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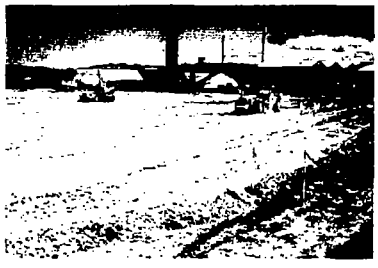

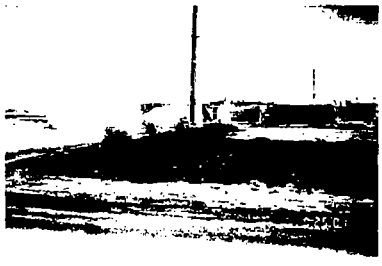

FINAL CONSTRUCTION REPORT FOR THE ASARCO EAST HELENA PLANT

CORRECTIVE ACTION MANAGEMENT UNIT (CAMU) - PHASE 1 CELL CONSTRUCTION PROJECT

PREPARED FOR:

ASARCO INCORPORATED
EAST HELENA, MONTANA

Hydrometrics, Inc.
Consulting Scientists, Engineers, and Contractors

JANUARY 2002

FINAL CONSTRUCTION REPORT FOR ASARCO EAST HELENA PLANT CORRECTIVE ACTION MANAGEMENT UNIT (CAMU) - PHASE 1 CELL CONSTRUCTION PROJECT

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January 2002

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(MAP POCKET IN BACK OF REPORT)

FINAL CONSTRUCTION REPORT FOR ASARCO EAST HELENA PLANT CORRECTIVE ACTION MANAGEMENT UNIT (CAMU) - PHASE 1 CELL CONSTRUCTION PROJECT

1. INTRODUCTION

This document and its appendices are the Final Construction Report for the Corrective Action Management Unit (CAMU)-Phase 1 Cell at the Asarco East Helena Plant in East Helena, Montana. This report was prepared to summarize construction of the CAMU-Phase 1 Cell Project. Plans and specifications for the project are in the Construction Documents for CAMU-Phase 1 Cell Project for the Asarco East Helena Plant (Hydrometrics, October 2000). Design criteria and design summary are described in detail in the Asarco East Helena CAMU-Design Analysis Report (Hydrometrics, July 2000).

Project construction commenced May 2001 and was completed by November 21, 2001. Project construction included the work generally described as follows:

- Construction of a Resource Conservation and Recovery Act (RCRA) Landfill. Loading, transporting, placing and compact designated soils (with elevated metal content) and construction debris in the landfill;
- Closure of the landfill;
- Construction of associated surface water and erosion controls, access road improvements, railroad crossing improvements, re-vegetation of newly constructed and disturbed areas, facility fencing, health and safety requirements, site access and haul controls (including traffic control) and construction surveys.

1.1 PROJECT HISTORY

The CAMU-Phase 1 Cell project history is summarized in Table 1-1. The project construction schedule (Exhibit 1) is in a map pocket at the back of this report.

TABLE 1-1. PROJECT HISTORY SUMMARY

May 5, 1998	Asarco and EPA entered into Consent Decree to further the objectives of the RCRA and CWA.
April 1999 (revised July 1999)	Interim Measures Work Plan for Asarco East Helena facility submitted to EPA.
April 1999 (revised July 1999)	Preliminary CAMU Design Analysis Report submitted to EPA.
October 27, 1999	EPA approves Preliminary CAMU Design Analysis Report.
March 2000	Supplemental Sediment & Soil Stockpile Data Report submitted to EPA.
July 28,2000	Final CAMU Design Analysis Report submitted to EPA.
October 2000	Project Contract Documents submitted to EPA.
October 10, 2000	EPA issues comments on Final CAMU Design Analysis Report.
October 26, 2000	Pre-Bid Conference with prospective bidders.
November 30, 2000	Bid Opening.
December 5, 2000	Notice of Award to Envirocon, Inc.
December 19, 2000	Asarco enters Agreement of Understanding with Montana Rail Link for railroad improvements at crossings required for CAMU project construction.
January 22, 2001	Letter from MDEQ regarding potential asbestos issues.
January 31, 2001	Asarco meets with Lewis and Clark County Road and Bridge Department to review county road access issues and permit requirements.
February 1, 2001	EPA approves Final CAMU Design Analysis Report with Contract Documents.
February 5, 2001	Asarco respond to MDEQ regarding potential asbestos issues during CAMU construction.
February 28, 2001	Hydrometrics completed pre-construction soil testing grid survey and staking.
March 12, 2001	Hydrometrics completed pre-construction soil testing sampling. Began soil testing.
April 5, 2001	CAMU Pre-Construction Meeting with Asarco and Hydrometrics.
April 5, 2001	Lewis & Clark County approves proposed access road improvements.
April 10, 2001	Asarco submits a storm water construction permit to MDEQ for CAMU construction project.
May 4, 2001	CAMU Pre-Construction Meeting with Asarco, Envirocon and Hydrometrics.
May 11, 2001	CAMU Clay-Rich Soil Delineation Testing for CCL Construction submitted to EPA.
May 17, 2001	Contract Negotiations completed, Contract signed, Issued Notice To Proceed.

TABLE 1-1. PROJECT HISTORY SUMMARY (continued)

May 2001	Envirocon submittals: Traffic Control Plan, Dust Control Plan, Health and Safety Plan, Quality Control Plan, Storm Water Control Plan.
May 24, 2001	Envirocon begins Mobilization to site for CAMU construction project.
May 29, 2001	Construction layout survey begins.
May 31, 2001	Envirocon begins topsoil removal and stock piling.
June 4, 2001	Some erosion control features placed (silt fence, ditches, straw bales).
June 6, 2001	Topsoil removal completed, topographic survey completed.
June 6-7, 2001	42" diameter access road culvert installed (south crossing). Access road improvements begin.
June 7, 2001	Runoff control pond excavated.
June 7, 2001	Envirocon material submittals: Asphalt mix design, 1.5" crushed base course material, HDPE, geonet, geotextile (GP Environmental).
June 11, 2001	Earthwork subcontractor, A.M. Wells, mobilizes scrapers to the site. Began subsoil excavation and stockpiling.
June 11, 2001	All erosion control features in place (silt fence, ditches, straw bales).
June 14, 2001	A.M. Wells completed subsoil excavation and stockpiling. Began excavating and stockpiling soils from CAMU cell. Clay-rich soils segregated from non clay-rich soil per the Material Handling Plan.
June 14 to 18, 2001	MRL subcontractor constructs railroad crossing improvements.
June 15, 2001	Envirocon material submittals: HDPE, geonet, geotextile (Northwest Lining). Envirocon to use different liner subcontractor.
June 16-18, 2001	36" x 48" CMPA access road culvert installed (North crossing).
June 22, 2001	Began access road base course placement and compaction.
June 28, 2001	Completed excavation of CAMU cell, topographic survey completed.
June 28 to 29, 2001	Access road pavement.
June 29, 2001	Began compacted clay liner (CCL) installation.
July 3, 2001	Oversized materials found in CCL. Meetings with EPA. Envirocon directed to remove all but the first 6" lift of CCL.
July 9, 2001	Screening plant set up. Recommence CCL construction.
July 25, 2001	Began installation of Geomembrane liner systems in CAMU cell
August 2, 2001	Complete installation of CCL.
August 7, 2001	Installation of Geomembrane liner systems was substantially complete. Topographic survey completed.
August 7, 2001	CAMU leak detection systems installed.
August 7, 2001	Begin hauling, placing and compacting Lower Lake sediments as first layer of waste material in the CAMU.
August 15, 2001	Remaining portions of the geomembrane liner system completed.
September 25, 2001	Debris removal in the area between Upper and Lower Lakes is completed, site grading begins.

TABLE 1-1. PROJECT HISTORY SUMMARY (continued)

September 27, 2001	Complete hauling, placing and compacting waste material in the CAMU.
October 2 to 6, 2001	Install gas migration layer. Pipe vents and vent system installed.
October 5 to 7, 2001	Ore Storage Yard site grading.
October 3, 2001	Northwest Lining began GCL and 40 mil HDPE cap installation.
October 10-12, 2001	Install cap drainage sand layer.
October 10, 2001	Cover soil installation began.
October 11, 2001	All GCL and 40 mil HDPE installation and testing completed.
October 22, 2001	Installation of toe drain pipe in anchor trench.
October 24, 2001	Cover soil installation substantially complete.
October 30, 2001	Subsoil and topsoil installation.
October 31, 2001	Permanent storm water run-on diversion installed uphill of CAMU.
October 31, 2001	Project construction is substantially complete.
November 1, 2001	Final inspection with Envirocon, Asarco and Hydrometrics.
November 2, 2001	Envirocon begins demobilization.
November 6, 2001	Final inspection with EPA.
November 9, 2001	Excess excavated soil stockpiles blended into agricultural land and covered with topsoil. Grass-Lands begins cultivation.
November 9, 2001	Seed bed preparation.
November 9, 2001	Fertilize and disc disturbed agricultural land areas.
November 12, 2001	Chain link fence installed around CAMU by Fence Works.
November 15, 2001	Seed, fertilize and mulch disturbed areas.
November 16, 2001	All bid items completed, Contractor demobilized from site.
November 16, 2001	Mulch was crimped into seedbed.
November 20, 2001	Short punch list provided to Envirocon.
November 21, 2001	Chain link gates installed at access roads.
November 21, 2001	Punch list items completed by Envirocon.
November 21, 2001	Project accepted as 100% complete.
January 8, 2002	Draft Final Report is electronically submitted to Asarco for review and comment.
January 15, 2002	Review draft Final Report with Asarco.
January 16, 2002	Final Report submitted to Asarco.
January 18, 2002	Final Report submitted to EPA.

1.2 REPORT ORGANIZATION

This report is intended to provide a concise summary of the construction of the CAMU-Phase 1 Cell. Additional detailed information is provided as appendices to this report. Appendices are as follows:

- APPENDIX A CONSTRUCTION CONTROL PLANS
- APPENDIX B QA/QC TESTING RESULTS
- APPENDIX C MANUFACTURERS' LITERATURE AND CERTIFICATIONS
- APPENDIX D PROJECT VIDEO
- APPENDIX E AS-BUILT DRAWINGS
- APPENDIX F PHOTO LOG

1.3 REPORT DISTRIBUTION

Copies of this report and all appendices are on file at the Environmental and Engineering Departments at Asarco East Helena Plant. A full set of construction photos, the QA/QC inspector's daily diary and all shop drawings are on file at the Hydrometrics' Helena office.

1.4 PROJECT MANAGEMENT ORGANIZATION

The project management organizational chart used during project construction is included as Figure 1-1. The construction prime contractor and subcontractors are listed in Table 1-2.

1.5 WORK DESCRIPTION

This section provides a narrative description of the CAMU Phase 1 Cell construction project.

1.5.1 Debris Sorting in the Area Between Upper and Lower Lakes

Prior to contract award in March, April and May 2001, Envirocon sorted and stockpiled debris in the area between Upper and Lower Lakes. An excavator and cutting torches were used to sort the debris and to reduce large metal pieces to sizes that were easier to handle.

Figure 1-1. Organization Chart

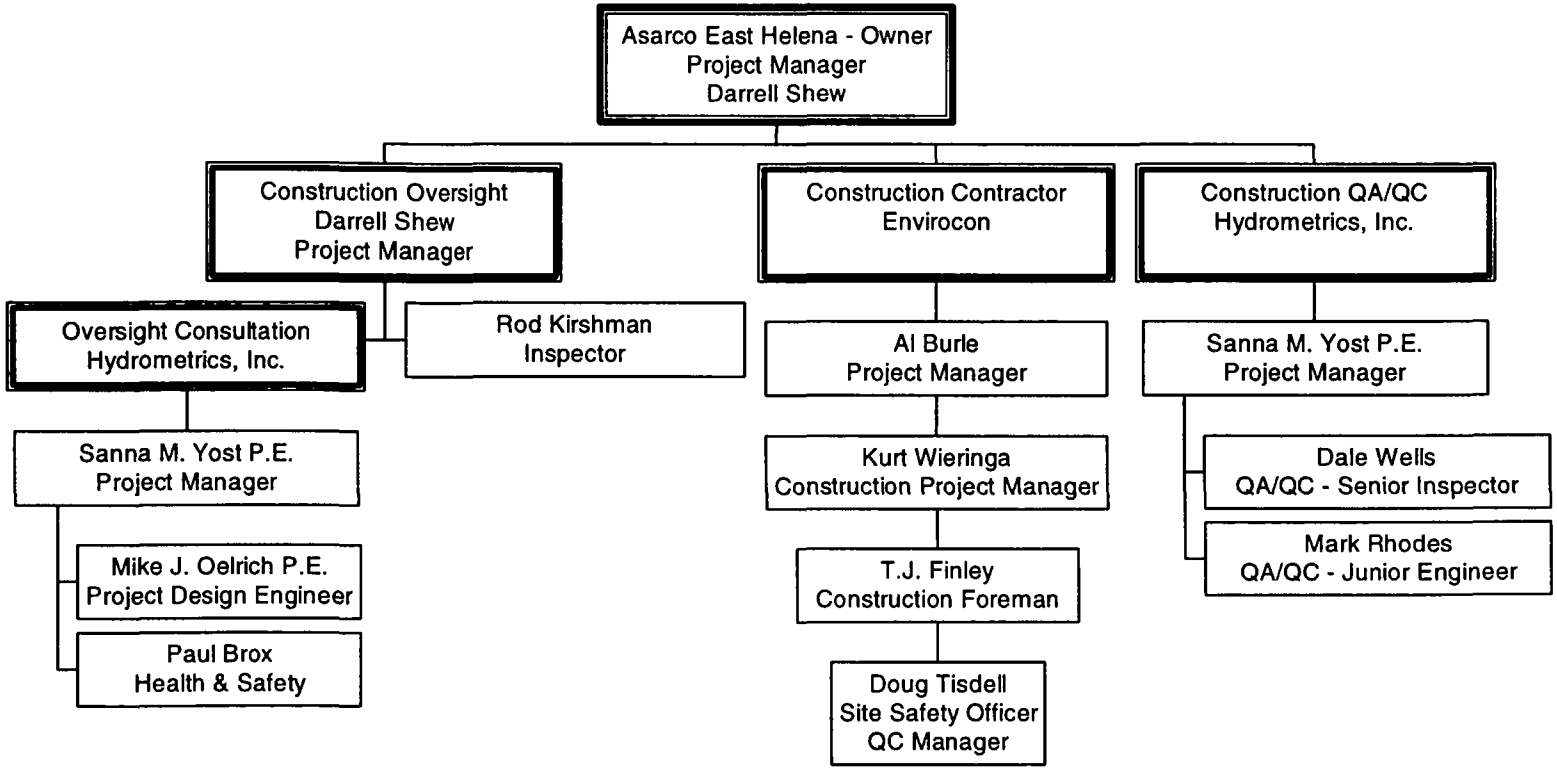

TABLE 1-2. CONSTRUCTION CONTRACTORS

Prime Contractor

Envirocon, Inc.
500 Taylor Street
Missoula, MT 59802
Phone: (406) 523-1150
Fax: (406) 523-1197
Contact: Mr. Kurt Wieringa, Project Construction Manager

Subcontractors

Surveyors:
Morrison and Maierle Engineering
Helena, Montana

Subsoil stripping and the subsequent cell construction work:
A.M. Wells
Norris, Montana

Geomembrane Liners, Geonet, GCL:
Northwest Linings
21000 77th Ave. South
Kent, WA 98032
Phone: (206) 872-0244
Fax: (206) 872-0245
Contact: Larry

Sand, Asphalt, Base Course Aggregate
Helena Sand and Gravel
900 Gibbon
Helena, MT 59601
Contact: Rich Jorgenson

Seeding:
Grass-Land
1821 Kelly Road
Helena, MT 59601
Contact: Duane Noel

Fencing:
Fence Works
Missoula, Montana 59801

1.5.2 Construction Surveys

On May 29, 2001, surveyors from Morrison and Maierle Engineering of Helena, Montana initiated the construction activities by performing the layout staking of the CAMU cell. Offset reference points were set by the surveyors to indicate the location of the top of cut for the cell excavation including the depth of cut to the cell bottom. Cell bottom coordinates were included on the plans to aid the surveyors in performing the layout. The excavation was staked for a 3:1 slope from the existing ground elevation to the toe coordinates provided on the plans. The final layout survey and reference point staking was completed on May 30, 2001.

1.5.3 Culverts Associated with Access Roads

Access roads were constructed across the borrow ditch on the south side of the county road south of the Plant. A 31-inch by 50-inch corrugated metal pipe arch (CMPA) was installed through the northern access road embankment and a 42-inch diameter corrugated metal pipe (CMP) was installed through the southern access road embankment.

Construction activities performed concurrent with the topsoil and subsoil stripping included installations of access road culverts, construction of railroad crossings, placement of temporary erosion control measures and access road paving. Envirocon was contracted to obtain county road crossing permits and install corrugated metal culverts (CMP) in two locations on the south side of the county road. Sixty lineal feet of 42" CMP was installed at the east entrance of the CAMU site across from the Asarco contractor's gate. Reject material obtained from the CAMU excavation was used for backfill and compacted in 1-foot lifts. Compaction tests results for the culvert backfill are included in Appendix A. Installation of the east 42" CMP was completed on June 7, 2001 and excavation began to install a culvert on the west entrance across from the proposed Ore Storage Yard haul road gate. The second culvert was originally scheduled to be a 31"x 50" CMPA but the size was not readily available. A 36" x 48" CMPA was approved as a substitute and installation of sixty lineal feet of culvert completed on June 18, 2001. Compaction test results for the culvert backfill are included in Appendix B.

1.5.4 Railroad Crossing Improvements

Railroad crossing improvements were completed at the two locations where the access roads crossed the existing tracks. Montana Rail Link (MRL) required that their crews perform the improvements. The two railroad crossings were completed by June 18, 2001.

1.5.5 Access Roads

Following completion of the railroad crossings and culvert installations, the base coarse placement and asphalt paving for the access roads proceeded. The access roads were constructed of 4-inches of asphalt placed on a prepared surface of 6-inches of base coarse. Base coarse placement and compaction began on June 22, 2001 followed by paving on June 28, 2001. Helena Sand and Gravel performed the asphalt paving and completed their work on June 29, 2001.

All haul routes were paved and maintained throughout the project. The paved access roads were 30 feet wide and will consist of 4 inches of asphalt and 6 inches of crushed base course over a compacted subgrade or embankment. Access road embankment and installation of a chain link gate with associated fencing adjustments to the existing fence were needed at the plant boundary for the northwestern access road.

1.5.6 Cell Excavation

Topsoil removal and stockpiling began on May 31, 2001 with two Moxy MT-30 articulated trucks hauling topsoil to a stockpile location designated on the Material Handling Plan. Envirocon utilized a Komatsu D65PX dozer to strip the topsoil and a Komatsu WA-450 loader to load the topsoil into the Moxy trucks. A 5000-gallon water truck equipped with a spray bar provided dust control. Topsoil removal was completed on June 5, 2001 and a topographic survey of the excavated area completed. The original design proposed a removal depth of 1-foot within a 5-acre area generating a volume of approximately 7,955 cubic yards. The final area of topsoil stripping was determined by survey to be 214,796 square yards (4.93 acres) with a measured stockpile volume of 6,185 cubic yards.

A.M. Wells of Norris, Montana was employed as a subcontractor to perform subsoil stripping and the subsequent cell construction work. The subcontractor mobilized two Terex TS-24 scrapers to the site on June 11, 2001 and began stripping and stockpiling subsoil. Subsoil was removed an additional two feet below the topsoil removal zone and stockpiled at a location designated on the Material Handling Plan. Persistent equipment breakdowns hindered the progress of the work but subsoil removal was finally completed on June 13, 2001. A topographic survey of the site was conducted to provide information for record drawings and to determine the volume of soil removed. The quantity of subsoil removed and stockpiled was calculated from the survey as 5,254 cubic yards.

Showers delayed the start of cell excavation until June 14, 2001 and recurring scraper breakdowns initially impeded progress. A.M. Wells eventually delivered a third, but smaller, TS-14 Terex scraper on June 15, 2001 to provide additional support and to be used as a backup scraper in case of future breakdowns. Excavation proceeded slowly but steadily beginning at the southeast side of the cell and moving northwest. Based on visual determination for clay content, scraper loads were directed to stockpiles designated for clay-rich material or reject soil material. These stockpiles were built at a location designated in the Material Handling Plan. As excavation progressed, it became evident that the CAMU site was characterized by a series of ancient meandering stream channels with the gravelly reject material occurring primarily in the channels. The ribbons of sand/gravel were approximately 3-feet wide and angled across the cell excavation from the west corner to the east corner. As the channels were exposed, they were identified and marked out for the scraper operators to excavate prior to removing the clay-rich material. Larger areas of sand/gravel were also identified during excavation and the material utilized for culvert backfill and haul road construction.

Cell excavation with the scrapers proved to be slower than anticipated so beginning on June 19, 2001, Envirocon augmented the scraper's efforts with the addition of two Moxy articulated trucks loaded with a Komatsu PC400LC excavator. The excavator demonstrated that it was better suited at separating the reject material from the clay-rich while maintaining a reasonable cycle time to the stockpile area. Cell excavation production was expedited and

subgrade work substantially completed by June 28, 2001. A survey to verify cell floor elevations was performed by Morrison and Maierle and total excavation quantity of 70,741 cubic yards determined by a computer. Following some minor grade adjustments, a final survey confirmed that the cell floor was constructed to the lines, grade and slope specified. The sides and bottom of the CAMU excavation were compacted with a Caterpillar CS-563 vibratory roller and the surfaces tested for compaction using nuclear density (ASTM D2922) and sand cone density (ASTM D1556) methods. The subgrade was subsequently accepted as being in conformance with the specifications and the Contractor given approval to begin installation of Compacted Clay Liner (CCL).

1.5.7 Temporary Erosion Controls

The Contractor was responsible for providing temporary erosion control measures which included preparation of a project Erosion Control Plan, acquisition of a MPDES storm water discharge permit and installation and maintenance of all construction BMP's. The project Erosion Control Plan and discharge permit are in Appendix A of this report. Preliminary project erosion control measures were in place by June 11, 2001 and included construction of temporary run-on diversion ditches around the perimeter of the site, construction of a runoff control pond and installation of a perimeter silt control fence. Additional erosion and pollution control measures were actuated as construction progressed and included placing a temporary cover over the cell during waste placement, dewatering excavations and maintaining positive drainage during construction.

Temporary run-on diversion ditches were constructed to prevent flow onto the construction site. Silt control fence were installed around the perimeter of the site. During construction, the Contractor had a temporary cover on site to place over the cell in the event of a significant probability of a rainfall event. The temporary cover was used until the cell was capped with a geomembrane. Runoff was not allowed to contact waste materials in the cell. Runoff contacting disturbed areas or from the top of the cover over waste materials were routed to the runoff control pond. The compacted clay liner (CCL) and waste material were kept as dry as possible to minimize potential landfill leachate.

1.5.8 Construction Controls

Envirocon prepared and submitted the following items in May 2001: Traffic Control Plan, Dust Control Plan, Health and Safety Plan, Quality Control Plan, Storm Water Control Plan. These plans are in Appendix A of this report.

1.5.8.1 Health and Safety Requirements

The Contractor prepared, submitted and maintained a written Site Health and Safety Plan (Site H&S Plan). The project Site H&S Plan is in Appendix A of this report. The Site H&S Plan was submitted on May 1, 2001 and was approved within the week. It was the Contractor's responsibility to implement the safety program to protect workers from all health and safety hazards associated with this project. Health and Safety training requirements for Contractor workers were dependent upon the type of work being performed. There were three distinct types of trained workers needed to complete project work.

Work was performed in accordance with the following:

- Special Provision Section 110 Safety
- OSHA 29 CFR 1926.65 (HAZWOPER)
- OSHA 1926.62 (lead)
- OSHA 1926.1118 (arsenic)
- OSHA 1926.1127 (cadmium)
- All applicable regulations and specifications

Work Included:

- Identifying and meeting all safety standards that are applicable to this project;
- Providing all personnel working on the project with required orientation and training on the potential hazards anticipated and the appropriate use of safety equipment;
- Providing adequate proof of required employee HAZWOPER training requirements;

- All Contractor employees working on the Asarco East Helena Plant site and/or handling materials being placed into the CAMU repository attended the Asarco Contractor Safety training session;
- Conducting monthly and weekly safety meetings;
- Developing and maintaining for the duration of work activities at the Site, a written Site Health and Safety Plan that effectively incorporated and implemented all applicable requirements;
- As part of the Site Health and Safety Plan, developing and maintaining for the duration of work activities at the Site, a written monitoring program that provided information necessary to comply with relevant worker health and safety regulations;
- Making appropriate corrective actions as required for compliance;
- All required reporting;
- Providing all required personal protective equipment with the exceptions of required respirators and coveralls;
- Providing a full time Site Safety Officer; and
- During waste placement phase, Contract employees showered prior to leaving the job site.

Site Safety Officer

Envirocon's Dan McCafferey initially served as their Site Safety and Health Officer for the project. Doug Tisdell served as Envirocon's Site Safety and Health Officer after mid-June 2001. The site Safety and Health Officer was present on-site at times during the period of time during waste excavation and placement in the CAMU repository until final covering of the repository with GCL/HDPE.

Personal Air Monitoring

Envirocon collected personal air monitoring samples to determine worker exposures to lead, arsenic, cadmium and asbestos. The air samples were sent to the Asarco lab in Salt Lake City for analysis. Personal air monitoring was completed using OSHA standard methods. The

monitoring frequency was done in accordance with OSHA standards for lead, arsenic, cadmium and asbestos.

Personal Protective Equipment

As part of the Site Safety and Health Plan, the Contractor was responsible for contractor workers wearing required Personal Protective Equipment (PPE). Workers wore the required PPE including a hard hat, safety glasses, hard-toed boots, coveralls, and respirator. Personal air monitoring test results showed that respirators were not required for project work at the CAMU site. Until air monitoring tests were available, respirators were used when driving vehicles, when dust was in the air, when operating equipment, when handling materials destined for the CAMU repository, when handling any ground materials within the plant site, when stripping and handling topsoil material at the CAMU site.

Asarco provided clean respirators and coveralls and respirator fit testing services. Envirocon was responsible for ensuring all other PPE was available.

Medical Monitoring

Envirocon was responsible for the Contractor employees medical monitoring program. For Contractor employees on this Site for more than 30 days, an initial medical examination and biological monitoring was required according to the OSHA standards for lead, arsenic, cadmium and asbestos. For Contractor employees on site for less than 30 days, only an initial blood lead analysis was required per the OSHA lead standard, unless the Contractor employee was exposed to these substances for more than 30 days in the past 12 months.

Envirocon was also responsible to provide Contractor employees a medial examination to determine the employee's ability to use a respirator. The Asarco's Contractor Safety Training was modified to address site requirements for working while the plant was in temporary closure status during the entire construction period.

Envirocon was responsible for subsequent medical monitoring including biological monitoring for lead every two (2) months for the first six (6) months of exposure. In addition to the requirements of OSHA standards, all Contractor employees were required to receive subsequent medical examinations using medical procedures covered in the OSHA standards for lead, arsenic, cadmium and asbestos every six (6) months.

For each employee, Envirocon provided Asarco with a statement from a licensed physician indicating that the employee could work in a lead, arsenic, cadmium and asbestos environment and that the employee is capable to use a respirator. Also, Envirocon provided Asarco with copy of each employee's biological monitoring results.

Training

Contract workers were required to receive training according to the OSHA HAZWOPER, lead, arsenic and cadmium standards. Contract workers were also required to receive training according to the OSHA asbestos standard. Envirocon provided Asarco with copies of each employee's HAZWOPER training certificates prior to beginning construction. Specific HAZWOPER training certificates included the initial 40-hour, initial 8-hour supervisory training for supervisors, and current 8-hour refresher training. These submittals are on file. All Contractor workers were required to attend Contractor Safety Training provided by Asarco. This training covered the potential hazards workers might encounter while on the plant site (including health hazards associated with lead, arsenic and cadmium), modified site rules, and emergency alarm systems and escape routes. Envirocon was responsible for providing its workers training regarding requirements of the Site Specific Health and Safety Plan. Envirocon gave Asarco documentation of each Contractor employee receiving this and all other required OSHA training specific to activities on this project.

Decontamination

After loading, hauling, placing and /or compacting waste materials, construction workers were required to shower prior to leaving the project site. Shower and change facilities were set up in a portable trailer near the Envirocon field office adjacent to the south/east

Contractor's gate. Construction equipment leaving the project site was cleaned using the wash bay facility located at the plant site.

1.5.8.2 Quality Control Plan

Envirocon prepared and submitted a Quality Control Plan (QCP). The project QCP is in Appendix A of this report. Asarco and Hydrometrics reviewed and commented on the QCP. It was revised, resubmitted and approved by May 15, 2001. Envirocon's Quality Control Plan identified the personnel, procedures, instructions, records, forms, and a description of the Quality Control management organization including an organizational chart. A copy of a letter, signed by an authorized official of the firm, which describes the responsibilities and delegates the authorities of the Quality Control manager were furnished. Envirocon's Doug Tisdell (Dan McCafferey initially served as QC manager) served as their Quality Control manager as well as the Site Safety and Health Officer.

The Quality Control Records contained a record of daily inspections for all work accomplished. Specific items of work checked each day were annotated. All work-in-place was certified as complying with the contract plans and specifications. Non-compliance items were clearly noted. Corrective actions were outlined and detailed for non-compliance items. Envirocon maintained daily records, which were on-the-job site and available for review by Asarco. Daily reports were signed by the designated Quality Control Manager and indicated hours spent on Quality Control that day. Copies of the QC daily reports were given to the Asarco.

Asarco provided the following items:

1. Nonpotable water for dust control and compaction;
2. Initial survey monuments and bench marks;
3. Quality control tests and compaction tests;
4. During the Waste Placement Phase and topsoil salvage and replacement tasks:
    a. Coveralls;
    b. Respirators;

c. Respirator fit tests; and

d. Site Specific Health and Safety training.

5. Asarco laundered coveralls and cleaned and maintained respirators daily during Waste Placement Phase and topsoil salvage and replacement tasks; and
6. Asarco provided a change room, a shower facility and a lunchroom (portable trailer) during the Waste Placement Phase and topsoil salvage and replacement tasks.

1.5.8.3 Site Access And Traffic Controls

Envirocon controlled public access to the CAMU site during construction. Temporary orange poly fence (safety fence) was installed around the perimeter of the CAMU construction site to prevent access by the public and wildlife. Safety fence and silt control fence was mounted on the same fence posts. Temporary locking gates were installed at site access points. Envirocon provided all traffic control associated with hauling and other construction activities between the plant and the CAMU site.

1.5.8.4 Dust Control

A Dust Control Plan was prepared and submitted to Asarco for approval. The plan addressed minimizing the creation and spread of dust during the excavating and loading on the plant, and placing and compacting activities in the CAMU and stockpiles. Watering was required during hauling, placing and compacting activities as needed for dust control. Asarco supplied non-potable water for compaction and dust suppression at fill station standpipes on the plant. Envirocon transported water to the point of use. A chemical compound was sprayed on loaded trucks to minimize dust during loading and hauling activities. Dust control for hauling operations on paved access roads is under a separate item.

1.5.8.5 Haul Road Maintenance

During hauling operations, Envirocon continuously swept the access roads using a dry vacuum sweeper during hauling operations. Solid bottom hauling vehicles were used to minimize leakage potential.

1.5.9 Runoff Control Pond

The runoff management system collected and controlled more than the water volume resulting from a 24-hour, 25-year storm (0.26 acre-feet). A 0.41 acre-feet runoff control pond was constructed down gradient from the CAMU. The pond's overflow channel, for events with runoff exceeding the available pond storage capacity, was lined with rock riprap. Topsoil was stripped and stockpiled from the proposed pond location. After pond excavation in June 2001, the pond was left in place throughout the project. Topsoil was replaced over the pond area at the end of the project, at same time topsoil was placed on the CAMU. The slopes and bottom of the pond were seeded, fertilized and mulched.

1.5.10 Compacted Clay Liner

The placement of the Compacted Clay Liner (CCL) began in earnest on June 29, 2001 using two scrapers and two Moxy trucks to import the clay-rich material from the stockpile to the cell. A Komatsu dozer and a Caterpillar motor patrol bladed the soil to a uniform lift in preparation for watering and processing. A Versatile Model 835 4x4 tractor with attached heavy-duty military-style construction disk incorporated water that was provided by two water distribution trucks. Two Caterpillar CS-563 vibratory rollers followed the moisture adjustment process to provide compaction. In place density and moisture testing was performed using shallow depth nuclear test methods (ASTM D2219) to monitor the result of the placement efforts. The Troxler 3400 nuclear gage used for performing the tests was checked periodically using Sand Cone density tests (ASTM D1556) and oven soil moistures tests (ASTM D2216). Results of the CCL compaction tests are included in Appendix B.

Initially, construction of the first 6-inch lift was impeded as Envirocon worked to determine a suitable material placement and processing method that would achieve acceptable moisture and compaction results. Envirocon was required to remove and replace material that failed to meet specification requirements until a sequence of operations achieved acceptable test results. Once this was accomplished, progress improved until it was perceived that the clay-rich material imported from the stockpile contained unacceptable oversize material. The project's CCL specification stipulated, "Cobbles and rock fragments having maximum dimensions of more than 2-inches shall not be used in the liners". Envirocon, using a skid

loader equipped with a rock picker and employing manual labor, was unable to remove sufficient oversized material to meet the specification. On July 3, 2001, the clay liner installed to date was rejected and Envirocon was directed to remove all but the first 6-inch lift. The A.M. Wells scrapers proceeded to excavate the previously installed CCL and remove the material for placement in a separate stockpile. Following removal of the rejected material, confirmation compaction testing was completed and a survey was performed to verify that the cell was at the required elevation before resuming CCL construction.

1.5.11 Screening Plant

Concurrent with removal of the rejected clay liner, Envirocon delivered and set up a screening plant at the site to begin production of material in compliance with the CCL specification. After several days of plant adjustments and preparatory production screening, a sufficient stockpile of material was generated to efficiently resume the work. Hauling, processing and compaction of the screened material commenced at the southeast side of the CAMU excavation and proceeded in staggered 6-inch lifts to the northwest side of the cell. Lift thickness was verified by survey methods and compaction testing performed at the specified frequency. Worked progressed steadily across the floor until half of the cell was completed to depth and accepted for liner installation. Subsequently, as liner installation progressed on the approved sections of the CCL, placement of the clay liner continued on the northwest half of the floor, the leachate collection trench and on the cell slopes.

Ultimately, the screening operation would generate a stockpile of 2,408 cubic yards of material as determined by a topographic survey. Gradation tests performed on the samples taken from the stockpile indicated that less than 1% by weight was actually oversized material with the remainder of the screened material being balls of clay. This created some concern since in the process of meeting the cobble and fragment specification, the most desirable material was being removed. Screening of the clay-rich pile continued, however, and the stockpile was eventually hauled to the area between Upper and Lower Lakes and utilized as clay cap material.

