WASTE MANAGEMENT

Geomembrane Liner Evaluation Report
Permit No. MSW-249C

For
Flexible Membrane Liner
Cell WD - 4

Austin Community Recycling & Disposal Facility
Austin, Texas

February 2001

SECOR International, Inc.

002937

GEOMEMBRANE LINER EVALUATION REPORT
CELL WD-4

PERMIT NO. MSW 249-C

Prepared for:

AUSTIN COMMUNITY RECYCLING & DISPOSAL FACILITY
9900 GILES ROAD
AUSTIN, TEXAS

FEBRUARY 2001

Prepared by:

SECOR INTERNATIONAL INCORPORATED
12651 BRIAR FOREST, SUITE 205
HOUSTON, TEXAS 77077

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1.0 INTRODUCTION

This report documents the construction quality assurance (CQA) testing and observation performed for the construction of the geosynthetic liner, the leachate collection system, and the protective cover for Cell WD-4 at Waste Management's Austin Community Recycling and Disposal Facility (ACRDF). This site is located in Travis County, east of Austin, Texas on Giles Road.

Cell WD-4 involves the construction of approximately 7.3 acres of cell. The construction included the construction of a composite liner system. The initial portion of the composite liner system consisted of a 2 foot thick recompacted clay liner. The Soil Liner Evaluation Report (SLER) for this clay liner was submitted by SECOR in January 2001 and verbally approved on February 2, 2001. This portion of the composite liner construction involved installation of textured 60 mil HDPE geomembrane throughout the cell. The HDPE liner was overlain with geonet and 8 oz./s.y. geotextile layers on the floor and 16 oz./s.y. geotexile on the slopes. The leachate collection system consisted of a leachate collection trench draining to a sump located at the north end of the cell floor. The protective cover was placed on the floor and up the full height of the slopes. The cell is constructed in accordance with the site permit and the Soil and Liner Quality Control Plan (SLQCP). The construction procedures and quality assurance tasks are summarized in the following sections.

2.0 PERSONNEL

The quality assurance program documented herein was provided by SECOR under contract with ACRDF. Longhorn Excavators was the earthwork contractor. ESI was the geosynthetic contractor. Martin Survey Associates (MSA) was utilized for surveying services. The key personnel and companies involved with the construction of ACRDF, Cell WD-4 are:

Waste Management of Texas, Austin Community Recycling & Disposal Facility - Owner

Rusty Fusilier	Construction Manager

SECOR International Incorporated - Construction Quality Assurance

J Roy Murray, P.E.	Professional of Record
Jeff Reed, P.E.	Professional of Record
Jean Wilson	Senior Site CQA Technician

