, FDC LB 6707
CPB	= Condo Plat Book	MHW	= Mean High Water	SN&D(W)	= Set Nail and Disk, FDC LB 6707 WITNESS PT
C/S	= Concrete Slab	MOL	= More or Less	SQ	= Square
C/T	= Curb Tie	N	= North	SR	= State Road
DB	= Deed Book	N/C	= No Cap	STY	= Story
DCVA	= Double Check Valve Assembly	N/F	= Not Found	SWFWMD	= Southwest Florida Water Management District
DNR	= Department of Natural Resources	N/S	= Not Set	S/W	= Sidewalk
DEPT	= Department	N/A	= Not Accessible/Not Complete	TBM	= Temporary Benchmark
DIA	= Diameter	NAD	= North American Datum	TBO	= Temporary Blow-off
DIP	= Ductile Iron Pipe	NAVD	= North American Vertical Datum	TOB	= Top of Bank
DMH	= Drainage Manhole	NGS	= National Geodetic Survey	TRAV	= Traverse
E	= East	NGVD	= National Geodetic Vertical Datum	(TYP)	= Typical
ECMP	= Elliptical Corrugated Metal Pipe	NP	= Normal Pool Elevation	TWP	= Township
EL	= Elevation	(NR)	= Non Radial	U/P	= Utility Pole
EOW	= Edge of Water	O/A	= Overall	VCP	= Vitrified Clay Pipe
E/P	= Edge of Pavement	OHW	= Overhead Wire	W	= West
EOP	= End of Pipe	ORB	= Official Record Book	W/	= With
ESMT	= Easement	(PA)	= Property Appraisers Map Data	W/F	= Wood Fence
(F)	= Field Data	PB	= Plat Book	WI	= Water Line
FCM	= Found Concrete Monument	PC	= Point of Curvature	WUP	= Wood Utility Pole
FDOT	= Florida Department of Transportation	PCED	= Pinellas County Engineering Department	W/T	= Wall Tie
FH	= Fire Hydrant	PACED	= Pasco County Engineering Department	WV	= Water Valve
FIR	= Found Iron Rod and Cap	PCSD	= Pinellas County Survey Department	xx°	= Degrees
FL	= Fire Line	PACSD	= Pasco County Survey Department	xx'	= Minutes (Bearings)
FND	= Found	PCP	= Permanent Control Point	xx"	= Seconds (Bearing)
FN&D	= Found Nail and Disk	PG(S)	= Pages	xx'	= Feet (Distances)
FFE	= Finished Floor Elevation	PI	= Point of Intersection		
		PID	= Permanent Identification Number		

LINETYPE LEGEND

- = Boundary Line
- = Center Line
- = Easement Line
- = Edge of Water
- = Jurisdictional Line
- = Right-Of-Way Line
- = Section Line
- = Top Bank or Top of Berm
- = Toe of Slope or Grade Break
- GAS GAS = Gas Line (See Limitation 8)
- FM FM = Proposed Forcemain
- FM FM = Forcemain
- ST ST = Storm Sewer Line (See Limitation 12)

SYMBOLS LEGEND

- = Aerial Target
- = Bench Mark
- CATV = Cable TV Paint Stripe
- CATV = Cable TV Box
- = Communications Manhole
- = Concrete Light Pole
- = Concrete Post
- = Concrete Utility Pole
- = Drainage Manhole
- = Electric Box
- = Electric Manhole
- EPPS = Electric Power Paint Stripe
- = Electric Power Pedestal
- = Fire Hydrant
- = Flag Pole
- = Gas Line Marker
- = Gas Filler Cap
- = Gas Valve
- = Gas Meter Box
- GLPS = Gas Line Paint Stripe
- = Grate Inlet
- = Telephone Manhole
- = Telephone Pedestal
- = Telephone Marker
- = Guy Anchor
- = Light Pole
- = Mail Box
- = Water Service (one whip)
- = Water Service (two whips)
- = Metal Post
- = Monitoring Well
- = Parking Meter
- RWPS = Reclaimed Water Paint Stripe
- RWB = Reclaimed Water Box
- = Sanitary Forcemain Valve
- = Sanitary Sewer Manhole
- = Sanitary Cleanout/Drainage Cleanout
- SANPS = Sanitary Sewer Paint Stripe
- = Section Corner
- = Siamese Connection
- = Sign
- = Sprinkler Control Box
- = Sprinkler Head
- STMPS = Storm Water Paint Stripe
- = Traffic Signal Box
- = Traffic Signal Pole
- VPS = Verizon Paint Stripe
- WPS = Water Line Paint Stripe
- = Water Meter
- = Water Valve
- = Wood Utility Pole
- = Wood Light Pole
- = Wood Post
- = Par Plan
- 25.00 = Point of Elevation
- 25.0' = Calculated Dimension from Structure to Boundary / Right-of-Way Line