1.5.12 Geosynthetic Liner System

Liner installers from Northwest Lining of Kent, Washington were on site July 16, 2001 performing preliminary work in preparation to begin liner installation. Supervision of liner material delivery, anchor trench excavation and fabrication of sandbags for ballast was completed prior to layout of the first 60-mil high-density polyethylene (HDPE) liner. Delays caused by inclement weather and the additional time required to complete construction of the CCL on the southeast slope prevented commencement of liner installation until July 25, 2001. Once liner placement began, it progressed proficiently across the southeast half of the cell. As specified, only the amount of geomembrane that could be seamed during the same day was laid out. The seams of the 60-mil HDPE were oriented down and parallel to the line of the slope with butt seams at least ten feet from the toe of the slope as shown on the panel layout submittal. Seams were welded with an automatic heat-fusion wedge welder and Northwest Lining provided a seam numbering system compatible with their panel numbering system to aid in identification of seam test samples. After the seams were fusion welded, air channel tests were conducted along the length of each seam to guarantee an airtight weld. The seams were subjected to an air pressure of 35 psi that was maintained a minimum of 5 minutes. Northwest Lining also tested liner specimens cut at the seams approximately every 500-1000 feet for peel adhesion and bonded seam strength (ASTM D 4437). Duplicate samples were provided to the Engineer for archive storage and submittal to Precision Geosynthetic Laboratories for evaluation and test corroboration of the field results. Test results are in Appendix B. Seam specifications for the 60-mil HDPE liner stipulated tests for seam peel adhesion and seam shear strength to be 80% of the material's specified sheet strength or 70 and 104 lb/in, respectively. Ambient temperatures were monitored 6" above the geomembrane and as afternoon temperatures approached 100°F, the results of field seam tests were used to determine whether or not seaming operations could continue. All of the field and laboratory samples tested exceeded the specification for strength and adhesion.

In addition to fusion welding of seams, extrusion welding was performed on liner patches to repair damage caused by handling, traffic, removal of folded or wrinkled areas, holes caused by destructive testing as well as on short butt seams and at locations where more than two

panel edges intersected. Non-destructive vacuum testing was used at the locations where seams were extrusion welded to verify adequate seaming.

As placement and compaction of the CCL continued on the northwest half of the cell, the next components of the composite geomembrane were installed on the southeast half of the cell. The first 200-mil geonet fabric was installed over the 60-mil liner and overlapping edges secured with plastic ties at minimum intervals of 5-feet. Once the geonet installation was completed, inspected and accepted by the Engineer, the second layer of 60-mil HDPE liner was installed. The seams were welded and tested similar to the first liner and the installation approved. Installation of the second layer of 200-mil geonet fabric was delayed for a day due to a liner temperature of 135°F creating excessive wrinkling. The second geonet was subsequently installed in the cooler morning hours of July 28, 2001 over a smoother HDPE liner, the geonet panels secured with plastic ties, inspected for defects and ultimately approved.

1.5.13 Leachate Collection System and CAMU Liner Completion

Construction of the leachate collection trench was partially completed concurrently with the liner installation on the southeast half of the cell. Liner installation in the trench proceeded immediately after completion and approval CCL liner in the trench on July 28, 2001. The first layer of 60-mil HDPE and succeeding 200-mil geonet was installed from the northeast side anchor trench across the collection trench and joined to the ends of the previously placed fabrics. Placement of the 4-inch perforated pipe and the drainage sand for the secondary leachate collection system followed. The second layer of 60-mil liner and 200-mil geonet was then installed followed by the 4-inch perforated pipe and drainage sand for the primary leachate collection system. When construction of the leachate collection piping system was completed and the second layer of liners installed, the final component of the liner system consisting of a 75-mil, nonwoven, polypropylene geotextile fabric, was laid out and the edges anchored with sandbags. Note that the ¼-inch tygon tubing and ½-inch PVC pipe guide which was to be solvent welded to the 4-inch HDPE sump stand pipe was <u>not</u> installed in either stand pipe.

On August 2, 2001, placement and compaction of the CCL was substantially completed on the northwest half of the cell and liner installation allowed to proceed. The sequence of operation was repeated for the second half of the cell. The bottom layer of 60-mil HDPE liner was placed, welded and tested, then installation of the geonet fabric followed by the second layer of 60-mil liner, geonet and the final 75-mil geotextile fabric. Some delays were experienced by inclement weather and a shortage of fabric prevented completion of the liner installation until August 15, 2001. On August 6, 2001, the last of the available liner was installed and a survey of the completed surface was performed by Morrison-Maierle for record drawing information and quantity calculations. On August 7, 2001, with installation of the CAMU composite liner system substantially complete, the Northwest Linings crew and their equipment mobilized off the site until the additional liner material was delivered.

On August 15, 2001, the additional liner material was delivered and Northwest Lining returned to the site to complete the geomembrane and geotextile installations. Because of health considerations for liner crews, Envirocon temporarily suspended hauling and placing hazardous waste in the CAMU and preceded to complete construction of the west half of the leachate collection trench. With the liner installation completed, inspected, approved and the Northwest Lining installers off site, waste hauling was allowed to resume.

1.5.14 Waste Material-Load, Haul, Place and Compact

Approximately 113,000 cubic yards of waste material was scheduled for transfer from the Asarco East Helena Plant area to the landfill for disposal. Sediment cake stockpiled from an earlier dredging project at Lower Lake was proposed for the first lift to act as a cushion between geotextile and the preceding lift of waste material. Following construction of the cushion, additional onsite waste from the area between Upper and Lower Lakes and the ridge-shaped pile (Shew Ridge) in the Ore Storage Yard would be placed in the landfill. Finally, an approximately 1-1/2 foot thick cap of the sediment would be placed over this waste material and below the compacted clay cover.

On August 7, 2001, the sediment stockpile's protective cover was removed and hauling of the sediment to the landfill began. Envirocon placed an excavator on the stockpile to scarify the compacted pile and create a loose stack of material for loaders to pickup and load into trucks. Initially, Envirocon used four Moxy trucks and a tandem dump truck for hauling but eventually added two Volvo articulated trucks to further expedite the waste removal. The trucks were dumped at the landfill while a Komatsu dozer and two Caterpillar steel drum rollers performed lift construction and compaction. As excavation progressed deeper into the stockpile, moisture levels in the fine-grained sediment increased sufficiently to create a "quick" condition that resulted in an unstable surface as the waste material was worked at the CAMU. Consequently, haul trucks were becoming stuck in the sediment as they dumped their loads of waste material. In order to provide a more substantial base to support the trucks, coarse waste from the area between Upper and Lower Lakes and Shew Ridge was placed immediately on the 2-foot thick sediment cushion and was compacted with static rolling. This ultimately resolved the problem and allowed the trucks to cycle faster. While waiting for the additional HDPE liner to be delivered, placing and compacting of waste material from the area between Upper and Lower Lakes and the Ore Storage Yard continued over the southeastern three-quarters of the CAMU cell. On August 15, 2001, hauling was suspended while Northwest Linings completed the geomembrane and geotextile installation. When the liner installation was completed, hauling of waste materials resumed.

The disposal of contaminated soil, concrete and debris continued from August 16, 2001, until the removal of waste was completed on September 27, 2001. For the duration of the hauling, a water truck and street sweeper were employed to maintain clean haul roads. The trucks were operated without tarps to cover the loads but a chemical for dust suppression was applied to each load before leaving the waste removal site. Large concrete sections encountered were sorted out of the waste piles and hammered to size specifications (2-ft minus) for disposal in the landfill. Eventually, five Moxy and two Volvo articulated trucks were in use to haul the waste. With the addition of extra trucks, debris removal from the Ore Storage Yard and the area between Upper and Lower Lakes was able to proceed simultaneously. Debris removal in the area between Upper and Lower Lakes was completed

on September 25, 2001 and site grading commenced. Debris removal from the Ore Storage yard was completed and site grading began on October 5, 2001. After the debris removal was completed from the designated areas of the Plant, the remaining pile of Lower Lake sediment was hauled to the CAMU and placed on previously placed waste materials as the top cushion. Hauling of waste materials and subsequent placement and compaction of the material in the landfill was completed on September 27, 2001.

Surveyors from Morrison and Maierle were employed by Envirocon to complete a topographic survey of the waste placed in the CAMU. The total amount of debris and waste, including Lower Lake sediments, ultimately hauled and placed into the landfill was calculated from the surveys at 110,019 cubic yards.

1.5.15 Area between Upper and Lower Lakes

Debris removal from the area between Upper and Lower Lakes was completed on September 25, 2001 and site grading of the area commenced. Upon completion of the waste removal at the area between Upper and Lower Lakes, re-grading of the waste removal site was accomplished to achieve positive drainage and to match adjacent contours. The area between Upper and Lower Lakes was capped by placing 6-inches to 12-inches of compacted clay-rich soils on the re-graded surface. Hydrometrics subsequently surveyed the area between Upper and Lower Lakes for record drawing information and quantity calculations.

1.5.16 Lower Ore Storage Area

Once the debris removal was completed from the designated areas of the Plant, the remaining pile of Lower Lake sediment was hauled to the cell and placed on top of compacted waste material as the top cushion. Hauling of waste materials and subsequent placement and compaction in the landfill was completed on September 27, 2001.

Upon completion of the waste removal at the Ore Storage Yard, re-grading of the waste removal site was accomplished to achieve positive drainage and to match adjacent contours. Debris removal from the Ore Storage yard was completed and re-grading began on October 5,

2001. Site grading was completed by October 7, 2001. This area is graded to drain to the plant's storm water collection and containment facilities.

1.5.17 Gas Migration System

Based on the survey provided by Morrison and Maierle, the upper CAMU surface was graded to achieve a minimum grade of 3% across the surface of the CAMU. Following the re-grading, the surface was resurveyed to confirm that minimum slope requirements were achieved and approval was given to begin installation of the gas migration sand layer and gas venting system. On October 2, 2001, construction of the gas migration layer started with the installation of 1,728 lf of 4-inch perforated pipe, five vent riser pipes and placement of a single 6-inch layer of sand bedding. Concrete collars were poured around the vent riser pipes at the T-connection with the perforated pipe. Construction of the gas migration system was completed on October 6, 2001.

1.5.18 Cap Liner System

The original design of the CAMU designated that a 24-inch compacted clay cap cover the gas migration layer followed by a 40-mil HDPE liner. The amount of acceptable clay-rich soil remaining in stockpile, however, was insufficient to complete construction of the cap. A reduced volume of acceptable clay-rich soil material was due, in part, to the fastidious sorting of the scraper loads during CAMU excavation. This resulted in more reject material being stockpiled and less clay-rich soil. Sorting the loads during the cell excavation was aggravated by the presence of meandering gravelly streambeds instead of the more distinct soil stratums that had been expected. The use of scrapers to excavate the material created an unacceptable heterogeneous mix of the streambed gravels and adjacent clays that resulted in more loads being rejected as clay-rich. Once Envirocon began using an excavator and haul trucks to separate the materials during excavation of the cell, less clay-rich soil was contaminated with gravel and fewer loads diverted to the reject pile. The end result, however, remained that a reduced volume of clay-rich material available to construct both the liner and the cap and an alternative design was needed.

Consequently, the consensus was to replace the original compacted clay cap with Geosynthetic Clay Liners (GCL) using a reinforced Bentomat-DN liner on the slopes and a thinner Claymax 200R on the CAMU top surface. The 40-mil HDPE liner would then be installed over the GCL as originally specified. Rolls of the approved GCL materials were delivered to the site on September 27, 2001 and preparations completed to begin installation of the liner. An EPA contract inspector from Booz-Allen & Hamilton of Denver, Colorado arrived on site to provide additional EPA oversight and offered suggestions to Envirocon during the GCL installation. Envirocon began placing the reinforced GCL on the northeast slope of the CAMU on October 3, 2001 and extended onto the upper CAMU surface using the reinforced Claymax liner. Placing bentonite granules between the overlapped sheets sealed overlap seams and the GCL was subsequently covered with the 40-mil HDPE. Northwest Liners returned to the site on October 4, 2001 to complete installation of the 40-mil HDPE geomembrane and performed welding and testing of the HDPE seams. Similar seam tests were performed (and at the same frequency) as were performed on the previous 60-mil liner installation. Seams were fusion welded and patches were extrusion welded. Seam samples were provided for archiving and selected samples submitted to Precision Geosynthetic Laboratories to verify the field tests performed by Northwest Liners. All seam tests conducted in the field and verified by the laboratory passed.

The underlying sand of the gas migration layer proved to be a problem during the installation of the liners causing mobility difficulty for the equipment and installers. Care was exercised to prevent damage to the gas migration pipes and vents. Northwest Liners sealed the vent riser pipes with fabricated pipe boots chemically welded to the HDPE pipe. GCL placement, installation of the 40-mil HDPE geomembrane and all related seam welding and testing were completed on October 11, 2001.

1.5.19 Cap Drainage System

Hauling and placing of the cap drainage layer proceeded on October 10, 2001 over the approved sections of the completed liner. The drainage layer consisted of a 12-inch layer of sand placed between the 40-mil liner and the upper cover soil layer. The number of trucks

operating after waste hauling was reduced to three Moxy trucks for hauling the sand and cover soil. As the sand was spread over the 40-mil liner with the dozer, a laborer with a survey rod (rod man) performed depth monitoring with a grade rod to verify sand placement to the specified depth.

The cap drain system also included a perforated collection drainpipe embedded in the outside perimeter of the sand drainage layer at the toe of the slope. Installation of the drain pipe around the base of the CAMU side slopes began on October 22, 2001 and occurred concurrently with the hauling and placing of the cover soil materials. Installation of the toe drain pipe portion of the cap drain system was deferred until after cover soil had been hauled and placed on the slope to prevent the drainpipe from being crushed by haul trucks. A trench was excavated at the toe of the slope of the CAMU exposing the previously placed cap drainage sand. The 4-inch perforated drainpipe was then installed in the trench and the pipe backfilled with sand. Cover soil was subsequently replaced over the drainage sand and the pipe installation was completed on October 24, 2001. The CAMU toe trench was not constructed per the project plans. However, examination of the site topography shows that runoff from the CAMU will flow to the runoff control pond.

1.5.20 Cover Soil

Hauling and spreading of cover soil over the sand drainage layer began on October 10, 2001 simultaneously with sand placement. The haul trucks had a tendency to bog down and become stuck in the sand so a cover soil lift immediately followed the sand placement in order to provide a base for the trucks. The cover soil was hauled from the subsoil stockpile first, placed in 12-inch loose lifts and each lift watered and compacted. Once the stockpile of subsoil was depleted, excess material from the reject clay pile was used to complete placement of the cover soil to the specified depth of 36-inches. Compaction was performed using a Caterpillar double steel-drum roller until test results achieved 90% of maximum dry density. Following the installation of subsoil, topsoil was hauled from the stockpile and uniformly placed over the landfill. Subsoil and topsoil placement was completed over the CAMU cell and adjacent disturbed areas on October 30, 2001.

1.5.21 Permanent Drainage Controls

The Phase 1 cell site lies within a drainage area of 8.57 acres with a peak run-on of 180 gpm from the 24-hour, 25-year storm to be diverted around the site.

Construction of the run-on diversion ditch around the perimeter of the landfill was completed on October 31, 2001 as well as grading of the interceptor run-on diversion ditch on the southwest side of the site. Re-grading of the Evaporation/Infiltration Pond at the north corner of the site was completed and riprap placed in the Slope Drain outlet structure.

1.5.22 Excess Excavated Soils Remaining in Stock Piles

Most of the reject soil stockpile created during the cell excavation (non clay-rich materials) was ultimately used for cover soil material on the CAMU and as capping material at the area between Upper and Lower Lakes. Several thousand cubic yards of soil, however, remained in stockpile following construction and final site mitigation required disposing of the surplus material. An area adjacent to the stockpile, approximately 300 feet wide by 300 feet long, was designated as a repository for the excess soil. Topsoil was stripped and stockpiled from this area. A dozer was used to spread the excess excavated soil over the designated repository area. The area was re-graded to form a low knoll and the topsoil was replaced on top of the placed excess soils. The area was subsequently cultivated and fertilized during the re-vegetation phase of the project.

1.5.23 Fencing

The CAMU Phase 1 Cell was fenced with a 6-foot high chain link fence with 3-strand barbed wire top section. Gates (30 feet wide) were provided at the access roads. Project signs were installed on each side of the CAMU gates.

Equipment demobilization and site cleanup was in progress November 2, 2001 and the fencing subcontractor, Fence Works of Missoula, Montana on site to set the corner posts for the chain link fence. The corner posts were set in concrete so a short delay occurred while the concrete cured. Once the subcontractor resumed fence construction, work progressed

steadily until fence construction was completed on November 12, 2001. The two gates needed to complete the security fence had to be specially fabricated and were eventually installed on November 21, 2001.

1.5.24 Vegetation

The seeding contractor hired to perform the re-vegetation work on the project was Grasslands, Inc. of Helena, Montana. Re-vegetation activities began on November 9, 2001 with cultivation of the topsoiled areas and fertilizer application and incorporation. Compacted soil conditions on the run-on diversion ditches were created during ditch excavation and required ripping to loosen the seedbed. A motor patrol equipped with rippers pulverized the compacted ditch slopes sufficiently so that standard cultivation equipment could be used to prepare the slopes for seeding. The site enclosed by the chain link fence and other areas designated for re-vegetation were seeded on November 15, 2001 using a grain drill. The seeded areas were then mulched using 3,000 pounds/acre of certified weed-free straw applied with a straw blower. The mulch was then crimped into the seedbed completing the project's re-vegetation requirements on November 16, 2001.

1.5.25 Final Punch List

A short list of project closeout items were provided to Envirocon on November 20, 2001 including replacement of a section of damaged toe drainpipe and installation of warning signs. The punch list items were subsequently completed and the project accepted as 100% complete on November 21, 2001. The drainage ditch around the toe of the CAMU slopes was not installed per project plans. Runoff from the CAMU, however, will drain to the runoff control pond, as required.

1.6 MANUFACTURERS' LITERATURE/CERTIFICATIONS

Manufacturers' Literature and Certifications for the geomembrane liners, geocomposite, geotextile and geosynthetic clay liner are in Appendix C.

1.7 PROJECT VIDEO

Envirocon created a digital project video of this project. The project video is in Appendix D of this report.

1.8 AS-BUILT DRAWINGS

As-Built Drawings are in Appendix E of this report.

1.9 PHOTO LOG

A Photo Log of the project is in Appendix F of this report. Envirocon took construction photographs through out the project, as did Hydrometrics. Full sets of originals of both Envirocon's and Hydrometrics' construction photos are on file at the Engineering Department of the Asarco East Helena plant.

1.10 O&M MANUAL

The O&M Manual for the CAMU-Phase 1 Cell was submitted to the EPA on July 28, 2000 as Appendix K of the Final CAMU Design Analysis Report. It was approved by EPA on February 1, 2001.

2. VOLUME AND QUANTITY MEASUREMENTS

2.1 GENERAL

Field measurements, including numerous surveys, hand measurements and truck scale load recordings, were made to determine the actual quantities of material excavated and placed throughout construction. Land Project software was used with AutoCAD to calculated earthwork quantities using the Average End Area method. Construction progress for the project is shown on the project construction schedule (Exhibit 1) in a map pocket at the back of this report.

2.2 FINAL QUANTITIES

As-built quantities varied from plan quantities for several project bid items. Final quantities are listed in Table 2-1. The total volume of waste materials placed in the CAMU was 10,019 cubic yards. The volumes of waste material from various sources are itemized as follows:

Ore Storage Yard & Shew Ridge	64,374 cubic yards
Lower Lake Sediments	26,781 cubic yards
Area Between Upper and Lower Lakes	18,300 cubic yards
Total Waste Material Placed in CAMU	110,019 cubic yards

2.3 QUANTITY VARIATIONS

The quantities of various bid items were monitored throughout excavation, installation and backfilling operations. Quantity variations between plan dimensions and as-built field dimensions were recorded. Specifically, bid item quantities that varied from plan estimates consisted of:

- Excavation quantities increased slightly, by about 2,500 cy, because bid quantity computations assumed a uniform slope of the existing ground when in actuality there was a small hill or rise down the center of the footprint.

TABLE 2-1. VOLUMES AND QUANTITIES

ITEM NO.	DESCRIPTION	BID QUANTITY		FINAL	
1	Mobilization	1	LS	1	LS
2	Culvert, 30" x 51" CMP Arch	58	LF	58	LF
3	Culvert, 42" diameter CMP	66	LF	62	LF
4	Access Roads	1	LS	1	LS
5	Railroad Crossing Improvements	1	LS	1	LS
6	Temporary Erosion Controls	1	LS	1	LS
7	Excavation & Stockpile	67,500	CY	70,007	CY
8	Subgrade Preparation, Grade & Compact	23,500	SY	23,285	SY
9	Compacted Clay Liner	22,500	CY	23,334	CY
10	HDPE, 60 mil	44,500	SY	45,760	SY
11	Drainage Geonet, 250 mil	44,500	SY	45,760	SY
12	Geotextile Construction Fabric	23,500	SY	22,880	SY
13	Leachate Collection & Removal Systems	1	LS	1	LS
14	Runoff Control Pond	1	LS	1	LS
15	Health & Safety Requirements	1	LS	1	LS
16	Site Access & Traffic Controls	1	LS	1	LS
17	Dust Control	1	LS	1	LS
18	Haul Road Maintenance	1	LS	1	LS
19	Load, Haul, Place & Compact Waste Materials	113,000	CY	110,019	CY
20	Gas Migration Layer	1,750	CY	1,600	CY
21	Compacted Clay Cover	15,800	CY	0	CY
22	HDPE, 40 mil	23,500	SY	23,875	SY
23	Cap Drainage Collection, 4" HDPE	1,900	LF	1,900	LF
24	Drainage Layer Sand	8,500	CY	6,900	CY
25	Cap Drainage Culvert, 6" HDPE	74	LF	45	LF
26	Cover Soil Layer	18,300	CY	20,626	CY
27	Permanent Run-on Diversion Ditches	750	LF	740	LF
28	Seed, Fertilize, & Mulch – Off Plant	11.5	ACRE	10.8	ACRE
29	Seed & Mulch – Agricultural	8.5	ACRE	7.5	ACRE
30	Chain Link Fence with Appurtenances	2,400	LF	2,400	LF
31	Construction Surveys	1	LS	1	LS
32	Quality Control Plan and Management	1	LS	1	LS
33	Cap at Area Between Upper and Lower Lakes	6,000	CY	3,200	CY
CHANGE ORDER #1.1	Screening to remove oversized	1	LS	1	LS
CHANGE ORDER #1.2	Misc Credits	1	LS	1	LS
CHANGE ORDER #2.1	Delete Bid Item 21	-15,800	CY		CY
CHANGE ORDER #2.2	Reinforced GCL	13,000	SY	11,061	SY
CHANGE ORDER #2.3	Non Reinforced GCL	11,500	SY	12,814	SY
CHANGE ORDER #2.4	Delete Cap Material Screening	-14,300	CY	-14,300	CY
CHANGE ORDER #2.5	Equipment Standby	1	LS	1	LS
CHANGE ORDER #2.6	Additional Insurance	1	LS	1	LS
CHANGE ORDER #2.7	Force Account Work	1	LS	1	LS
CHANGE ORDER #3.1	Revise Bid Item 28: Reclaim Ag Land	8.5	ACRE	7.5	ACRE
CHANGE ORDER #3.2	Quantity Adjustment Amount	1	LS	1	LS

- Envirocon actually built the CAMU cell about one foot deeper than designed by both over-excavating 3 to 6 inches and by extending the sides of the cell to 9 to 12 inches above the existing ground. The deeper cell resulted in a larger footprint, which in turn, resulted in larger quantities of CCL, HDPE, geonet, fabric, GCL and coversoil.

- There was about 3,000 cy less waste material placed in the CAMU than was in the initial bid price. The bid quantity included 10,000 cy more than existing stockpiles for miscellaneous volume variation. In actuality, there was only 7,000 cy more than calculated from surveyed stockpiles.

- Cover soil increased because original plans called for a total cover soil (topsoil and subsoil) depth of 24 inches, but there was actually 30 inches of cover soil placed over the GCL.

- Volumes of cap material at the area between Upper and Lower Lakes decreased because the compacted soil cap over the area between Upper and Lower Lakes was not as large or as deep as shown on the plans.

- The amount of reinforced and non reinforced GCL varied because less waste material placed in the CAMU resulted in a lower landfill plateau, which in turn resulted in an increased top area (non reinforced GCL) and a decrease in the surface area of the side slopes (reinforced GCL).

- Surface areas for gas migration and drainage sand layers were slightly smaller and the thickness' of the layers was slightly less (but within specified tolerances) than shown on the plans.

- The cell subgrade was slightly smaller than plan quantities.

- Envirocon disturbed less area (both agricultural and non agricultural land) as anticipated.

- The diversion ditch and drainage culverts varied slightly to better fit field conditions.

3. SAMPLING AND TESTING DURING CONSTRUCTION - QA/QC

3.1 GENERAL

The purpose of Construction Quality Assurance (CQA) was to provide Asarco and EPA with data verifying that the CAMU construction satisfies the design intent, the specification requirements, and the performance standards contained in 40 CFR 264. Project QA/QC consisted of the field testing program and reporting described in the Construction Quality Assurance Plan (CQAP, Hydrometrics, 2000). The Asarco Project Manager, with assistance from Hydrometrics, provided project Manufacturing Quality Assurance (MQA) to verify that the CAMU was constructed from materials that met specifications. Numerous quality control checks and tests were completed throughout construction. Quality control checks included soil sampling for moisture content, density, permeability, lift thickness, particle size/gradation; HDPE subgrade, seam, vacuum tests, placement and handling, temperature; geocomposite panel fastening; water material moisture, lift thickness and voids; survey layout and as-built verification.

3.2 COMPACTED CLAY LINER

This project involved the construction of one 3-foot thick compacted clay liner.

3.2.1 CQA items for CCL

Quality control checks for the CCL were as follows:

a. Materials
   (1) Maximum Particle Size < 2" - Visually checked continuously.
   (2) No unsuitable Material – Visually checked continuously.
   (3) Plasticity – 39 measurements.
   (4) Grain Size Distribution – 39 measurements.
   (5) In situ Moisture Content – 39 measurements.
   (6) Moisture / Density Relationship – 8 measurements.

b. Workmanship

(1) Compacted Lift Thickness < 6" – approximately 4200 measurements.

(2) Moisture Content – 240 nuclear measurements and 24 oven measurements.

(a) $\geq$ 2% dry of optimum

(b) $\leq$ 5% wet of optimum

(c) $\leq$ 20% of the samples may be drier than optimum

(d) $\leq$ 20% of the samples may be more than 3% wet of optimum

(3) Density - 240 nuclear measurements and 24 sand cone measurements.

(a) $\geq$ 90% Standard Proctor

(b) $\leq$ 20% of the samples may be less than 95% Proctor

(4) Permeability < 1×10^{-7} cm/sec – 11 measurements.

(5) Construction Stakes Inventory – 34 measurements.

(6) Scarification – Visually checked continuously.

(7) Number of Compaction Passes – Visually checked continuously.

3.2.2 QC Testing and Results

The results of all of the soil testing associated with QA/QC (listed in the previous section) of the CCL are in Appendix B. All soil samples were collected by Hydrometrics and were tested by Hydrometrics' East Helena soils laboratory. Samples for the hydraulic conductivity tests were collected by Hydrometrics and shipped to HWA Geosciences, Inc. of Lynnwood, Washington for testing. All hydraulic conductivity samples tested passed project specifications. These results are also in Appendix B.

3.3 FLEXIBLE MEMBRANE LINERS - HDPE

There were three geomembrane liners installed on this project. Primary and secondary 60-mil HDPE liners were installed on the CCL as part of the CAMU liner system. A 40-mil HDPE liner was installed as part of the CAMU cap system.

3.3.1 CQA items for HDPE

Quality control checks for the CCL were as follows:

a. Materials met project specifications.

b. Installer was experienced and used experienced crews and provided references.

c. Workmanship.

(1) Ambient Temperature > 40°F and < 100°F – logged every 2 hours – approximately 60 measurements.

(2) Precipitation winds – monitored continuously.

(3) Install longitudinal to slope – monitored continuously.

(4) No seams within 10 feet of slope – monitored continuously.

(5) Master Seamer on site during seaming – monitored continuously.

(6) Trial Seam Tests – observe and record 150 tests (minimum).

(7) Seam Strength - observe and record 60 tests, send 12 to lab for testing

	40 mil	60 mil
(a) Seam Shear	60 ppi	100 ppi
(b) Seam Peel	50 ppi	70 ppi

(8) Overlap > 3" for extrusion and 4" for hot wedge seaming – monitored continuously.

(9) Vacuum Seam Tests – observe continuously.

d. Other Inspection Items.

(1) Prepared Subgrade – observe continuously for holes, roots, stones, etc.

(2) Installer certification of prepared subgrade – verify.

(3) Anchor Trenches for compliance with drawings – observe continuously.

(4) Handling and Placement of FMLs.

(a) Sheet Position – observe continuously.

(b) Damage During Placement – observe continuously.

(5) Repairs – observe continuously.

(6) Operating Temperatures – approximately 60 measurements.

(a) Extrudate Temperature or Hot Wedge Temperature.

(b) Preheat Temperature.

(7) Verification of Seaming – observed continuously.

(a) # of seamers and spares agreed to in pre-construction conference.

(b) Extruder is purged of heat-degraded extrudate prior to beginning a seam.

(c) Seam grinding has been completed less than 1 hr before seam welding.

(d) Ends of old welds more than 5 minutes old are ground to expose new material before restarting weld.

(e) Weld is free of dust and debris.

(f) Cross Seam is ground smooth prior to welding.

(g) No solvents or adhesives are in weld area.

(h) No free moisture in seam area.

(i) Generators are not damaging liner.

(j) Insulating plate placed beneath hot welders when not in use.

(k) Liner is being protected in high traffic areas.

3.3.2 QC Testing and Results

Northwest Linings was the geomembrane installer. They conducted all field tests. Destructive samples were taken for testing the liner seams. The seam test samples were sent to Precision Geosynthetic Laboratories, headquartered in Anaheim, CA for verification testing. Liner test results are in Appendix B.

3.4 GEOCOMPOSITES

Two geonets were installed in the CAMU liner, one above the primary HDPE liner and one above the secondary HDPE liner.

3.4.1 CQA items for Geocomposites

Quality control checks for the CCL were as follows:

a. Materials met project specifications.

b. Workmanship.

(1) Overlap $\geq$ 3" on sides and $\geq$ 6" on ends – monitor continuously.

(2) Placement longitudinal to slope – monitor continuously.

c. Other Inspection Items – monitor continuously.

(1) Manufacturer's Certification.

(2) Handling and Storage.

(3) Panel Fastening.

3.4.2 QC Testing and Results

Northwest Linings was the geocomposite installer. Hydrometrics watched to insure proper overlap, placement, handling and storage of the geocomposite. Manufacturer certification was provided and is in Appendix B.

3.5 EMBANKMENT COVER SOIL

Cover soil was placed over the drainage sand layer that was installed above the 40-mil HDPE and GCL in the CAMU cap layer. The original project drawings called for 16 inches of subsoil and 8 inches of topsoil for a total cover soil depth of 24 inches. The depth of cover soil was increased to 30 inches and consisted of 24 inches of subsoil and 6 inches of topsoil.

3.5.1 CQA items for Cover Soil

Quality control checks for the Cover Soil was as follows:

a. Materials

(1) Gradation – Maximum Particle Size < 3"

(2) Plasticity – Nonplastic (%Fines $\leq$ 15%)

(3) Compaction Characteristics – Standard Proctor

(4) Oversized or Deleterious material (lenses or pockets of substantially different materials)

(5) No frozen materials

b. Workmanship

(1) In-situ Water Content - $\geq$ 3% below and $\leq$ 2% above optimum

(2) In-situ Density > 95% Maximum

(3) Lift Thickness < 8" except in top two feet < 4"

(4) Scarification Depth of Foundation and Hard Surfaces > 2"

(5) Subgrade Compaction Depth = 6"

c. Other Inspection Items

(1) Conformance to grades and lines shown on plans

(2) Contractor's proposed equipment and construction methods

(3) Foundation Preparation

3.5.2 QC Testing and Results

Hydrometrics tested for gradation, density, moisture content, compaction and particle size and watched for lift thickness, scarification depth and conformance to plan lines and grades. The results of all of the soil testing associated with QA/QC (listed in the previous section) of the cover soil are in Appendix B. All soil samples were collected by Hydrometrics and were tested by Hydrometrics' East Helena soils laboratory.

3.6 WASTE MATERIALS/SOURCE SOILS

3.6.1 CQA items for Waste Materials/Source Soils

Quality control checks for the CCL were as follows:

a. Materials

(1) Free Liquids – test as needed.

(2) Gradation < 1" in cushion layer – monitor continuously.

b. Workmanship

(1) Equipment size – check before work begins.

(2) Number of compaction passes – monitor continuously.

(3) Lift Thickness < 12" – monitor continuously.

3.6.2 QC Testing and Results

The testing associated with waste materials was only visual. QA/QC Inspection is noted in the inspector's daily journal entries.

3.7 GEOMEMBRANE CLAY LINER-GCL

The original project design did not use a GCL. Because there was a shortage of clay-rich soils on site, a GCL was used to cap the CAMU in lieu of a 24-inch thick layer of compacted clay.

3.7.1 CQA items for GCL

Quality control checks for the GCL were as follows:

(1) Materials met project specifications.

(2) Installer was experienced and used experienced crews and provided references.

(3) Workmanship

(a) Precipitation and winds – monitored continuously.

(b) Install longitudinal to slope – monitored continuously.

(c) No seams within 3 feet of slope – monitored continuously.

(d) Seam overlap (longitudinal 6 inches minimum, end-of-roll 24 inches minimum) – monitored continuously.

(e) Bentonite-enhanced seams in overlap zone in reinforced GCL areas. (A continuous bead of granular sodium bentonite was applied at a minimum application rate of one quarter pound per lineal foot) – monitored continuously.

(f) sealed around penetrations and embedded structures embedded in accordance with the GCL manufacturer details) – monitored continuously.

(4) Other Inspection Items

(a) Prepared Subgrade – observe continuously for holes, roots, stones, etc...

(b) Installer certification of prepared subgrade – verify.

(c) Anchor Trenches for compliance with drawings – observe continuously.

(d) Handling and Placement of GCL

(i) Sheet Position – observe continuously.

(ii) Damage During Placement – observe continuously.

(iii) No equipment travel directly on GCL– observe continuously.

(iv) Reduction of friction damage during placement.

(v) panels flat with no wrinkles or folds.

(vi) cover at night-no moisture to touch GCL (prevent hydration)

(e) Repairs – observe continuously.

(f) Cover placement – observe continuously.

3.7.2 QC Testing and Results

Northwest Linings was the GCL installer. The testing associated with GCL installation was only visual. QA/QC Inspection is noted in the inspector's daily journal entries. No problems were encountered and the GCL was installed in accordance with project specifications.