Longhorn Excavators - Earth Work Contractor

John Parker	Project Manager
John Cavazos	Construction Superintendent

ESI - Geosynthetic Contractor

Randy Story	Site Superintendent

CQA Testing Laboratories, Inc. - Soils Laboratory

Mike Griggs	Laboratory Manager

TRI/Environmental, Inc. - Geosynthetic Laboratory

Sam Allen	Geosynthetics Laboratory Manager

Martin Survey Associates, Inc. - Surveyor

Kevin Olson	Registered Surveyor

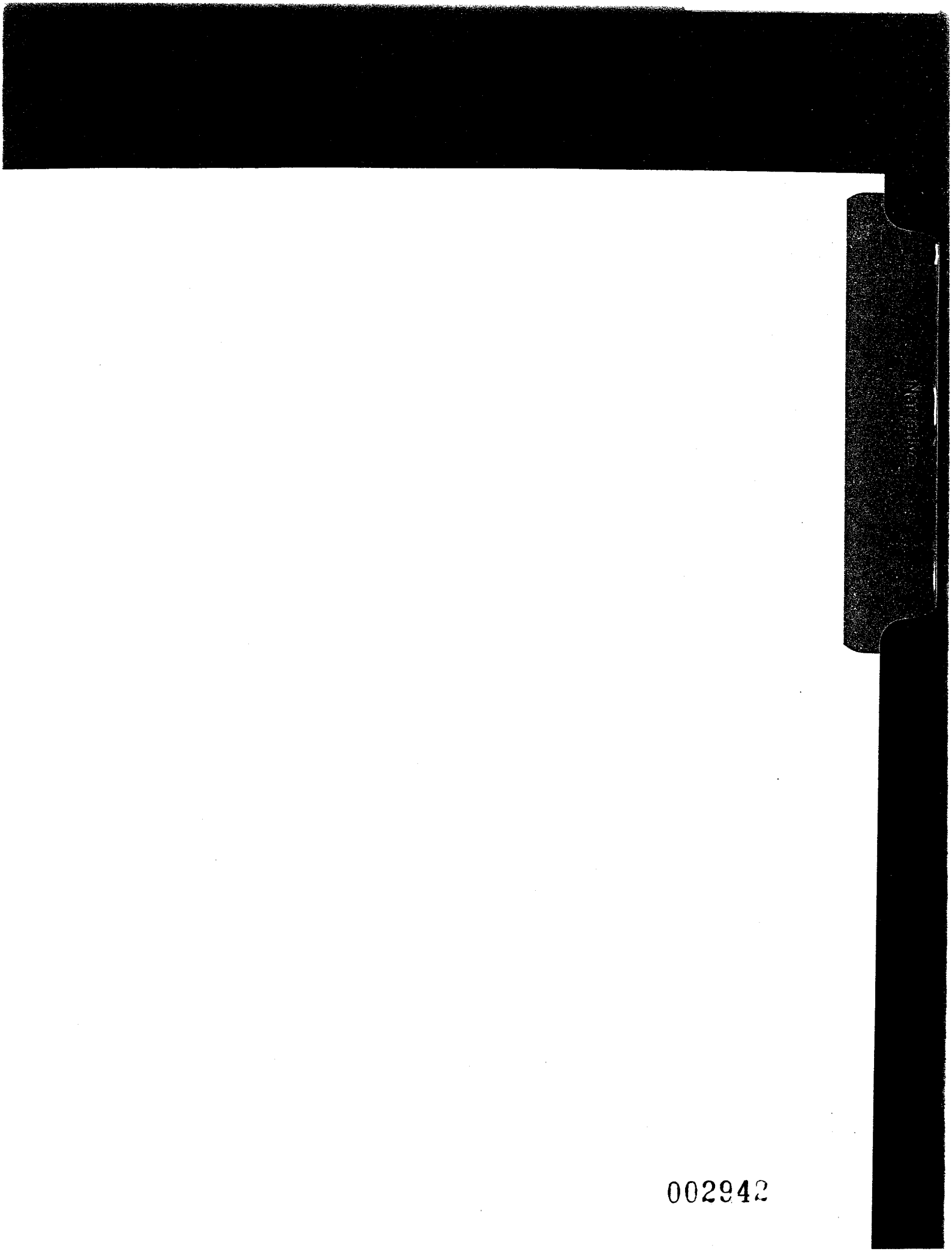
3.0 PROJECT DESCRIPTION

As the geosynthetic materials arrived on site, they were inventoried and compared to their bills of lading. Conformance samples of geomembrane materials had been taken along with the inventory. Certification documentation from the manufacturer was received and reviewed for compliance to both the manufacturer's product specifications and the SLQCP for all materials received onsite.

Textured 60 mil HDPE geomembrane was utilized for the entire project. 16 oz/s.y.. non-woven geotextile was installed on the slopes, while geonet and 8 oz./s.y. geotextile fabric were installed on the floor.

The leachate collection trench was constructed with coarse aggregate wrapped in a minimum 8 ounce geotextile. Contained within this aggregate was a 6 inch HDPE SDR 17 pipe with $^3/_8$-inch holes for leachate collection. The leachate collection sump is located at the north end of the cell floor and contains a 24-inch HDPE SDR-17 riser pipe along with a solid 6 inch HDPE SDR 17 pipe as a cleanout riser. The lower ten feet of the riser pipe is perforated with $^3/_8$-inch holes and is welded to a 4' x 8' x 2" HDPE flatstock. An 8-inch HDPE SDR 17 transducer pipe with the lower ten feet perforated is also welded to the flatstock.

A minimum thickness of 2 feet of on-site soil was used as the protective cover layer. The aggregate in the leachate collection trench was built above the top of protective cover a minimum of one foot width to serve as a chimney drain in accordance with the permit.



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4.0 REFERENCE DOCUMENTS

A. "Soil and Liner Quality Control Plan" for Waste Management of Texas, Inc., Austin Community Recycling and Disposal Facility, Austin, Texas. Permit No. MSW-249-C, Revision 2b, approved by the State of Texas, November 1997.

B. Construction drawings entitled "Cell WD-4 Construction Drawings, Austin Community Recycling and Disposal Facility". Prepared by SECOR International Inc., September 2000.

C. Technical Guide #3, Liner Construction and Testing Handbook, TNRCC, July 1,1994.

D. Texas Natural Resources Conservation Commission rules; Title 30 Texas Administrative Code, Chapter 330.

5.0 SCOPE OF SERVICES

The scope of services for the CQA work was outlined in a Service Agreement between ACRDF and SECOR. SECOR was contracted to provide CQA for the Cell WD-4 construction. The duties which were required to be performed are described in the following sections.

5.1 CQA MANAGEMENT AND CERTIFICATION

A. Project initiation activities consisted of:
   1. Reviewing quality control data and conformance data.
   2. Reviewing daily logs, reports, and test results.

B. CQA project management activities consisted of:
   1. Monitoring the budget for SECOR activities.
   2. Review of daily summary reports, logs, and test results.

C. Certification activities consisted of:
   1. Regular site visits by the Professional of Record to observe construction quality and progress.
   2. Review of field data and reports to assure proper CQA documentation and that the work is in compliance with the design, permit regulations, and general construction practices.
   3. Review all quality control submittals to assure completeness and accuracy.
   4. Interface with regulatory agency regarding the project report.

5.2 FIELD CQA SERVICES

This task includes the field services associated with the 7.3 acre Cell WD-4 construction of the landfill. Cell construction duties consisted of the following:

- Verifying the completion of grade for the soil liner.
- Providing acceptance certification for the soil liner surface prior to geomembrane deployment.
- Inventorying geosynthetic material arriving on site and reviewing geosynthetic manufacturers' certifications.
- Obtaining conformance samples for geomembrane materials and shipping samples to the lab.
- Observing the installation of the 60-mil HDPE geomembrane, geonet, and geotextile.
- Observing the installation of the leachate collection system.
- Observing the installation of the two-foot thick protective cover.

More specifically, the CQA activities for geosynthetics involved the following:

A. Reviewed manufacturer's certification data for each geosynthetic material for completeness and meeting specified minimum values.
B. Reviewed the conformance test data for meeting minimum specified values.
C. Observed and documented the installation of the geosynthetic liner system. Specifically, the CQA team documented the following:
    1. Trial weld
    2. Panel placement
    3. Panel seaming
    4. Nondestructive seam testing
    5. Destructive sampling and testing of seams
    6. Repair and retest of any failures and other general repairs
D. Monitored the installation of the geonet and geotextile layers.
E. Observed and documented the installation of the leachate collection system.
F. Obtained one conformance sample of leachate drainage stone for grain size analysis.
G. Observed the placement of the on-site soil as protective cover.