DOCUMENT LEGEND

(C) = CALCULATED DATA
(F) = FIELD DATA
(P) = PLAN DATA (SEE DATA SOURCE 4)

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
MAR 23 2011
SOUTHWEST DISTRICT
TAMPA

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
MAR 23 2011
SOUTHWEST DISTRICT
TAMPA

THE MAP AND REPORT ARE NOT FULL AND COMPLETE WITHOUT THE OTHER

DRAWN: JEB
CHECKED: JEB
QUALITY CONTROL: DB

FLORIDA DESIGN CONSULTANTS, INC.
ENGINEERS, ENVIRONMENTALISTS, SURVEYORS & PLANNERS
3030 Starkey Blvd. New Port Richey FL 34655
Tel. (727) 849-7588 - Fax. (727) 848-3648
Certificate of Authorization: LB 6707
State of Florida

SUBJECT: PASCO COUNTY LANDFILL

SHEET DESCRIPTION: **RECORD SURVEY**
REPORT AND LEGENDS

NO.	DATE	REVISIONS	BY	QUALITY CONTROL
16	2-16-2011	ADD LATITUDE AND LONGITUDE ON MONITORING WELLS	LCS	DB
15	11-11-2010	ADD LEACHATE SYSTEM ELEVATION	DB	DB
14	11-8-2010	ADD SOD AREAS, LEACHATE SYSTEM, PARKING AND STORM DRAIN PIPE LOCATIONS	LCS	DB
13	10-25-2010	ADD SOD AREAS	LCS	DB
12	10-20-2010	ADD FORCEMAIN, WATER LINE, DRAINAGE STRUCTURES, LEACHATE SYSTEM AND FINAL GROUND ELEVATIONS	LCS	DB
1-11	VARIOUS	SEE LIMITATIONS 10	LCS	DB

SHEET INDEX:
1. SURVEYOR'S REPORT
2-3. MAP OF SURVEY – UTILITIES
4. MAP OF SURVEY – CELL ELEVATIONS
5. MAP OF SURVEY – MONITOR WELLS

ADDITIONS OR DELETIONS TO SURVEY MAPS OR REPORTS BY OTHER THAN THE SIGNING PARTY OR PARTIES IS PROHIBITED.

JOB NUMBER: 2009-70 | EPN: N/A
PROJECT DATA BASE: 2009-70-CON
FIELD BOOK NUMBER & PAGES: SEE LIMITATIONS 10
LAST DATE OF ORIGINAL FIELD WORK: SEE LIMITATIONS 10
SCALE: NONE

SURVEY MAP AND REPORT OR THE COPIES THEREOF ARE NOT VALID WITHOUT THE SIGNATURE AND THE ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER.