4. RELATED CONSTRUCTION ACTIVITIES

The activities described in this section were outside the scope of work for Envirocon's contract but were required to complete project construction.

4.1 PAVEMENT OF COUNTY ROAD

Prior to construction beginning on the CAMU, the Lewis and Clark County Road Department completed improvements on the county road preparatory to CAMU construction and in mutual cooperation with Asarco. Equipment and labor was provided by the county to raise the road profile, grade the shoulder slopes and modify the north ditch line to accommodate 48-feet of new 15" corrugated metal culvert. The county road between the project haul roads was graded and new asphalt pavement was placed. Asarco provided funding to Lewis and Clark County for the paving project. Asphalt, 2.5-inches thick, was placed between the haul roads (and extended 50 feet beyond each haul road). A new 15" CMP was installed in the north ditch for access to the proposed west haul road at the entrance of Asarco's Ore Storage Yard. In addition to pavement improvements, permits were needed at the haul road crossing locations.

4.2 STORM WATER PERMIT

Hydrometrics assisted Envirocon in completing the construction storm water permit application. The application was submitted to the Montana Department of Environmental Quality on April 11, 2001. DEQ issued construction storm water permit MTR100854 for this project on April 30, 2001. Mr. Brian Heckenberger, Montana DEQ Storm Water Program Coordinator, inspected the project site on June 28, 2001 and found all BMPs and erosion controls to be in place and satisfactory.

4.3 DUST CONTROL IN THE AREA BETWEEN UPPER AND LOWER LAKES

Asarco purchased and applied magnesium-chloride to the compacted clay surface of the area between Upper and Lower Lakes for dust control. This successfully stopped dust created during windy conditions from the barren surface of clean soil.

4.4 MISCELLANEOUS WORK ITEMS

During the course of the contract, Asarco requested that Envirocon complete some work tasks that were outside the scope of work for the original contract. These work items are described in this section.

4.4.1 Ore Storage Building

Some waste material was stored in the Ore Storage Building. In lieu of moving the materials to the area between Upper and Lower Lakes or to the Ore Storage Area stockpiles, Asarco had Envirocon's crews load and haul the material from the ore storage building.

4.4.2 Asbestos Siding

A few sheets of asbestos siding were encountered at the area between Upper and Lower Lakes. Envirocon's foreman was certified in asbestos removal. The material was gathered in accordance with regulations and disposed of in the CAMU.

4.4.3 Other Miscellaneous Items

On July 12, 2001, Asarco sent a letter to EPA requesting to dispose of additional miscellaneous materials in the CAMU. In accordance with EPA's letter of August 7, 2001, the following remediation wastes were collected and placed in the CAMU:

1. Montana Rail Lind railroad switching yard and track clean up debris;
2. Road sweepings from the City of East Helena;
3. Road cleanup and sweepings from the Asarco East Helena facility;
4. Obsolete archived soil samples from the East Helena Residential soils project; and
5. Debris and concrete from the abandoned zinc plant.

5. REFERENCES

Hydrometrics, Inc., April 1997. Asarco East Helena Draft CAMU-Phase 1 Cell Project Design Analysis Report.

Hydrometrics, Inc., July 2000. Asarco East Helena CAMU-Phase 1 Cell Project Design Analysis Report.

Hydrometrics, Inc., October 2000. Construction Documents for Asarco East Helena Plant CAMU (RCRA Landfill)-Phase 1 Cell Project.

APPENDIX A

CONSTRUCTION CONTROL PLANS

A.1 QUALITY CONTROL PLAN

A.2 HEALTH AND SAFETY PLAN

A.3 TRAFFIC CONTROL PLAN

A.4 DUST CONTROL PLAN

A.5 CONSTRUCTION STORM WATER DISCHARGE PERMIT

A.6 EROSION CONTROL MONITORING LOGS

A.7 SUBMITTAL SCHEDULE

QUALITY CONTROL PLAN

ASARCO's
CAMU – Phase I Cell Construction Project
East Helena Plant

Submitted to:

ASARCO, Inc.
P.O. Box 1230
East Helena, MT 59635-1230

Submitted by:

Envirocon, Inc.
P.O. Box 16655
500 Taylor Street
Missoula, Montana 59808

Submittal date:

April 24, 2001

QUALITY ASSURANCE PROGRAM

Reviewed and Approved by:

_____

Mr. Dan McCaffery
Corporate Quality Assurance Officer

_____

Mr. Al Brule'
Project Director

_____

Mr. Kris Kok
Rocky Mountain Regional Manager

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Figure 1.0 Project QA Organizational Chart

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Appendix J QC Manager's Letter of Authorization

1.0 INTRODUCTION

This Project is being conducted under the oversight/control of the Client and/or the Client's Engineer who have significant responsibility for Project quality. Envirocon will support/supplement the Client's/Engineer's QC staff by implementing our own subtier QC Program.

1.1 Administrative Policies

Envirocon's policy is to maintain a stand-alone QC Program on-site, with Corporate involvement during project start-up, internal QC audits and in cases of repetitive deficiencies or serious staff conflicts. Further, Envirocon's policy is to satisfy the Client's QA/QC requirements, as expressed in the Specifications, Drawings, Change Orders, and documented Field Directives.

1.2 Procedures

Envirocon's QC procedures are based on the USACE's Three-Phase Quality Assurance System, including the Preparatory, Initial, and Final control phases. These phases include material submittals and inspection, training field personnel, reviewing upcoming tasks and relevant Specifications with the involved personnel/subcontractors, inspecting work to be built upon or concealed, ensuring that specified tests, samples, measurements, and documentation are conducted, collected, or prepared. The focus of this effort is to ensure that quality is maintained, that deficiencies are identified and corrected in a timely manner, and that the project progresses towards an acceptable, timely, and quality closure.

1.3 Objective

This Quality Control Plan (QCP) presents Envirocon's methodology for furnishing a quality product to its Client. This QCP has been developed to ensure that the completed CAMU cell and appurtenances comply with the various requirements of the Project Specifications. These requirements are summarized in the Specification's Quality Control subsection, attached as Appendix A.

The essential components of this QCP are:

- Quality Management System;
- Personnel Qualifications and Training;
- Quality Improvements;
- Documents and Records;
- Work Process Controls;
- Procurement, including submittals;
- Inspections and Tests; and
- Quality Assessments.

2.0 QUALITY MANAGEMENT SYSTEM

This section describes the planned Quality Management (QM) system to be implemented and maintained throughout the performance of the contract. The QM system is organized to prevent confusion in the lines of authority and avoid assigning personnel with conflicting responsibilities.

2.1 Organizational Chart

A Project-specific Quality Assurance (QA) Organizational Chart has been prepared defining the chain-of-command and lines of communication. This is presented as Figure 1.0 – QA Organizational Chart.

2.2 Reporting

Subtier contractor QC personnel and Envirocon crew foremen will report QC activities to the QC Manager (QCM), who will consult with the Field Superintendent, as necessary, before reporting to the Project Manager. In the case of repetitive deficiencies, or serious conflicts, the CQM has the option of reporting directly to Envirocon's Corporate QA Manager. The Project Manager reports directly to the Project Director.

2.3 Authority

The QC Manager has the authority to Stop Work in cases where the quality of the Work is unacceptable, particularly where the Work in question is about to be built upon or concealed. The QC Manager's Letter of Authorization is presented as Appendix J. The Project Manager has encompassing on-site authority for all aspects of the Project under Envirocon's control.

2.4 Responsibility

The Project Manager is responsible for ensuring that the manpower and resources are available to adequately implement and operate the QA Program. He is also responsible for ensuring that the program is fully supported by site staff.

The QC Manager is responsible for actually implementing and overseeing the QA Program; he will support the field superintendent in preparing the Daily Construction Reports, and ensure that QC monitoring, tests, and inspections are conducted, documented, and reported to the Client.

The Corporate QA Manager is responsible for assisting with project startup, conducting initial and interim audits to ensure that the QC Program is implemented and functional, and will assist with Project closeout.

Conflicting QC responsibilities assigned to a single person will be avoided by lines of authority which do not converge until they reach the Project Manager. Alternate lines of communication for

exceptional circumstances are available between the QC Manager and the Corporate QA Manager, and between the CQAM and either the Regional Manager or Envirocon's President. Figure 1.0 depicts these lines of authority.

2.5 Project Personnel

The key project personnel and their assigned authorities and responsibilities are:

Corporate Quality Assurance Manager (CQAM) The CQAM is responsible for implementing and overseeing the QA Program. He is authorized to stop work in specific areas in the event QA objectives are not being achieved. His involvement will be primarily during startup (in implementing the QA Program and reviewing initial submittals) and as closeout approaches (to ensure the as-built drawings are updated and submission of submittals is on-track). During the on-going phases of the project, his involvement will be primarily supportive and advisory; the QC Manager will assume on-site responsibilities during this period.

Project Manager (PM) The PM is responsible for all project activities. He reports directly to the Project Director. The PM provides overall direction and support for field and technical activities and serves as the link between Envirocon and the Client. He represents Envirocon in technical and administrative issues and is authorized to negotiate change orders and make decisions on all aspects of the Project. In addition, the PM:

- Directs the project in compliance with the contract specifications;
- Has final approval of task plans and operating procedures necessary to meet quality objectives; and
- Approves and signs all purchase orders, lower tier subcontracts, and service agreements to provide labor, materials, or equipment for work within the scope of the project.

Field Superintendent (FS) The FS is responsible for supervising all construction field activities, including Envirocon employees, subcontractors, off-site fabricators, and suppliers. The FS operates at the discretion of the PM; his authority is delegated by the PM. In addition, the FS:

- Provides timely input concerning field activities to the PM;
- Supervises construction work by providing over-all direction to field personnel and subcontractors involved in construction;
- Consults with the PM, HSO, and Client QA personnel to ensure Specification compliance;
- Ensures that agreed-upon corrective actions are conducted promptly; and
- Contributes to "tailgate" safety meetings by apprising site workers of current and upcoming work and discussing site work issues.

QC Manager (QCM) The QCM is responsible for preparing technical QC documentation required by the specifications. For this project, Envirocon anticipates that the CQAM will be on-site to initiate the QC Program. His replacement will be the QCM, doing double-duty as the HSO. The QCM will remain on-site throughout waste material handling and until the cap has been completed. At that point, the CQAM will perform a site audit in preparation for project closure.

The QCM has the following responsibilities:

- Prepares and tracks submittals required by the contract specifications;
- Reviews task plans and operating procedures necessary to meet quality objectives;
- Ensures testing is performed, as required by specifications or necessary to provide a quality product;
- Reviews technical reports, submittals, as-built drawings, and other documentation;
- Inspects and accepts materials, equipment, and services provided by Envirocon employees, subcontractors, and vendors.
- Ensures materials and fixed equipment meet specifications before being purchased and incorporated into the work;
- Ensures all data required for the as-built drawings are collected before any work is closed/concealed;
- Reviews land survey services to ensure surveys are completed in an accurate and timely manner, and specification drawings are updated as work progresses in preparation for the as-built drawings;
- Takes monthly project photographs;
- Identifies deficient work items;
- Recommends corrective actions; and
- Ensures that agreed-upon corrective actions have been conducted and are sufficient to correct the deficiency.

Site Health and Safety Officer (HSO) The HSO is responsible for compliance with the site specific Health and Safety requirements, including OSHA 1910.120 – Hazardous Waste Site Operations, the Hanford Radiological Control Manual, OSHA 1926 – Construction Safety, and other requirements intended to assure the health and safety of site workers and the public. Specifically, the HSO:

- Designates and oversees the installation of signs, barriers, fences, and other protective devices;
- Conducts regularly scheduled "tailgate" safety meetings which will include updating site workers on changes to controls;
- Develops and implements procedures for decontaminating personnel and equipment;
- Documents and tracks employee training and occupational/medical qualifications for work at the site; and
- Works with Client representatives to ensure complete control of equipment, excavated material, personal protective equipment (PQCM), and personnel.

3.0 PERSONNEL TRAINING AND QUALIFICATIONS

Envirocon's project personnel are qualified to perform their assigned duties. This is accomplished by employing experienced personnel and through training. Training and qualifications documentation will be maintained and available for inspection at the on-site office. A training matrix and a qualfications table, are presented as Appendix B.

Envirocon tracks training for employees through its corporate office. All training conducted by Envirocon or obtained by an outside provider is entered into a database controlled and maintained by the Health and Safety Training Coordinator. The database is queried monthly, and a training matrix is generated to reflect the current status of each employee's training. Notification to personnel is provided through direct correspondence, with a copy routed to the Site Health and Safety Officer; however, every employee is required to be familiar with the required training for their position, and know approximately when his training will expire.

Personnel will be trained to the planned procedures and critical documents including the approved work plans and Site Specific Health and Safety Plan. These guidance procedures will be routed to persons assigned to the project. Documents will contain a sign-off page or use a routing slip. Personnel will be required to sign or initial that they have reviewed and understand the material; the QCM will ensure that the sign-offs have been completed before the relevant work task proceeds.

Relevant and major documents will be reviewed, as necessary, during the "tail-gate" safety meetings or during preparatory and initial phase meetings. Attendance at these meetings will be documented with a sign-in sheet.

The following training and qualifications may be required for Project personnel, depending on the nature of the task:

- OSHA 40-Hour Hazardous Waste Worker Training – 20 CFR 1910.120 for personnel entering an exclusion zone;
- Competent Person, 1 person minimum, when required for work within excavations;
- Respirator fit test, as required;
- Asbestos 8-hr Worker Awareness – OSHA;
- Site Specific Training; and
- Medical examinations of personnel in accordance with the HASP.

All personnel will be required to attend required site-specific training.

4.0 DEFICIENCY CORRECTIONS

This section describes the corrective action system to be implemented. This system documents deficiencies in items and services, reports the deficiencies, and verifies corrective action accomplishments. Construction deficiencies include any work below the minimum acceptable contract requirements. All work found deficient will require corrective action. Corrective action will be initiated and confirmed by the QCM.

4.1 Deficiency Notification and Reporting

The QCM shall notify the PM of any potential deficiencies. This notification shall be made using a Corrective Action Report (CAR) as soon as possible after initial knowledge of the deficiency, but no later than three (3) working days after. Potential deficiencies shall be evaluated by the PM to assess their significance. If it is determined that a significant deficiency does exist, the CAR will be serialized. The CAR will be noted with a Sequential Deficiency Number (SDN), description of the deficiency, and party responsible for the corrective action. A sample Corrective Action Report is presented as Appendix C.

4.2 Resolution and Corrective Action

The FS will be responsible for ensuring that the deficiency is resolved. After completing the corrective action, the resolution shall be documented in the space provided on the CAR. The response to the resolution shall include a description of the action taken to prevent a reoccurrence of the deficiency.

4.3 Deficiency Resolution Close-out

The CAR shall not be closed until all corrective actions have been completed and preventive measures have been established or long-term corrective actions have been established and implemented. Final deficiency close-out will include verification on the CAR that the corrective action was implemented successfully and the subject work is now in compliance. A photographic record will document subject work, and shall record both the original deficiency and implemented corrective action.

4.4 Unresolved Deficiencies

In the event a satisfactory resolution is not accomplished or the deficiency reoccurs, a meeting will be arranged for the FS, QCM, and PM to discuss the unresolved deficiency and arrange a mutually acceptable resolution.

5.0 DOCUMENTS AND RECORDS

This section describes the processes to be implemented controlling the review, approval, and revision of documents and submittals. Records documenting the work quality will be controlled, protected, maintained, and submitted according to contract specifications.

5.1 Review, Approval, and Revision

All project QC documents are the responsibility of the QC Manager (QCM). The QCM has sole authority to review and approve all QC documents. These documents include:

- Daily Construction Reports,
- Calibration Records,
- Construction Photographs,
- Survey Records, and
- Corrective Action Reports.

In the QCM's absence, designated Staff may make entries and revisions in QC records, but the QCM will review and approve these entries and revisions.

Documents such as plans, reports, and procedures will be controlled using revision numbers. Document revisions will be designated as "Revision 0"; subsequent revisions will increase numerically (e.g., 1, 2, 3, ...). No revisions to plans or procedures will be issued until the original signatories approve the revised document.

5.2 Document and Record Control, Protection, and Maintenance

All project documents, including QC records, will be controlled by the Project Manager (PM) and secured in the job-site office under his direct control. Current records of operations, activities, and tests performed will be maintained.

A copy of the Daily Construction Report is presented in Appendix D. The record information will include, but is not limited to:

- Number of personnel working;
- Description of trades working on the project;
- Work performed each day stating location, description, and by whom;
- Currently active contractor/subcontractor(s) and the task/area of responsibility;
- Type of equipment used each day stating location and description;
- Off-site product inspections, including any actions taken;
- Materials received at the site and their condition;
- Test and/or control activities performed with results, and specification requirements, identification of control phase, and deficiencies noted along with relevant corrective action(s);

- Instructions received from the Client's Representative; and
- Conflicts in plans and/or specifications; and
- Any delays.

The records will document contract compliance of workmanship, equipment, and materials. The records will include attached copies of reports and tests performed. The Daily Construction Report will be reviewed and countersigned by the FS.

Additional QA records include the Corrective Action Report (CAR) and Photographic Record. QA record examples are presented in Appendices C through E as follows:

• Corrective Action Report	Appendix C
• Daily Construction Log	Appendix D
• Photographic Record	Appendix E

A pictorial record of the work in progress, deficiencies, and corrective action will be maintained. A minimum of 12 photographs per month will be taken, and will include photos of each bid item before, during, and after construction. Any significant items to be buried or concealed will also be photographed. The photographs will be identified on Photographic Records (photo logs) by frame number and date; a description of the pertinent object depicted will be included. The negatives will be filed in order taken and stored separately from the photographs.

Upon request, all QC records will be made available for inspection by the PM and the Contractor's Representative.

5.3 Document and Record Submittals

The QC Manager (QCM) will be responsible for ensuring that submittals are complete and in accordance with the Specifications; variances will be clearly noted on the submittal. The QCM will ensure that project progress and sequencing is not delayed due to incomplete, deficient, or late submittals. All submittals will be reviewed and certified by the PM or QCM. All anticipated submittals will be listed on the Submittal Register. This Register will be updated each time any submittal, listed or not, is submitted. The status of each submittal will also be tracked on the Submittal Register. ASARCO's submittal schedule from the Specifications is attached as Appendix H.

A list of significant submittals includes the following:

Plans and Procedures:

- QC Plan
- Health & Safety Plan
- Dust Control Plan
- Erosion Control Plan (to MDEQ)
- Water Control Plan (to MDEQ)
- Traffic Control Plan
- Installer's Quality Control Plan (FML)
- Liner Installation Instructions
- FML placement diagram

Certifications, Approvals, & Warranties:

- Utility locates
- Asphalt concrete mix design certification (with material delivery)
- FML manufacturer's approval of installing subcontractor
- FML warranty
- Seed type bulk weight ratio certification
- Fertilizer composition "certificate"
- Weed-free, live seed certification

Composite Material Formulas:

- Asphalt concrete mix design

Project Tracking Documents:

- Daily Construction Reports, including quantities completed

As-Builts:

- As-Builts based on regularly up-dated Red-lined drawings and Specifications:
  - Leachate collection systems (as-built)
  - FML Record (as-built) w/installed panel layout drawings including limits, panel #s, direction rolled, seams, sample, patch, and repair locations.

Photographs:

Two sets of project photographs and the negatives are to be conveyed to the Client as part of project close-out.

6.0 WORK PROCESS

This section presents planned measures to ensure work is performed to established technical standards using approved work instructions, procedures, and other appropriate means. Work instructions will be used to control processes for which quality of results are not easily measured or otherwise verified. Measuring and testing equipment will be maintained, controlled, and calibrated commensurate with its intended function.

The tentative Order of Work is listed below:

Site Layout Surveys
Install Site Access Controls (temporary fence and gates)
Install Stormwater BMPs (temporary diversion ditch, silt fence...)
RR Crossing Improvements (by MRL)
Construct Access Roads with Culverts
Strip & Stockpile Topsoil and Subsoil
Excavate Base of CAMU Cell
Grade, Roll, & Compact CAMU Subgrade
Place & Compact Clay Liner (CCL)
Grade & Roll CCL Surface for HDPE
Install Secondary Containment HDPE
Install Secondary Containment Geonet
Install Secondary Containment Leachate Removal System
Install Primary Containment HDPE
Install Primary Containment Geonet
Install Primary Containment Leachate Removal System
Crush or Break Oversized Concrete Debris to < 2-feet Dimensions
Traffic Control
Dust Control
Haul Road Maintenance & Continuous Sweeping
Load & Haul Waste Soil and Debris from plant
Place & Compact Waste Soil and Debris in CAMU
Salvage & Stockpile Designated Items on the plant
Install Gas Migration Layer & Venting System
Implement & Maintain Surface Water Controls During Waste Placement
Sweep clean the Paved on-plant areas under Removed Waste Piles
Place & Compact Clay Cover (CCC)
Grade & Roll Surface of CCC
Grade & Compact Subgrade for Cap at Former Southeast Stockpile Area
Spread, Grade & Compact Clay Cover (Cap) at Former Southeast Stockpile Area
Install HDPE Cap on CAMU
Install Cap Drain Material

Install Drainage Geotextile on Drain Material
Place & Compact Lower Cover Soil Layers (16" Subsoils)
Place & Compact Upper Cover Soil Layers (8" Topsoils)
Construct Permanent Diversion Ditch; Remove Temporary Diversion Ditch
Prepare Surface of CAMU Topsoil & Other Distrubed Areas: mulch, seed & fertilize
Install Perimeter Chainlink Fence, Gases & Signs.

6.1 Process Control Procedures

This section presents the three-phase control system to be employed in controlling the resulting quality of project work tasks. This system includes preparatory, initial, and final control phases.

6.1.1 Preparatory Phase

The preparatory control phase will be used to prepare for upcoming features of work. Contract drawings and specifications associated with an imminent feature of work will be reviewed. All equipment and material received at the job site will be inspected to ensure contract compliance based upon the submittal register and task-specific approved submittals.

Prior to each defined work feature, the required control inspections and tests will be reviewed. Provisions will be made for conducting the required inspections and testing as discussed in Section 8.0. The inspections and tests will be scheduled based upon the QC Manager's assessment of current field progress.

Prior to beginning a new work feature which will build upon existing work, a field inspection of the work area will be conducted by the QC Manager to ensure the existing work is in compliance with the contract. The equipment, material, and any sample work for the upcoming task will be physically examined to ensure they are available, conform to approved shop drawings or submitted data, and in good condition.

Prior to beginning a defined work feature, the HSO will record all physical hazards related to the upcoming work feature as part of the Job Safety Analysis, if deemed necessary or required by contract documents. The HSO will also ensure relevant safety precautions have been implemented.

The FS will discuss procedures for conducting the work with involved field personnel. This discussion will include possible deficiencies experienced in the past on this or other projects. Construction tolerances and workmanship standards will be refined above and beyond those defined in Section 8.0. The FS, in consultation with the QC Manager, will instruct workers on the acceptable level of workmanship required to meet contract specifications.

The QC Manager will notify the PM and Oversight Engineer 24 hours prior to beginning any work related to the preparatory phase. A meeting will be conducted by the PM and attended by the FS, HSO, Oversight and QC Manager. The results of the preparatory phase actions shall be documented

by the QC Manager on the Daily Construction Report. A sample Daily Construction Report is presented in Appendix C.

6.1.2 Initial Phase

The initial control phase builds on QA measures completed during the preparatory phase. The initial phase will be conducted when the definable feature of work is initiated. This phase will begin with verification that all preliminary work is in compliance with contract requirements. Preparatory meeting notes will be reviewed by the QC Manager and FS. Any problems encountered in this review will be resolved in consultation with the PM.

The Site-specific Health and Safety Plan and Job Safety Analysis will be reviewed by the HSO for compliance with the actual work hazards and upgraded as required. The FM will notify the PM and QC Manager 24 hours prior to beginning any work related to the initial phase controls. The initial phase will be repeated whenever new work crews arrive on-site, or when specified quality standards are not being met.

6.1.3 Final Phase

The final control phase will build upon the QA measures implemented during the preparatory and initial phases; this phase includes the daily quality control activities of the QA Program. A daily review will be made by the QC Manager to assure continued compliance with contract requirements, including control testing and identifying any construction deficiencies, and will be recorded in the Daily Construction Report. Follow-up checks will be conducted and deficiencies corrected prior to beginning additional features of work. Corrective action will be conducted as outlined in Section 4.0 - Deficiency Corrections.

6.2 Measuring and Testing Equipment

Measuring and Testing Equipment which Envirocon personnel will operate consists of the following items, listed by work task:

Excavation and Backfill

Survey Equipment - The surveying transit/total station will be maintained and calibrated by the subcontracted surveying and geotechnical firms according to the manufacturer's recommendations. The records will be reviewed to ensure calibrations are current.

Health and Safety

Air Monitoring Equipment, Miscellaneous - The air monitoring equipment will be maintained and calibrated by the HSO according to the manufacturers recommendations.

Combustible Gas Indicator (CGI) - The CGI will be maintained and calibrated by the HSO according to the manufacturers recommendations.

7.0 PROCUREMENT

This section presents planned measures for ensuring that procured materials meet the Specification requirements, are suitable for their intended use, and are received and maintained in good condition prior to use. Procurement control systems will ensure that appropriate technical and quality specifications are satisfied. The submittal process is crucial in satisfying the Specifications.

Subcontractors, off-site fabricators, and suppliers will provide Envirocon with the required submittal information for their materials/services. No materials will be ordered until the associated submittal has been reviewed by the QC Manager, submitted, and approved by the Client. All materials will be inspected as they are brought on-site to ensure that they match the submittal requirements and arrive in good condition. The Daily Construction Report will identify and document non-conforming items during the procurement process.

All purchase orders (POs) and agreements will state that the subject material or service must be in compliance with the approved submittal (attached to the PO) or will be replaced at no additional cost to the contractor or Client. The QC Manager (QCM) is responsible for generating and signing as "ordered by" POs based on project requirements and quotations received. The POs, with appropriate backup (quotes, submittal copies, etc.), will be forwarded to the PM for his review and signature as "authorized by". POs will be tracked using an associated and pre-numbered PO Log. With the PM's approval, the equipment, materials, supplies, or service will be ordered by the QCM.

All materials will be inspected by the QCM when they are brought on-site to ensure they match the respective approved submittal and arrive in good condition. The QCM will write the vendor's invoice number on and sign the corresponding PO. A copy of Envirocon's Purchase Order form and PO Log are presented in Appendix G.

8.0 INSPECTIONS AND TESTS

Acceptance inspections and tests of specified items, services, and processes will be conducted using established acceptance and performance criteria. All routine inspections, and acceptance inspections or tests will be formally documented and submitted as required.

8.1 Control, Verification, and Acceptance Testing

Each task plan will contain a list of specific tests, including the test name, frequency, specification paragraph reference, the estimated number of tests, and who is responsible for conducting the test. Tests requiring off-site analytical testing will be sent to an approved laboratory. The QC Manager (QCM) will ensure the tests are sufficient to provide a product conforming to contract requirements. Results of all field tests will be kept on file at the project site office.

Specifically, the QCM will ensure that:

- Testing procedures and results comply with contract requirements;
- Facilities and testing equipment are available when needed and comply with testing standards;
- Certified standards are used in calibrating test instruments;
- Recording forms are prepared and test documentation requirements are reviewed by the QA and testing staff; and
- Results of all tests are recorded and kept on file at the site project office. Specification paragraph reference, test location, and a unique sequential control number identifying the test will also be recorded.

8.2 Testing Summary

The following field tests are required by the Specifications. This list is not complete – please refer to the Contract Specifications and referenced DOT Standard Specifications. Also, additional tests may be necessary to provide a quality product; any additional tests will be determined by the PM, in consultation with the oversight engineer. In addition, some of these tests may be the responsibility of the Oversight Engineer. These questions should be resolved during the preparatory phase.

Field QC Tests:

Earthwork:

Proctors:	-	1/material
Density :	-	Client's responsibility unless excessive failures

Flexible Membrane Liner (FML):

- progressive vacuum or pressure tests (non-destructive)
- Welder qualification sample welds
- Successful warm-up welds required daily for each welder.
- HDPE welding will only take place when temperature is 40F<T<100F.

Geonet Filter Fabric:

- Sewn seam shear

8.3 Completion Inspection

Upon completion of work or task, the QC Manager will conduct an inspection of the work to identify items which do not conform to the approved plans and specifications. These deficient items will be included in the CAR, with an estimated date for correction. Corrective actions will be confirmed and documented as described in Section 4.0 of this plan.

9.0 ASSESSMENTS

This section presents plans to measure quality, the adequacy of work performed, and promote improvements. Obstacles inhibiting the achievement of project objectives will be corrected.

This Project is being conducted under the oversight/control of the Client and the Client's Engineer who have significant responsibility for Project quality. Envirocon will support/supplement the Engineer's QC staff by implementing our own subtier QC Program.

Specific physical assessments to be conducted and documented include: field inspections, performance tests, and audits. Assessments will be documented on the Daily Construction Report.

- Field Inspections - Field inspections will be conducted by the Field Superintendent as work progresses and site conditions dictate. A field inspection of the work area will be conducted to ensure the existing work is in compliance with the contract prior to beginning any new work feature. Upon completion of work or task the FS will conduct an inspection of the work to identify items which do not conform to approved plans and specifications. In addition, the FS will inspect items brought to his attention as out-of-compliance or problematical. Inspections will be documented on the Daily Construction Report.

- Operating and Performance Tests - Tests cited in the specifications will be conducted; in addition, relevant tests will be conducted on completed work as needed. The FS will also test items and processes which have been brought to his attention as out-of-compliance or problematical; tests will be documented on the Daily Construction Report.

- Audits - Performance audits will be conducted by the FS to verify processes or equipment are operating up to standards. All audits will be performed internally and a report submitted to the PM with conclusions and recommendations.

  One or more system audits will be conducted during the project to ensure implemented QA systems are functioning and will result in the desired product. The first system audit will be conducted early in the Project after the Corporate QA Manager has delegated on-site responsibilities to the QC Manager. Audits will be documented on the Daily Construction Report.

ENVIROCON, INC. PROJECT QA ORGANIZATIONAL CHART

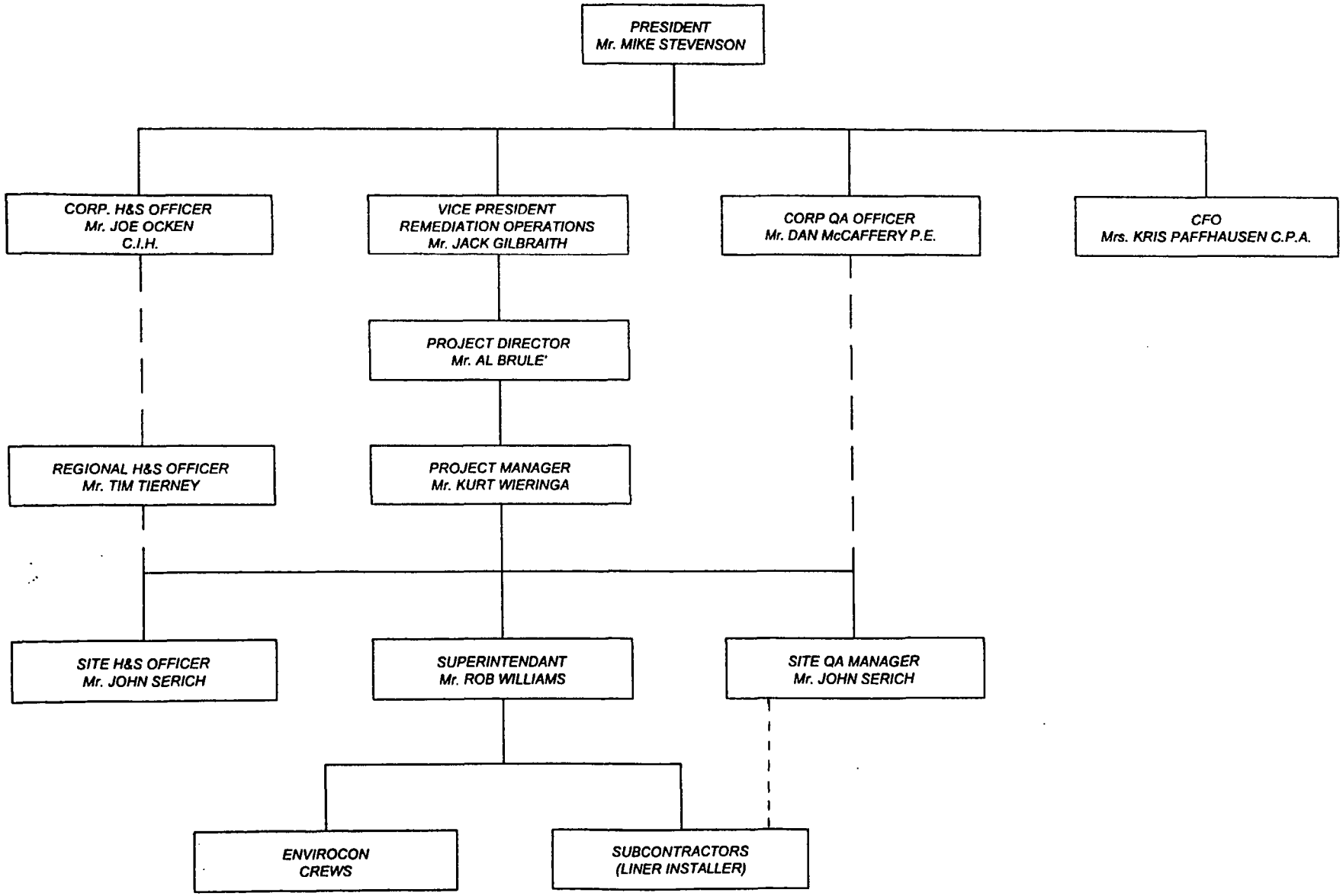

FIGURE 1

Appendix A ASARCO's Construction QC Specifications

fence will be mounted on the same fence posts. Temporary locking gates will be installed at site access points. The Contractor will provide all traffic control associated with hauling and other construction activities between the plant and the CAMU site. The Contractor will be responsible for site security until final acceptance of the work. A Contractor's field office will be maintained near the CAMU throughout the project. The Contractor's superintendent will carry a cellular phone.

SURVEYS

Surveys include layout, grade control, quantity determination and as-built surveys. The Contractor will complete all surveys and furnish all stakes, markers, tools and equipment required to lay out the work from bench marks and/or control point markers indicated by the Engineer. Copies of all survey notes will be given to the Engineer within 1 day after the survey is conducted. The Contractor will not disturb existing survey monuments or bench marks without the consent of the Engineer. A licensed land surveyor will replace markers that are accidentally disturbed by earthwork operations at the Contractor's expense. Existing groundwater monitoring wells and manhole lids will not be disturbed.

CONSTRUCTION PHOTOGRAPHS

At least monthly during construction of the work, the Contractor will provide project pictures. Furnish two sets of (approximately 3" x 5") and negatives to the Owner. Provide a minimum of twelve (12) photos per month, including photos of each bid item before, during and after construction. Photos must be taken of all items to be buried while they are still exposed.