5.3 GEOTECHNICAL/GEOSYNTHETIC LABORATORY TESTING

SECOR utilized the services of qualified geotechnical and geosynthetic laboratories for the testing of the drainage stone and geosynthetic materials as follows:

A. CQA Testing Laboratory, Inc., Indiana was utilized to perform the following construction test:

1. Coarse Drainage Stone
   a. Preconstruction Testing (Information included in SLER dated January 2001)
      - Particle Size — ASTM C 136
      - Calcium Carbonate — ASTM D 3042(JL Method)
   b. Construction Testing
      - Particle Size — ASTM C 136

B. TRI/Environmental, Inc. - Austin, TX. was utilized to perform the following tests.

1. 60-mil HDPE Geomembrane
   a. Conformance Testing
      - Tensile Properties — ASTM D 638
      - Thickness (Textured) — ASTM D 1593
      - Density — ASTM D 1505
      - Carbon Black Content — ASTM D 1603
      - Carbon Black Dispersion — ASTM D 5596
      - Puncture Resistance — ASTM D 4833
      - Tear Resistance — ASTM D 1004
   b. Construction Testing (Destructs)
      - Seam Strength — ASTM D 4437
      - Peel Adhesion — ASTM D 4437

5.4 GLER DOCUMENTATION REPORT

This final documentation report includes the following items:

1. A narrative describing the construction sequence and documentation activities.
2. A statement certifying that construction was in substantial accordance with the plans and specifications and signed and sealed by a professional engineer registered in the State of Texas.
3. A completed GLER.
4. A series of sections containing the following:
   a. Geosynthetic material inventory logs.
   b. Manufacturer's quality control documentation.
   c. Geosynthetic laboratory conformance test results.
   d. Subgrade acceptance reports.
   e. Geomembrane field documentation including:

- Trial welds
- Panel placement
- Panel seaming
- Nondestructive testing
- Destructive testing
- Repairs

f. Photographs
g. Resumes of key personnel
h. Certificate of Completion
i. Pertinent documentation

5. Set of record drawings consisting of the following:
   a. Drawing of construction area and previously filled areas.
   b. Geomembrane panel seam locations as well as locations of destructs and repairs.
   c. Top of protective cover.
   d. Pertinent details.

6.0 CONSTRUCTION ACTIVITIES

6.1 GEOSYNTHETIC MATERIAL TESTING

The Construction Quality Assurance (CQA) program included a review of the geosynthetic material manufacturer's quality control test results and certifications. This information was reviewed and found to be in compliance with the design specifications.

The geosynthetic liner system consisted of four types of materials. The components of the geosynthetic liner system included the following:

1. 60-mil textured high-density polyethylene (HDPE) geomembrane for the geosynthetic component of the liner system.
2. HDPE geonet for drainage on the floor.
3. A non-woven polypropylene geotextile with a minimum of 8 ounces per square yard. The 8 ounce geotextile was installed as a separation layer between the geonet and the protective cover; and the drainage stone and the protective cover.
4. A 16 ounce non-woven geotextile over the geomembrane on the slopes.

The geosynthetic materials were delivered, inventoried, and stockpiled on site prior to the installation of the liner system. Representative conformance samples of the geomembrane were collected and taken to the TRI laboratory and tested. The conformance sampling and testing procedures were performed in accordance with the SLQCP and as outlined in Section 5.3 of this report.

Conformance tests were performed at a frequency rate of one test per 100,000 square feet of geomembrane material with no less than one per resin lot. All test results passed the required values. Specific rolls tested can be found on the material inventory log. The inventory log as well as the results of the conformance tests are included in this report.

6.2 SUBGRADE ACCEPTANCE

Prior to the deployment of the geomembrane, a final walk-through of the subgrade surface (ie. top of recompacted clay liner) was conducted by the Owner's Construction Manager, SECOR , the ESI Superintendent, and the Contractor's Superintendent. The walk-through was to identify any unacceptable areas or objects (rocks, ruts, ridges, and soft spots) requiring immediate attention. Once the area was deemed acceptable, the ESI Superintendent and the SECOR Senior Site Manager would complete the Subgrade Surface Acceptance form. These forms are included in this report.

6.3 GEOSYNTHETIC INSTALLATION AND DOCUMENTATION

Upon arrival to the site, ESI supplied resumes of their personnel and calibration records for their tensiometer. These documents are included in this report. Prior to the deployment of geosynthetics

on the east slope, an anchor trench was excavated using a trackhoe. The anchor trench was cut a minimum of 24 inches deep and on a 2:1 slope. Laborers removed any loose material from the bottom of the trench and rounded the inside crest of the trench. Geosynthetics were extended to the bottom of the anchor trench, which was then backfilled and compacted. The backfill material was on-site soil.

CQA personnel were responsible for documenting panel placement, trial weld testing, seam welding, nondestructive and destructive testing of completed seams and repairs, as well as visual inspection of the geomembrane. Panel thickness tests were also conducted along the leading edge of each geomembrane sheet. Field activities and observations were recorded on daily field reports. The data associated with the installation of the geosynthetics is presented in this report.

ESI's deployment consisted of unrolling the geomembrane panels from rolls supported by a spreader bar attached to a John Deere front end loader. The rolls of textured geomembrane were an average of 23 feet wide by 500 feet long. The geomembrane was deployed directly on the prepared soil liner with a minimum overlap of six inches. No horizontal seams were permitted on any slope. Panel placement information includes panel number, roll number, stationing, time, date, location of panel, and field thickness.

Trial welds were run at a minimum of one every five hours for the use of each machine, usually each morning and after lunch or when construction activities dictated. Trial welds were also conducted as different welding machines were put into production, and when a welding machine was disconnected from its power source. Trial weld "bones" were tested on a certified calibrated field tensiometer by ESI and observed by SECOR CQA personnel. Each trial weld sample consisted of testing two 1-inch "bones" for peel adhesion and two 1-inch "bones" for shear. Trial weld information included date, time, barrel, and preheat temperatures for extrusion welders, wedge temperature for fusion welders, seamer ID, tool ID, pass or fail result, and CQA Monitor ID.

For panel seaming, ESI utilized a double-tracked fusion welder to perform all major panel seaming work. The double-tracked fusion welder creates an air channel bounded by two fusion welds. The extrusion welding process was used for patches and repairs, and the tie-in to an existing geomembrane liner. This method extrudes a bead from the HDPE rod onto the clean ground edge of liner and the underlying panel. Panel seaming information includes the date, seam number (identified by the two adjacent panels), seam length, seamer ID, tool ID, seam start time, and the CQA Monitor ID.