DENNIS BOGGS
PROFESSIONAL SURVEYOR AND MAPPER
LICENSE NUMBER LS 6069
STATE OF FLORIDA

SHEET 1 OF 5

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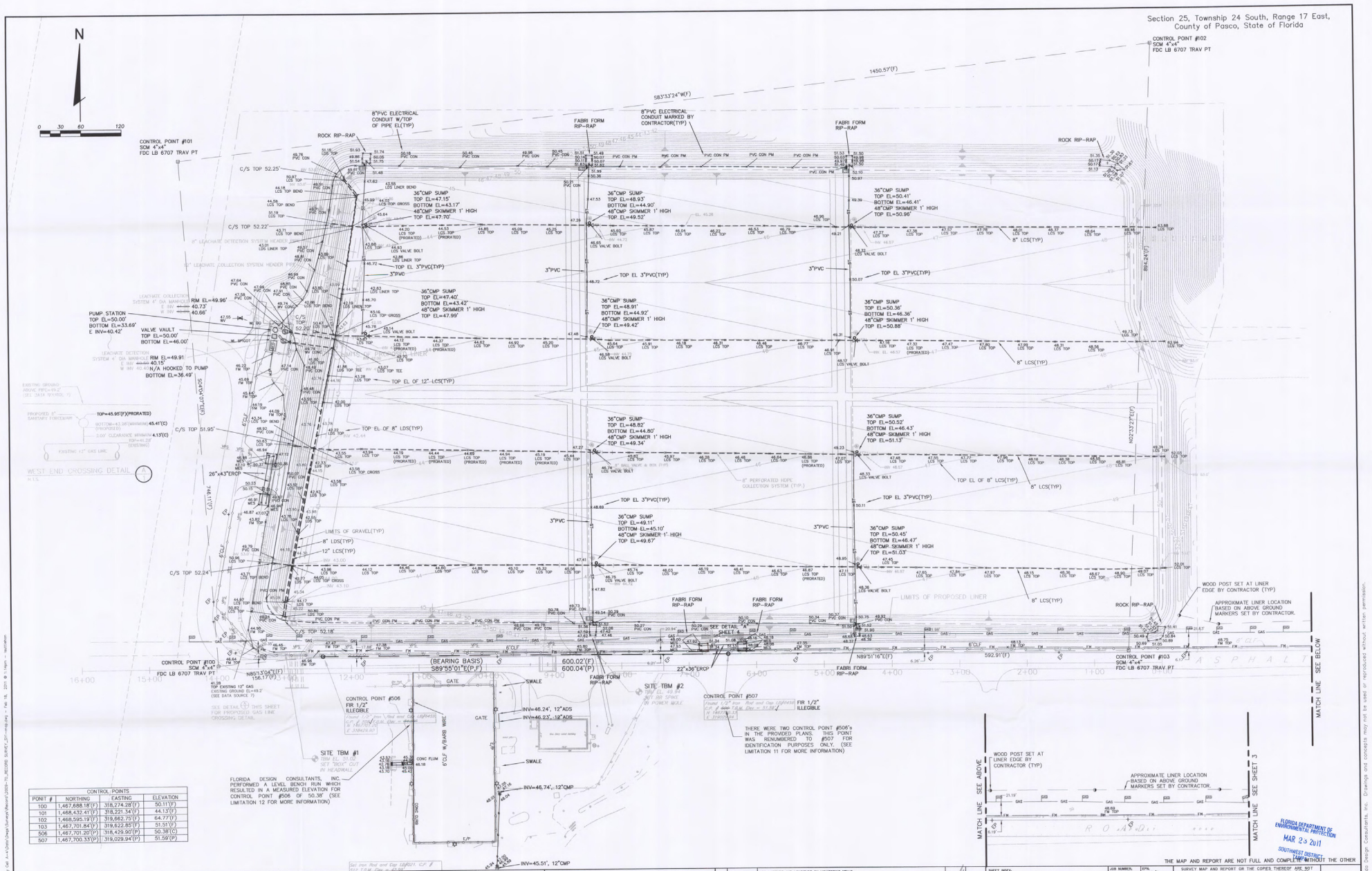
X:\Construction MPDC\Pasco County Cell A-4\Data\Dwgs\Survey\Sheets\2009-70_RECORD SURVEY_SITE.mxd (MAP) - Feb 16, 2011 @ 1:17pm - Nicholson