CONTRACTOR STORAGE AREA

Prior to notice to proceed, Contractor will be provided a storage area near the project site. Contractor is responsible for the security of assigned storage area (5,000 S.F., more or less). All temporary facilities (including tractor trailers) will be maintained in good repair. Storage areas will be enclosed by 6' chain link fence with access gates. Spare keys to any locked gates will be provided to the Owner. Storage areas will be clean, orderly, and free of debris, demolished materials, etc.

QUALITY CONTROL

THE CONTRACTOR IS RESPONSIBLE FOR QUALITY CONTROL WHICH IS CONSIDERED TO BE A MAJOR INSPECTABLE ITEM OF THIS CONTRACT. The Contractor will perform all Quality Control inspection and/or testing required by this contract unless otherwise specified. The Quality Control system must consist of personnel, plans, procedures, and organization necessary to provide materials, equipment, workmanship, fabrication, construction and operations that comply with contract requirements. The system will cover construction operations, including fabrication both on-site and off-site, and will be keyed to the proposed construction sequence. The Notice to Proceed will not be issued until the Contractor submits an acceptable Quality Control Plan.

The Contractor's Quality Control Plan will identify the personnel, procedures, instructions, records, forms, and as a minimum, will include the following:

- A description of the Quality Control management organization including an organizational chart.
- The number, classifications, qualifications, duties, responsibilities, and authorities of personnel: A copy of a letter, signed by an authorized official of the firm, which describes the responsibilities and delegates the authorities of the Quality Control manager will be furnished. The Quality Control manager must have a minimum of five years of documented experience in the primary areas of construction included in this contract. Include qualifications in the submitted plan for Owner approval. This contract does not require a full time Quality Control Manager. The individual assigned may have other duties within the contractor's organization but must commit a minimum average of two hours per day towards fulfilling the QC requirements of this section. Hours dedicated to this function will be annotated on the submitted QC records.
- The Contractor's Quality Control activities to be performed, include those of subcontractors, off-site fabricators, and suppliers. A job specific detailed work item list for inspection purposes will be developed by the contractor. The list will be broken into sections identical to the contract specifications and will contain all inspection actions necessary to ensure full compliance with the contract.
- Quality Control testing procedures including corrective actions to be taken where non-compliance is noted by the Quality Control Manager.
- Documentation format for Contractor's Quality Control activities and testing. The provided form is to be used for documenting daily inspections, corrective actions, etc.
- Procedures for ensuring As-Builts are accurate and updated daily.
- Methods to ensure scheduled appointments are met and documentation to verify arrival and departure times at the work site.
- A listing of all required mechanical and electrical testing, balancing, and operational tests.
- Safety program issues will be addressed in the Site Health and Safety Plan.

The Quality Control Plan will be reviewed and approved, if acceptable, by the Engineer. The Contractor will make such changes and additions necessary for clarity and completeness as requested. Acceptance is conditional and the Owner reserves the right to require the Contractor to make changes in the Quality Control Plan, personnel, and operations to correct deficiencies found by the Engineer during performance of work. No change will be implemented prior to acceptance in writing by the Owner. The Contractor will submit four copies of the proposed Quality Control Plan for approval not more than 15 days after Contract Award.

The Quality Control Records will contain a record of daily inspections for all work accomplished. Specific items of work checked each day will be annotated. All work-in-place must be certified as complying with the contract plans and specifications. Non-compliance items must be clearly noted. Corrective actions must be outlined and detailed for non-compliance items. The Contractor will maintain daily records, which will be on-the-job site and available for review by the Engineer. Daily reports will be signed by the designated Quality Control Manager and will indicate hours spent on Quality Control that day. A copy of the QC daily reports will be given to the Engineer.

Appendix B Training Matrix

Thanks for your Zero Incident Performance (ZIP)! Accident free work benefits you, your buddy, Envirocon, and our clients. (NOTE: ZIP performance appear on this report only when it has been more than 1,000 manhours since your last recognition.)

Project: 14 Envirocon Corporate Office

Employee:	Number	latest 8 hr	last medical	asbestos	training status	medical status	asbestos status	total manhours	last incident	latest award	ZIP award hours	award enclosed	initial for receipt of award
Alexander, James	506221		10/20/2000		—	OK	—						
Bishop, Marty	339979	1/27/2000	2/21/2001		disqualified	OK	—						
Cody, Mel	511345		9/15/2000		—	OK	—						
Davito, Darci	482193	2/16/2001	9/20/2000		OK	OK	—	6,565		5,000	6,565		
Evans, Dale	276621	4/14/1998			disqualified	—	—						
Feltus, Nikki Lee	509165				—	—	—						
Frame, Greg	417691	3/28/2001	9/10/1999		OK	disqualified	—						
Gies, Cheryl	510140				—	—	—						
Gilbraith, Jack	464462	2/13/2001	4/5/1999		OK	disqualified	—						
Gjording, Laurie	371506				—	—	—						
Grams, Ken	494864	3/24/2000	8/24/2000		< 60 day	OK	—	5,934	*4300*	3,586	1,634		
Harman, Jody	499016				—	—	—						
Hooper, Chad	454061	2/16/2001	6/5/2000		OK	< 60 day	—						
Houston, Maria	471988				—	—	—	9,124		8,000	9,124		
Jones, Cayce	516613		11/2/2000		—	OK	—						
Joy, Pete	297262	1/27/2000	1/30/2001		disqualified	OK	—	18,119		17,000	18,119		
Lambert, Nancy	499817				—	—	—						
Mathews, Lori	416081				—	—	—						
McConnell, Kristi	487429				—	—	—	5,148		4,000	5,148		
Mercil, Forest	503581	1/19/2001			OK	—	—						
Mikell, Jeffrey	453253	6/6/2000	4/27/2000		< 60 day	< 60 day	—						
Paffhausen, Kris	479066				—	—	—						
Parker, Carolyn	479584				—	—	—						
Pickett, Leonard	473123	2/2/2001	2/21/2001		OK	OK	—						
Plute, Teresa	458361				—	—	—						
Quick, Kyle Shane	507258		7/11/2000		—	OK	—	2,467		1,438	2,467		
Richter, Paul	486805	1/19/2001	3/6/2001		OK	OK	—						
Rust, Sheila	471970				—	—	—						
Schillesci, Chris	507995		4/24/2000		—	< 60 day	—						
Spence, Annette	502828		6/6/2000		—	< 60 day	—						
Stacy, Amanda	520153				—	—	—						
Steinberg, Scott	510158		6/27/2000		—	OK	—						
Stevenson, Mike	356162		3/6/2001		—	OK	—						
Stone, Jeffery	495963				—	—	—						

This is the monthly employee ZIP evaluation and qualifications status report. ZIP incentives will be listed at the far right. Please initial in the box at the right to acknowledge receipt of the award. Employees that are disqualified for overdue annual training and medical exams are not eligible to recieve awards.

INTERNAL LIST OF QUALS

Equipment/Qual	*Employee Qualified*	*Project where qualified*	*Qualified by*	*NOTES*	*Date*
Compactor					
	Anderson, Marvin	Jacob's Smelter OU1, Residential	Mikell, Jeffrey	12/6/00	12/11/00
	Bishop, Brett	Jacob's Smelter OU1, Residential	Mikell, Jeffrey	12/6/00	12/11/00
	Burk, Steven	FMC Pocatello RCRA Pond Closures	Cleaves, Brent	Qualified 4/19/00	12/6/00
	Contreras, Richard	Asarco Construction OLF	Schaffer, Richard	`12/6/00 5 yrs experience	12/6/00
	Edmo, Tyrone	FMC Pocatello RCRA Pond Closures	Boer, John	4/17/00	12/6/00
	Erlwein, Andrew C.	Asarco Construction OLF	Pickett, Leonard	12/6/00	12/6/00
	Farmer, Deloyd	FMC Pocatello RCRA Pond Closures	Cleaves, Brent		12/6/00
	Fyke, John	Peters Creek Lagoon Closure	Grams, Ken	36 years of experience	12/4/00
	Jones, Dallas	Jacob's Smelter OU1, Residential	Mikell, Jeffrey	12/6/00	12/11/00
	Kimball, Richard	Asarco Construction OLF	Schaffer, Richard	12/6/00 14 Yrs Experience	12/7/00
	Kriner, Mark	FMC Pocatello RCRA Pond Closures	Boer, John	4/17/00	12/6/00
	Lemus, Javier	Jacob's Smelter OU1, Residential	Mikell, Jeffrey	12/6/00	12/11/00
	McClure, Thomas E.	Asarco Construction OLF	Schaffer, Richard	12/6/00 30 Yrs Experience	12/7/00
	Merrell, Guy	FMC Pocatello RCRA Pond Closures	Kriner, Mark	4/17/00	12/6/00
	Neinke, David	Asarco Construction OLF	Pickett, Leonard	12/6/00	12/6/00
	Pecka, Kelly	Asarco Construction OLF	Schaffer, Richard	12/6/00 17 Yrs Experience	12/7/00
	Porter, Arlie	FMC Pocatello RCRA Pond Closures	Cleaves, Brent	Qualified 4/17/00	12/5/00
	Powell, Neleen	Jacob's Smelter OU1, Residential	Wiltse, Mark	12/4/00	12/4/00
	Rowley, Anthony	RMA WP5 South Plants Phase II	Sparks, Bert	9/22/00 2Yrs Experience w/Envir	12/7/00
	Salazar, Selso	RMA WP5 South Plants Phase II	Sparks, Bert	12/6/00	12/7/00
	Samp, Orrie	Kerr McGee Residential Properties	Valdez, Robert	3 Yrs Experience	12/5/00
	Selman, Brent	RMA WP5 South Plants Phase II	Sparks, Bert	1/18/00	12/7/00
	Selman, William L.	RMA WP5 South Plants Phase II	Sparks, Bert	10/19/00	12/7/00
	Sibulkin, Laurie	Jacob's Smelter OU1, Residential	Kiggins, Chance	12/4/00	12/11/00
	Sparks, Bert	RMA WP5 South Plants Phase II	Blankenfeld, Christopher	1/2/00 one of the best and most v	12/7/00
	Uranich, Kevin	Kerr McGee Residential Properties	Valdez, Robert	17 Years Experience	12/5/00
	Vaughan, Scott	Kerr McGee Residential Properties	Valdez, Robert	25 Yrs Experience	12/5/00

Appendix C Corrective Action Report

ENVIROCON, INC.
CORRECTIVE ACTION REPORT (CAR)

CAR#

Project	Data
Name:	Report Date:
Number:	Reported by:
Location:	
Client:	
S/C#:	

Description & Location of Issue:

Suspected Cause:

How and when issue was discovered:

How long issue existed:

Suggested corrective measures:

Documentation of corrective measures:

Results of corrective measures:

Suggested methods to prevent similar issues:

Signatures

Site Superintendent

Site QA Officer

Appendix D Daily Construction Reports

DAILY CONSTRUCTION REPORT

Date: _____

Project: _____ Project # _____

Client: _____ Project Manager: _____

Contractor: _____

Weather _____ Temperature _____

Wind _____ Precipitation _____

FIELD FORCE			
Name of Contractor	**Prime or Subcontractor**	**No. of Persons on Project**	**Remarks**

ENGINEER'S PERSONNEL			
Time	**Name**	**Duties**	**Remarks**

EQUIPMENT ON THE SITE

CONSTRUCTION ACTIVITIES

DAILY CONSTRUCTION REPORT (continued)

Page: _____

Date: _____

Initials: _____

ACTIVITIES

Items of Work Completed	Location	Amounts	Remarks

By:_____ Title:_____

Appendix E Photographic Record

ENVIROCON, INC.
PHOTOGRAPHIC RECORD

Project		Data	
Name:		Date:	
Number:		S/C #	
Location:		Report Date:	
		Reported By:	

PHOTO #	DATE	LOCATION	COMPASS DIRECTION	DESCRIPTION / ACTIVITY

Signatures

Site Superintendent

Site QA Officer

Appendix F Field Question Form

ENVIROCON, INC.
FIELD QUESTION (FQ)

Project	Data
Name:	Report Date:
Number:	Reported by:
Location:	
Client:	
S/C#:	

Description & Location of Issue:

Reason for Question:

Signatures

Site Superintendent

Site QA Officer

Appendix G Procurement Forms

PURCHASE ORDER LOG

Project name:_____
Issued To: _____
Date Issued:_____

**Every Friday submit Purchase Orders, Invoices, and a copy of the Purchase Order Log into the Missoula office.

Purchase Order #	Issued to (Vendor Name)	Summary of Item(s) ordered	PO $ Total	Requested By	Date Requested	Estimated Arrival	Office Use Only
12001							
12002							
12003							
12004							
12005							
12006							
12007							
12008							
12009							
12010							
12011							
12012							
12013							
12014							
12015							
12016							
12017							
12018							
12019							
12020							
Extra							
Extra							
Extra							

ENVIROCON

500 Taylor St./59802
P.O. Box 16655
Missoula, MT 59808
TEL (406) 523-1150
FAX (406) 543-7987

VENDOR NAME:
VENDOR ADDRESS:

ATTN:

Ship to:

PURCHASE ORDER #

DATE::

JOB #:

JOB TITLE:

COPY

CODING? (circle one) Y / N

Page 1 of

Quan Ord.	Unit Meas.	Quan Rec'd	INVOICE	DESCRIPTION	Unit Price	Extended Price	CODING
				ESTIMATED FREIGHT CHARGE			

VENDOR CONTACT:

QUALITY REQUIREMENTS FOR VENDOR:

SHIP VIA: _____ Delivery Date: _____

☐ DESTINATION ☐ COD

☐ ORIGIN ☐ PREPAID

Subtotal

_____ % Sales tax

P.O. Total

☐ CONFIRMING

☐ NON-CONFIRMING

ESTIMATE FROM:

☐ Catalog ☐ Estimate

☐ Quote (attached) ☐ Verbal

☐ Past P.O.

SPECIAL INSTRUCTIONS:

SEE REVERSE SIDE FOR TERMS AND CONDITIONS OF PURCHASE WHICH ARE BINDING ON THE PARTIES

Accepted by: _____ DATE

Print name of authorized signer _____

Signatures/Approvals

REQUISITIONED BY:	DATE
PROJECT MGR./PROJECT DIR.	DATE
REGIONAL MANAGER	DATE
PRESIDENT/OPS VICE PRES.	DATE

WHITE - A/P PINK - SITE YELLOW - CONFIRMING COPY GOLDENROD - VENDOR

(on reverse of P.O.)

PURCHASE ORDER TERMS & CONDITIONS

1. The contract between Seller and Purchaser (Envirocon or "EI") is incorporated into the terms and conditions of this Purchase Order (PO), together with any supplemental documents, specifications, drawings, notes, instructions, engineers notices or technical data referred to herein. EI shall not be bound by this PO unless, and until, Seller executes and returns an acknowledgement copy of this PO, and no other form of acceptance shall be binding on EI. Seller accepts and shall be bound by the terms of this PO when it executes and returns the acknowledgement copy or when it commences its performance hereunder. This PO expressly limits acceptance to the terms stated herein, and any additional or different terms proposed by Seller are rejected. No contract shall exist except as herein provided. This PO sets forth the entire understanding of the Parties with respect to the subject matters hereof, and is a complete and exclusive statement of the terms of the agreement between the parties. No waiver or modification of any provision of this PO shall be valid unless made in writing and duly executed by EI's properly designated representative. A waiver of any default shall not waive subsequent defaults. Time is of the essence in Seller's obligations hereunder. Any provisions allowing the delivery of products or services in installments, shall not be construed as making the obligations of Seller severable.

2. EI agrees to pay Seller for the full, timely & satisfactory performance & completion of services &/or delivery of materials as specified and priced on the PO, subject to additions or deductions for agreed upon changes. Unless stated otherwise, if the price is based upon unit prices & estimated quantities, then the sum is approximate only and will be adjusted on the basis of final actual quantities. Further, estimated quantities are subject to revision at EI's discretion without change in unit price.

3. Invoicing against this PO must be made separately from all others and must show PO number. Shipping tickets and/or packing slips must show in detail items shipped and must accompany all deliveries. No charges will be accepted by EI for crating, boxing, cartage, drayage, storage or like services unless otherwise agreed on the PO.

4. Payment terms are NET 30 days. Invoices not received by the fifth business day subsequent to month of purchase may, at the option of EI, be held until the following month and discounts taken. Discount dates will be calculated from the date that an acceptable invoice or material purchased is received by EI, whichever is the later date.

☐5. Itemized statements must be submitted monthly.

6. When prices, terms and deliveries are noted on the PO, the Seller is not, without written authorization from EI, authorized to furnish or ship the items specified except on the basis of the prices, terms and deliveries noted.

7. EI reserves the right to refuse payment for any items billed at prices other than, or delivered at a date later than, specified on this PO, without prejudice to EI's other legal remedies.

8. Seller warrants clear and merchantable title to all material supplied hereunder and agrees to indemnify EI against all liability for patents, copyright or other infringement on account of its purchase and use of such material.

9. When Seller is not required to install all materials furnished by Seller under this PO, such material is to be delivered F.O.B. job site, unless otherwise noted on the face of the PO. Any delivery charges (to include all sales, use, excise and/or similar taxes to be paid by EI) so noted & approved, will be itemized separately on all invoices.

10. All materials are to conform to all applicable requirements of the plans, standard specifications, and special provisions attached hereto and made a part hereof. This PO shall not include any proposals, correspondence or agreements dated or alleged to have been made prior to the date of this PO, unless specifically identified & incorporated herein. Any such documents so identified by EI, are to include supplemental terms and conditions, if any, and are incorporated by reference the same as if set out in full herein.

☐11. All required testing, inspection and approval of materials (or workmanship) by the proper authorities to be provided and arranged by Seller at no additional cost to EI.

12. Seller shall comply with all applicable laws and regulations of governmental authorities, including but not limited to those involving wages, hours, materials, race, color and creed of worker, price regulations and renegotiation provisions.

13. It is understood that the Seller will accept exclusive liability for all employment related taxes and insurance, unemployment insurance and Withholding Tax laws and similar or related laws and applicable regulations.

☐14. Prior to commencing work, the Seller agrees to furnish acceptable certificates of insurance to EI and maintain in force those required coverages, without any cost to EI.

15. If the Seller defaults on any provision of this PO, EI has the right to immediately declare this PO null and void.

☐16. The Seller shall furnish, for the approval of the Architect or Engineer, all shop drawings and such samples as they may require. All workmanship and materials provided pursuant to this PO shall be in strict accordance with these approved samples.

17. Seller shall defend and indemnify EI and its Client from any loss resulting from the operation and effect of any lien or encumbrance, including costs and attorney's fees.

18. Seller agrees to reimburse and indemnify EI for any and all liquidated or actual damages that may be assessed against EI which are caused in whole or in part by Seller's failure to satisfactorily perform the work required by this PO. Seller further agrees to reimburse EI for such other damages sustained by reason of any delay of Seller, including, but not limited to, recovery of attorney's fees incurred by EI and recovery of EI's overhead and expenses. Seller further agrees that the payment of such damages shall not release the Seller from its obligation to otherwise fully perform this PO.

19. EI and Seller shall not be liable to one another for any delays arising out of acts of God, strikes, embargoes; or other causes beyond their respective control; except that in the event EI's Client should assess liquidated damages or similar penalties against EI, then Seller shall be responsible for such portion of the assessment as may be attributable to it.

20. Seller may neither assign its rights under this contract nor subcontract its obligation hereunder without first obtaining the written consent of EI.

21. If Seller becomes insolvent or makes an assignment for the benefit of its creditors, or if a petition in bankruptcy is filed by or with respect to Seller, EI may, by notice in writing, terminate this PO without liability except for items already delivered. EI may terminate this PO at any time by notice in writing to Seller. In such latter event, EI shall pay such cancellation charges as may be agreed upon. The provisions of this paragraph shall not limit or affect the right of EI to terminate this PO immediately for the default of the Seller.

22. Arbitration: If the Prime Contract, which EI has with its Client, calls for arbitration and an arbitration concerning or relating to Seller's work and/or materials, is commenced between EI's Client and EI; Seller, will, on demand of EI, become a party to such arbitration proceedings and shall submit to any award that may be rendered therein. Subject to the foregoing, if any questions arise regarding the work required and/or materials supplied under this PO, or the Prime Contract, such questions shall be subject to arbitration, provided however, that if the work involves EI's Client, and EI is unable to compel or persuade its Client to participate in such arbitration, then EI may elect to have the dispute litigated in a Court of Law where all parties can be joined. Arbitration shall be had in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association in effect at the time the arbitration is initiated. All arbitrators selected or appointed shall hold an active license as either a Contractor, Architect, Civil or Mechanical Engineer in the State where the proceedings are arbitrated. Should any party refuse or neglect to appear or participate in arbitration proceedings, the arbitrator shall have the power and authority to, and shall decide the controversy in accordance with whatever evidence is presented. The arbitrator shall be authorized to award any party or parties such as he deems proper for the time, costs, expense and effort of arbitration, including reasonable attorney's fees. A party shall not be deemed to have waived the right to demand arbitration under this PO by filing suit, provided:

(1) The party files suit in order to prevent the running of the applicable statute of limitations, or in order to obtain the benefit of some provisional remedy such as mechanic's lien, stop notice attachment or injunctive relief, and

(2) The party commencing suit stays the court proceedings pending arbitration.

23. Payment is in trust. The Seller as Trustee agrees and covenants that money received is in trust for the performance of this PO and shall be used solely for the benefit of persons and firms supplying labor, materials, supplies, tools, machines, equipment, plant or services exclusively for the Project in connection with this PO and having the right to assert liens or other claims against the land, improvements or funds involved in the Project or against any bond or other security posted by EI or its Client, that any money paid to the Seller pursuant to this PO shall immediately become and constitute a trust fund for the benefit of said persons and firms, and shall not in any instance be diverted by Seller to any other purpose until all obligations arising hereunder have been fully discharged and all claims arising therefrom have been fully paid.

24. In the event action is instituted for the enforcement of any term or condition of this PO, the prevailing party shall be entitled to an award of reasonable attorney's fees in such suit, in addition to costs and reasonable expenses incurred in the prosecution of said suit.

25. Arbitration or legal action on this PO shall be in Missoula County, Montana.

☐26. Special Provisions:

☐a) Delivery Schedule is: ☐ attached; ☐ on face of PO; or ☐ as follows:

☐b) These PO Terms & Conditions take precedence over and supercede any other terms and conditions previously agreed to between the parties or documents attached hereto.

☐c)

NOTE: Those paragraphs appearing above with a box in front of the number, only apply if checked.

Appendix H ASARCO's Submittal Register

Specifications Table 104

TABLE 104-. SUBMITTAL SCHEDULE

SUB ID NO.	SPEC PARA NO. OR DRWG NO.	TYPE OF SUBMITTAL	DESCRIPTION OF MATERIAL	TIME OF SUBMITTAL	DATE REC. FROM CONTR	TO CONTR APPROVED/ DISAPPROVED	RESUBMITTAL DUE FROM CONTRACTOR	REMARKS
Section	III							
1		Notification	NonCollusion Affidavit	With Bid				
2		Notification	Subcontactor and Equipment/Material Listing	With Bid				
3		Notification	Subcontractor Qualifications	With Bid				
4		Notification	Summary of Insurance Requirements	With Bid				
Section	VIII							
5	PART 6	For Approval	Evidence that all indebtedness connected with work has been paid.	Prior to final payment				
6	PART 7	For Approval	Certificate of Insurance	Prior to mobilization				
Section	X							
7	PART 3	For Approval	All Contractor Drawings for project	15 Days PBC				
8	PART 3	For Approval	Any shop drawings, detail sheets, fabrication details, installation diagrams for any phase of the work.	15 Days PBC				
9	PART 3	Final	Final As Built Drawings	30 Days AFI				
10	PART 3	For Approval	O&M Instructions and Manuals	Prior to shipping				
11	PART 4	For Approval	Detailed work schedule and work plan	15 Days after Contract Award				
12	PART 35	For Approval	Notice of Interference with Owner Operations	3 Days prior to work				
13	PART 42	For Approval	Provide Engineer with sample of material to be used, product data to demonstrate material adherance to specifications.	Prior to ordering material				
14	PART 42	For Approval	Provide Engineer with list of materials to be used.	15 Days PBC				
Section								
15	104.09	Notification	Project photographs	Monthly				
16	104.09	For Approval	Acceptable Quality Control Plan	15 Days after Contract Award				
17	109.11.04	For Approval	County Road Crossing permits	15 Days PBC				
18	109.11.05	For Approval	Railroad submittals	15 Days PBC				
19	110.02.5	For Approval	Certification of Worker Medical Testing and compliance.	5 Days PBC				
20	110.02.6	For Approval	Certification of Worker Training and Compliance	Prior to attending site specific training				
21	110.02.8	For Approval	Site Health and Safety Plan	10 days ANP				
22	111.01	Cert of Compliance	Documentation from seed supplier showing actual bulk weight of individual seed types.	3 Days prior to use				
23	111.01	Cert of Compliance	Fertilizer Certificates	3 Days prior to use				
24	111.01	Cert of Compliance	Seed Certification	3 Days prior to use				
25	203.07.1	Notification	All survey data	1 day after survey conducted				
26	203.07.2	For Approval	Surveyor to meet with Engineer prior to commencing layout survey of specific areas	5 Days PBC				

TABLE 104-. SUBMITTAL SCHEDULE

SUB ID NO.	SPEC PARA NO. OR DRWG NO.	TYPE OF SUBMITTAL	DESCRIPTION OF MATERIAL	TIME OF SUBMITTAL	DATE REC. FROM CONTR	TO CONTR APPROVED/ DISAPPROVED	RESUBMITTAL DUE FROM CONTRACTOR	REMARKS
27	203.07.3	Notification	Utility Companies for locates	15 Days PBC				
28	203.07.3	Notification	Construction near utility systems	Prior to digging				
29	203.07.6	For Approval	Dust Control Plan	30 Days PBC				
30	208.03.2	For Approval	Erosion Control Plan to MDHES	30 Days PBC				
31	208.03.2	For Approval	Water Control Plan to Engineer	30 Days PBC				
32	301.03.1	For Approval	Sampling and Testing Aggregate	Upon installation completion				
33	401.03.1	For Approval	Asphalt concrete mix design	15 Days prior to use				
34	401.03.1	For Approval	Sampling and Testing Aggregate	Upon installation completion				
35	402.03.2	For Approval	Asphalt concrete mix design certification	Upon installation completion				
36	402.03.2	For Approval	Quality Control Plan	Upon installation completion				
37	402.03.2	For Approval	Sampling and Testing Bituminous Material	Upon installation completion				
38	618.03.2	For Approval	Traffic Control Plan	30 Days PBC				
39	623.03.A	For Approval	Installer's Quality Control Manual	3 Weeks prior to installation				
40	623.03.A	For Approval	Liner installation instructions	3 Weeks prior to installation				
41	623.03.A	For Approval	Panel layout drawings	3 Weeks prior to installation				
42	623.03.A	For Approval	Qualifications of installer	3 Weeks prior to installation				
43	623.03.B	Notification	Geomembrane data	Prior to shipment to site				
44	623.03.B	Notification	Polymer compound data	Prior to shipment to site				
45	623.03.C	Cert of Compliance	Certificate of subgrade acceptance	Prior to installation				
46	623.03.C	For Approval	Warranties for material and installation	Prior to installation				
47	623.03.D	Notification	Certified test results from quality control testing.	During installation				
48	623.03.E	Cert of Compliance	Installation Certification	Upon installation completion				
49	623.03.E	For Approval	As-Built Drawings	Upon installation completion				
50	623.03.E	Notification	Warranties from manufacturer, fabricator and installer.	Upon installation completion				
51	624.03E	Cert of Compliance	Certificate of subgrade acceptance	Prior to installation				
52	624.03E	Cert of Compliance	Installation Certification	Upon installation completion				
53	624.03E	For Approval	As-Built Drawings	Upon installation completion				
54	624.03E	For Approval	Certified test results showing geonet meets specs - certification documentation	3 Weeks prior to installation				
55	624.03E	For Approval	Installer's Quality Control Manual	3 Weeks prior to installation				

TABLE 104-1 SUBMITTAL SCHEDULE

SUB ID NO.	SPEC PARA NO. OR DRWG NO.	TYPE OF SUBMITTAL	DESCRIPTION OF MATERIAL	TIME OF SUBMITTAL	DATE REC. FROM CONTR	TO CONTR APPROVED/ DISAPPROVED	RESUBMITTAL DUE FROM CONTRACTOR	REMARKS
56	624.03E	For Approval	Liner installation instructions	3 Weeks prior to installation				
57	624.03E	For Approval	Panel layout drawings	3 Weeks prior to installation				
58	624.03E	For Approval	Qualifications of installer	3 Weeks prior to installation				
59	624.03E	For Approval	Warranties for material and installation	Prior to installation				
60	624.03E	Notification	Certified test results from quality control testing.	During installation				
61	624.03E	Notification	Geomembrane data	Prior to shipment to site				
62	624.03E	Notification	Polymer compound data	Prior to shipment to site				
63	624.03E	Notification	Warranties from manufacturer, fabricator and installer.	Upon installation completion				

NOTES:

AFT - After Final Inspection
ANP - After Notice To Proceed
ATT - After Test is Taken
BD - Before Delivery
PBC - Prior to Beginning Construction
PFI - Prior to Final Inspection
PPC - Prior to Project Construction
PT - Prior to Testing/Task

Appendix I

Corporate QA Manager's Resume

DANIEL McCAFFERY, P.E., QEP

TITLE Corporate Quality Assurance Manager

EXPERIENCE

Mr. McCaffery serves as Envirocon's Corporate Quality Assurance Officer. In this role, Mr. McCaffery is responsible for organizing and assisting with QA/QC submittals, preparing Contractor Quality Control plans and reports, conducting job site audits, reviewing submittals status in preparation for project closure, and overseeing air, water, and soil sampling programs. Mr. McCaffery also has extensive expertise in the construction and operation of soil vapor extraction systems (SVE), air sparging, and groundwater treatment. In addition, Mr. McCaffery has 11 years experience in environmental remediation and construction. As Senior Engineer, Mr. McCaffery is also responsible for overseeing Envirocon's Engineering Group which includes managing Project Engineers, Auto Cad and Drafting personnel, and sampling technicians.

His selected project experience includes:

- Implementing Quality Assurance/Quality Control (QA/QC) procedures for an 80-acre railyard remediation project including groundwater extraction and treatment, free-product recovery, soil-vapor extraction of chlorinated solvents, and closure of four ponds containing an oil-based sludge. Mr. McCaffery performed other tasks including air modeling for off-site population exposures; EPA ambient air, indoor air, and NIOSH air sampling; and operating/calibrating a meteorological system.

- Project Engineer/Quality Control Manager on South Plants Structure Demolition Phase I – Work Package #3 at Rocky Mountain Arsenal (RMA). This project involved the hazardous materials abatement, demolition, sizing and disposal of 57 structures in the former South Plants are of RMA. Mr. McCaffery was heavily involved in the preparation of submittals and the follow up work required for their approval by the client. Submittals included the SPCC plan, erosion control plan, storm water management plan, dust control, and odor control plan. Mr. McCaffery also prepared daily QC reports, Plan of the Day; performed quality inspections and conducted engineering survey reviews.

- Project Engineer/Quality Control Manager on Toxic Storage Yards remediation at Rocky Mountain Arsenal. This project involved the excavation of human health risk soils from the highly sensitive bald eagle management area at RMA. All excavation conducted on this project was completed under continuous monitoring for the presence of chemical warfare agents. Mr. McCaffery was responsible for the preparation of project submittals and quality reporting.

- Project Engineer/Quality Control Manager for a residential property remediation at the former Jacobs Smelter in Stockton, Utah. The project involved the removal of heavy metals contaminated soils from 125 properties in the town of Stockton. The project was highly visible and required a high degree of interaction with residents and property owners. Mr. McCaffery prepared and tracked submittals; trained an intern project engineer; reviewed subcontractor submittals for compliance with contract specifications; conducted field inspections in support of the field QA/QC technician; and managed subcontracts for the construction of several septic systems and timber retaining walls. Mr. McCaffery also monitored the quality of imported borrow soils used to backfill the excavated yards.

- Project Engineer overseeing the construction of a 4.5-acre final cover, and placing initial fill preloading on seven separate phosphate sludge ponds totaling over 27 acres at a operating phosphorous chemical plant in Pocatello, Idaho. The process ponds held a soft, low strength sludge that contained elemental phosphorus and phosphene gas. These conditions dictated that a large portion of the initial fill work scope to be conducted in Level B personal protection and flash protection suits.

- Designing and implementing quality control programs for a project at an abandoned wood products treatment facility in Denver, Colorado. Approximately 80,000 cubic yards of soil contaminated with diesel and

pentachlorophenol were excavated and placed into two land treatment units. The land treatment units were constructed using clay, synthetic liners, and leachate collection systems. Quality control programs encompassed project submittals, personnel training, health and safety, NIOSH and EPA air sampling, and meteorological data collection.

- Designing and implementing a quality control program for ambient air emissions monitoring at a large active copper mine in Salt Lake City, Utah. The quality control program included personnel training, periodic system audits, meteorological data collection, and PM10 and TSP sampling including heavy metals.

- Managing the construction and 18-month operation of an SVE system at the Luke Air Force Base fire training pits in Arizona to remediate soils contaminated with JP-4 jet fuel for the U.S. Army Corps of Engineers. A thermal oxidizer was used to control emissions and an on-site mobile lab was used to track cleanup progress. Envirocon received an "Excellent" rating on the Performance Evaluation conducted by the U.S. Army Corps of Engineers for this project.

- Managing the construction and 2-year operation of an SVE system at the Yuma U.S. Border Patrol facility in Arizona for the U.S. Army Corps of Engineers to remediate soil contaminated by a leaking UST pipe delivery system. Contamination from the leak had reached a depth of 40 feet. A catalytic oxidizer was used to control air emissions. Soil contaminated with waste oil was also removed and disposed of at another nearby Border Patrol Facility. Restoration of this site included the placement and compaction of backfill and reconstruction of a retaining wall.

- Managing the construction and 3-year operation an SVE/air sparging system at a an Air Force mission control facility at Malmstrom Air Force Base in Great Falls. Envirocon was contracted to construct and operate a combined SVE/air sparging system to remediate soil and groundwater contaminated by a leaking gasoline UST.

- Managing the construction of a bioventing system to remediate soils contaminated by a leaking fuel-oil UST and pipe delivery system at the Presidio of San Francisco, California as part of the BRAC process.

- Managing numerous leaking underground storage tank sites, from the Remedial Investigation to conducting remediation activities, and obtaining site closure.

- Project Engineer for the demolition and site closure project at a large abandoned smelter in Great Falls, Montana. The project was a high-visibility project along the banks of the Missouri River and included: demolishing and capping relic foundations; reducing the slope, capping, and revegetating the riverbank; and capping and landscaping an adjacent dam tailrace island.