Nondestructive testing was performed to verify seam continuity and integrity. Air pressure testing was performed on the fusion welded seams. The testing involved sealing both ends of the air channel, inserting a needle and pressure gauge into the air channel, and pressurizing the air channel to approximately 30 psi. A seam was considered acceptable, or passing, if the seam exhibited a pressure loss of 3 psi or less over a five minute testing period and the seam displayed a pressure loss at the conclusion of the test when the opposite end of the seam was pierced or cut. This testing procedure ensures continuity throughout the entire length of the seam. The seam would be tested in smaller

sections if the continuity of the seam was in question.

Nondestructive vacuum box testing was performed on all extrusion welds. The vacuum box consists of an 8 inch by 18 inch cast aluminum box, fitted with a clear viewing window and a neoprene gasket to provide the appropriate seal required for testing. A pressure gauge is installed in the interior of the box and the exterior valve is connected to a portable air compressor, which controls the vacuum. The test procedure requires that the target seam be wetted with a soapy solution, the vacuum box placed over the area, and a vacuum created over the test area. Vacuum box tests were performed continuously with a vacuum of 5 pounds per square inch for a minimum of 10 seconds. SECOR CQA personnel verified each acceptable seam segment by visually monitoring that no air bubbles were present. When bubbles appear, a leak exists which is located, repaired, and retested.

Destructive seam samples were designated and removed from welded seams at a minimum rate of one per 500 linear feet per welding machine (averaged over the area of the entire cell). The goal of this testing program was twofold: first to obtain samples that represent the overall quality of the installation and second, to test suspect areas. Each destructive sample measured a minimum of 34 inches long and 12 inches wide. The first section (18 inches by 12 inches) was sent to TRI Environmental Inc. for destructive testing, and the second section (12 inches by 12 inches) was retained in the Site's archive. Four "bones" were tested on-site (two for peel and two for shear) prior to the sample being sent to the lab. If the field testing failed, the seam was tracked back to where there were passing field tests prior to laboratory testing. If the laboratory samples failed, then the seam was also tracked back until a passing test was obtained for a particular machine. The failing seam would then be repaired and retested.

Typical repairs of the geomembrane included:

A. Patching locations of destructive seam samples and nondestructive air testing holes.
B. Repairing damage to the liner (cuts, tears, punctures, creases) created during the installation process.
C. Repairing any imperfections of the HDPE liner encountered during deployment.
D. Repairing failed field seams indicated by either failed destructive seam samples or failed nondestructive testing.
E. Burnouts and other machine malfunction locations.

A total of 43 original destructive seam samples were taken, of which five failed laboratory testing. The following table provides information on the tracking and bounding destructs.

SAMPLE ID	"BEFORE" SAMPLE	"AFTER" SAMPLE	COMMENTS
DS12 SM 31/32 @ 1+55	DS 12B SM 31/32 @ 1+45	DS 12A SM 31/32 @ 1+65	Seam reconstructed between bounding samples
DS 24 SM 41/62 @ 0+95	DS 24B SM77/78 @ 2+00	Machine 101 capped out in the after direction - machine did not weld again on the project	All seams welded by machine 101 from DS24B to end on production were capped

DS 25 SM30/72 @ 3+48	DS 23 used as before bounding sample	DS 25A SM 82/83 @ 0+10	All seams welded by machine 103 from DS 23 to DS 25A were capped
DS 34 SM 82/96 @ 0+20	DS 34B SM82/96 @ 0+09	DS 34A SM 82/95 @ 0+30	Seam reconstructed between bounding samples
DS 39 SM 25/78 @ 4+70	DS 39B on R47/112 - failed - tracked to DS 39B1 on R49/82	DS 39A R92/81	All repairs and seams welded by Gun 02 in the time frame between passing bounding samples were capped

If a seam failed destructive or nondestructive testing, the seam was repaired or reconstructed in accordance with the SLQCP.

An HDPE rub sheet was installed in the sump to the dimensions specified on the construction drawings.

Final walk-throughs were performed by SECOR personnel prior to the deployment of geonet or geotextile to ensure all the necessary repairs and testing had been completed. Any areas needing addressing were noted, completed, and checked. A Certificate of Completion for the geomembrane liner is included in this report.

After completion of the geomembrane installation, geonet and 8 oz./s.y. geotextile was deployed on the floor and 16 oz./s.y. geotextile on the slopes. The geonet seams were tied using plastic ties at intervals of five feet along the edges and every six inches on cross seams. The geotextile seams were sewn with portable hand held sewing machines using a polymeric thread with chemical and ultraviolet light resistance properties equal to or exceeding those of the textile. All geonet and geotextile materials were deployed, overlapped, and connected as specified above and in the SLQCP.

MSA surveyors provided record drawing locations of the panels, seams, destructive seam samples, repairs, leachate collection pipes, chimney drains, and protective cover.

6.4 LEACHATE COLLECTION SYSTEM

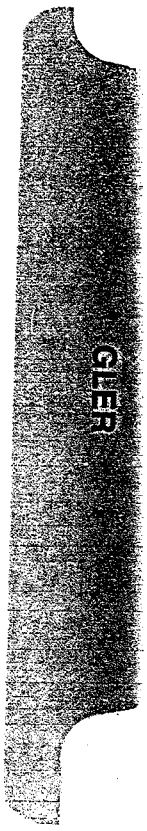
An 8 ounce non-woven polypropylene geotextile fabric was deployed in the leachate collection trench and the sump. The leachate collection trench, serving as a chimney drain, also contained a 6 inch HDPE SDR-17 pipe with $^3/_8$-inch drilled holes for leachate collection. In the sump, this pipe was connected to a solid 6-inch HDPE SDR-17 pipe which was placed up the side slope to be used as a cleanout. The sump contained a 24-inch HDPE SDR-17 riser pipe welded to a 4' x 8' x 2" HDPE flatstock placed in the base of the sump. The flatstock corners and edges were rounded prior to installation. The lower ten feet of the riser pipe was perforated with $^3/_8$-inch holes. The coarse drainage stone was placed on the geotextile in the trench and sump as detailed in the design drawings. The geotextile was then overlapped.