CONTROL POINTS			
POINT #	NORTHING	EASTING	ELEVATION
100	1,467,688.18'(F)	318,274.28'(F)	50.11'(F)
101	1,468,432.41'(F)	318,221.34'(F)	44.13'(F)
102	1,468,595.19'(F)	319,662.75'(F)	64.77'(F)
103	1,467,701.84'(F)	319,622.85'(F)	51.51'(F)
506	1,467,701.20'(P)	318,429.90'(P)	50.38'(C)
507	1,467,700.33'(P)	319,029.94'(P)	51.59'(P)

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
MAR 23 2011
SOUTHWEST DISTRICT
TAMPA

THE MAP AND REPORT ARE NOT FULL AND COMPLETE WITHOUT THE OTHER

DRAWN: JEB
CHECKED: JEB
QUALITY CONTROL: DB

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Certificate of Authorization: LB 6707
State of Florida

SUBJECT: PASCO COUNTY LANDFILL

SHEET DESCRIPTION: **RECORD SURVEY** UTILITIES

NO.	DATE	REVISIONS	BY	QUALITY CONTROL
16	2-18-2011	ADD LATITUDE AND LONGITUDE ON MONITORING WELLS	LCS	DB
15	11-11-2010	ADD LEACHATE SYSTEM ELEVATION	DB	DB
14	11-8-2010	ADD SOD AREAS, LEACHATE SYSTEM, PARKING AND STORM DRAIN PIPE LOCATIONS	LCS	DB
13	10-28-2010	ADD SOD AREAS	LCS	DB
12	10-20-2010	ADD FORCEMAIN, WATER LINE, DRAINAGE STRUCTURES, LEACHATE SYSTEM AND FINAL GROUND ELEVATIONS	LCS	DB
1-11	VARIOUS	SEE LIMITATIONS 10	JEB	DB

SHEET INDEX:
1. SURVEYOR'S REPORT
2-3. MAP OF SURVEY – UTILITIES
4. MAP OF SURVEY – CELL ELEVATIONS
5. MAP OF SURVEY – MONITOR WELLS

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JOB NUMBER: 2009-70 EPN: N/A
PROJECT DATA BASE: 2009-70-CON
FIELD BOOK NUMBER & PAGES: SEE LIMITATIONS 10
LAST DATE OF ORIGINAL FIELD WORK: SEE LIMITATIONS 10
SCALE: 1" = 60'

SURVEY MAP AND REPORT OR THE COPIES THEREOF ARE NOT VALID WITHOUT THE SIGNATURE AND THE ORIGINAL RAISED SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER.