EDUCATION

B.S., Environmental Engineering with honors, Montana Tech, Butte, Montana

LICENSES

Registered Professional Engineer, Montana

CERTIFICATIONS

U.S. Army Corps of Engineers Construction Quality Management for Contractors
Qualified Environmental Professional (QEP), by the Institute of Environmental Professional Practice

DANIEL McCAFFERY, P.E., QEP (Cont.)

AFFILIATIONS

Missoula County Air Quality Advisory Council
Air and Waste Management Association

TRAINING

40-Hour Hazardous Waste Operations Training
8-Hour Hazardous Waste Operations Supervisor Course
CPR and First Aid, by Medic First Aid
US Army Corps of Engineers Quality Control Training

PUBLICATIONS

Soil Vapor Extraction of JP-4 Jet Fuel Contaminated Soils, 1993, ER Meeting the Challenge Environmental Remediation Conference, U.S. Department of Energy

Appendix J

QC Manager's Letter of Authorization

ENVIROCON

ENVIROCON, INC.
500 TAYLOR STREET / 59802
POST OFFICE BOX 16655
MISSOULA, MT 59808-6655
(406) 523-1150
(406) 543-7987 FAX
www.envirocon.com

April 18, 2001
ENV #14000

Attention: John Serich

Subject: Project QA Manager Letter of Authorization

Dear Sir:

This letter hereby gives you the responsibility to conduct and supervise sampling activities, verify the compliance of completed field activities, monitor and review data collection, analytical services, data assessment, take corrective action, and prepare Quality Management reports.

In addition, you are authorized to stop work, where necessary, in order to take corrective measures and to ensure that the QA goals of the client are met.

The off-site lab QA personnel will report to you. In the absence of the field supervisor, you will have the authority to act in his behalf, with all his responsibilities and authorities.

You will report directly to the Project Manager in all QA matters, and to the Corporate QA Manager as necessary.

Sincerely,

Vice President of Operations

SITE SPECIFIC HEALTH AND SAFETY PLAN

ASARCO'S

CAMU – Phase I Cell Construction Project

East Helena Plant

Submitted to:

ASARCO, Inc.
P.O. Box 1230
East Helena, MT 59635-1230

Submitted by:

Envirocon, Inc.
P.O. Box 16655
500 Taylor Street
Missoula, Montana 59808

Submittal date:

May, 2001

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT SHEET

I acknowledge having received a briefing on this health and safety plan, and that I understand the requirements of this plan, including the potential for random or for-cause drug and alcohol testing. I further acknowledge that failure to follow the requirements of this plan may result in removal from this site.

Printed Name	Company	Signature	Date

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APPENDICES

Appendix A: Voluntary Emergency Data Form

Appendix B: Acronyms

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A. SITE INTRODUCTION

This site-specific health and safety plan (HASP) provides safety-related information and requirements specific to the task and work location(s) described. General requirements contained in the Envirocon Health and Safety Program Manual along with this site-specific HASP will be implemented except where noted.

A.1. Scope

This Health and Safety Plan applies to the ASARCO East Helena CAMU Phase 1 Cell Construction; loading, transport, and placement of source area soils; and landfill closure project located in East Helena, Mt.

A.2. Description of Work

This project involves the construction of a lined RCRA landfill cell. Once constructed the cell will be filled with materials from the various source area soils on the ASARCO smelter site. When the soils have been have been landfilled a HDPE cap will be installed with a drainage system over top of the HDPE that will collect and transfer water to an detention pond. Finally a top soil cover will be installed and seeding with grasses for erosion control.

A.3. Tasks

The scope of work associated with this project includes supervision, labor, equipment and expertise to perform the following:

- Site mobilization / demobilization tasks;
- Earthwork and subgrade preparation for the construction of a RCRA landfill;
- Load, transport, and placement of contaminated soils from the source area in the ASARCO Smelter;
- Geomembrane, Geocomposite, Geotexile and Geosynthetic liner and cover installation;
- Construction of associated surface water and erosion controls, access road improvements; fencing, vegetation, and construction surveys.

B. BASIS

This section will discuss the basis in regulations, standards and policies for the project. It includes OSHA regulations and Envirocon policies and procedures.

B.1. Preparation and Approval

This plan is based upon existing available information regarding the site and upon past experience at other sites. This document is also based on OSHA regulations, contractual specifications applicable to the scope of work, the client's health and safety plans and procedures, Envirocon's Health and Safety Program, and Envirocon policies and procedures. This document describes the site-specific implementation of those policies and procedures. Envirocon personnel and lower tier subcontractors are required to adhere to all of these documents during the course of this project. Some of Applicable regulations and standards are described in Table B.3:

B.1.a. Prepared For

This plan was prepared for:

- ASARCO Incorporated
  P.O. Box 1230
  East Helena, MT. 59635
- Hydrometrics, Inc.
  2727 Airport Road
  Helena, MT. 59601

B.1.b. Prepared By

This plan was prepared by:

- Tim Tierney
  Envirocon, Inc.
  500 Taylor St.
  Missoula, MT 59802

B.1.c. Approvals and Modifications

This plan and future changes must be approved as follows:

1) After preparation and approval by Envirocon, this plan will be submitted to the client's representative in accordance with the applicable contract and specifications.

2) Envirocon's designated Project Manager is responsible for the final approval of this plan before transmittal to the client.

3) Envirocon's Corporate Director of Health and Safety or designated representative is responsible for approval of this plan and any future modifications after preparation. Note: Certified Envirocon Safety and Health Professionals (CIH or CSP) are hereby designated to approve changes to this plan.

B.2. Zero Incident Performance (ZIP)

Zero Incident Performance means error-free project execution: no injuries, illnesses, property damage, community or environmental impacts, or incidents that could have resulted in these occurrences under different conditions. Zero Incident Performance does not happen by chance: It is achievable through the integration of safety into all management systems, the project process, and individual efforts. We believe that all incidents are preventable.

B.3. Policies and Regulatory Basis

Table B.3 Some Important Applicable Regulations and Standards	
Latest revision	Contract Specifications applicable to the scope of work.
29 CFR 1910.20	Access to employee exposure and medical records
29 CFR 1910.38	Employee emergency plans
29 CFR 1910.95	Occupational noise exposure
29 CFR 1910.134	Respiratory protection
29 CFR 1910.120	Hazardous waste operations
29 CFR 1910.151	Medical services and first aid kit
29 CFR 1910.157	Portable fire extinguisher
29 CFR 1910.1000	Air contaminants
29 CFR 1910.1200	Hazard communication
29 CFR 1926	Construction Industry Standards
29 CFR 1926.62	Lead
29 CFR 1926.1118	Inorganic Arsenic
29 CFR 1926.1127	Cadmium

B.4. Changing Conditions

The plan presents a realistic approach to the anticipated hazards at the site. It is expected that site conditions may vary throughout the duration of the project. This plan will be modified as necessary to respond to changing conditions and/or scope of work. Changes in conditions and identification of previously unrecognized hazards are identified by the following processes:

- site inspections by supervisory and site safety personnel
- observations and suggestions by all personnel
- proper planning for each new phase of operations
- Activity Hazard Analysis (AHA) for each new phase of operations
- communicating plans and controls to all effected employees

- accident investigations and lessons learned from this and other projects
- contract modification

B.5. HASP and AHA familiarization

The information presented in this plan will be reviewed with the employees during site-specific training to be completed before working on site. These site entry briefings will focus on the specific tasks of those being briefed. A copy of this plan will be available at all times on the site for any one to review thoroughly. As the project initiates new tasks on site, the crews for those tasks will be briefed on the appropriate AHA(s). AHAs will highlight applicable controls from this plan. All assigned personnel, visitors, and regulatory personnel are therefore expected to be familiar with and comply with all aspects of this plan. If the safety requirements are unclear each individual is responsible for getting clarification from their supervisor. The qualifications required for various tasks on this project are summarized in the training and qualifications section below.

B.6. Compliance

Failure to follow the rules and procedures prescribed in this document potentially jeopardizes the working environment of other employees. For this reason, Envirocon is prepared to enforce the progressive disciplinary procedures described in the site control section of this document for those who fail to follow the established policies and procedures for this project.

C. SITE ORGANIZATION AND KEY PERSONNEL

29 CFR 1910.120 requires an effective site organization to be responsible for supervision of all work at hazardous waste sites. The purpose of this section is to describe this site's organization as it applies to this project.

C.1. Project Manager: Kurt Wieringa

The Project Manager is responsible for oversight and management of all aspects of the project including health and safety, quality assurance, construction, remedial design, equipment, and personnel.

- The Project Manager is responsible for project health and safety performance in accordance with ZIP goals.
- Conducting periodic site inspections.
- Participating in incident investigations.
- Provides safety leadership through example and by holding all personnel assigned to this project accountable for their safety responsibilities.

C.2. Site Superintendant: T.J. Finley

The site supervisor is responsible for coordinating activities with the project manager and site safety officer. This includes:

- enforcing the provisions of this HASP;
- preparing for new tasks in advance of field operations in accordance with the Envirocon Field Operations Manual;
- ensuring that an AHA has been completed before any new work commences; and
- briefing crew members before assigning them to the new task;
- ensuring that employee safety suggestions are fairly and respectfully evaluated, and that employees are informed of the outcome of the evaluations;
- monitoring the conduct of operations in the field to ensure safe delivery of a quality product for the client;
- supervising subcontractors in accordance with this plan; and
- ensuring that injured personnel (with or without life threatening injuries) are escorted to medical treatment by the safety officer or other supervisory personnel.

C.3. Corporate Director Health and Safety: Mr. Joseph Ocken, CIH, CHMM, MHS

Envirocon's Corporate Director of Health and Safety is responsible for the development and implementation of the Corporate Health and Safety Program. The program contains Envirocon's accident prevention plans and procedures and other related plans, policies and procedures required by OSHA standards. The Corporate Director is responsible for:

- ensuring that all health and safety issues on site are resolved;
- ensuring that employee complaints are addressed in accordance with Envirocon policies and procedures; and applicable laws;
- ensuring that all confidential employee complaints received by the director are kept confidential;
- ensuring appropriate investigation of all incident reports;
- ensuring that audit findings are corrected in accordance with Envirocon policies and procedures; and applicable laws; and
- providing professional support for the project manager's health and safety program.

C.4. Health and Safety Supervisor: Tim Tierney

The Health and Safety Supervisor is the senior designated Health and Safety Officer (HSO) assigned to the project, and is responsible for the following:

- developing and implementing the Project Manager's site-specific health and safety program and procedures;
- providing professional technical support for the Project Manager with regard to all matters of health and safety associated with the project;
- technical supervision of the HSOs and technicians assigned to the project;

- assisting HSOs in developing and reviewing project health and safety procedures, hazard analysis and other supporting documents;
- implementing and administers this HASP;
- conducts periodic inspections and audits of the project site for the Corporate Director;
- coordinating all health and safety activities with the Project Manager; and
- in the event that personnel fail to adhere to established safety guidelines, recommending disciplinary and/or corrective actions to the Project Manager.

C.5. Site Health and Safety Officer(s): John Serich

Health and Safety Officers (HSO(s)) are the employees designated as the health and safety competent persons for this project. HSO(s):

- serve as the OSHA "site safety and health supervisor" as defined in the HAZWOPER standard 29 CFR 1910.120/1926.65(b) (Note: This includes authorization to administer the requirements of this plan, the Envirocon Health and Safety Program, and applicable OSHA regulations on site);
- implements the provisions of this HASP;
- serves as a safety and health competent person (SCP);
- conducts and documents daily site safety inspections;
- maintains the site health and safety logs;
- maintains health and safety records on site;
- reports, and documents incidents and issues related to site safety;
- assists the project manager with incident investigations related to health and safety;
- supervises decontamination of personnel and equipment;
- conducts monitoring tasks on site;
- monitors the use of PPE to ensure proper usage;
- inventories and inspects PPE;
- selects PPE within the guidelines of this plan;
- ensures all personnel are qualified and "Fit for Duty;"
- inspects first aid kits/fire extinguishers and emergency response equipment;
- as needed, accompanies employees to clinics or other health care providers to ensure proper care and evaluation of injured or ill employees; and
- reports/coordinates return-to-work issues with the Corporate Director of Health and Safety.

C.6. Site Competent Persons

OSHA's general safety and health provisions from the construction industry standards (29 CFR 1926.20(b)) include accident prevention responsibilities. Such programs shall provide for frequent and regular inspections of the job sites, materials, and equipment to be made by competent persons designated by the employers. OSHA's regulations regarding scaffolding, excavation and hazardous waste operations have similar requirements. The construction safety competent person is defined in 29 CFR 1926.32 to mean "one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them."

Competent persons are designated on the form that follows this section. Each competent person is given responsibility and authority for certain aspects of safety on site. It is important for each competent person to recognize the limits of their own knowledge, training, experience and capability. It is the responsibility of each competent person to act within the limits of their own knowledge, training, experience and capabilities.

C.6.a. Site safety competent persons

The HSO(s) serve as the general site competent person (SCP) responsible for accident prevention in accordance with 29 CFR 1926.20. The competent person is responsible for, and authorized to act to ensure that personnel are not working under conditions which are unsanitary, hazardous, or dangerous to their health or safety.

1) The competent person's accident prevention responsibilities includes
   a) frequent and regular inspections of the job site,
   b) inspections of materials on site, and
   c) inspection of equipment on site.
2) The project manager may designate additional competent persons.
3) Designated persons, in accordance with 29 CFR 1926.32, must be capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees.
4) Once designated, these competent persons share Envirocon's authority take prompt corrective measures to eliminate these hazards.

C.6.b. Excavation Competent Person (as designated in the table below)

This individual will have direct supervisory control over all excavation activities involving entry into excavations or trenchs. All competent persons shall be authorized and acknowledge authorization in the table below.

1) Compliance standards

   The excavation competent person ensures compliance with 29 CFR 1926, Subpart P (1926.650 thru 652). The scope of these regulations include all

excavations (e.g., hand digging, equipment excavation, with or without personnel entry). Additional competent persons may be designated by the Project Manager in consultation with the Corporate Director of Health and Safety. Designation will be based on experience and knowledge of the these standards.

2) Specific duties include:

   a) Assists supervisor with planning excavations.

   b) Ensures that utilities are located and marked (underground or overhead hazards) prior to excavating. Hand dig to locate when excavating within six feet of utilities.

   c) Where personnel entries are involved, classifies soils in accordance with OSHA soil classification in 29 CFR 1926 Subpart P.

   d) Ensures the use of protective systems in accordance with Subpart P where personnel entries are required.

   e) Monitors all excavation activities for associated hazards.

   f) The competent person is authorized by Envirocon to take corrective action to eliminate hazardous or dangerous situations. This includes halting excavation operations and/or removing personnel from excavations.

   g) Performs inspections of excavations prior to the start of work, as needed throughout the shift and after every rainstorm.

C.6.c. Scaffold Competent Person (as designated in the table below)

The use of scaffolds is not expected at this time. Should they be needed this individual(s) will have direct supervisory control over all scaffold activities. All competent persons shall be authorized and acknowledge authorization in the table below.

1) Compliance standards

   The scaffold competent person ensures compliance with 29 CFR 1926, Subpart L (1926.451 thru 453). Additional competent persons may be designated by the Project Manager in consultation with the Corporate Director of Health and Safety. Designation will be based on experience and knowledge of the standards.

2) Specific duties

   a) Supervises scaffold erections.

   b) Inspects scaffold repairs.

   c) Inspects scaffolds daily.

   d) The competent person is authorized by Envirocon to take corrective action to eliminate hazardous or dangerous situations. This includes halting operations and/or removing personnel from scaffolds.

C.7. Lower Tier Subcontractors

Lower Tier Subcontractors are responsible for supervising their work and personnel in accordance with this plan and applicable site policies and procedures. Regardless of other requirements, lower tier subcontractors shall adhere to all federal, state and local laws and regulations. In particular this includes the requirements of 29 CFR 1910.120/1926.65 HAZWOPER Standards. Lower tier subcontractors personnel will be supervised in accordance with the same requirements and standards as Envirocon and subcontractor personnel. Where their programs, policies and procedures exceed the requirements of this document and the applicable site policies and procedures, the lower tier subcontractor may use their own policies and procedures to implement these requirements otherwise they must adapt this document.

C.7.a. Job Services Personnel

Job services personnel will normally be supervised by Envirocon supervisors. These personnel will be supervised in accordance with the same requirements and standards as Envirocon and subcontractor personnel. Where job services programs, policies and procedures exceed the requirements of this document and the applicable site policies and procedures, they may use their own policies and procedures to implement these requirements otherwise they must adapt this document.

C.7.b. Site Access Control

Envirocon is in part responsible for controlling access to this site along with our client. Envirocon reserves the right to deny access to personnel who pose a hazard to operations through serious, willful, or repeated violation of safety requirements; and those personnel who are not otherwise qualified to work on site.

This safety plan does not necessarily address all of the hazards specific to lower tier subcontractors' work. Lower tier shall submit either a site-specific health and safety plan for their particular operation(s) or prepare and submit appropriate Activity Hazard Analysis(ses) to append to this plan.

C.8. Competent Person Designation Form

COMPETENT PERSON DESIGNATION		
The following individual(s) has been designated as the "Competent Person," meaning one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who is hereby authorized by Envirocon to take prompt corrective measures to eliminate them. The person(s) named below has knowledge of the systems, equipment, conditions and procedures in relationship to the proper use, inspection, manufacturers' recommendations and instructions, and maintenance as designated below. This person(s) has been delegated the responsibility to coordinate all activities and operations as defined by the designation(s). In carrying out these responsibilities, it shall be the duty of the competent to act within the limits of their knowledge and training.		
NAME/DESIGNATION(S)	**COMPANY**	**COMPETENT PERSON**
Joe Ocken	Envirocon	☐Excavation, ☐Site Safety, ☐Scaffolds
Acknowledgment: Signature _____ Date _____ Competent Person		
Tim Tierney	Envirocon	☐Excavation, ☐Site Safety, ☐Scaffolds
Acknowledgment: Signature _____ Date _____ Competent Person		
John Serich	Envirocon	☐Excavation, ☐Site Safety, ☐Scaffolds
Acknowledgment: Signature _____ Date _____ Competent Person		
Kurt Wieringa	Envirocon	☐Excavation, ☐Site Safety, ☐Scaffolds
Acknowledgment: Signature _____ Date _____ Competent Person		
T.J. Finley	Envirocon	☐Excavation, ☐Site Safety, ☐Scaffolds
Acknowledgment: Signature _____ Date _____ Competent Person		

D. SITE SECURITY AND CONTROLS

This section deals with site access and general project rules, physical security of the project work areas and the controls related to waste management and access to contaminated areas to ensure qualifications of personnel.

D.1. Security

The work areas associated with this project are within the confines of the site. The site has an established security plan which will be followed by all member of this project in order to obtain access to the site, to the site work areas, or any other client facilities.

D.1.a. Security Officer

The Envirocon Project Manager is responsible for the security of the project site.

1) The project manager will be assisted in these duties by the health and safety supervisor who will serve as security officer.

2) The security officer's responsibilities include:

   a) Ensuring that all personnel entering the site are qualified to go into the areas where they are seeking access.

   b) Ensuring that authorized personnel conduct themselves in accordance with the established security and safety requirements.

   c) Ensuring that personnel sign in at the beginning of each shift.

   d) Establishing and maintaining appropriate exclusion zone boundaries around contaminated areas.

   e) Work areas and zones shall be adequately marked and posted along access routes to give warning of restrictions to visitors.

   f) Ensuring that adequate barriers and warnings are used to prevent site access by the general public or unqualified personnel.

   g) Providing adequate surveillance and lock-up for small equipment and pilferable items.

   h) Ensuring that heavy equipment is adequately secured after working hours to prevent theft or mischief.

D.1.b. Public Safety

The work area shall be suitably delineated (i.e., as appropriate for a construction site) in order to prevent unauthorized entry.

Visitors shall be directed to the project manager's designated representative to seek authorization when appropriate. Visitors shall be logged onto the site. Visitors that are not qualified for work in the EZ shall be escorted or otherwise prevented from accidentally entering the EZ.

All unattended equipment will be secured physically and mechanically during periods of non use.

D.2. Project Rules

The project rules have been developed by Envirocon and our client in order to create a problem-free and rewarding work environment, one in which the employee understand what is expected of them on the project site. An employee who fails to maintain at all times the proper standards of conduct or who violates any of the following rules and regulations may be subject to disciplinary action, including but not limited to, termination of employment or denial of access.

D.2.a. Unacceptable Conduct

Unacceptable employee conduct and/or violation of a project rule or requirement may be reason for disciplinary action up to and including suspension without pay, termination of employment, or denial of access to the work area or client facilities. Examples of unacceptable employee conduct and/or rule violation are as follows:

- Possessing, when not authorized, government, project, or other person's property or services, or theft of the same.
- Altering, damaging, or mutilating government, project, or other person's property.
- Violating the Security Rules.
- Reporting or badging for other employees or other identification misrepresentation.
- Making or stating false claims or falsifying reports or records.
- Refusing to submit to a search.
- Refusing to submit to drug and alcohol screening or testing or other similar inspections.
- Possessing or using alcoholic beverages, controlled substances, or weapons on any project.
- Using or possessing keys or other devices used for lock opening without specific permission.
- Sleeping on the project.
- Improperly using, or failure to use, toilet facilities.
- Failure or refusal to perform assigned work as directed.
- Fighting.
- Negligence resulting in an infraction of health and safety or project rules or requirements.
- Taking unauthorized work breaks.
- Engaging in horseplay of any kind.

- Engaging in gambling or the sponsoring of raffles.
- Not using trash receptacles or otherwise creating unsanitary conditions.
- Smoking, using tobacco, or eating in prohibited areas.
- Unauthorized cooking on the project.
- Selling food, beverages, or other items on the project.
- Failure to display identification badge or area access credentials in the proper manner and in a conspicuous place.
- Violating health and safety or project rules or requirements.
- Sexual harassment.
- Not reporting use of prescription drugs.
- Not reporting equipment or material damage.
- Not reporting an accident or incident.
- Displaying pornographic, sexually explicit or otherwise offensive photographs, calendars, or other materials that may be objectionable to other individuals or groups.

The above is not an all-inclusive list. If you are unsure what may constitute unacceptable behavior, ask your Supervisor!

D.2.b. Prohibited Articles, Materials, Substances

The use, possession, concealment, transportation, promotion, or sale of the following items or substances is prohibited on site premises. Employees who violate this policy will be subject to disciplinary action up to and including removal from site and/or termination. Project management reserves the right to conduct drug and/or alcohol search and screening consistent with Envirocon and client policy.

- Illegal, look-alike, designer drugs and drug paraphernalia
- Controlled substances, such as medications, when usage is abused
- Valid medications, when not kept in marked prescription bottles
- Alcoholic beverages
- Firearms, weapons, and ammunition
- Unauthorized explosives
- Stolen property or contraband
- Unauthorized cameras or photographic equipment
- Unauthorized recording devices

D.2.c. Discipline

Envirocon reserve the right to take disciplinary action at its discretion up to and including suspension or termination of employment or denial of access to the site work areas, depending on the severity of the violation.

1) At the discretion of Management, suspension with/without pay may be given in lieu of discharge.

2) Envirocon employees should refer to the Envirocon Employee Information Manual for policies and procedures related to employee conduct and disciplinary action.

3) Verbal warnings and written reprimands are forms of discipline used to document and intended to correct, undesirable actions.

4) Unacceptable conduct or failure to adhere to established policies and procedures willfully or repeatedly may be subject to removal from this project and/or termination.

D.2.d. Subcontractors

Subcontractors shall also adhere to established policies and procedures applicable to this project site.

1) Subcontractors are responsible for disciplinary actions regarding their own employees and their lower tier subcontractors.

2) Failure of subcontractor employees to adhere to policies and procedures as described in this document will result in verbal or written warnings to the responsible subcontractor.

3) Envirocon reserves the right to permanently or temporarily remove and bar subcontractor employees from the project site. Unacceptable conduct or failure to adhere to established policies and procedures willfully or repeatedly may result in such removal from the project site.

D.3. Communications

Personnel in the Exclusion Zone will remain in constant communication or within sight of the PM, or his representative. Two-way radio is the primary method of communication.

1) If radio communication and hand signals are not feasible:

   a) The PM will identify the site activities that can continue without communication, if any; and

   b) If necessary, one long air horn signal will be used to evacuate the site until communications have been restored.

2) Emergencies

Table D.3

Emergency Signals	
One long or continuous blast	emergency including fire/explosion evacuate unless otherwise directed
One short blast	attention getter; stop work and assemble at CRZ
Two short blasts	all's clear

a) One long or continuous horn blast.

b) Unless otherwise directed, all personnel will leave the Exclusion Zone.

c) The audible signals in Table D.3 using an air horn, will be used as appropriate:

D.4. Site Access

Access to the site shall be limited to those personnel that are qualified and have an acceptable (in the judgement of the client facility's designated representatives and the Envirocon security manager) reason for being on site. Continuing access is further conditioned on adherence to the established site policies and procedures.

D.4.a. Badging Procedures

Prior to entering the site, personnel shall obtain a security badge as required by the host facility. Workers shall have their identification badges or area access credentials in their possession at all times.

D.4.b. Motor Vehicles

Privately owned vehicles are subject to site rules and regulations when operated on site. Seat belts are required for all vehicle drivers and passengers when the vehicle is in motion.

D.4.c. Parking

Parking areas are provided for employee vehicles as designated by the client facility manager. Privately owned vehicles are prohibited from entering the work areas. Employees who illegally park in fire lanes, areas posted with no parking signs, handicapped parking spaces, or visitor parking spaces are subject to disciplinary action and removal of the vehicle at the workers expense.

D.4.d. Inspection

All employees are subject to search upon entering or leaving the job site.

D.4.e. Cameras/VCRs

No unauthorized cameras, videocassette recorders, or other photographic recording or playing devices will be allowed on a project.

D.4.f. Contamination Control Boundaries

The site safety officer is responsible for establishing and maintaining contamination control boundaries and supervising decontamination.

1) Work Areas. The work area, for purposes of this project, is that area defined by hazardous waste and supporting operations. The work area is that area that is regulated by 29 CFR 1910.120 and/or 1926.65.

2) Exclusion Zone (EZ). The EZ is that part of the work area where, at a given time, workers may potentially come in contact with contaminated materials. This contact is generally defined as inhalation of airborne levels exceeding site-specific action limits or 50% of established exposure limits (OSHA or ACGIH). Contact also includes any ingestion, skin contact, injection, or other contact route of exposure to materials exceeding EPA or other established levels of contamination for the site.

3) Contamination Reduction Zone (CRZ). The CRZ is that part of the work area between the EZ and support areas where contamination from the EZ is controlled in such a way as to remove the potential for contaminating support areas.

4) Support Area. The support area is that part of the work area where supporting tasks are conducted, and where the potential for exposure to contaminants has been fully controlled (i.e., personnel are not exposed to potential contact with contaminants).

5) Boundaries

   a) Boundaries are established by the site safety and health officer based on the definitions above as compared to actual site conditions as monitored. Boundaries are flexible and should reflect current site conditions.

   b) Boundaries to be marked with suitable barriers (e.g., yellow banner guard, brightly colored rope, barricades, or orange snow fence) to clearly establish the specified areas and the applicable regulations for that area. If rope is used, pennants should be tied to the rope to help increase the visibility to foot and vehicle traffic and to provide a suitable warning.

D.5. Decontamination

The site safety officer is responsible for establishing and supervising decontamination on site. The following procedures are intended to establish guidelines for this purpose. As work progresses control zones may be altered. It is essential that the safety officer adjust this process as necessary to ensure that:

- personnel and equipment leave the site free of contamination, and
- contamination is not spread to other areas on site.

D.5.a. Contamination Reduction Zone(s) (CRZ)

Contamination Reduction Zone(s) are those areas established for the purpose of transition between an EZ and adjoining areas. CRZs should be established for personnel and/or equipment to decontaminate during exit from an EZ into:

1) clean support areas, and/or
2) an adjoining EZ with different or lesser contamination.

D.5.b. Frequency

1) All equipment will be inspected and be adequately decontaminated to avoid cross-contamination when moving out of an EZ.
2) All equipment will be decontaminated for site release before leaving the site.
3) All personnel will be decontaminated before leaving a designated EZ.

D.5.c. Personnel Decon Procedures

ASARCO will allow the use of a changehouse and shower facility located on the east end of the plant to be used at the end of shift if necessary. Envirocon may also provide a decon trailer with shower facility adjacent to the work zones as an alternative. The need to shower is contingent upon air monitoring results for heavy metals conducted in the work areas. Exposure monitoring results will be compared to action limits in the applicable OSHA standards. Monitoring results above action limits will institute the showering policy.

1) Entering Contaminated Area through Support Zone(decon trailer):
   a) Pick up clean PPE and boots covers.
   b) All donning of clothing and equipment, taping, etc. is done here.
   c) Equipment contaminated from the preceding day is to be picked up in the contamination control area when exiting the decon area.
   d) Proceed to contamination control area.
2) CRZ:
   a) Prior to entering this area, be sure that all personnel protective equipment is in good working condition.
   b) Conduct final inspection of PPE.
   c) Enter Exclusion/work Zone.
3) Exiting Exclusion Zone
   a) Personnel and equipment leaving the Exclusion Zone shall be thoroughly decontaminated. All workers who enter the exclusion zone will be required to decontaminate whenever they leave the exclusion zone. Coveralls will be doffed at the boundary of the exclusion zone in the decon trailer, used PPE will be stored in the doffing area for reuse where practical (visually

contaminated or soiled PPE will not be reused until decontaminated, laundered or otherwise cleaned). Dirty PPE will be disposed of or laundered as appropriate. After doffing PPE personnel will be required to use wet towlettes to wash face and hands or shower if necessary.

b) The following protocols shall be used for the decontamination stations according to the level of protection as follows:

Decon Procedures

	GROUP C	GROUP B
1.	Equipment drop	Equipment drop
2.	Outer boot wash	Glove removal
3.	Outer boot rinse	Rubber Boot removal
4.	Outer boot removal	
5.	Coverall removal/disposal/vacuum	Coverall removal
6.	Respirator removal (if used)	Remove hard-hat
7.	Hand/face wash	Hand/face wash
8.	Respirator cleaning/sanitizing	
9.	Shower(if necessary)	

D.5.d. Emergency Decontamination

1) The contaminated materials on this site do not pose an acute hazard and should not take precedence over emergency medical treatment of injuries.

2) Use water or brushes to clean of contaminated materials as best as can be safely accomplished.

3) If an injured person can not be safely moved (e.g., because of potential spinal injuries):

   a) Establish a clean staging area around the victim using plastic sheeting, trash bags, clean PPE or similar clean materials.

   b) Bring similar clean materials to the CRZ for placing in the ambulance or evacuation vehicle.

   c) Bring clean potable water and a first aid kit to the victim for cleaning wounds.

4) Facilities and materials for decontamination shall be provided in the immediate work area for employees to:

a) immediately wash the affected area which comes into contact with any contaminated materials;

b) immediately flush the eyes with copious amounts of water (15 minute continuous flush) if the eyes come into contact with any contaminated material; and

c) First Aid equipment is available on site at the Support Zone entrance.

d) Refer to the emergency procedures section for other emergency procedures.

D.5.e. Equipment Decontamination

1) Equipment decontamination for release from the site will be performed on the facility decon pad.

2) Prior to exiting an EZ, the equipment operator will ensure that the equipment is inspected for visible gross contamination. Visible gross contamination will be removed using shovels and hand equipment as necessary to prevent cross-contamination of the site. If necessary a low pressure water hose will be used to remove materials.

3) Before release from the site, all equipment will be thoroughly decontaminated at the decon pad using water hoses, low pressure mechanical washers as necessary to remove visible contamination.

a) Initially, equipment will be brushed free of contaminated materials with brooms. Equipment coming from exclusion zone tasks will be washed, if necessary, with high-pressure hoses. Special attention must be given to mud flaps, wheel wells, tracks, undercarriage and foot surfaces (cab floor, control pedals, or walking boards).

b) If water is used, the vehicles will be held in the area for a short time to allow for collection of drippings.

c) Excavators/loaders moved from one area to another will have wheels/tracks and bucket frisked and cleaned.

d) Following decontamination and prior to release the PM or a designated alternate, shall be responsible for insuring that each piece of equipment (i.e., monitoring instruments, tools, generators, etc.) has been sufficiently decontaminated.

e) The final inspection for release will be logged and the log entry documented to the Envirocon Equipment Division.

4) If material is judged as uncleanable it will not be used outside the Contamination Zone and will be disposed of at the end of its usefulness.

D.5.f. Small equipment procedure

Surface debris and dirt will be removed from small equipment and tools with vigorous brushing.

D.5.g. Disposition of Decontamination Wastes

All equipment and solvents used for decontamination shall be decontaminated or disposed of with the established waste streams as described in the waste management plan.

D.6. Waste Management and RCRA Compliance

The purpose of this procedure is to establish site-specific practices for compliance with environmental requirements of RCRA. The scope of this procedure includes all work conducted under the project heading.

D.6.a. Training

All personnel responsible for any aspect of waste handling on site shall receive a briefing on this procedure. Training will be documented and submitted as a safety meeting record. Personnel files regarding qualifications on site will be updated accordingly and maintained by the safety officer.

D.6.b. Hazardous Waste Manager

1) The hazardous waste manager for this site will be designated by the client facility.

2) The hazardous waste manager is responsible for compliance with RCRA and associated environmental compliance standards.

3) Envirocon's superintendent or the project manager's designated representative shall serve as the QA/QC engineer responsible for hazardous waste coordination for Envirocon's activities regarding waste materials. The QA/QC engineer shall ensure that:

   a) the instructions of the client's hazardous waste manager are strictly followed by Envirocon personnel; or

   b) in the event of disputed procedures, Envirocon's QA/QC engineer shall immediately notify the project manager of the concern for resolution before proceeding.

D.6.c. Reporting incidents

1) All incidents must be reported in accordance with the project Health and Safety Plan (HASP) and Envirocon procedures.

2) The on-site supervisor is responsible for ensuring that the Hazardous Waste Manager is informed of any spills.

3) This includes, but is not limited to, the following:

   a) accidents (with or without damages),

b) finding unusual materials or soil conditions (e.g., previously disturbed soils, materials with unusual odors, materials with unusual coloration, etc.);

c) spills of remediation waste; or

d) spills of lubricants, coolants, fuels, or any other hazardous materials.

D.6.d. Waste Stream Management

1) All waste must be segregated into the established waste streams. It is very important not to mix waste streams unless directed by the Hazardous Waste Manager.

2) The Envirocon QA/QC engineer will be responsible for field identification and sorting in accordance with the directions of the Hazardous Waste Manager.

3) If you are unclear which type of waste is which... ASK YOUR SUPERVISOR.

4) Anticipated waste streams may include:

   a) Simple trash

   b) Recycleable Oils (including lubricants, greases and related products that the recycler will accept)

   c) Non-recycleable oils (e.g., oils contaminated with heavy metals)

   d) TSCA asbestos waste

   e) RCRA wastes scheduled for on-site remediation

   f) Gray water from shower facilities.

D.6.e. Categorization

1) Waste streams will be categorized in accordance with the directions of the Hazardous Waste Manager.