Preconstruction testing for the coarse drainage stone is included in the SLER. One grain-size analysis was performed on a select sample of this stone for construction testing. The testing frequency was performed at one sample per 3,000 cubic yards of material.

6.5 PROTECTIVE LAYER PLACEMENT

On-site soil was placed over the geotextile on the floor and slopes to a minimum thickness of two feet. This soil was graded with a low ground pressure (less than 5 psi) track dozer. A three foot thick road was maintained for trucks to operate on. The soil was pushed up the slope from the floor and spread with the same dozer. The construction of the protective cover was performed under the observation of the CQA technician.

MSA surveyors verified the thickness at the same grid locations as the previous surveys. At all locations checked, the minimum thickness of 2 feet of protective material was maintained. The elevations which verify this thickness are shown on the record drawing.



TEXAS NATURAL RESOURCE CONSERVATION COMMISSION
MUNICIPAL SOLID WASTE LANDFILL SITE
GEOMEMBRANE LINER EVALUATION REPORT

***** *READ THESE INSTRUCTIONS BEFORE COMPLETING THIS FORM* *****

This form is to be completed by a qualified professional experienced in geotechnical engineering and/or engineering geology who is experienced in geomembrane testing, the interpretation of these test results,and the proper methods of constructing impermeable synthetic liners that meet the requirements of the Texas Natural Resource Conservation Commission's (TNRCC) rules.

The purpose of the geomembrane evaluation requirement is to assure that ground water, as defined in the TNRCC rules, is protected from contamination resulting from the land disposal or storage of municipal solid waste. This synthetic liner evaluation is required to provide an opportunity for a professional, geotechnically qualified individual to inspect the trench or area and to document that the synthetic liner meets the TNRCC's regulatory requirements prior to filling operations.

Data and information required in this questionnaire are to provide the basis of the evaluation made by the Professional Of Record (POR). This report is to be supplemented with those quality-assurance/quality-control (QA/QC) tests as detailed in the permit's Soils and Liner Quality Control Plan (SLQCP) and shall be the basis of documentation of the quality control and acceptance of a constructed liner.

The term "geomembrane" as used in this report refers to the flexible membrane liner (or FML) as described in the TNRCC rules. The term "GLER" refers to this report form and is synonymous with the term "FMLER" as used in the TNRCC rules. The term "SLER" as used in this report is as described in the TNRCC rules and refers to either a conventional SLER or a GCLER (Geosynthetic Clay Liner Evaluation Report).

Attach additional sheets as needed, and on each sheet identify the appropriate Part and Paragraph number for each reference.

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PART A. SITE IDENTIFICATION

Permittee Austin Community Recycling & Disposal Facility

Permit No. 249-C Operational Classification Type I

County Travis

(SUBMIT THIS REPORT TO THE TNRCC IN TRIPLICATE)

SOLID WASTE MGMT.

2001 FEB 14 PM 2:32

TNRCC 10071 (8/3/98)
GLER Form

002954

PART B. GENERAL INFORMATION

1. What type of liner is required by the Permit and is it detailed in the Site Development Plan? (SDP) Approved Site Development Plan - Subtitle D.

2. Is this part of a composite liner system as defined in Subtitle D of RCRA (Resource Conservation and Recovery Act)? Yes.

3. Does the SDP require a leachate collection system (LCS) for this liner system? Yes.

4. What are the dates of the most recent SLER/GLER submittals prior to this document's submission? SLER January 2001 GLER September 1998.

5. Date of the current SLQCP that was used to develop this GLER. Revision 2b, November 1997
Does it follow the latest TNRCC guidelines? Yes.

   a. Was this plan followed? Yes.

   b. If not followed, why not? N/A.

PART C. LOCATIONS AND/OR DESCRIPTION OF AREAS CURRENTLY BEING EVALUATED

1. Attach to this report a copy of the original sectorized fill layout plan showing the areas or sectors of the landfill site currently under evaluation and noting areas previously filled. If a copy of the original site plan is not available or is determined to be inaccurate, then prepare and attach an updated site layout that identifies the areas already filled, those currently receiving waste material, and the area or areas now being evaluated, and the location designation and approval dates of prior liner evaluations. The required grid system must be shown on this drawing.

2. On a sketch(es) or drawing(s) of the area or areas under evaluation, indicate the following:

   a. Boundary lines distinguishing the bottom and sidewall areas of the trenches or fill areas being evaluated and SLER/GLER boundary markers.

   b. Site drawing showing area covered by the geomembrane, seam locations, panel numbers, location of destructive tests, all repairs, and SLER/GLER boundaries/markers.

   c. As-built elevations of the liner (if not provided in a preceding SLER or GLER for this cell/waste area).

3. Are boundary markers in place at the time of this submittal? Yes (See 30 TAC 330.55(b)(10)(A)(v) and (B)(v)).

4. Present evaluation location and area of coverage:

a. Trench, sector, or area identification or number (give grid/station boundary limits of this evaluation) N96830.98/E151221.02 N95643.20/E151431.92 N95584.40/E151401.44 N95864.72/E150857.73 N96826.60/E151196.41

b. Excavation depth 57 ft. Actual elevation of trench at: top 631 ft.; bottom 574 ft; Length of excavation at: top 1275 ft.; bottom 450 ft. Width of excavation at: top 680 ft.; bottom 325 ft., and ratio of side slopes 3 H: 1 V.

c. Total number of square feet of geomembrane liner constructed for the floor 70950 ft.^{2} and for each individual side slope: (1) W 104364 ft.^{2}; (2) E 141015 ft.^{2}; (3) _____ ft.^{2}; (4) _____ ft.^{2} (if evaluated area has more than four sides, list all others below). _____

PART D. GEOMEMBRANE MATERIALS

1. Indicate type of geomembrane used on floor and sidewalls 60 mil textured

2. Indicate geomembrane roll dimensions 23 x 500

3. Does the geomembrane material meet the specifications and the requirements given in the SDP and the SLQCP? Yes If not, please explain _____ Attach roll delivery documentation, manufacturer's certification, and conformance testing results. Provide information on Geosynthetic Inventory form (attached) if not provided elsewhere.