DENNIS BOGGS
PROFESSIONAL SURVEYOR AND MAPPER
LICENSE NUMBER LS 6069
STATE OF FLORIDA

SHEET 2 OF 5

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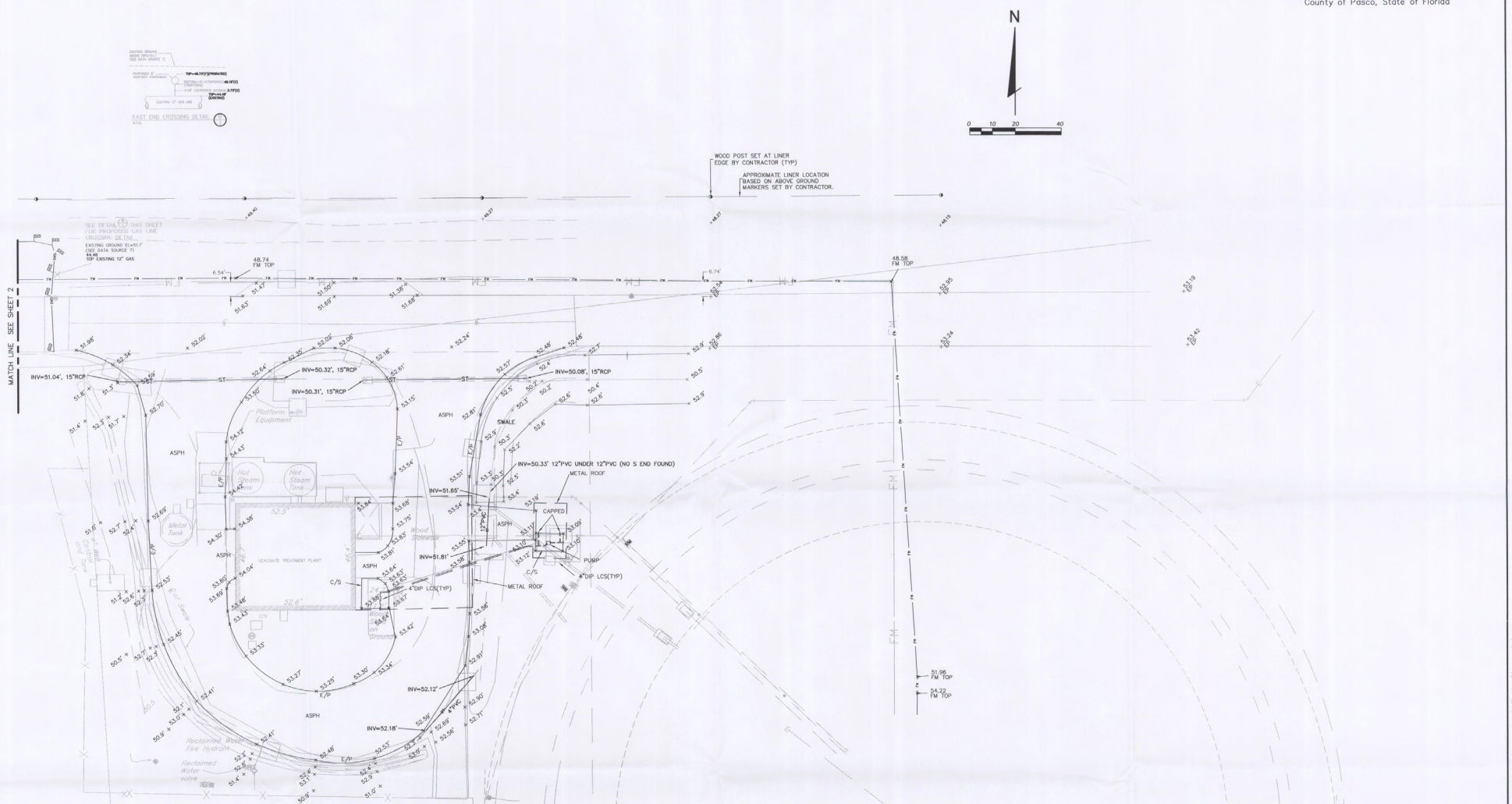
Section 25, Township 24 South, Range 17 East,
County of Pasco, State of Florida



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FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
MAR 23 2011
SOUTHWEST DISTRICT
TAMPA

DRAWN	CHECKED	QUALITY CONTROL
KCB	KCB	DB

FLORIDA DESIGN CONSULTANTS, INC.
ENGINEERS, ENVIRONMENTALISTS, SURVEYORS & PLANNERS
3030 Starkey Blvd. New Port Richey FL. 34655
Tel. (727) 849-7588 - Fax. (727) 848-3648
Certificate of Authorization: LB 6707
State of Florida

SUBJECT: PASCO COUNTY LANDFILL

SHEET DESCRIPTION: **RECORD SURVEY** UTILITIES

NO.	DATE	REVISIONS	BY	QUALITY CONTROL
16	2-18-2011	ADD LATITUDE AND LONGITUDE ON MONITORING WELLS	LCS	DB
15	11-11-2010	ADD LEACHATE SYSTEM ELEVATION	DB	DB
14	11-8-2010	ADD SOD AREAS, LEACHATE SYSTEM, PARKING AND STORM DRAIN PIPE LOCATIONS	LCS	DB
13	10-28-2010	ADD SOD AREAS	LCS	DB
12	10-20-2010	ADD FORCEMAIN, WATER LINE, DRAINAGE STRUCTURES, LEACHATE SYSTEM AND FINAL GROUND ELEVATIONS	LCS	DB
1-11	VARIOUS	SEE LIMITATIONS 10	KB	DB