2) Employees SHALL NOT determine if a waste stream is a "hazardous waste." Only the Hazardous Waste Manager shall make this determination.

3) Waste streams will be placed in the appropriate containers designated by the Hazardous Waste Manager.

4) Waste streams will be labeled in accordance with the Hazardous Waste Manager's Instruction.

5) Waste streams SHALL NOT be labeled as "hazardous waste" unless expressly authorized by the Hazardous Waste Manager.

D.6.f. Tracking Records

1) All regulated waste streams (i.e., those identified on the Record of Decision (ROD) for the site) shall be identified and logged immediately after being contained for storage or disposal by Envirocon personnel.

2) Envirocon will track and document the movement and disposition of all regulated wastes in the waste handling log until the materials are removed from site or otherwise transferred to the responsibilities of other entities.

3) The disposition of waste streams and the tracking records shall be maintained in accordance with the site QA/QC engineer's instructions.

4) The transfer of regulated wastes shall be performed in accordance with the directions of the hazardous waste manager for the site.

D.6.g. Emissions Controls

1) Dust Controls

   a) Dust levels will be monitored on site in accordance with the HASP monitoring requirements for protection of personnel. Recognized limits for this monitoring include the Department of Labor (OSHA) Permissible Exposure Limits (PEL) and/or the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV).

   b) Perimeter dust levels will be monitored to avoid public nuisance.

   c) Exceedance shall be controlled by a combination of the following:

      i. changing control zone boundaries

      ii. upgrading respiratory protection control

      iii. slowing or suspending intrusive work

      iv. application of water

      v. application of dust control palliatives

      vi. application of a foam barrier

      vii. application of a latex/latex-paper emulsion barrier

D.6.h. Spill Response and Prevention

Spill prevention controls and response procedures are documented in the emergency response procedures of this Health and Safety Plan.

D.6.i. Waste Management

1) All hazardous waste streams will be managed in accordance with the established Waste Management procedures. Each waste stream is to be segregated in the field in accordance with these procedures.

2) Segregated materials will be temporarily stored and protected until they can be replaced or remediated.

D.6.j. Waste Minimization

1) Waste generated on site will be minimized by proper sampling and categorization of waste streams.

2) Waste generated on site will be minimized by protecting segregated wastes from wind, weather and runoff.

3) Waste generated on site will be minimized through the proper selection of PPE, use of launderable materials where prudent, and reuse of decontaminated materials.

D.7. Qualifications and Access Requirements

Access to project sites is conditioned upon maintaining qualifications with regard to training, medical monitoring, drug & alcohol testing, adherence to required procedures, and related requirements. Failure to maintain these qualifications may result in removal from site and/or termination of employment.

D.7.a. Training qualifications summary

Table D.7.a summarizes the training qualifications for this project.

Table D.7.a TRAINING SUMMARY

	HAZWOPER Training				Site / Site Specific				
	40 hr with respirator training	24 hr	8 hr annual refresher	8 Hr Super-visor	Site HASP Briefing 2 hr ①	Facility orienta-tion 2 hr ①	arsenic, lead, cadmium ACM standard	applicable AHAs	Daily safety briefings 20 min①
Supervisors	X		X	X	X	X	X	A	X
Group B (i.e., with potential use of respirators) off site					X	X	X	A	X
Occasional site work only (surveyors, engineers, mechanics)		X	X		X	X	X	A	X
Work outside of EZ					X	X		A	X
Trailer staff					X	X			X
Delivery personnel					E	A		A	
Work in regulated areas (i.e. arsenic, lead): Group C workers	X		X		X	X	A	X	X
Asbestos regulated areas Group C workers	X		X		X	X	A②	X	X

Notes: **X** = required **A** = those that are applicable. **E** = escorted

①Approximate training time.

②AHERA training certificate/licenserequired.

Due to the nature of the tasks associated with this site, exclusion zones are not anticipated unless a change of conditions indicates exposures above action levels may occur.

1) All personnel performing work inside of the work area will receive a briefing on the Site Health and Safety Plan and this HASP. This training must be acknowledged on the two sign-up sheets at the front of this plan.

2) Personnel entering the exclusion zone shall have a minimum of 24 hours of HAZWOPER training in accordance with 29 CFR 1910.120 or 1926.65.

3) Personnel required to wear respiratory protection will have a minimum of 40 hours of HAZWOPER training, to include respiratory protection training.

4) Personnel working in regulated areas (those areas where a specific OSHA standard applies to the work, such as asbestos, arsenic, lead, benzene) shall receive the training required by that standard.

   a) Asbestos Standard (29 CFR 1910.1001, or 1926.1101 as applicable)

   b) Lead Standard (29 CFR 1910.1025, or 1926.62 as applicable)

   c) Inorganic Arsenic Standard (29 CFR 1910.1018, or 1926.1118 as applicable)

   d) Cadmium Standard (29 CFR 1910.1027 or 1926.1127 as applicable)

5) Supervisors will have an additional 8 hours of supervisory training for work in the EZ.

6) Personnel required to have HAZWOPER training must be up to date on annual 8 hour refresher training.

7) Personnel performing support functions (i.e., work outside of the EZ) are not required to have HAZWOPER training but shall be briefed on this HASP and applicable hazard analysis.

8) Daily Safety Meetings. In order to maintain qualifications, it is necessary to have regular meetings in order to enhance planning efforts and to pass information from lessons learned or changes in procedures.

   a) A "toolbox" or "tailgate" safety meeting will be held at least daily before starting work. Safety meetings will also be held when site conditions change, before starting new activities, and after accidents.

   b) These daily meeting shall be used to keep personnel up to date on changes in plans and procedures since their initial training and also to ensure coordinated work assignments by outlining the day's activities and job assignments.

   c) Attendance is mandatory for all site personnel including lower tier subcontractors.

   d) Meetings will also be used to discuss:

      i. Topics of interest or concern of the crew,

ii. Suspected hazards for that day's work and what precautions are necessary to deal with these hazards.

iii. Necessary training requirements and site work rules

iv. Changes in work practices or environmental conditions

v. Precautions or safe work practices related to the day's site activities

vi. New or modified site-wide procedures or requirements

vii. Incident alerts provided by the client

e) Documentation of daily safety meetings shall be maintained on site.

f) Daily safety meetings shall be used as a time for personnel to make safety suggestions. Suggestions shall be noted in the minutes and evaluated by supervisory and safety personnel. Actions taken on suggestions should be noted on the daily safety meeting form.

g) The daily safety meeting shall function as the project's Environmental Health and Safety Committee. At the option of the project manager a separate committee may be established. Members shall be determined from nominations of the wage earning employees.

D.7.b. Medical qualifications summary

The following medical qualifications are required to perform work in certain areas.

Table D.7.b: Summary of Medical Requirements

TEST COMPONENT (1)	Group B	Group C Exclusion Zone (1)	Arsenic, lead, cadmium, asbestos zones (1)	Support Zone Workers (1)	Envirocon New Hires (1)(5)	Post-Accident/ exposure (1)	End of Project (1)(2)
Occupational History/update	X	X	X	(5)	X		(7)
Audiometric Exam	X	X	X		X		
Manual lifting protocol	X	X	X		X		
Cadmium protocol (29 CFR 1910.1027, 1926.1127)		X	X(8		X		
Lead protocol (29 CFR 1910.1025, 1926.62)	X	X	X(9)		X	(6)	(6)
Inorganic Arsenic (29 CFR 1910.1018, 1926.1118)		X	X(8)		X	(6)	(6)
Serum Cholinesterase							
Drug testing(1)					(5)	X(4)	
DOT Breathalizer Alcohol Testing						X(4)	
Fitness to return to work (after work/non-work related injuries or illness).						X	
Fitness for Asbestos Remediation (29 CFR 1910.1001, 1926.1101)		X	X			(6)	(6)
Fitness for Hazardous Waste Work (29 CFR 1910.120)	X	X	X			(1)	(7)
Fitness to wear respirators (29 CFR 1910.134)	X(3)	X(3)	X(3)		X(3)		
Basic Fitness For Duty (Level D, Construction, or non-HAZWOPER)				(5)	(5)		

NOTES:

(1) GMG WorkCare provides medical monitoring for all Envirocon employees through local health care facilities. The appropriate protocol will be scheduled by an authorized Envirocon representative and should never by scheduled by the employee (except in the case of a medical emergency). Lower tier subcontractors and guest are required to produce their own protocols equivalent to those indicated and/or in accordance with the referenced regulatory requirements. Employee may be required at any scheduled exam, examinations conducted after accidents, randomly, or as part of facility procedures to donate specimens for drug and alcohol testing. Failure to conform to medical monitoring requirements, drug & alcohol, or other related requirements may be grounds for removal from site and termination of employment.

(2) This column refers to certain site-specific protocols. It IS NOT A TERMINATION OF EMPLOYMENT EXAM requirement. All Envirocon employees should be notified of potential eligibility for termination exams when they are terminated from employment. If they request such an exam, the Director of Health and Safety will review the request and determine eligibility under the Envirocon Medical Monitoring Program in accordance with 29 CFR 1910.120.

(3) Must be completed prior to wearing respiratory protection

(3) Must be completed prior to wearing respiratory protection

(4) As determined by Envirocon policy and the Director of Health and Safety accidents, incidents, injuries, or illnesses involving medical evaluations, potential OSHA recordability, potential property damages in excess of $500, involving damages or injuries to parties not affiliated with Envirocon shall be evaluated.

(5) New employees are hired provisionally based on their ability to pass the fitness for duty examination. GMG Workcare makes the final determination regarding fitness for duty for Envirocon Employees (this includes all aspects of fitness for duty and drug testing results). New hires may begin Level-D work (i.e., this evaluation does not authorize work where exposures may exceed the action levels for chemical exposures) with the basic fitness for duty evaluation provided by the attending or examining physician. The examining or attending physician's evaluation is considered temporary (not to exceed 30 days) until final evaluation by GMG Workcare's final evaluation.

(6) As indicated by air monitoring results. Not expected at this time.

(7) Employees that will be terminated at the end of the project and have not had a HAZWOPER physical within the last six months shall be offered a termination examination.

(8) Medical monitoring including biological monitoring for cadmium and arsenic is required every six (6) months.

(9) Medical monitoring, including biological monitoring for lead every two (2) months for the first six (6) months of exposure and every six(6) months thereafter is required.

E. HAZARDS

An effective safety and health program includes a variety of processes for recognizing and evaluating hazards in order to plan controls. Hazard identification and evaluation must be a continuing process although the focal point is the planning phases of tasks.

E.1. Accident Prevention Program

Envirocon's Health and Safety Program Manual serves as the primary accident prevention program document. This HASP further develops the site-specific procedures to prevent accidents at the site. Beyond these documents, the accident prevention program is an ongoing process which involves the participation of all personnel through hazard identification, hazard analysis and hazard control. Refer to Envirocon's Health and Safety Program Procedure 14 "Correcting Unsafe Conditions and Work Practices."

E.1.a. Elements of the Accident Prevention Program

The accident prevention process at this site includes a number of ways to identify hazards and develop appropriate controls. They include the following programs and procedures.

1) Proper planning. There are a number of planning process which take place prior to execution of a given task. Based on many other plans and programs, Envirocon and the client have developed a HASP for the site.

2) Activity Hazard Analysis (AHA). The planning and hazard assessment process continues into the individual job task through the use of AHAs. AHAs shall be

developed for all significant work tasks associated with this project. New tasks, or previously undeveloped hazards require a new AHA or redraft existing ones. AHAs are primarily a planning phase tool. As needed, this HASP may be modified in order to accommodate control requirements identified through the AHA process.

3) Work place inspections. All supervisory personnel, safety officers, and competent persons shall conduct site inspections. Site inspections are intended to ensure that established plans and procedures are followed, changes in conditions are identified, effectiveness of controls are assessed, and new hazards identified.

4) Employee involvement. The active involvement of every employee is encouraged through the site incentives program, "time out for safety" authority, safety observer program, and daily safety briefings. Employee involvement is the cornerstone of the ZIP goal. This goal will not be met (and has no real meaning) without every employee's complete focus at all times on every task. Additionally, every employee is required to look out for their coworkers when their focus falters.

5) Incident investigations. Employees are required to immediately report all incidents in order to ensure a timely investigation. Incident investigation is aggressive at site in order to capture lessons learned from minor incidents and correct controls before significant accidents occur.

E.1.b. Responsibilities

1) Supervisors, assisted by safety and health personnel are responsible for implementing effective accident prevention processes. This includes:

   a) conducting required planning,

   b) conducting required inspections,

   c) aggressively investigating all incidents,

   d) encouraging employee participation, and

   e) taking a leadership role in achieving ZIP.

2) Employees are responsible for:

   a) following established procedures,

   b) actively participating in training processes,

   c) reporting all incidents immediately to their supervisors,

   d) positively assisting in investigations of incidents, and

   e) looking out for their coworkers (i.e., "buddies").

E.2. Risk Assessment

For purposes of this document, risk will be described by a ranking methodology. This purpose of this ranking is to focus attention on significant hazards for purposes of better

utilizing limited resources. The purpose of this assessment ***is not*** to determine precise probabilistic measures (it is actually intended that high potentials will go unrealized by focused attention). Two cases define the issue of risk versus hazard in the accident prevention context. Severe hazards that are infrequently encountered, and low severity hazards that are frequently encountered both represent cases where controls may not receive the attention they merit. This ranking system will consider three factors that contribute to overall risk potential. They include severity of outcome, frequency of exposure, and potential for occurrence when exposed.

E.2.a. Severity

Severity describes the significance of consequences if the potential is realized.

1) High severity means the following.
   a) There is a distinct possibility of fatal injury or illness.
   b) A factor of 4 will be used to score risk potential.
2) Moderate severity means the following.
   a) There is a distinct possibility of permanent disabling injury or illness.
   b) There may be a residual possibility of fatal injury or illness.
   c) A factor of 2 will be used to score risk potential.
3) Low severity means the following.
   a) It is unlikely to result in fatality.
   b) There may be a residual possibility of permanent disabling injury/illness.
   c) There is a distinct possibility of medical treatment.
   d) A factor of 1 will be used to score risk potential.

E.2.b. Frequency

For this analysis, frequency represents the amount of exposure to the hazard, or how often risk is experienced.

1) Frequent exposure means the following.
   a) Regular or daily exposure to the hazard.
   b) A factor of 4 will be used to score risk potential.
2) Moderate frequency of exposure means the following.
   a) Weekly or biweekly exposure to hazard, or
   b) seasonally it becomes a frequent exposure to hazard.
   c) A factor of 2 will be used to score risk potential.
3) Infrequent exposure means the following.
   a) Exposures occur on a monthly basis or less frequently.

b) A factor of 1 will be used to score risk potential.

E.2.c. Probability

Probability reflects the likelihood of injury or illness when exposed to the hazard. For purposes of this analysis, probability includes consideration of efficiency of identifying hazards in order to implement controls and effectiveness of controls.

1) Probable means the following.
   a) Difficult to recognize, and
   b) controls tend to have limited effectiveness.
   c) A factor of 3 will be used to score risk potential.
2) Somewhat probable means the following.
   a) Either the hazard is difficult to recognize or controls tend to have limited effectiveness.
   b) A factor of 2 will be used to score risk potential.
3) Generally improbable means the following.
   a) The hazard is readily recognized and reliably controlled.
   b) A factor of 1 will be used to score the risk potential.

E.2.d. Risk Assessment Table

Risk Assessment Table E.2.d

Type of Hazard	Severity score	Frequency score	Probability score	***RISK Potential***	*Description of potential hazards*
Safety	1	4	3	**12**	• Slips/trips/falls and walking and working surfaces
	4	4	1	**16**	• Heavy equipment
	4	4	2	**32**	• Vehicle traffic
	2	4	1	**8**	• Excavations
	2	2	2	**8**	• Opening lift gates
	1	1	2	**2**	• Grass fires
	2	2	1	**4**	• Structural and Equipment Fires
					•
					•
Utilities	4	1	2	**8**	• Strikes during mob/demob and servicing support areas.
Chemical contamina -tion (details in following Table E.3)	2	4	2	**16**	• Arsenic, lead, cadmium

Risk Assessment Table E.2.d					
Type of Hazard	Severity score	Frequency score	Probability score	***RISK Potential***	*Description of potential hazards*
	4	1	3	**12**	• Asbestos
Biological/ Environ-mental	2	1	2	**4**	• snakes and wildlife (most soils are placed after being disturbed at other work locations)
	2	2	2	**8**	• Heat and cold stresses
	1	4	1	**4**	• Noise from equipment
	2	2	1	**4**	• Animal Carcasses
	2	2	1	**4**	• Sanitary Waste
					•

E.3. Potential Chemical Waste Hazards

contaminant	OSHA PEL	ACGIH TLV	Exposure routes	acute symptoms	Chronic symptoms	Target organ	IP	Spec. gravity	V.P. mmHg	Flash point deg F	LEL %	UEL %
				twitching muscles, convulsions	cancer							—
arsenic	0.5 mg/m3	0.01 mg/m3	Inhalation Absorption Contact Ingestion	Ulceration of nasal septum, Dermatitis, Respiratory Irritation	GI disturbances peripheral neuropathy cancer	Liver, kidney, skin, lungs	na	5.73	0	na	na	na
asbestos	0.1 f/cc	na	Inhalation ingestion Contact	Dyspnea; eye irritation	asbestosis, dyspnea, interstitial fibrosis, restricted pulmonary function, club finger, cancer	respiratory system, eyes	na	varies	0	na	na	na
cadmium	0.005 mg/m3	0.01 mg/m3	Inhalation Ingestion	dyspnea nausea, headache, tight chest, pulmonary edema Cancer,	muscle aches, vomiting, diarrhea	Lungs, kidneys, blood	na	8.65	0	na	na	na

contaminant	OSHA PEL	ACGIH TLV	Exposure routes	acute symptoms	Chronic symptoms	Target organ	IP	Spec. gravity	V.P. mmHg	Flash point deg F	LEL %	UEL %
lead	0.05 mg/m3	0.05 mg/m3	Inhalation Ingestion Contact	eye irritation hepatitis dermatitis vomiting, dermatitis	weakness, anorexia, tremors nephropathy, hypotension	CNS G.I. Tract, kidneys, blood, gingival, tissue.	NA	11.34	0	na	na	na

F. INDUSTRIAL HYGIENE PROGRAM CONTROLS

OSHA mandates programmatic controls for many hazards. This section describes the programs in place to control safety and health hazards on site. Personnel air monitoring will commence once intrusive activities begin. An adequate number of air samples will be taken to characterize the air borne hazards and insure appropriate PPE levels. Additional air monitoring will be performed when new tasks or work in new areas begins. The levels of PPE will be based on the results of air monitoring and will follow the actions specified in Table F.1 below.

F.1. Site Monitoring

Table F.1: Air Monitoring Requirements (1)

Chemical Hazard	Instrument	Method[1]	Action level	ACTION
Oxygen (O2)	Combustible Gas /O2 meter	Direct read area sample prior to confined space entry.	<19.5%, or >23.5%	• ventilate until readings can be brought to 21% +/- 1% or do not enter. • ventilate until readings can be brought to 21% +/- 1% or do not enter.
Combustible Gas /Vapors (CG)	Combustible Gas /O2 meter	Direct reading area sample prior to entering confined space	>10% LEL	clean, secure source of vapors, ventilate until readings can be brought to +/- 1% LEL or do not enter.
		• Prior to hotwork near flammables • Suspect gas leak	Any detection above background drift or fluctuation	clean, secure source of vapors, ventilate until readings indicate source has been controlled.
Metals (Arsenic, Cadmium, Chromium, Lead)	Personal sampling pumps, MCE filter cassette in breathing zone of worker	NIOSH 7300 when suspected	>50% < 10x PEL or TLV	Apply engineering controls Level C PPE protection Repeat sampling quarterly or when conditions change
			>50X PEL or TLV	Apply engineering controls Upgrade to Level B PPE protection
			>1000 PPM or > IDLH	Stop work, determine source of hazard and apply engineering control
Asbestos	Personal sampling pumps, MCE filter cassette in breathing zone of worker	NIOSH 7400 At least monthly while ACM is being handled on site.	>50% < 10x PEL or TLV	Apply engineering controls Level C PPE protection

Table F.1: Air Monitoring Requirements (1)				
Chemical Hazard	Instrument	Method[1]	Action level	ACTION
			>50X PEL or TLV	Apply engineering controls Upgrade to Level B PPE protection
			>1000 PPM or > IDLH	Stop work, determine source of hazard and apply an engineering control
			>50X PEL or TLV	Apply engineering controls Upgrade to Level B PPE protection
			>1000 PPM or > IDLH	Stop work, determine source of hazard and apply an engineering control

Comments or special instructions:

1. Methodology determines the analytical method used by the laboratory
2. Breathing zone is the location of the sampling media, it would be attached to the workers shoulder at approximately the same height of the workers nose and mouth

F.2. Personal Protective Equipment

F.2.a. Summary of PPE Requirements

Table F.2.a: Summary of Standard PPE					
Activity	*Head/ Face*	*Foot*	*Hands*	*Respirator*	*Clothing*
General site labor, non-intrusive support zone tasks	• Hard hat(2), • safety glasses(2)	Steel toed boots	Leather gloves as needed.	None. (1)	• Shirt w/sleeves • Long pants
Supervision of support zone work.	• Hard hat(2), • safety glasses(2)	Steel toed boots		None. (1)	• Shirt w/sleeves • Long pants
Dry equipment decon.	• Hard hat(2), • safety glasses(2) • Face shields or goggles	Steel toed PVC outer boots	• Leather gloves or PVC coated outer gloves	None. (1)	Tyvek coveralls or Launderable coveralls(5)

Table F.2.a: Summary of Standard PPE

Activity	*Head/ Face*	*Foot*	*Hands*	*Respirator*	*Clothing*
General site labor tasks in dry contaminated areas.	• Hard hat • Safety glasses • (2)	PVC outer boots w/steel toes, or Steel toed boots w/Boot covers (4)	• Leather or PVC coated cotton as needed	• Half mask APR / P100 (1)	• Launderable coveralls (3) • High vis vest(5)
General site labor tasks in wet contaminated areas.	• Hard hat • Safety glasses • (2)	Steel toed boots with water resistant outer boot covers (6)(8)	• Nitrile or Leather or PVC coated cotton as needed	• Half mask APR / P100 (1)	• Water resistant outer coveralls (3)(6) • High vis vest(5)
Wet Decon	• Hard hat • Safety glasses • (2) • face shield	Steel toed boots with water resistant outer boot covers (6)(8)	• Nitrile gloves in combination with Leather or PVC coated cotton gloves	• (1)	• Water resistant outer coveralls (3)(6)(7) • High vis vest(5)
Drivers	• (9)	• (9)	• (9)	•	• long pants • shirts with sleeves • (9)

Table F.2.a: Summary of Standard PPE					
Activity	*Head/ Face*	*Foot*	*Hands*	*Respirator*	*Clothing*

(1) Voluntary use of respirators is authorized for nuisance dusts and exposures known to be below PEL levels. For nuisance dust use disposable N, R or P 95 or better (dispose of N or R types daily and P type weekly) For odors use half mask with OV or OV/P95 or better (change at start of week)

(2) Hard hats and safety glasses are not required inside of enclosed cabs with windshields; or when working outside of the contaminated areas performing non-labor tasks such as walking to and from buildings/trailers, typing, or making notes.

(3) Dust resistant outer coveralls with modesty garments underneath. These are not allowed for use with hazardous materials! Disposable or "paper" suits may be substituted for non-labor light work task such as surveying and supervisory tasks.

(4) Boot covers are any suitable covering capable of resisting dust penetration which would contaminate steel toed boots, and with durability appropriate for the task.

(5) High visibility vests are for use in work areas within 25 feet of vehicular or equipment traffic.

(6) When working with wet contaminated materials, a PVC or other equivalent water resistant outer boot covering will be used to prevent contamination of steel toed boots. Under conditions with launderable coveralls are penetrated by wet conditions they shall be similarly substituted or covered with a suitable outer water proof layer.

(7) For purposes of preventing heat or cold stress, decon personnel may use water proof outer coverings with holes in the backs or aprons to allow for perspiration to escape (provided inner garments do not get wet as a result.

(8) Wet work and decon may use a PVC steel-toed boot in place of a leather boot with cover.

(9) Drivers entering contaminated areas shall be prepared to put on the applicable personal protective clothing worn in that area in the event of an emergency exit.

F.2.b. PPE Rules

1) All personnel are required to use the personal protection specified for their work. This may include, but is not limited to cartridge respirator, protective suit, gloves, boots, hard hat, hearing protection, and safety glasses.

2) All respirator use to be done in accordance with Envirocon's Respiratory Protection Program and/or site-specific procedures.

3) Safety Boots/Shoes

   a) Safety steel-toed boots/shoes that meet the requirements and specifications of ANSI Z41.1 shall be worn while working in field locations.

   b) Boots/shoes must be in good repair and laced or fastened. Sandals and tennis-style shoes of any type shall not be worn while working.

   c) Overshoes or other outer boots must be worn in contaminated areas, work boots that become contaminated will not be allowed off site unless properly decontaminated.

4) Safety / Hard Hats

a) Approved safety hats that meet requirements and specifications established in ANSI Z89.1 shall be worn at all times in the field or construction zone/yard removal locations.

b) Safety hats are not required to be worn in vehicles (passenger cars or trucks)or offices. Safety hats are not required in construction equipment with enclosed cabs. Safety hats must be worn in all construction equipment (loaders, bobcats, excavators, dump trucks, backhoes, etc.) that do not have enclosed cabs.

5) Eye Protection

a) As a minimum, ANSI-approved safety glasses with side shields will be worn at all times when working on this site.

b) ANSI-approved safety glasses must be worn by equipment operators while in cabs unless eye hazards are adequately controlled by other methods listed in the most recent eye hazards analysis for this project.

c) Proper eye protection (goggles, safety glasses, etc.) must be worn when performing work with a recognized hazard to the eyes such as wire brushing, hammering, buffing, chipping, grinding, welding, cutting wire rope, working on rust, dirty chains, cables, or handling chemicals. **If the job might result in eye injury, then eye protection is required.**

d) Special goggles must be worn while helping or working within close range of welders.

e) Goggles or transparent full-face shields must always be worn when grinding.

f) Envirocon will not provide prescription safety glasses; Envirocon will provide safety glasses capable of fitting over prescription glasses.

6) Hearing Protection

a) Approved earplugs or earmuffs must be worn in areas of high noise levels.

b) High noise level is defined as areas where noise levels exceed, or may exceed, 90 dBA.

7) Safety Vests

a) Orange safety vests are required anytime Envirocon personnel are working around operating equipment.

b) This requirement applies to equipment operators whose duties involve them leaving the cab of their equipment and working in general area.

8) Clothing

a) Launderable cotton coveralls will be supplied by ASARCO if necessary.

b) Sleeved shirts must be worn on the job.

c) Tank tops will not be allowed.

d) Long pants shall be worn. Pants shall cover the work boot top.

e) Shorts will only be allowed if they are worn under cotton coveralls or other protective clothing.

f) Loose or ragged clothing shall not be worn.

9) All personnel are responsible to clean and maintain the protective equipment issued to them excepting cotton coveralls. Any noted defects in the equipment shall immediately be reported to the Envirocon Project Manager or the site superintendent, as appropriate.

F.3. Site-specific Respiratory Protection

F.3.a. Documents

Envirocon's written Respiratory Protection Program is contained in Procedure 1403-16. This health and safety plan procedure serves as the site-specific procedure for the use of respirators on this project. In the event respiratory protection becomes necessary ASARCO will fit test workers and supply them with respirators and appropriate cartridges. All workers must have medical clearance from GMG WorkCare prior to fit testing.

F.3.b. Administration

1) The Respiratory Protection Program Administrator is Joe Ocken, CIH.

2) Tim Tierney, or the designated site safety officer for this project will serve as assistant program administrator.

3) Medical qualification procedures are evaluated and implemented by GMG WorkCare, Drs. Greaney and Chan.

F.3.c. Continuing respirator effectiveness

1) The assistant administrator (site safety officer) is responsible for conducting daily site inspections, including special inspections described in the inspections section of this procedure.

2) Daily site inspections shall include surveillance of work place conditions. In particular the following conditions shall be assessed.

   a) potential changes in contaminant concentration,

   b) changes in employee exposure or stress; and

   c) respirator effectiveness.

F.3.d. Training

1) Envirocon Respiratory Protection Training Procedure

   a) Employees may be trained using either the Envirocon Respiratory Protection Program lesson plan or ASARCO's respirator training program.

2) 40 hr HAZWOPER Training. Employees may be trained in a recent 40 hour or Emergency Response training courses (within the last year), or a recent 8 hour refresher training course which covers the use of respiratory protection (within the last year).

3) Respirator wearers may also be trained by certified training using a lesson plan covering the new (1998) revised respiratory protection program standard.

F.3.e. Voluntary use of respirators

1) The voluntary use of respirators by employees (e.g., for control of odors or nuisance dusts) must be qualified.

2) Voluntary use of respirators is only allowed in areas characterized as not requiring respiratory protection.

3) The specific type of respirator and conditions of use must be approved by the Director of Health and Safety.

4) Voluntary use of respirators must otherwise be in accordance with this procedure.

5) Employees voluntarily using respirators must be trained in the information provided in Appendix D to Sec. 1910.134 "Information for Employees Using Respirators When Not Required Under the Standard."

6) Voluntary use of disposable nuisance dust masks does not require medical evaluation. Voluntary use of these masks does not require a fit test.

F.3.f. Medical qualifications.

1) Envirocon (PLHCP)

   a) Respirator wearer's shall be medically evaluated by a company designated physician or other licensed health care professional (PLHCP).

   b) Envirocon's PLHCP is Drs. Greaney and Chan of GMG Workcare.

   c) Dr. Greaney will be assisted in these duties by a local PLHCP. Local PLHCPs will also be licensed physicians. Fitness to wear respiratory protection will be determined by the local PLHCP and reviewed by Dr. Greaney.

F.3.g. Fit Testing

1) General requirements

   a) Before an employee uses any respirator with a negative or positive pressure tight-fitting facepiece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used.

   b) Positive pressure (i.e., pressure-demand mode) supplied air respirators (SAR) or self contained breathing apparatus (SCBA) with tight-fitting facepieces are included in this requirement.

c) Unless noted otherwise, fit test shall be administered using an OSHA-accepted Quantitative (QNFT) protocol.

d) A QLFT may be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less (i.e., half mask air purifying respirators).

e) Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by QNFT or QLFT.

2) Tight-fitting atmosphere-supply & powered air-purifying respirators

a) Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing quantitative or qualitative fit testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection.

b) Qualitative fit testing of these respirators shall be accomplished by temporarily converting the respirator user's actual facepiece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure air-purifying respirator facepiece with the same sealing surfaces as a surrogate for the atmosphere-supplying or powered air-purifying respirator facepiece.

c) Quantitative fit testing of these respirators shall be accomplished by modifying the facepiece to allow sampling inside the facepiece in the breathing zone of the user, midway between the nose and mouth. This requirement shall be accomplished by installing a permanent sampling probe onto a surrogate facepiece, or by using a sampling adapter designed to temporarily provide a means of sampling air from inside the facepiece.

d) Any modifications to the respirator facepiece for fit testing shall be completely removed, and the facepiece restored to NIOSH-approved configuration, before that facepiece can be used in the workplace.

e) Voluntary use respirators

i. Voluntary use of disposable paper masks for nuisance dusts does not require a fit test.

ii. Voluntary use of disposable paper masks for nuisance dusts does not require medical evaluation.

iii. Voluntary use of any other respiratory protection (e.g., disposable, tight-fitting, negative pressure half mask APRs) requires normal fit testing and medical evaluations.

3) Loose-fitting respirators

a) Loose-fitting respirators include respirators such as hood or helmet-type continuous flow (type C or CE) respirators.

b) Loose-fitting respirators do not require fit testing.

4) Envirocon fit testing will be done in accordance with the OSHA-accepted QLFT and QNFT protocols and procedures are contained in Appendix A of 29 CFR 1910.134.

F.3.h. Fit testing period.

1) Fit test results are good for a period of one year.

2) If an employee using a tight-fitting facepiece respirator will be assigned a different respirator facepiece (size, style, model or make) the fit testing must be repeated.

3) Fit test results are voided whenever the employee, a supervisor, a safety officer, the PLHCP, or program administrator makes visual observations of, changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to:

   a) facial scarring,

   b) dental changes,

   c) cosmetic surgery, or

   d) an obvious change in body weight.

F.3.i. Use of respirators.

1) Employees are not allowed to use respirators with tight-fitting facepieces with:

   a) facial hair that comes between the sealing surface of the facepiece and the face or that interferes with valve function; or

   b) any condition that interferes with the face-to-facepiece seal or valve function.

2) If an employee wears corrective glasses, Envirocon will obtain the appropriate spectacle kit for the full-face respirator and have it fitted with prescription lenses.

3) Employees are required to perform a fit check when donning all tight-fitting respirators.

F.3.j. General inspection and repairs

ASARCO will provide replacement respirators for any at a designated location for any respirator needing repair.

1) Inspection requirements

   a) All respirators used in routine situations shall be inspected before each use and during cleaning.

   b) All respirators maintained for use in emergency situations shall be inspected at least monthly and in accordance with the manufacturer's recommendations, and shall be checked for proper function before and after each use.

c) Emergency escape-only respirators shall be inspected before being carried into the workplace for use.

d) Self-contained breathing apparatus (SCBA) shall be inspected monthly.

2) Repairs

a) Respirators that fail an inspection or are otherwise found to be defective are removed from service, and are discarded or repaired or adjusted in accordance with these procedures:

b) Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations.

c) Repairs shall be made using only the respirator manufacturer's NIOSH-approved parts designed for the respirator.

d) Repairs shall be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed.

e) Reducing and admission valves, regulators, and alarms shall be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

3) Employees shall inspect their respirator carefully and paying particular attention to:

- exhalation valve(s),
- inhalation valve(s),
- tightness of components,
- elasticity of components,
- look for missing components,
- look for cracked components,
- look for missing cartridge gaskets;
- look for damage to cartridges (in particular the seat that seals with the cartridge gasket); and
- ensure that all filters, cartridges and canisters used are labeled and color coded with the NIOSH approval label and that the label is not removed and remains legible.

4) For supplied air systems also inspect for:

- proper functioning of regulators;
- final regulator pressures not exceeding 125 psi;
- air lines (low pressure) not exceeding 300 feet in length; and
- grade D certification of breathing air.

F.3.k. Respirator cartridges changes

1) Respirator cartridges shall be changed

   a) in accordance with manufacturer's recommendations, and

   b) as prescribed by this HASP or Activity Hazard Analysis (AHA).

2) Cartridges shall also be changed:

   a) If the wearer detects vapor or gas breakthrough;

   b) if the wearer detects changes in breathing resistance; or

   c) if the wearer detects leakage of the facepiece.

F.3.l. Cleaning and disinfecting.

A cleaning and disinfecting program for soiled respirators is in place and will be used while at the ASARCO facility. Workers will be informed during the fit testing and respirator training as to the specifics of the ASARCO program including location of respirators and procedure for exchanging soiled or damaged respirators for clean respirators. The following is included as part of the Envirocon Respirator program.