PART E. INSTALLATION OF THE GEOMEMBRANE LINING

A professional engineer with geotechnical experience or a member of his or her staff qualified by training and experience shall monitor liner construction, but the final evaluation must be made by the aforementioned engineer.

Describe concisely on attached sheets the field and laboratory activities performed by yourself and/or your staff to accomplish this evaluation.

1. Dates synthetic liner was constructed January 5 - 9, 2001

2. Dates the POR actually visited the site JRoy Murray - January 5, 23, 2001 Jeff Reed February 6, 14, 2001
Date of last visit made by POR? February 14, 2001

3. Dates that protective cover was installed January 23 -27,29-31, February 1-3,2001 .(Also see PART I.2. below.)

4. Name(s) of the POR's technician and dates on site Jean Wilson January 5 -27, 29-31, February 1-3,6 2001.

5. Was each panel checked for thickness by using a micrometer? Yes.

6. Was the soil subgrade rolled with a smooth-wheel roller prior to geomembrane deployment? Yes Was the subgrade maintained in a suitable condition as described in the SLQCP prior to geomembrane placement? Yes Submit subgrade acceptance certificates.

7. Were anchor trenches properly prepared? Yes.

8. Were anchor trenches backfilled? Yes.

9. Type(s) of field seaming used Fusion and extrusion.

10. Submit Geomembrane Panel Deployment Summary and Geomembrane Seam Summary forms (attached).

Part F.GEOMEMBRANE EVALUATIONS CONDUCTED DURING THE CURRENT STUDY

Provide separate summaries for the tests listed below and show locations for destructive testing and repairs. Note: The POR or his or her engineering technician shall observe all test seam procedures, field tensile testing, and non-destructive testing.

1. Were all the QA/QC tests and the rate of testing performed in conformance with the current SLQCP? Yes If not, please explain

2. Start-Up Testing

   Were peel and shear test seams made by each seamer each day at the start-up of each seaming period and after the mid-day break, for each seaming apparatus he or she used that day? Yes. Did each seamer make at least one test seam each day he or she performed seaming? Yes. Submit applicable Geomembrane Fusion Trial Seam Summary and Geomembrane Extrusion Trial Seam Summary forms (attached).

3. Non-Destructive Testing

   a. Was continuous, non-destructive testing performed on all seams? Yes.

   b. Type of non-destructive testing: vacuum box Yes, air pressure Yes, other (please explain).

   c. Submit Air Pressure Test Summary form (attached) and other non-destructive test documentation on the applicable Geomembrane Seam Summary and Geomembrane Repair Summary forms (attached).

4. Destructive Testing

a. Number of locations where destructive tests were performed 43. Total length of seaming 17783 feet. Was destructive testing performed on every 500 linear feet of seam? Yes. Attach destructive test results.

b. Minimum number of peel tests required to be performed by quality control laboratory 5 (10 for fusion). Number actually performed 5 (10 for fusion). (Dual track welds must be tested independently.)

c. Minimum number of shear tests required to be performed by quality control laboratory 5. Number actually performed 5.

d. Where are samples from each destructive test location archived? On site.

e. Submit Destructive Test Summary form (attached) and laboratory destructive test data.

5. Repairs

Were all seams which failed destructive or non-destructive testing and other areas requiring repairs repaired in accordance with the SLQCP? Yes Submit Geomembrane Repair Summary form (attached).

PART G. LEACHATE COLLECTION SYSTEM/PROTECTIVE COVER

1. Gradient of bottom of evaluated area 2.0% min..

2. Gradient of leachate collection lines 1.0%.

3. What method of placement was used for the LCS and/or protective cover over the geomembrane? Off road trucks and dozers for protective cover Off road trucks and trackhoe for drainage stone placement. Minimum 3' thick road maintained for trucks to drive on.

4. Do protective cover soils and LCS materials (trench backfill, leachate collection layer soil; drainage, filter, or cushion geosynthetics; collector pipes) meet the required specifications? Yes.

5. Attach results of any required permeability, grain size, and calcium carbonate content tests on soil drainage and protective cover materials by suppliers and independent laboratory. For geosynthetic materials attach roll delivery documentation, suppliers' certifications and test results, and results of any conformance tests required by the SLQCP. Submit Geosynthetics Inventory form (attached) if the roll information is not provided elsewhere.

6. Attach survey documentation for thickness verification of LCS and protective cover. Also attach sketch(es) showing liner/LCS/protective cover cross section.

7. Was the liner system (including LCS/protective cover placement) completed prior to your final visit? Yes

PART H. UPLIFT STABILITY

Does this liner system require any ballast to overcome hydrostatic pressure? No
If yes, submit Ballast Evaluation Report (BER) upon completion (or at end of interim period if required by the SLQCP) of ballast placement (if operating under mid-1995 revision of 30 TAC 330.203) or documentation of ballast placement with this GLER (if operating under pre-1995 rules). If waste is to be used as ballast and BER is to be submitted later, include demonstration of stability during construction (or post-construction BER if desired) with this GLER. If no ballast is required, submit documentation to substantiate that ballast is not needed. This documentation must include: (1) the seasonal high water table and how it was derived (a table showing the groundwater elevations from monitoring wells or piezometers is sufficient); (2) the depth of the excavation (Part C.2.c above); and (3) a narrative explaining why ballasting is not required with respect to the depth of excavation and the seasonal high water table elevation.