SHEET INDEX:
1. SURVEYOR'S REPORT
2-3. MAP OF SURVEY – UTILITIES
4. MAP OF SURVEY – CELL ELEVATIONS
5. MAP OF SURVEY – MONITOR WELLS

ADDITIONS OR DELETIONS TO SURVEY MAPS OR REPORTS BY OTHER THAN THE SIGNING PARTY OR PARTIES IS PROHIBITED.

JOB NUMBER: 2009-70 | CPN: N/A
PROJECT DATA BASE: 2009-70-CON
FIELD BOOK NUMBER & PAGES: SEE LIMITATIONS 10
LAST DATE OF ORIGINAL FIELD WORK: SEE LIMITATIONS 10
SCALE: 1" = 20'

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DENNIS BOGGS
PROFESSIONAL SURVEYOR AND MAPPER
LICENSE NUMBER LS 6069
STATE OF FLORIDA

SHEET 3 OF 5

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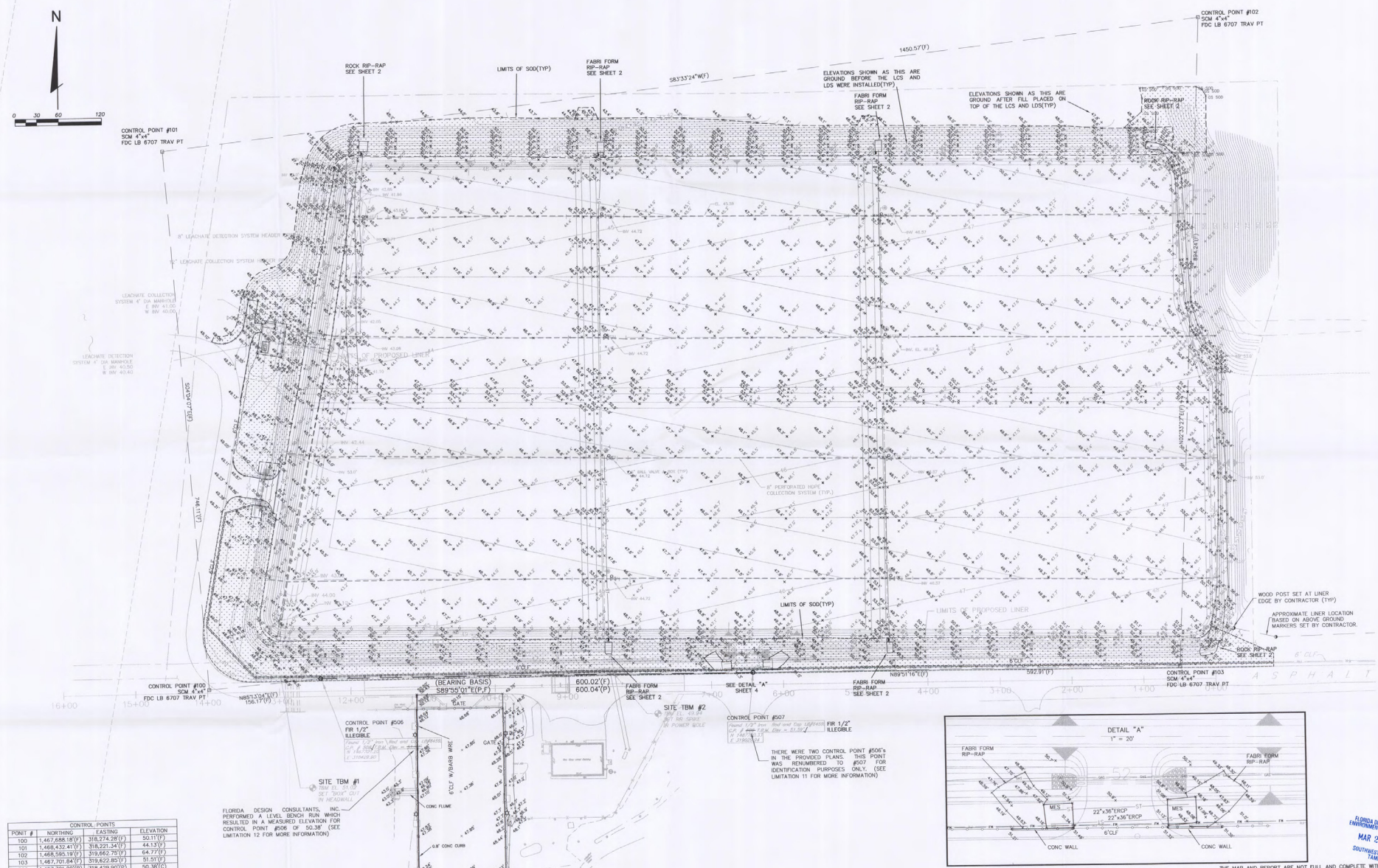
Section 25, Township 24 South, Range 17 East,
County of Pasco, State of Florida