1) Cleaning

   a) Whenever respirators are doffed, employees shall wash their faces and respirator facepieces in order to prevent eye or skin irritation.

   b) Cleaning shall be accomplished by using soap and water or equivalent cleaning solutions.

2) Disinfecting requirements

   a) Respirators issued to more than one employee shall be cleaned and disinfected before being worn by different individuals.

   b) Respirators maintained for emergency use shall be cleaned and disinfected after each use.

   c) Respirators used in fit testing and training shall be cleaned and disinfected after each use.

   d) Respirators used by a single individual shall be disinfected at least weekly.

3) Disinfecting procedures

   a) Respirator components should be immersed for two minutes in one of the following:

      i. disinfecting agent recommended for respirator sanitizing; or

      ii. hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 deg. C (110 deg. F); or

iii. aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 deg. C (110 deg. F).

b) Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water.

c) Drain (The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.)

d) Use a mild solution of baking soda to remove chlorine or disenfectant residues.

e) Components should be hand-dried with a clean lint-free cloth or air-dried.

f) Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.

g) Test and inspect the respirator to ensure that all components work properly.

F.3.m. Storage

1) All respirators shall be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals.

2) All respirators shall be packed or stored to prevent deformation of the facepiece and exhalation valve.

3) Emergency respirators shall be:

a) kept accessible to the work area;

b) stored in compartments or in covers that are clearly marked as containing emergency respirators; and

c) stored in accordance with any applicable manufacturer instructions.

F.3.n. IDLH atmospheres

1) Use of respirators in IDLH atmospheres must be approved by the Respiratory Protection Program Administrator. The administrator will approve the entry by reviewing and signing off on the AHA for the entry.

2) A specific Activity Hazard Analysis (AHA) shall be written for each IDLH entry. The AHA will include:

a) the type of respirators to be used,

b) area monitoring requirements,

c) escape provisions, and

d) rescue provisions.

3) At least one employee will serve as an attendant.

a) Attendants will remain outside the IDLH atmosphere.

b) The attendant shall maintain visual, voice, or signal line communication with the employee(s) in the IDLH atmosphere.

c) Attendants and rescue personnel will be trained in the approved JHA for the entry.

d) Attendants shall not attempt a rescue until provisions have been made for someone else to assume responsibilities as attendant.

F.3.o. Site Inspections

1) The assistant administrator (site safety officer) is responsible for conducting certain site inspections on a routine basis.

2) Program inspections

a) Site inspections will be conducted daily.

b) The site safety officer is responsible for these inspections, including special inspections described in the inspections section of this procedure.

c) Daily site inspections shall include surveillance of work place conditions. In particular the following conditions shall be assessed.

i. potential changes in contaminant concentration,

ii. changes in employee exposure or stress; and

iii. respirator effectiveness.

3) Level B, and Level A inspections

a) Sites which involve the level A and/or B equipment require the following items to be inspected weekly.

b) Ensure that compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration accords with the following specifications:

c) Compressed and liquid oxygen shall meet the United States Pharmacopoeia requirements for medical or breathing oxygen; and

d) Compressed breathing air shall meet at least the requirements for Type 1-Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:

i. Oxygen content (v/v) of 19.5-23.5%;

ii. Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;

iii. Carbon monoxide (CO) content of 10 ppm or less;

iv. Carbon dioxide content of 1,000 ppm or less; and

v. Lack of noticeable odor.

e) Ensure the proper functioning of regulators.

f) Ensure that final regulator pressures do not exceeding 125 psi.

g) Ensure that air lines (low pressure) do not exceeding 300 feet in length (or their maximum certified length.

h) Ensure that compressed oxygen is not used in atmosphere-supplying respirators that have previously used compressed air.

i) Ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.

j) Ensure that cylinders used to supply breathing air to respirators meet the following requirements:

k) Cylinders are tested and maintained as prescribed in the Shipping Conainer Specification Regulations of the Department of Transportation (49 CFR part 173 and part 178).

i. 3 year hydro for fiberglass/ composite cylinders

ii. 5 year hydro interval for steel cylinders

iii. 10 year hyrdro for specially certified tall bottles with star punch symbol "★"

iv. Note: a " + " authorizes an additional 10% capacity for certain non-liquified gases and DOES NOT increase the hydro test period.

l) Cylinders of purchased breathing air have a certificate of analysis from the supplier that the breathing air meets the requirements for Type 1--Grade D breathing air.

m) The moisture content in the cylinder does not exceed a dew point of -50 deg.F (-45.6 deg.C) at 1 atmosphere pressure.

n) Ensure that compressors used to supply breathing air to respirators are constructed and situated so as to:

i. prevent entry of contaminated air into the air-supply system;

ii. minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (5.56 deg.C) below the ambient temperature;

iii. have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality.

o) Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions.

i. Have a tag containing the most recent change date and the signature of the person authorized to perform the change.

ii. The tag shall be maintained at the compressor.

p) For compressors that are not oil-lubricated, ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm.

q) Oil-lubricated compressors shall use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

r) Ensure that breathing air couplings are incompatible with outlets for nonrespirable worksite air or other gas systems. No asphyxiating substance shall be introduced into breathing air lines.

s) Ensure that breathing gas containers are marked in accordance with the NIOSH respirator certification standard, 42 CFR part 84.

4) SCBA inspections

a) Where SCBAs are used. Level A/B Inspections should include the following additional items.

b) Air and oxygen cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level.

c) Ensure that regulators and warning devices function properly.

F.3.p. Emergency use respirator inspections

1) Where the site maintains respirators for emergency use, the following additional inspection items should be included on a monthly basis.

2) Certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator.

3) Provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.

F.4. Heat Stess

The site heat stress program shall be enforced prior during periods when the ambient temperature of 65 °F. Training shall be accomplished prior to implementation.

F.4.a. Training.

All site personnel shall be trained in the hazards and controls of heat stress prior to the onset of hot weather.

F.4.b. Acclimatization.

Personnel become acclimatized in about 7 to 10 days (and loose acclimatization in about the same period of time). Extra attention should be given during transitional weather and to new employees that are not used to heat stressful conditions.

F.4.c. Fluids.

Workers shall be encouraged to increase consumption of water. Cool or cold water shall be used to enhance palatability and consumption. Electrolyte-containing beverages may also be used to encourage consumption.

F.4.d. Shelter.

Shelter from radiant heat (i.e., shade) shall be available for ground laborers exposed to direct sunlight (i.e., radiant heat loading) during conditions of heat stress. Shelter does not necessarily require air conditioning, and air conditioning may actually be uncomfortable for employees working in heat stressful conditions.

F.4.e. Clothing.

Clean dry undergarments help prevent some heat stress related problems. Provisions should be made for changing PPE garments that may become sweaty and dirty. Showering also helps to rehab personnel that show signs of high stress. Every effort should be made to minimize PPE requirements which may increase the heat stress of personnel without a commensurate gain in personal protection.

F.4.f. Monitoring.

At the discretion of the Site Safety Officer one of two monitoring programs may be employed during program implementation. A program of personal stress monitoring is appropriate for personnel wearing PPE (e.g., level C workers) and for most other situations. A program of WBGT & work/rest regimen is appropriate for personnel not wearing chemical resistant PPE which fully encloses the body and prevents evaporative cooling of skin surfaces (e.g., level D workers and workers using certain modified level D or C ensembles). Employees that must be monitored in either program shall include at a minimum:

1) exposed personnel (e.g., those not working in air conditioned spaces) conducting ground labor tasks in any ensembles;

2) exposed personnel (e.g., those not working in air conditioned spaces) wearing whole body, chemical protective clothing PPE; and

3) any additional personnel considered to be at particular risk by the SSO or PHSM.

F.4.g. Area Monitoring and Work Rest Regimens

1) WBGT Area Monitoring

a) The use of WBGT (wet bulb globe temperature) area monitoring may be used in conjunction with an established work/rest regimen. WBGT monitoring and the work/rest regimen shall be in accordance with the latest edition of the American Conference of Governmental Industrial Hygienists' (ACGIH) "Threshold Limit Values for Chemical Substances and Physical Agents" also refered to as the "TLV booklet."

b) In general, this procedure should only be applied to personnel in breathable work clothing with PPE which allows for evaporative cooling (e.g., level D workers or modified level D workers where PPE does not prevent evaporative cooling of the skin). If this monitoring program is used for personnel in PPE, the ACGIH TLV booklet correction factors for clothing shall be used.

2) Work Rest Regimen

a) The TLVs specified on Table 1 refer to heat stress conditions under which it is believed that nearly all heat acclimatized, adequately hydrated, unmedicated, healthy workers wearing light-weight summer clothing may be repeatedly exposed without adverse health effects. The work areas are assumed to have at least some air movement.

Table 1: TLVs for Heat Exposure

Hourly Activity	WBGT for Work Rates that are:					
	light		Moderate		Heavy	
	°C	°F	°C	°F	°C	°F
100% Work	30.0	86.0	26.5	80.0	25.0	77.0
75% Work; 25% Rest	30.5	87.0	28.0	82.5	26.0	79.0
50% Work; 50% Rest	31.5	89.0	29.5	85.0	28.0	82.5
25% Work; 75% Rest	32.0	89.5	31.0	88.0	30.0	86.0

Notes: Work and rest environments are assumed to be the same. If different, hourly time-weighted average WBGTs must be calculated.

WBGT values are rounded to the nearest half degree.

b) When the WBGT values on Table 1 must be exceeded, the guidelines on Table 2 must be followed.

F.4.h. Personal monitoring programs.

A program of personal stress monitoring should be used for most situations where whole body chemical protective clothing PPE is in use. It may also be used for other situations as well. The site safety officer shall use pulse as the primary method for monitoring but may use any combination of the following which includes pulse.

F.4.i. Pulse.

Pulse is the primary means of personal monitoring for heat stress. Pulse should be less than 110 bpm (The radial or carotid pulse should be taken seated or standing if necessary. Take reading before or at the beginning of a break whenever heat stress conditions exist. Workers should be rehabed until the pulse returns below 105 bpm.

F.4.j. Ear or Oral temperature.

Ear temperature may also be used. Ear temperature should be taken when full face respirators and/or hoods are being worn (i.e., the head may become overheated before the rest of the body shows signs of stress). Workers should be removed if ear temperature increases by more than 1.5 °F. Workers should be rehabed until the temperature returns to normal. It should be noted that some employees may have a "normal" temperature which is different than 98.5 °F (Individual employees should be monitored for one week prior to the beginning of heat stress conditions in order to establish if they have a different normal baseline temperature). Workers should not be allowed to enter the zone if they are already have an elevated temperature.

F.4.k. Body weight.

Body weight change may also be used for personal monitoring for heat stress. Body weight loss of more than 1.5% should not be allowed.

F.4.l. Rehab.

Rehabilitation should include at a minimum: seated rest in a shady location; removal of some/all outer garments; fluids; observation; reduction in the ratio of work/rest periods; and increased monitoring after return to work.

F.4.m. Action level for personal monitoring.

An action level for personal heat stress monitoring has been established at 85° F ambient temperature when site personnel are wearing chemical protective clothing during the performance of field activities.

At temperatures exceeding 100° F ambient temperature, all ground laborers, regardless of PPE, should be monitored.

F.4.n. Work/rest regimen.

The following work/rest schedule may be used to help control heat stress when monitoring removals dictate the need. Ground labor and PPE labor should also be scheduled for early morning or evening if possible.

Ambient Temperature (degrees F)	*Work Period (minutes)*	*Rest Period (minutes)*
72-80	120	15
80-85	90	15
85-90	60	15
90-95	30	15
95-100	15	15

F.4.o. Adjusted Temperature Area Monitoring

The adjusted Temperature Work/Rest Schedule is also appropriate for personnel working outdoors in PPE. The adjusted temperature is calculated as shown below.

Work/Rest Schedule (light-moderate work) 250 kilocalories/hour based on Adjusted Temperature in °F(ATF) Monitoring		
ATF = T + (13 x % sunshine) WHERE T = NORMAL AIR TEMPERATURE IN °F MEASURED IN THE SHADE, AND WHERE % SUNSHINE = 100 FOR NO CLOUD COVER AND DISTINCT SHADOWS = 0 FOR COMPLETE CLOUD COVER AND NO SHADOW OR ESTIMATED VALUES BETWEEN.		
ATF/ATC	**Work-Rest Regimen Normal Work Clothing**	**Work-Rest Regimen Impermeable Clothing**
90°F / 32.2°C OR ABOVE	After each 45 minutes of work	After each 15 minutes of work
87.5-90°F / 30.8-32.2°C	After each 60 minutes of work	After each 30 minutes of work
82.5-87.5°F / 28.1-30.8°C	After each 90 minutes of work	After each 60 minutes of work
77.5-82.5°F / 25.3-28.1°C	After each 120 minutes of work	After each 90 minutes of work
72.5-77.5°F / 22.5-25.3°C	After each 150 minutes of work	After each 120 minutes of work
Normal clothing is breathable cotton coveralls or long pants and shirt. Impermeable clothing is non-breathable PPE. For additional information refer to ACGIH TLV Booklet.		

F.5. Cold Stress

To minimize cold related illnesses, site supervisors are to be aware of the symptoms and environmental conditions that lead to cold-related illnesses. Appropriate steps shall be taken to take to prevent their occurrence of these illnesses. This procedure describes the causes, symptoms, treatment and/or prevention of cold-related illness.

F.5.a. Thermal Balance.

When the temperature of the surrounding air or water are cooler than the worker, the body's physical processes must increase to maintain thermal balance.

Shivering is the body's attempt to generate increased heat.

F.5.b. Cold Stress Symptoms.

1) Common (but unreliable) symptoms

   a) Shivering, pain, and numbness, although commonly associated with cold stress, **are not trustworthy indicators** to cold exposures!

b) The reason you should not trust these is because prolonged cold exposure numbs all body sensations.

c) If these symptoms are detected, cold stress should be suspected.

d) The lack of these symptoms **DOES NOT rule out** the possibility of cold stress.

2) Wind-chill temperature is a better means of evaluation as it takes into account the wind's ability to strip heat from the body through convection.

3) Water conducts heat away from the body much faster than air. Personnel are especially exposed to a cold stress hazard when performing spill clean-up in boats or around open water in cold weather situations. Falling into cold water can rob body heat very quickly.

4) Clothing that is wet with perspiration (as well as from water contact) will cause heat loss through conduction.

F.5.c. Cold Injury

1) Trench Foot.

a) Cause: Occurs as a result of extended exposure of the feet to cold and moisture.

b) Injury: Capillary walls of the feet are injured, resulting in tingling, itching and pain.

c) Recognition: Blisters may form followed by ulceration of the skin.

2) Frost-Nip.

a) Cause: Is a localized superficial freezing of extremities such as ears, nose, toes, and fingers.

b) Injury: Worker experiencing frost nip are susceptible to future injury and should avoid chilling.

c) Recognition: Initially there is a dark bluish color due to bleeding under the skin which at times can become gangrenous.

3) Frostbite.

a) Cause: Frostbite occurs when the moisture in the skin actually freezes, forming ice crystals, resulting in the damage of skin cells. The ears, nose, toes and fingers are most susceptible because of poorer circulation in these areas. The body may shut down flow to the extremities in order to maintain warmth in body core areas.

b) Injury: Tissues are destroyed when bodily fluids turn to ice. Damaged area can become gangrenous resulting in the loss of tissue, finger tips and toes.

c) Recognition:

i. A burning pain is noted initially, then pain decreases and numbness sets in.

ii. The injured area becomes red, then blue/red.

iii. The skin becomes waxy pale in appearance because of lack of oxygen.

4) Hypothermia.

a) Cause: Occurs when heat production of the body is not sufficient to replace heat lost to the environment.

b) Injury: The core body temperature is lowered and the pulse rate slows. Metabolic processes in the body are finely tuned to perform at normal body temperature. As the temperature is lowered, muscular weakness occurs, mental abilities dull and the worker becomes uncoordinated. Cardiac arrest follows if core temperature continues to fall.

c) Recognition:

i. Signs of hypothermia are evident at 95 degrees F body core temperature.

ii. Consciousness is lost between 89.6 - 86.0 degrees F.

iii. At lower core temperatures, cardiac arrest is possible.

iv. Exposure to cold water decreases the body core temperature rapidly and consciousness is quickly lost.

v. Workers on or over water should be acutely aware of the danger of immersion during cold weather.

vi. Hypothermia results in dulling of senses and could result in poor decision making.

F.5.d. Prevention

1) Training and recognition.

a) Prevention of cold stress is, in many ways, similar to preventing heat stress. Training and recognition of the hazard is especially important.

b) All personnel will receive training on the cause, symptoms, and most importantly, methods of prevention of cold stress injuries.

2) Clothing.

a) Prevention of hypothermia and other cold injuries is best accomplished by protecting workers from cold and moisture.

b) Clothing is the most important factor in prevention of injury.

c) Personnel working on land should layer clothing with outer layer being wind and water resistant.

d) The layers should be capable of being vented at wrist, neck and waist to reduce wetting by perspiration.

e) Protect extremities that have poor circulation.

f) Keep head and face covered.

g) Wear insulated foot wear, keep socks dry (bring extra socks as needed).

h) Gloves are extremely important.

i) Never allow bare skin to contact metal surfaces at sub-zero temperatures.

3) Acclimatization.

a) Do not count on acclimitization.

b) A limited degree of acclimatization can occur from exposure and working in cold environments.

c) Some physiological changes do occur but people also learn how to more effectively protect themselves from temperature extremes.

4) Fluid Replacement.

a) As with heat stress, blood circulation and heat transfer is critical to dealing with cold temperature extremes.

b) Cold weather causes significant water loss as a result of the dryness of the air.

c) Fluid intake should be increased to prevent dehydration which directly affects blood volumes and flow to the extremities.

d) Warm, sweet, caffeine-free, nonalcoholic drinks and soup offer the best fluid replacement and provide caloric energy.

5) Work-Rest Regimens.

a) When temperatures are less than 20 degrees F (actual or windchill) heated warming shelters should be made available.

b) Workers should use these on regular basis. See Table I at the end of this procedure for guidelines for scheduling breaks.

6) Diet.

a) As with any work in extreme temperatures, personnel will be instructed to eat a well-balanced diet to replace calories burned and provide necessary vitamins and nutrients.

7) Environmental Monitoring.

a) Regular monitoring of the environment by recording wind speed and actual thermometer readings for comparison to the windchill chart should occur at regular intervals depending on conditions. See Table I at the end of this procedure for wind chill equivalents.

8) Prohibited Activities.

a) Alcohol should not be consumed since it increases blood circulation to the skin and interferes with internal thermostatic control. Alcohol also interferes with mental acuity which can lead to risk taking.

b) Cigarette smoking should be prohibited since the nicotine restricts flow of blood to the extremities.

9) ACGIH TLV Guidelines:

a) The current edition of the American Council of Governmental Industrial Hygienists' Threshold Limit Values (TLV) provides a reference on cold stress prevention.

b) Some of the TLV information is summarized in the following Table I.

F.5.e. Treatment of Injuries

1) Trench Foot, Frostnip and Frost Bite.

a) These injuries require immediate response, including removal of the individual from a cold environment, the gradual warming of the affected areas, having the victim not use the affected limbs, (drive victim or carry, do not allow the victim to walk).

b) Obtain immediate medical attention as these types of injuries become more severe as exposure progresses.

c) AVOID RAPID WARMING OF EXTREMITIES.

2) Hypothermia.

a) Hypothermia is a life threatening condition that requires immediate response. Remove victim to a warm area. The individual may be disorientated and unable to talk clearly or understand you.

b) Help the individual to a warm place and wrap them in warm blankets or bathe them (if possible) in warm (not hot) water.

c) If they are conscious give hot (non-caffeine) liquids to drink.

d) Summon immediate medical attention. UNTREATED HYPOTHERMIA CAN LEAD TO VENTRICULAR FIBRILLATION (HEART ATTACK) AND DEATH.

F.6. Hazard Communication Program

The Envirocon Program, in its entirety, is located in a separate labeled notebook in the Envirocon Project Trailer. The notebook is available for review by employees at any time during normal work shift. Envirocon will be responsible for maintaining a copy of their Hazardous Communication Program and MSDSs on site.

F.6.a. Subcontractors

Subcontractors will be responsible for keeping an individual copy of their respective programs.

F.6.b. Material Safety Data Sheets (MSDSs)

MSDSs will be located in a separate labeled notebook in the Envirocon Project Trailer. MSDSs will be available to all employees for review during the work shift. Copies of all MSDSs for materials on site will be provided to Bureau of Reclamation prior to material delivery on the site.

F.6.c. Container labeling

All containers received on site will be inspected to ensure the following:

1) All containers clearly labeled;
2) Appropriate hazard warning; and
3) Name and address of the manufacturer.

F.6.d. Employee Training and Information

Prior to starting work, each employee will attend a health and safety orientation and will receive information and training on the following: An overview of the requirements contained in the Hazardous Communication Program. This training shall include at a minimum the following:

1) Hazardous chemicals brought to the site for the project;
2) The location and availability of the written Haz Comm Program;
3) Physical and health effects of the hazardous chemicals;
4) Methods of preventing or eliminating exposure;
5) Emergency procedures to follow if exposed;
6) How to read labels and review MSDSs to obtain information; and
7) Location of MSDS file and location of hazardous chemical list.

G. SITE SAFETY PROCEDURES

This section addresses safe work practices and site-specific safety procedures that will be used to control hazards on site.

G.1. Code of Safe Work Practices

Every employee has a responsibility to ensure that the program proceeds efficiently and safely. The following procedures constitute the basic safe work practices expected of every employee.

G.1.a. Conducting Yourself in a Responsible Manner.

Safety programs are not only for your safety, but the safety of everyone on site. Your conduct potentially impacts your coworkers.

1) Perform all tasks in a safe and approved manner.

2) Do not direct an air hose at another person. Do not use compressed air to remove debris from clothes, hair, or any part of the body.

3) Honor the barricades erected by other contractors on the job site.

4) Do not stand in front of a door that opens toward you.

5) Do not work while your ability or alertness is so impaired by fatigue, illness, or other causes that they might unnecessarily expose yourself or others to injury.

6) Do not bring, keep, or use alcoholic beverages, controlled substances, or weapons on site.

7) Anyone known to be under the influence of drugs or intoxicating substance, which impair the employees ability to safely perform the assigned duties, shall not be allowed on the job while in that condition.

8) Workers shall not handle or tamper with any electric equipment in a manner not within the scope of their duties, unless they have received instructions from a qualified, licensed electrician.

9) Do not use any form of solvent, gasoline or kerosene for cleaning hands or clothing. Use soap and water or other cleansers intended for the purpose.

10) Use handrails when climbing or descending stairs and walkways.

11) Do not run, except as necessary in an emergency.

12) Horseplay, scuffling, and other acts which tend to have an adverse influence on the safety or the well being of other employees is prohibited.

13) Do not jump (e.g., climb off equipment using three points of contact, walk down stairs, use platforms to cross trenches).

14) Always stand on an approved ladder to remove articles that may out of reach from floor level. Do not stand on chairs, boxes, or other makeshift devices.

15) Loose or frayed clothing, loose or hanging long hair, dangling ties, finger rings, etc., shall not be worn around moving machinery or other areas where they may become entangled.

16) Do not improperly use, mishandle, or tamper with health and safety equipment and sampling devices.

17) Personnel shall not drop or throw any articles or materials of any kind unless a specific procedure has been developed to do so safely.

18) Do not harass, feed, or photograph wildlife. If you find an injured or dead animal, contact the nearest gate attendant or the U.S. Fish and Wildlife Service.

G.1.b. Participate in Your Safety Programs

There are a number of ways for you to influence the safety on site. Don't just complain about problems, participate in your own safety.

1) Attend each day's work briefing as scheduled.
2) Attend all required safety meetings, training, or briefings.
3) Complete safety observer reports when you want to make a suggestion, observe a commendable act of safety or quality, take a "time out for safety" to correct an unsafe act or condition.
4) Approach every task with incident free performance in mind ... ZIP!
5) Ask questions when you are uncertain about a procedure or equipment use.
6) Participate in the evaluation or investigation of any accident or incident when you are requested to do so.
7) If you fear reprisal use the Envirocon safety Hotline **800-224-7389.**

G.1.c. Practice Good Housekeeping

Housekeeping is the hallmark of

1) Keep your work area clean and orderly.
2) Good housekeeping practices shall be maintained continually.
3) Keep work, storage, and access areas clean of tools, equipment, and debris.
4) All means of egress shall be kept unblocked, kept clear of debris and slip or trip hazards, kept well lighted, and kept unlocked at times.
5) Immediately remove spilled liquids from the floor.
6) Clean up or otherwise remove slip/trip/fall hazards immediately.
7) Do not leave boards with protruding nails or other loose material on the floor where they may be stepped on.
8) Keep aisles and walkways clear of electrical and telephone cords.
9) Do not overload electrical outlets.
10) Electric cords shall not be exposed to potential damage from vehicles.
11) Mark or barricade slip/trip/fall hazards that can not be removed.
12) Any time work is performed overhead, barricades shall be erected.
13) Barricades shall consist of caution (yellow) or danger (red) barricade colors and appropriately worded tape or signs.
14) All barricades shall be removed when not in use.

G.1.d. Follow Standard Procedures

Hazardous waste operations involve a number of standard procedures which are particularly important. Make these procedures a habit.

1) Use the Buddy System when performing operations in hazardous areas; when working with hazardous contaminants; when physical capabilities may become stressed (heat stress); or working in proximity of operating machinery or equipment.

2) Practice contamination-avoidancetechniques.

3) Enter and exit the Exclusion Zone (EZ) and the Contamination Reduction Zone (CRZ) through designated areas.

4) Complete sign-in/out logs when required.

5) Do not eat, drink, chew tobacco or gum, smoke, or engage in any other activity that may increase the possibility of hand-to mouth contact in the EZ or the CRZ. (Exceptions may be permitted by the Health and Safety Supervisor for other reasons, such as to allow fluid intake during heat stress conditions.)

6) Do not use lighters or matches in the EZ and CRZ.

7) Employees under a physician's care and/or taking prescribed narcotics must notify the designated site safety supervisor.

8) Lift material in a safe manner and avoid strains. Bend your knees, keep your back straight, and push upwards with your legs when lifting. The lifting of heavy and bulky objects will normally be done by or more shop personnel. Lifting heavy/bulky objects improperly can result in needless injury.

9) Get help (mechanical help or more people) when lifting heavy or awkward materials.

10) Wear the personal protective equipment (PPE) specified in the site HASP, including hard hats, steel toed boots, and safety glasses that must be worn at all times in active work areas.

11) If you are required to wear a respirator, remove facial hair (beards, long sideburns, or mustaches) that may interfere with the satisfactory fit of the respirator mask.

12) Use safety devices provided for your protection (e.g., handrails, guards, pressure relief valves, and seat belts). Do not remove these devices while the equipment is being operated.

13) Never approach within 25 feet of the operating area of a piece of equipment without first making eye contact with the operator, signaling your intention, and receiving an acknowledgement from the operator. If you wish to approach the equipment (e.g., to speak with the operator) the operator must first lower all buckets, blades, etc. and idle the engine before you approach.

14) When ground personnel support heavy equipment, pay particular attention to pinch points (e.g., the counterweight swing radius and the tracks of an excavator). Keep out from under suspended loads.

G.1.e. Follow Safety Procedures

In addition to standard procedures, there will be many site specific procedures to learn and follow. You need to learn these from your site-specific training and follow the procedures. If you feel the procedures are incorrect or inadequate it is improper to take it upon yourself to modify procedures. Ask your supervisor, make suggestions, or raise questions during planning and training.

1) Attend, pay attention, and ask questions during procedure training and briefings.

2) Implement, adhere to, and follow established rules, guidelines, procedures, plans, etc., as specified.

3) Follow proper decontamination procedures.

4) Make sure fall protection or fall arrest systems are in place when working at elevations greater than 6 feet above the surrounding work area.

5) Follow the work-rest regimens and other practices required by the heat stress program.

6) Where appropriate, lockout procedures shall be used.

7) Employees shall not work under vehicles supported by jacks or chain hoists without protective blocking that will prevent injury if jacks or hoists should fail.

8) Obey all authorized safety signs and demarcations. Do not place or remove these items except as authorized by the Site Health and Safety Supervisor (HSS).

9) Become familiar with the on-site hazards, work zones, PPE requirements, and decontamination methods.

G.1.f. Permit Required Procedures

Many of the most important procedures dealing with the most dangerous hazards involve permit requirements to ensure that necessary precautions are taken before work begins. Pay particular attention to these procedures.

1) Do not enter a permit-required Confined Space without a permit, and follow all requirements of permits as issued.

2) Don't rely on postings to warn you of confined space hazards. When in doubt ask for a permit and testing. Manholes, underground vaults, chambers, certain confining excavations, tanks, silos or other similar spaces may have a confined space hazard.

3) Check with your Supervisor prior to starting any Hot Work operation (welding or cutting operations) and, if you are working in an area that requires a Hot Work Permit, follow the permit as issued.

4) Depending on the fire hazards at your facility, hot work permits may be required for use of cigarette lighters, electrical equipment that is not intrinsically safe, flash photography, motors, engines, or spark producing metal tools.

5) The combination of hot work and confined spaces is particularly dangerous even if you don't plan to enter the space! No burning, welding, or other source of ignition shall be applied to, or near any enclosed tank or vessel, even if there are some openings, until it has first been determined that no possibility of explosion exists and authority for the work is obtained from the foreman or superintendent. **This includes small voids too!** An sealed can, doubler space, storage compartments or similar small spaces can contain flammable debris or explosive vapors.

6) Do not dig or drive objects into the ground without first ensuring that an intrusive work permit has been issued. This includes driving fence posts or hand digging small holes as well as excavating a trench.

7) Check excavations daily for slope stability and air quality. Do not enter an excavation greater than 4 feet deep unless authorized by the HSS and then only after the excavation has been sloped or shored properly. Maintain safe means access and egress from all excavations.

8) Follow lockout/tagout procedures when working on equipment involving moving parts or hazardous energy sources. Install and remove locks and tags only in accordance with procedure and only when authorized.

G.1.g. Use Tools Properly

Tools, especially hand tools, are used frequently with minimal supervision. It can be all to easy to use tools improperly and create serious safety hazards.

1) Use all tools in the manner intended and/or prescribed. The operating instructions for all tools and equipment ***ARE MANDATORY.***

2) Modification of use or design must be in accordance with the written instructions or permission of the manufacturer.

3) Do not suspend tools or any other items using electrical cords.

4) In locations where the use of a portable power tool is difficult, the tool shall be supported by means of a rope or similar support of adequate strength.

5) Air hoses shall not be disconnected at compressors until the hose line has been bled.

6) Inspect safety devices before every use including but not limited to:

   a) respirators,

   b) personal protective equipment,

   c) body harnesses,

   d) lanyards,

e) monitors,

f) fire extinguishers,

g) confined space retrieval systems (not the same as fall protection harnesses), and

h) manbaskets.

7) Inspect other tools and equipment before use.

a) A competent person must inspect scaffolds and manlifts before each day's use.

b) Ladders must be in good service, placed at the proper angle, secured, and extents to the proper length (for access to heights the ladder must be 3 feet above the landing).

c) Inspect power tools, looking especially for damaged insulation or missing ground plugs on electrical cords.

d) Inspect cutting devices looking especially for properly sharpened and guarded edges.

e) Inspect hand tools look especially for chisels, hammers and punches with mushroomed heads; files without handles, and hammers with broken handles.

8) Do not use defective equipment.

a) Don't leave defective equipment in service for others to use. Remove it from service and report the problem to your supervisor.

b) At a minimum, defective equipment must be tagged out of service.

i. Use a red tag placed near starting switches or levers.

ii. Describe the reason the equipment is tagged out.

iii. Write your name and the date on the tag.

c) Alternatively, defective equipment can be taken out of service by destruction and disposal.

9) Use ground fault circuit interrupters (GFCI) for cord and plug equipment used outdoors, in damp locations, or when equipment is not plugged directly into permanent wiring.

10) Use only extension cords rated for hard service or junior hard service (e.g., SO, JSO, SOW, JSOW). A UL label on a local hardware store flat cord is probably ***NOT*** rated for this service!

11) Keep electrical cords out of walkways and accumulations of water unless protected and rated for such service.

G.1.h. Operate Equipment Safely

1) All equipment is to be operated in accordance with manufacture's written instructions and/or manuals.

2) Equipment shall not be modified or operated out of specified limits without written permission from the manufacturer and the health and safety manager for the project.

3) Only trained and authorized persons shall operate machinery or equipment.

4) Do not operate equipment unless you are properly trained and authorized to do so in a manner consistent with the owner/operators manual.

5) DO NOT use a piece of equipment, which has been tagged out of service! Do not remove red tags without authorization from the person placing the tag or the person responsible for the repairs.

6) Inspect equipment before using it.

   a) Heavy equipment inspections shall be documented. Note all discrepancies and tag out equipment that may be dangerous to operate.

   b) Red tags must have a description of the reason for the tag, the name of the person placing the tag, and the date the tag was applied.

7) Machinery shall not be serviced, repaired, or adjusted while in operation, nor shall oiling of moving parts be attempted, except on equipment that is designed or fitted with safeguards to protect the person performing the work.

8) Use vehicle or equipment seat belts any time the vehicle or equipment is in motion.

9) Excavating equipment shall not be operated near tops of 'cuts, banks, or cliffs if employees are working below.

10) Do not maneuver equipment into the working area of other equipment without first making eye contact with the operator working in the area and signaling your intentions to maneuver into that area.

11) Always acknowledge that you understand that other equipment or ground personnel may enter your working area.

12) Do not allow people on foot to approach without lowering hydraulically lifted or suspended components (e.g., buckets, blades, bellies) and reducing engine speed to idle.

13) Tractors, bulldozers, scrapers, and carryalls shall not operate where there is a possibility of overturning in dangerous areas such as the edges of deep fills, cut banks, and steep slopes.

14) Do not allow supporting ground personnel to work within pinch points of the equipment (e.g., the swing radius of a counterweight and the tracks on an excavator) or under suspended loads.

G.1.i. Prepare Yourself for Incidents

1) Become familiar with the emergency response plan so that you can respond properly in an emergency.

2) Become familiar with the locations and types of emergency equipment, such as fire extinguishers, emergency showers, or air horns.

3) Report all incidents to your supervisor immediately!

4) Participate fully and truthfully in incident investigations.

G.1.j. Supervisors Play a Leadership Role in Safety

As with all aspects of conducting operations, the supervisor is ultimately responsible for carrying out work in accordance with company policies and procedures, and in accordance with the specifications and applicable regulations.

1) Take a leadership role in establishing safety a safety culture on site.

2) Give employees frequent accident prevention instruction and encouragement.

3) First through encouragement and incentives, ensure that employees observe and obey all applicable Company, State or Federal regulation and order as is necessary to the safe conduct of the work. When necessary, compliance must be compelled using progressive disciplinary measures described in this document.

4) Ensure that employees are qualified for the work they are assigned.