PART I. PLANS CONCERNING FUTURE EVALUATIONS

1. On what date do you anticipate the GLER for the next trench or area will be submitted? March 2001.

2. Provide an interim status report within 6 months completion of the protective cover as stated in Part E.3 above and each 6 months thereafter until the entire liner system is covered by municipal solid waste. This report should be developed by a qualified independent consultant and submitted to the TNRCC. No formal report form exists for this purpose. The integrity and required thickness of the protective cover must be verified. If erosion of the protective cover has occurred, then it must be replaced and reported as such and verified by the consultant that it meets the thickness requirement. If repairs are necessary on the synthetic liner, then these repairs must be completed in accordance with the approved SLQCP and reported to the TNRCC in a supplemental GLER.

****
****

PART J. SIGNATURE OF THE PROFESSIONAL OF RECORD

AFFIX PROFESSIONAL ENGINEER'S SEAL BELOW

Jeffrey K. Reed
(Signature)

Jeffrey K. Reed
(Typed or printed name)

2/14/01
(Date signed)

Professional of Record
(Title)

281 397 6747
(Phone number)

SECOR International, Inc.
(Company or business name)

281 293 7878
(FAX number)

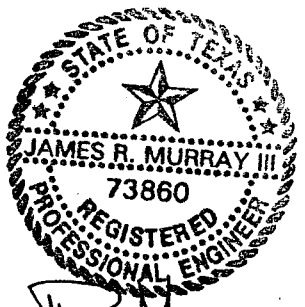
12651 Briar Forest Suite 205
Houston, TX 77077
(Address, city, zip code)

Note: The professional engineer must be registered in Texas.

****
****

PART J. SIGNATURE OF THE PROFESSIONAL OF RECORD

AFFIX PROFESSIONAL ENGINEER'S SEAL BELOW



(Signature)

James R. Murray III

(Typed or printed name)

02/14/01

(Date signed)

Professional of Record

(Title)

281 397 6747

(Phone number)

SECOR International, Inc.

(Company or business name)

281 293 7878

(FAX number)

12651 Briar Forest Suite 205
Houston, TX 77077

(Address, city, zip code)

Note: The professional engineer must be registered in Texas.

Part K. SIGNATURE OF PERMITTEE

By signing this document you are agreeing to the following regulatory requirements and policies.

1. I have read and fully understand the findings of this GLER submittal.

2. Any trench or area not covered by a previously accepted SLER document and this GLER or any prior accepted SLER and GLER documents will not be used for the receipt of solid waste.

3. The trench or area covered by this GLER document will not be used for the receipt of solid waste until written acceptance of this GLER document is received or 14 days have elapsed from the date of receipt of this GLER by TNRCC and you or your designated representative have notified the Groundwater Protection Team of the TNRCC Municipal Solid Waste (MSW) Division by telephone of your intent of usage. In this manner you will be able to determine the date of arrival of the GLER in question. To obtain a status report on this GLER submittal please call 512/239-6732.

4. The acceptance of this GLER document does not grant its usage for the receipt of solid waste without acceptance, where required, of the LCS, protective cover, and soil ballast "as built" documentation.

If the landfill operator places waste after 14 days without formal authorization or has not notified the TNRCC MSW Groundwater Protection Team of this intent and the GLER is found to be unacceptable for any reason, the operator will then be required to remove such waste and place it in an approved area until the liner is found acceptable by TNRCC.

Note: If you include your fax number along with your telephone number, we will notify you or your designated representative as soon as GLER acceptance has been determined. Verbal and/or faxed notification will be followed by written acceptance.

Rusty Fusilier
(Signature)

Rusty Fusilier
(Typed or printed name)

District Engineer
(Title)

2/14/01
(Date signed)

WM Austin Community RDF
(Company or business name)

9900 Giles Rd.
Austin, TX 78754
(Address, city, zip code)

512 272-6221
(Phone number)

512 272-9370
(FAX number)

(Phone number and FAX number if you wish preliminary notification in this manner)

IMPORTANT: Three signed, sealed, and dated copies of this form which includes 1 original copy and all attachments (drawings, comments, etc) must be provided to the TNRCC.

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SECOR International, Inc.

Certificate of Completion

Status of Certificate: **Partial**_____ **Final** X

Client: WM ACRDF Project Name: WD-4

Date: 1-23-01 Project No. 11505

Description of Work: Installation of geosynthetics associated with WD-4. Textured HDPE throughout the cell, 16oz geotextile on slopes and geonet covered with 8oz geotextile on floor. Surveyed liner quantity 341,734 sq.ft.

I hereby state the the above identified work is complete and has been installed as per the contract documents and/or the approved CQA plan.

CONTRACTOR REPRESENTATIVE

Signature: [signature] Date: 1-23-01

Name (print) Randy Story

Title: Field Supervisor

Representing: Environmental Specialties Int'l.

I hereby state that the above identified work has been inspected and that it is has been installed as per the contract documents and or/the approved CQA plan. I further state that all required field and laboratory testing has been completed and the results have been deemed acceptable by the CQA Firm. The work described above is suitable for its intended use.

CQA REPRESENTATIVE

Signature: Jean Wilson Date: 1-23-01

Name (print) Jean Wilson

Title: CQA

Representing: SECOR

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SECOR International, Inc.

Certificate of Acceptance of Soil Subgrade by Installer

Client: WM ACRDF Project Name: WD-4

Installer: ESI Project No.: 11505

INSTALLER

I, the undersigned, a duly authorized representative of ESI do hereby accept the Soil Subgrade surface covered by panel(s) 1-22 as an acceptable surface on which to install.

Randy Story — Name (print)

Signature

Field Supv — Title

1-5-01 — Date

CQA FIRM

Certificate accepted by SECOR International, Inc.

Jean Wilson — Name (print)

Signature

CQA — Title

1-5-01 — Date

SECOR International, Inc.

Certificate of Acceptance of
Soil Subgrade by Installer

Client: WM ACCOF

Project Name: WD-4

Installer: ESI

Project No.: 11505

INSTALLER

I, the undersigned, a duly authorized representative of ESI do hereby accept the Soil Subgrade surface covered by panel(s) 23-57 as an acceptable surface on which to install.