CONTROL POINTS			
POINT #	NORTHING	EASTING	ELEVATION
100	1,467,688.18'(F)	316,274.28'(F)	50.11'(F)
101	1,468,432.41'(F)	318,221.34'(F)	44.13'(F)
102	1,468,595.19'(F)	319,662.75'(F)	64.77'(F)
103	1,467,701.84'(F)	319,622.85'(F)	51.51'(F)
506	1,467,701.20'(P)	318,429.90'(P)	50.38'(C)
507	1,467,700.33'(P)	319,029.94'(P)	51.59'(P)

DRAWN: JEB
CHECKED: JEB
QUALITY CONTROL: DB

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SUBJECT:
PASCO COUNTY LANDFILL

SHEET DESCRIPTION:
RECORD SURVEY
CELL ELEVATIONS

NO.	DATE	REVISIONS	BY	QUALITY CONTROL
16	2-18-2011	ADD LATITUDE AND LONGITUDE ON MONITORING WELLS	LCS	DB
15	11-11-2010	ADD LEACHATE SYSTEM ELEVATION	DB	DB
14	11-8-2010	ADD SOD AREAS, LEACHATE SYSTEM, PARKING AND STORM DRAIN PIPE LOCATIONS	LCS	DB
13	10-25-2010	ADD SOD AREAS	LCS	DB
12	10-20-2010	ADD FORCEMAIN, WATER LINE, DRAINAGE STRUCTURES, LEACHATE SYSTEM AND FINAL GROUND ELEVATIONS	LCS	DB
1-11	VARIOUS	SEE LIMITATIONS 10	JEB	DB

SHEET INDEX:
1. SURVEYOR'S REPORT
2-3. MAP OF SURVEY – UTILITIES
4. MAP OF SURVEY – CELL ELEVATIONS
5. MAP OF SURVEY – MONITOR WELLS

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DENNIS BOGER
PROFESSIONAL SURVEYOR AND MAPPER
LICENSE NUMBER LS 6069
STATE OF FLORIDA

SHEET 4 OF 5

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
MAR 25 2011
SOUTHWEST DISTRICT
TAMPA