Randy Story — Name (print)

Signature

Field Supv — Title

1-6-01 — Date

CQA FIRM

Certificate accepted by SECOR International, Inc.

Jean Wilson — Name (print)

Jean Wilson — Signature

CQA — Title

1-6-01 — Date

SECOR International, Inc.

Certificate of Acceptance of Soil Subgrade by Installer

Client: WM ACRDF

Project Name: WD-4

Installer: ESI

Project No.: 11505

INSTALLER

I, the undersigned, a duly authorized representative of ESI do hereby accept the Soil Subgrade surface covered by panel(s) 58-81 as an acceptable surface on which to install.

Randy Stone — Signature — Field Supv.

Name (print) Signature Title

01-08-01

Date

CQA FIRM

Certificate accepted by SECOR International, Inc.

Jan Wilson — Jan Wilson — CQA

Name (print) Signature Title

1-8-01

Date

SECOR International, Inc.

Certificate of Acceptance of
Soil Subgrade by Installer

Client: WM ACRDF

Project Name: WD-4

Installer: ESI

Project No.: 11505

INSTALLER

I, the undersigned, a duly authorized representative of ESI do hereby accept the Soil Subgrade surface covered by panel(s) 82-119 as an acceptable surface on which to install.

Randy Story — Signature — Field Supv.

Name (print) Signature Title

1-9-01

Date

CQA FIRM

Certificate accepted by SECOR International, Inc.

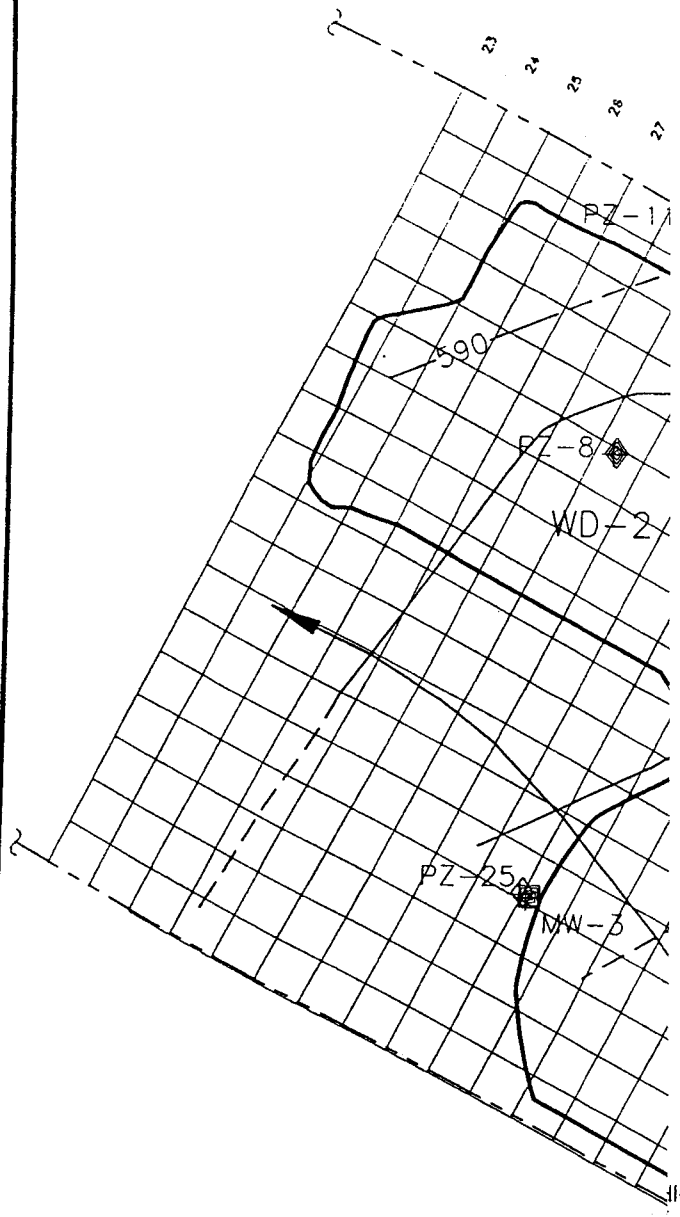
Jean Wilson — Signature — CQA

Name (print) Signature Title

1-9-01

Date

002968



EXISTING PIEZOMETER

DECOMISSIONED PIEZOMETER

CURRENT MONITORING WELL

POTENTIOMETRIC SURFACE ELEVATION CONTOUR (in feet msl)

POTENTIOMETRIC SURFACE ELEVATION CONTOUR (dashed due to lack of control points and intersection with waste unit boundary).

GROUND WATER FLOW DIRECTION

PHASE LIMITS

LANDFILL LIMITS (EAST HILL)

IGH WATER TABLE WILL BE
TIME OF EACH CONSTRUCTION
PZ L BE ADJUSTED UPWARD IF
ER LEVELS.

200 0 200 400 600

SCALE IN FEET

REV	DATE	DESCRIPTION

SHEET TITLE: SEASONAL HIGH WATER TABLE

PROJECT TITLE: AUSTIN COMMUNITY RECYCLING AND DISPOSAL FACILITY BALLAST EVALUATION REPORT. PERMIT NO. MSW-249C TRAVIS COUNTY, TEXAS

CLIENT: WASTE MANAGEMENT

SCS ENGINEERS
STEARNS, CONRAD AND SCHMIDT CONSULTING ENGINEERS
221 CONGRESS AVENUE, SUITE 1900, AUSTIN, TEXAS 78701-3428
PH. (512) 480-4567 FAX NO. (512) 480-4539

PROJ. NO. 1699007.00 | DES. BY: | CHK. BY: SCS | QA REV. BY: WRF | DWN. BY: WRF | APP. BY: RAD

FILE NAME: HI-WATER.DWG

DATE: SEPTEMBER 1999

SCALE: AS-SHOWN

FIGURE NO: 1

003180