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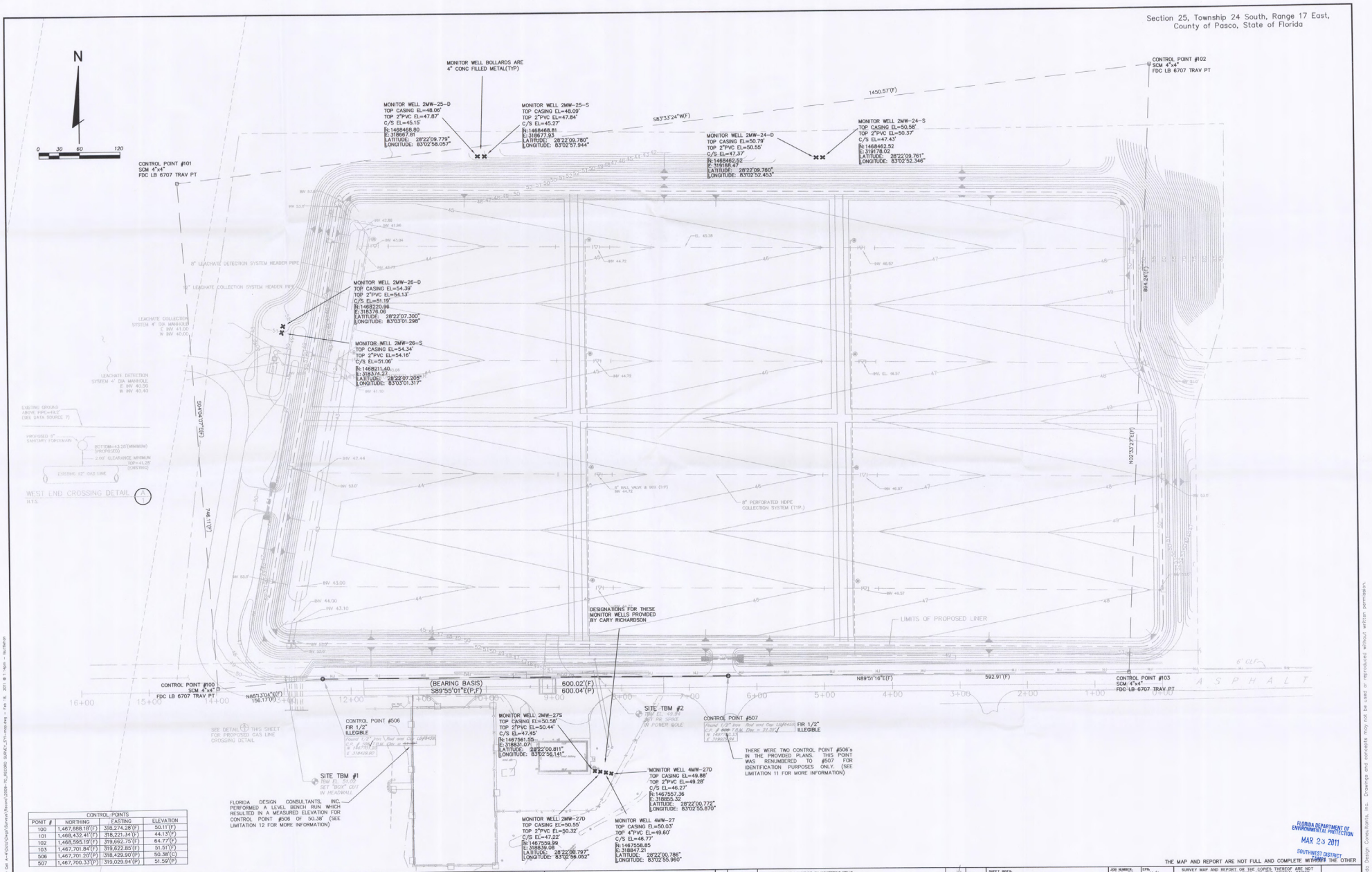

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QUALITY CONTROL: DB

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State of Florida

SUBJECT: PASCO COUNTY LANDFILL

SHEET DESCRIPTION: **RECORD SURVEY**
MONITOR WELLS

NO.	DATE	REVISIONS	BY	QUALITY CONTROL
16	2-18-2011	ADD LATITUDE AND LONGITUDE ON MONITORING WELLS	LCS	DB
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DENNIS SCHOOL
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SHEET 5 OF 5

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
MAR 23 2011
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J:\Construction WRD\Pasco County Cell 4-4\Const Drngs\Survey\Record\2009-70_RECORD_SURVEY_CPT-Hnd.dwg - Feb 15, 2011 @ 1:14pm - JebMiller