5) No one shall knowingly be permitted or required to work while the employee's ability or alertness is so impaired by fatigue, illness, or other causes that they might unnecessarily expose the employee or others to injury.

6) Do not allow anyone to remain on site when under the influence of drugs or intoxicating substance, which impair their ability to safely perform assigned duties.

7) Daily "tailgate" safety meetings shall be held to discuss safety concerns, instruct on new procedures, and discuss lessons learned from investigations and other related safety topics.

8) Encourage and listen to the suggestions of all employees.

9) All work shall be thoroughly planned and supervised to prevent injuries in the handling of materials and in working together with equipment.

10) Inspect the site daily.

11) Investigate all incidents.

12) Ensure thorough documentation of all aspects of the safety program.

G.2. Employee Participation

This project has established a variety of procedures to encourage the participation of employee in their own safety. Employee participation includes all Envirocon, and lower tier subcontract personnel.

G.2.a. Training

Training is required for each employee before starting any new task or working in a new area. Training is considered an employee participation process. Employees are encouraged to ask questions and utilize training sessions to familiarize themselves with procedures.

G.2.b. Daily Safety Briefing

Each day's work begins with a safety briefing. These briefings shall be conducted in a manner to encourage employee participation.

1) Supervisors shall report the plan of the day for all employees. This should include other work that may occur near the project site or impact on project work. Special tasks expected for the day. Waste loads expected that will require special procedures.
2) Discuss lessons learned from incidents on this site or others.
3) Report and discuss safety observations made by employees.
4) Report and discuss times out for safety.
5) Discuss employee suggestions.
6) Recognize safety performance (good and unsatisfactory).

G.2.c. "Time Out for Safety" Authority

The "time out for safety" authority is intended to encourage employees to take initiative in correcting unsafe conditions or behaviors. Where an unsafe condition or behavior poses an imminent threat that can be readily addresses without a change in procedure or policy, each employee is authorized to correct the situation or report the issue. If the unsafe condition can not be readily corrected, your supervisor should be notified to have it corrected. Examples:

1) Stop another employee that is driving into the wrong direction.
2) Grab a roll of barrier tape to mark a broken step on a stairway and report it to your supervisor.
3) Moving several boxes blocking the access to an eye wash.
4) Flagging traffic around a spill until a response crew arrives.

G.3. Intrusive Work (including excavations, drilling, driving posts)

The OSHA standards for excavation safety (29 CFR 1926, Subpart P) shall be followed at all times during excavation activities. Excavations include "any man-made cut, cavity,

trench, or depression in an earth surface, formed by earth removal." This includes trenches. This standard applies regardless of the depth of the excavation although many of the requirements do not apply until personnel enter or the depth exceeds 5 feet. Utility locates should be done at any depth for example.

G.3.a. Facility Requirements

1) Determine if the client requires an intrusive work permit to be completed and improved before conducting any intrusive work.

2) This includes driving fence posts, grubbing with a dozer, manually digging a hole with a shovel, or drilling among other things.

3) A competent person shall be designated and supervise all intrusive work.

G.3.b. Excavations 4 feet or deeper that personnel will be entering.

In excavations 4 feet deep or deeper, a competent person shall ensure that the following requirements are met.

Table G.3.b Excavation Sloping Requirements

SOIL OR ROCK TYPE	EXAMPLES	MAXIMUM ALLOWABLE SLOPES HORIZONTAL TO VERTICAL FOR EXCAVATIONS LESS THAN 20 FEET DEEP (1)
Stable Rock		Vertical (90 Degrees)
Type A Cohesive	Clay, Hardpan, Silty Clay	3/4 : 1 (53 degrees)
Type B Cohesive/Granular	Silt, Unstable Rock, sandy Loam, Fissured type A	1 : 1 (45 degrees)
Type C Granular	Gravel, Submerged, Loamy, Sand	1.5 : 1 (34 degrees)

(1) Excavations greater than 20 feet deep must be designed by a PE.

1) Provide safe access and egress. This includes ladders or ramps. In trenches, a point of egress must be within 25 feet at all times while in the trench. Ramps shall be sloped so as not to require the use of hands to walk out of the excavation.

2) Employees must be protected from cave-ins.

   a) In trench excavations the competent person must have all sides sloped in accordance with OSHA requirements on either side of the trench where personnel are working.

   b) In excavations, at a minimum, employees within a distance equal to the depth of a cut face shall be protected. Where employees are in excavating

equipment, at a minimum, the equipment shall not undercut a face in such a way that the cab is closer than the height above the cab.

3) Alternative protections, specified by OSHA include trench boxes or shoring.

4) In excavations where employees may be required to enter, excavated or other materials shall be effectively stored and retained at least 2 feet or more from the edge of the trench.

G.3.c. Water

Whenever, groundwater may be encountered; a specific classification and slope adjustment will be made on site by the Competent Person. At a minimum an additional 1/2 to 1 slope will be added if flowing conditions are encountered at the toe of the slope where personnel are working.

G.3.d. General excavation practices

1) In excavations with potential airborne vapor hazards, where employees may be required to enter shall have the atmosphere tested before each entry and as conditions change.

2) Employees exposed to vehicular traffic shall be provided with and instructed to wear warning vests made of reflective or high visibility materials.

3) All employees in trenches shall wear the appropriate PPE, e.g., hard hats, safety glasses, hard-toed boots, etc.

4) No employees will be permitted under loads.

5) Dust conditions shall be kept to a minimum in accordance with the project dust control plan.

6) Where employees or equipment are allowed to cross over excavations, all walkways and/or bridges will have guardrails.

7) Adequate barrier protection will be provided at remotely located excavations (e.g., reflective cones or sawhorse barriers).

8) Each excavation must be inspected daily. If evidence of cave-ins or slides is apparent, all work in the excavation must cease until necessary precautions have been taken to safeguard employees.

9) Where vehicles or equipment operate near excavations or trenches, the sides of the excavation must be shored or braced as required to withstand the forces exerted by the superimposed load.

G.3.e. Utility Lines

Utility lines, both above and below ground, must be addressed in any excavation activity regardless of depth.

1) Be aware and always suspect the existence of underground utilities such as electrical power, gas, petroleum, telephone, sewer and water. Underground utilities are a concern at any depth.

2) Overhead and buried utilities should be located, noted and emphasized on all excavation and work plans (regardless of depth of excavation). Post warning barricades on the ground along the line of excavation in order to alert excavating equipment approaching overhead utilities.

3) When excavating within 6 feet of buried utilities, first locate and mark the expected location. Due to the inaccuracies of locating, hand digging (i.e., potholing) will be used to visually confirm the utility location before using heavy equipment.

4) When excavating within 6 feet of underground utilities, a spotter shall be used to assist mechanical excavating equipment in locating utilities.

5) When excavating within 6 feet of underground electrical, phone, flammable gas/liquid lines make every effort to de-energize lines.

6) The requirements above should be taken as a minimum. High volume or high pressure mains should be given a wider margin. Fiber-optical lines should be given additional margin. High pressure or high volume water lines should be approached in the same manner as "more dangerous" utilities.

7) Overhead Utilities.

   When overhead electrical power lines exist at or near an excavation site, consider all wires to be alive and dangerous. Support overhead utility lines as necessary. Overhead electrical lines may induce a current without actually touching the lines. Be sure to maintain clearances from electrical lines of 50 kV or greater in accordance with 29 CFR 1926.550(a)(15). Place ground markers to indicate overhead hazards as well as those below ground.

G.3.f. Competent Person.

The excavation competent persons are assigned in the organization and key personnel section earlier in this document. The excavation competent person is authorized to, and shall take prompt action to correct unsanitary, hazardous, or dangerous working conditions. Other responsibilities include (but are not limited to):

1) The competent person will supervise each intrusive work permit.

2) The competent person will directly oversee all operations and be present on site at all times while employees are in the excavation.

3) The competent person will make a daily inspection of the excavation area before each shift begins, after any changes in the excavation area or after a rainstorm.

4) The competent person will ensure that personnel in excavations will not work under suspended loads.

5) The competent person will ensure that work activities on the surface of the excavated area will be restricted to prevent working above personnel.

6) The competent person will ensure that banner guard and barriers will be placed across public access to the excavation areas at night to protect and warn personnel as necessary.

7) The competent person will ensure that personnel exposed to high traffic areas will wear high visibility vests; orange for daytime and reflective for night operations.

G.4. Falling and tripping hazards

G.4.a. Falls--Housekeeping and materials storage.

1) All material shall be stored in a manner that will ensure that the material is safe from unexpected movement, falling, rolling, blowing, or any other uncontrolled motion.

2) Materials and supplies shall be kept away from edges of floors, stairways and access/egress routes (36 inches minimum).

3) Forms and scrap lumber with protruding nails and all other debris shall be cleared from work areas, passageways, stairs, and in and around buildings or other structures.

4) Tripping hazards, protruding nails, oil slicks, scrap materials and other hazardous conditions occurring during the course of the job shall be eliminated as work progresses.

5) Tools and equipment shall not be strewn about where they might cause tripping or falling hazards and shall, at the end of each workday, be collected and stored or disposed of as appropriate.

6) All food waste and oily/greasy rag containers shall be equipped with tight closing lids.

7) Protruding reinforcing steel (rebar) shall be properly capped or otherwise protected to prevent a hazardous condition.

8) All non-hazardous trash, oily wastes, PPE, debris and trash of any kind shall be segregated according to the applicable waste segregation scheme; and shall be labeled accordingly.

9) Covers on all roll-offs, drums, and containers of any type shall be securely covered at the end of the day.

G.4.b. Falls--slippery surfaces, unstable surfaces, uneven terrain

1) Wet conditions on the site caused by rain and/or work activities are likely to be encountered during the project.

2) Employees will be informed of the hazards associated with walking on slippery and or uneven surfaces.

3) Mark or remove trip hazards.

4) Proper foot wear will be provided to all employees involved with work activities during these conditions.

5) When possible, pedestrian traffic will be redirected around potentially dangerous areas.

6) Everyone should keep the work area and other areas where people may walk clean and orderly.

7) Tools, debris, and other objects should not be left on the floor, decking, or other areas where they present hazards during a job or after a job is completed.

8) Oil spills and slippery spots shall be cleaned up immediately.

9) Extra precautions should be taken when walking on steel decking during wet/icy weather and/or oily conditions.

10) Never walk on piping, never take dangerous shortcuts, and avoid jumping from elevated places.

G.4.c. Falls–Ladders

1) Personnel must visually inspect each ladder for defects before use, defective ladders shall not be used.

2) When working from a ladder, wear fall protection if work requires your body to extend past the margins of the ladder sides.

3) While ascending or descending a ladder, carry nothing which will prevent holding onto the ladder with both hands.

4) Metal ladders will not be used if there are any existing or potential electrical hazards in the work area.

5) All ladders must be securely tied off or secured by an attendant while the ladder is in use.

6) When working from ladders, work facing the ladder with both feet on the rungs.

7) Workers shall not stand with their waist above the top step of a ladder without wearing a safety belt that is securely tied off to a local structure.

8) Short ladders shall not be spliced together to make a longer ladder.

9) The base of the ladder must be set back a safe distance from the vertical; approximately one-fourth the working length of the ladder.

G.4.d. Falls--Fall Protection working from elevated surfaces

Duties involving heights greater than 6 feet above the ground include:

1) Utilize fall protection or restraint system as described in the Envirocon Fall Protection Program.

Table D-65.1 of 29 CFR 1926.65: Illumination of Work Areas	
Foot Candles	Area of Operations
5	General Site Areas
3	Excavation and waste areas, accessways, active storage areas, loading platforms, refueling, and field maintenance areas.
5	Indoors: Warehouses, corridors, hallways, and exitways.
5	Tunnels, shafts, and general underground work areas. (Exception: minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling. Mine Safety and Health Administration approved cap lights shall be acceptable for use in the tunnel heading.
10	General shops (e.g., mechanical and electrical equipment rooms, active storerooms, barracks or living quarters, locker or dressing rooms, dining areas, and indoor toilets and workrooms.
30	First aid stations, infirmaries, and offices.

2) Append a task specific AHA to this plan to specify type and design of fall protection system on a case by case basis.

3) The open edges of all floors 6 feet or more above the next floor or level shall be guarded by an approved barricade secured to prevent accidental displacement.

G.4.e. Illumination

Light plants or other sources of light shall be used as necessary to maintain the requirements described in Table D-65.1 of 29 CFR 1926.65.

G.5. Portable Tools

G.5.a. Deadman switches

Portable electrical power tools will be equipped with constant pressure switches or controls that will shut off power when the pressure is released.

G.5.b. Guards

All tools will be equipped with appropriate guards, the guards will be properly adjusted, and the guards will be replaced if they are damaged.

G.5.c. Field modifications

Hand/Powered tools may be used only for their intended purpose. The design or guard capacity shall not be exceeded or circumvented by unauthorized attachments or modifications.

G.5.d. Electrical

1) All portable electrical powered tools shall be double insulated or grounded.

2) Ground Fault Interrupters (GFCIs) will be used with all outdoor temporary wiring.

3) Power tools shall be hoisted or lowered by a hand line; never by the cord or hose.

G.6. Fire Prevention

G.6.a. Extinguishers

1) Extinguishers will be readily available on site. At a minimum, extinguishers will be places as follows. (Extinguishers of greater size or inclusive types may be substituted).

2) Heavy Equipment will be equipped with a 5 # ABC fire extinguisher rated at 2-A:10-B:C.

3) Fuel depots and flammable liquid storage/handling areas

   a) 20# ABC fire extinguishers with a rating of 2-A:40-B:C will be provided within 75 feet of, but no closer than 25 feet to, all refueling depots and flammable storage areas.

   b) 10# ABC fire extinguishers with a rating of 2-A:40-B:C will be provided within 75 feet of, but no closer than 25 feet to, all mobile fueling stations, flammable liquid transfer areas, and generators.

   c) Where Bureau of Reclamation requirements are applicable: a minimum of two, 40 # ABC extinguishers must be on site.

4) Trailers, buildings and work areas

   a) All trailers and work areas will have at least a 5 # ABC fire extinguisher rated at 2-A:10-B:C.

   b) Extinguishers in trailers will be mounted near a clear evacuation egress point (door).

   c) Extinguishers on site will be located at the primary entrance to the work area.

5) Access routes to fire extinguisher shall be kept clear at all times.

6) All fire extinguishers shall be inspected monthly and serviced annually.

G.6.b. Fighting fires

1) Personnel are authorized to fight fires in the beginning stages of development and only to the extent that they judge this can be done safely. Personnel are not required to fight fires.

2) When a fire is detected, first ensure that the area is safely evacuated and the supervisor is being notified so that the fire department can be summoned.

3) Ensure your own evacuation route before attempting to extinguish a fire.

4) If more people or more extinguishers are needed, the effort should be abandoned.

5) Contact plant fire department if applicable.

G.6.c. Facility systems

1) A site-specific procedure will be developed where project work (such as demolition) potentially jeopardizes facility systems.

2) Facility managers will generally be notified when any work is done above facility systems such as fixed fire suppression systems for buildings, or where excavations encroach on facility systems such as fire hydrants or related piping.

3) When excavating or performing demolition near facility systems, the facility systems should be uniquely marked to avoid damaging these systems.

4) Demolition of fire systems will only commence after notification and approval of the facility manager or designated representative.

5) Facility fire hydrants shall not be used without notification and permission of the facility manager or designated representative.

G.6.d. Flammable Liquids, Fuels and fueling

1) Protection of depots

   a) Depots will be located in such a manner as to provide clear access for fire trucks.

   b) Depots will be protected from damage from vehicle or equipment damage using bollards, bails, curbs or similar devices.

2) Portable containers

   a) All portable fuel cans shall be free of deformities which threaten the integrity of the container.

   b) All flammable storage cans of 1 gallon capacity or greater shall have self closing lids and flame arresters (i.e. safety cans).

   c) All flammable storage containers shall be labeled as to their contents, and shall include a warning regarding flammable contents.

   d) Gasoline engines shall not be fueled while the engine is running.

G.6.e. Containments

1) All equipment shall be fueled through funnels or spouts that prevent spillage. All spouts and funnels must be of metal construction.

2) NFPA flammables (e.g., gasoline) will not be stored in the same containment as NFPA combustibles (diesel fuels).

3) Containers and depot tanks in excess of 5 gallons will be held or stored in containments designed to collect spillage.

4) Covered containments must be capable of containing a volume equal to:

   a) the capacity of the largest tank, plus

b) the combined displaced volumes of all tanks and containers stored in the containment.

5) Uncovered containments must be capable of containing a volume equal to:

a) the capacity of the largest tank, plus

b) the combined displaced volumes of all tanks and containers stored in the containment, plus

c) 25 percent excess capacity for rain collection.

d) Uncovered containments will be kept free of standing water.

i. Water in excess of 5% containment capacity will be pumped off within a 48 hour period.

ii. Water will not be discharged onto the ground unless free of visible residues or films.

6) Bonding and grounding

a) Any transfer of a flammable liquid from one container to another requires bonding from one container to the other.

b) All flammable fuel depot tanks set up on site will be grounded.

G.6.f. Smoking, fire and hotwork

1) Hotwork permits shall be issued for all applicable hot work according to facility requirements.

2) Smoking and hot work will not be allowed within 50 feet of fuel depots or other flammable liquid storage and/or transfer areas.

3) Fuel depots or other flammable liquid storage and/or transfer areas will be posted against smoking, open flames, or hot work.

4) Oily rags

a) Oily rags, trash and other combustible scrap materials shall be placed in closed receptacles separate from other trash.

b) Oily rags shall be stored in containers approved for this purpose.

G.6.g. Welding, Cutting, and Hotwork

1) General

a) All welding and hotwork will be done in accordance with Envirocon's Health and Safety Procedures 11.0 and 12.0;

b) All welding and hotwork will be done in accordance with facility requirements.

2) Equipment operation

a) Welding equipment shall be used only for operations for which it is approved, and as recommended by the manufacturer.

b) Workers assigned to operate or maintain oxygen/fuel-gas supply equipment and resistance welding equipment shall be thoroughly instructed in the safe use of such equipment.

3) Personal Protective Equipment

a) Eye and Face Protection

i. Welding helmets and hand shields shall be used during all arc welding/cutting operations, excluding submerged arc welding.

ii. Safety goggles or glasses (with side shields) are also worn during arc welding/cutting operations. The goggles or glasses may be either of clear or colored glass, depending upon the type of exposure in welding operations. Helpers or attendants wear proper eye protection.

iii. Safety goggles or glasses with side shields and suitable filter lenses shall be permitted for use during gas welding operations on light work, torch brazing, or inspection.

iv. All operators and attendants on resistance welding or brazing equipment will use face shields or goggles, depending on the particular job.

b) Protective Clothing

i. All welders/cutters shall wear flameproof gauntlet gloves.

ii. Flameproof aprons made of leather, or other suitable material, must be used as protection against radiated heat and sparks.

iii. Leather jackets will be utilized if personnel are performing hot cutting/welding work above their shoulders.

iv. Nylon clothing is not permitted for welding/cutting operations.

v. All outer clothing, such as jumpers or overalls, should be free from oil or grease.

c) Respiratory Protective Equipment

i. When respiratory protective equipment is required, the Respiratory Protection Program shall be adhered to.

ii. Respiratory protection will be required depending on job duration and contaminant specific personal time weighted average air sample results.

iii. Supplied air respiratory protection is required for cutting on lead paint until personal exposure sampling indicates exposure requiring lower levels of protection.

4) Gas Welding and Cutting Safety

a) Fuel-gas hose and oxygen hose are easily distinguishable from each other.

i. The contrast is made by different colors or by surface characteristics readily distinguishable by touch.

ii. Oxygen and fuel-gas hoses shall not be interchangeable.

iii. A single hose having more than one gas passage shall not be used.

b) When parallel sections of oxygen and fuel-gas hose are taped together, not more than 4 inches out of 12 inches shall be covered by tape.

c) All hose in use shall be inspected at the beginning of each working shift. Defective hose shall be removed from service.

d) Hoses, cables, and other equipment shall be kept clear of walkways, ladders, and stairs.

e) Clogged torch tip openings shall be cleaned with approved cleaning wires, drills, or other devices designed for this purpose.

f) Torches to be used shall be inspected at the beginning of each working shift for leaking shutoff valves, damaged hose couplings, and clogged tip connections. Defective torches will not be used.

g) Torches shall be ignited by friction lighters or other approved devices only. Matches, flame lighters, or hot work will not be used to ignite torches.

h) Oxygen and fuel-gas pressure regulators, including related gauges, shall be in proper working order.

i) All oxygen cylinders and fittings shall be kept away from oil or grease. Cylinders, cylinder caps and valves, couplings, regulators, hose, and apparatus shall be kept free from oil or greasy substances and shall not be handled with oily hands or gloves. Oxygen shall not be directed at oily surfaces or greasy clothes, or used within a fuel oil or other storage tank or vessel.

j) Flash-back arresters shall be installed on all oxygen and fuel-gas setups, at a minimum at the gauges.

k) Torches and hoses shall be completely depressurized (bled) prior to storage, or at the end of each shift.

l) Torches and hoses shall not be stored in enclosed areas (e.g., gang boxes, lockers) while connected to cylinders.

m) Do not hang torches from the regulators attached to the cylinder.

n) Release the hose pressure and close the cylinder valves when work is interrupted for an extended period (breaks, lunch).

o) Don't leave a pilot flame burning at the tip of the torch during interruption of operations.

p) When working in an elevated position:

i. Provide a screen to keep hot metal, electrode stubs, hot metal slag, etc. from falling below;

ii. Provide toe boards when working from scaffolding under which workers may be passing or working; and

iii. Restrict access to the area below the work site.

5) Arc Welding and Cutting Safety

a) Electrode holders shall be designed for arc welding/cutting and are capable of safely handling the maximum rated current required.

b) Exposed current-carrying parts of electrode holders shall be insulated in a manner which provides full protection against electrical shock for operators of arc welders/cutters.

c) All arc welding/cutting cables must be completely insulated and flexible, capable of handling the maximum current requirements of the work.

d) Only cable free from repair or splices for a minimum distance of 10 feet from the electrode holder is used. Cables with standard insulated connectors or splices with insulating quality that is equal to that of the cable may be permitted.

e) If it is necessary to splice lengths of cable, insulated connectors equivalent to that of the cable are used. If connections are made by cable lugs, they are securely fastened together and provide a good electrical contact. Exposed metal parts of the lugs must be completely insulated.

f) If electrode holders are left unattended, the electrodes shall be removed and the holders placed so that they cannot make electrical contact with employees or conducting objects.

g) Electrode holders shall not be dipped in water.

h) The power supply to the equipment shall be turned off whenever the arc welder or cutter leaves work or stops work for any appreciable length of time, or when the arc welding/cuttingmachine is to be moved.

i) Any faulty or defective equipment shall be reported to the supervisor and tagged out of service until repaired.

j) All arc welding/cutting operations shall be shielded by noncombustible or flameproof screens which will protect employees and other persons working in the vicinity from the direct rays of the arc or from arc flash.

k) The frames of all arc welding and cutting machines shall be grounded.

l) Never weld on any line or equipment until it has been connected to the ground connection of the welding machine.

m) Never pull or disconnect a ground line while the arc is in use.

n) Never let the live metal parts of the welding circuit touch damp skin or clothing.

o) All parts that are being cut must be supported in such a manner as to prevent them from falling during or at completion of he cut.

6) Storage and Handling of Compressed Gas Cylinders

a) Compressed gas cylinders shall be legibly marked with either the chemical or trade name of the gas. Such markings shall be stenciled, stamped, or labeled and are not easily removable. The marking shall be located on the shoulder of the cylinder.

b) Compressed gas cylinders shall be equipped with approved connections.

c) Acetylene cylinders shall always be used and stored in an upright position (valve end up) to prevent the acetone (a stabilizing agent) from draining into the valves or fittings. Acetylene should never be used at a hose pressure exceeding 15 psi. Above 15 psi, acetylene is extremely unstable, and the possibility of an explosion exists.

d) Oxygen cylinders shall not be stored near oil or grease or other highly combustible/flammablematerials.

e) Oxygen cylinders in storage shall be separated from fuel-gas cylinders by a minimum distance of 20 feet, or by a noncombustible barrier at least 5 feet high and having a fire resistance rating of at least 1/2 hour.

f) Cylinders shall not be dropped, struck by objects, or permitted to strike against each other violently.

g) Cylinder valves shall be closed before moving cylinders, at the end of the shift, or when work is finished.

h) Valves of empty cylinders shall be closed.

i) Cylinders shall be kept far enough away from the actual welding/cutting operation so that sparks, hot slag, or flames will not reach them.

j) Cylinder valves shall be opened slowly.

k) Acetylene cylinder valves shall not be opened more than one and one-half turns of the valve stem and preferably no more than three-fourths of a turn.

l) Where a special wrench is required, it shall be left in position on the stem of the valve while the cylinder is in use. In the case of manifolded or coupled cylinders, at least one such wrench shall be available for immediate use.

m) Regulators are removed, valve caps are in place, and valves closed when cylinders are transported by vehicles. All vehicles used to transport cylinders shall have a proper support rack installed.

n) A suitable cylinder truck, chain, or other steadying device shall be used to prevent cylinders from being knocked over while in use or storage.

o) Cylinders shall not be placed where they may become part of an electric circuit. Tapping of an electrode against a cylinder to strike an arc is prohibited.

p) Cylinders shall be stored in shaded areas and secured in upright position with protector caps in place.

q) Cylinders shall never be used as rollers or supports.

r) Oxygen cylinders--when full--contain 2400 psi at 70°F and must be treated with respect for the high pressure. The valve protector cap must always be in place when moving the cylinder.

s) A spontaneous explosion is likely to occur when oxygen comes in contact with hydrocarbons. Keep oxygen and hydrocarbons separated. Never lubricate or allow oil or grease to get oxygen connections or use oxygen for compressed air or pressure.

t) When handling cylinders by powered vehicles, they shall be secured in a vertical position. Unless cylinders are firmly secured on a special carrier intended for this purpose, regulators shall be removed and valve protection caps put in place before cylinders are moved.

u) Oxygen and acetylene must be stored separately or separated by a fire wall rated for a minimum of 30 minutes resistance. Plate steel may be used to separate cylinders in this manner.

7) Manifolding of Cylinders

a) Cylinder manifolds shall be installed under the supervision of an experienced person(s) and must comply with proper practices in construction and use.

b) All manifolds and parts shall be appropriate for the gases for which they are approved.

c) When acetylene cylinders are manifolded, approved flash arresters shall be installed between each cylinder and the coupler block. One flash arrestor installed between the coupler block and regulator is acceptable for outdoor use only if the number of cylinders coupled does not exceed three.

d) Each cylinder lead shall be provided with a backflow check valve.

8) Welding/Cutting on Containers

a) Used Containers: No welding, cutting, or other hot work shall be performed on empty drums, barrels, tanks, or other containers until they have been cleaned thoroughly. (This is to ensure that there are no flammable materials present or any substances such as greases, tars, acids, etc., which might produce a hazard when subjected to heat.) Any connection to the drum or vessel shall be disconnected or blanked off.

b) Venting and Purging: All hollow spaces, cavities, or containers shall be ventilated to remove gases before preheating, cutting, or welding. Purging with inert gas is recommended.

c) All enclosed spaces to be welded on will be checked for flammability and oxygen content prior to any hot work.

9) Fire Protection During Welding.

a) Objects to be welded, cut, or heated shall be moved to a designated safe location. If this is not possible, all movable fire hazards in the work space shall be taken to a safe place.

b) If the object to be welded, cut, or heated cannot be moved and all fire hazards cannot be removed (e.g., equipment, walls, floors, etc.), positive means shall be taken to confine the heat, sparks, and slag to protect the immovable fire hazards.

c) Welding, cutting, or heating shall not be performed where the application of flammable paint, the presence of other flammable compounds, or heavy dust concentration create a possible hazard.

d) Openings or cracks in floors, walls, ducts, tanks, etc., shall be closed. Where openings or cracks cannot be closed, additional precautions shall be taken to prevent sparks from penetrating the openings. The same precautions shall be taken in the presence of open doorways and open or broken windows.

e) Approved fire extinguishing equipment shall be present in the immediate work area.

f) Fire Watch

i. A fire watch shall be maintained for at least 30 minutes after completion of welding/cutting operations so that possible smoldering fire can be detected and extinguished.

ii. Fire watch personnel shall be instructed in the selection and use of appropriate fire extinguishers.

iii. Fire watch personnel shall be familiar with facilities and the procedures to be followed in the event of a fire. They watch for fires in all exposed areas and attempt to extinguish fires only when obviously within the capacity of the equipment available.

iv. The requirement for a fire watch may be waived when, after completion of the Welding, Cutting, and Heating Permit, it has been determined that there is no possibility of sparks, slag, hot material, etc., coming into contact with flammable or combustible solids, vapors, liquids, or residues.

G.7. Lifting heavy objects

Heavy objects will be lifted using appropriate machinery or enough manpower as is required. Employees will be specifically instructed to seek assistance in lifting heavy objects.

G.7.a. Before lifting:

1) Determine if the object can be moved by some other means (mechanical device).
2) Determine if the object is too bulky and would obscure vision; if so, get another person to help carry it. When handling material with others, everyone should agree on who will act as leader and give the signals. Loads should not be released until everyone is ready. Teamwork is important.
3) Determine if the object is within the lifter's capability (a preliminary "heft" will indicate this).
4) Determine if the footing around the object is solid.

G.7.b. Lifting

1) Legs should be bent at knees, back nearly vertical, body as close to the object as possible, feet apart but not further than shoulder width. Take a firm hold and straighten knees. Back is still straight and upright. Pull load close to body and lean back slightly to keep center of gravity over feet.
2) Avoid twisting the body when lifting or carrying loads.

G.8. Environmental Hazards

G.8.a. Sanitizing and Decontamination of Biological Hazards

The following methods apply to most biological hazards as described below.

1) Do not use dry methods or dust generating methods. Do not dry sweep. Use wet sanitizing methods including a mixture of soap, water and about 10% bleach in water (i.e., chlorox bleach mixed in water or hypochlorite powder from a pool supply or water treatment supply source).
2) Wear PPE including:
   a) Small (minimal exposure risk) Cleanups (this includes one person spending about an hour to remove and sanitize):
      i. face shields or safety glasses
      ii. PVC or water proof gloves

b) Large scale (moderate exposure risk) cleanups (this includes significant cleanups involving several manhours of work and where personnel will be exposed to splash potential or need to walk through contaminated areas):

i. face shields

ii. PVC or water proof gloves

iii. PVC or water proof boots or boot covers

iv. HEPA respirator (N100, R100, or P100)

v. Splash protective clothing (e.g., resistant paper suits, or other disposable garments). If work will involve significant exposure to wet splash, upgrade to PVC outer garments.

c) High risk of exposure cleanups:

i. face shields

ii. PVC or water proof gloves

iii. PVC or water proof boots or boot covers

iv. Full face HEPA respirator (N100, R100, or P100)

v. PVC or water proof outer garments

3) Depending on the size of the operation the sanitizing solution can be applied by hand held spray bottle, Hudson-type sprayer, back pack sprayer etc. Allow it to sit for 15 minutes for small scale work or longer for larger scale work.

4) Remove wetted materials for disposal. Apply more sanitizing solution as necessary to ensure that all materials of concern are wetted and sanitized before handling.

5) For extreme cases a shock strength of 10% hypochlorite might be considered. Use of hypochlorite will normally require upgrading respiratory protection to full face respirators fitted with cartridges rated for chlorine as well as the requirements for the biological hazard itself.

6) Dispose of materials in landfill using a red bag marked with universal biological (i.e. etiological) hazard symbol.

G.8.b. Hanta Virus or Four Corners Disease

Hanta virus is associated with fecal and nesting materials of rodents. The following controls and information is based on guidelines from the Centers for Disease Control (CDC) and should be followed when working in areas of concern.

1) Use of wet methods would include simple dust control (no dry sweeping, no use of pressurized air, use water to keep surfaces from shedding dust).

2) Sanitizing methods are the same as G.8.a above. Use a mixture of soap, water and bleach (e.g., chlorox bleach mixed in water with soap). Depending on the size of the operation this can be applied by hand held spray bottle, hudson-type sprayer, back pack sprayer etc. Allow it to sit for 15 minutes for small scale work or longer for larger scale work. For extreme cases a shock strength of 10% hypochlorite might be considered. Use of hypochlorite will normally require upgrading respiratory protection to full face respirators fitted with cartridges rated for chlorine as well as the requirements for the hanta virus itself.

3) Guidelines call for "HEPA" filters which have been replaced by new NIOSH designations. Any of the new respirator cartridge types may be used. These include N100 cartridges which must be discarded at the end of each day and can not be used in oily environments. R100 cartridges must also be discarded at the end of each day's use but may be used in oily environments. P100 cartridges may

Table G.8.b: HANTA VIRUS CONTROLS

Controls	Small scale cleanups or exposures	Moderate exposure	High Risk of Exposure
Use wet methods.	X	X	X
Pre-work sanitizing.	X	X	X
Respirators		X	X
Pre-work cleanup.		X	X
PPE (1)	Gloves	Gloves and boot covers (face protection for application of disinfectants)	Gloves, boots, face shields (or full-face respirators), water resistant coveralls.
Baseline Serum Sample			Case-by-case

(1) Refer to sanitizing and decontamination of biological hazards.

be used in oily environments and can be used until breathing resistance is uncomfortable to the wearer. For purposes of this application, they should be discarded at the end of each work week regardless of resistance.

4) Suspect areas should be cleaned under these guidelines before beginning other work.

5) This control will be determined by medical consultation.

G.8.c. Ticks and spiders

1) Insect bites may cause localized pain, and in some cases an allergic reaction. Of greatest concern is tick bites (deer ticks carrying Lyme disease, and wood ticks carrying Rocky Mountain Spotted Fever), poisonous spider bites (black widows

marked with a red hour-glass under the abdomen and brown recluse marked with a violin on their back).

2) Controls (ticks, spider bites).

   a) Repellents.

      i. Use DEET repellents to avoid ticks.

      ii. Do not apply to open wounds.

      iii. Do not spray repellents onto face (spray on hands to apply to face or use liquid).

      iv. Wash hands and clothing at the end of the day's use.

   b) Long sleeved shirts and full length pants.

      i. Wearing long sleeved shirts and full length pants will help to avoid all of the above.

      ii. Wear light colored clothing to better see insects on your clothing.

   c) Wear bands to seal pant legs at the sock.

   d) Avoid or clean out their living areas.

      i. Proper clearing and grubbing helps to remove hiding and nesting locations.

      ii. Poisonous spiders will normally be found in quiet, secluded, dark, moist areas such as underneath trailers.

      iii. When entering or working near these locations clean them out first using a broom or other long handled device.

3) Signs and symptoms (ticks, spider bites).

   a) Poisonous spider bites

      i. bite marks

      ii. swelling

      iii. pain

      iv. nausea

      v. difficulty breathing, or

      vi. difficulty swallowing.

   b) Ticks.

      i. body of tick remains

      ii. painful joints

      iii. fever

iv. unusual rashes

v. flu - like symptoms

4) First Aid.

a) Poisonous spider bites and scorpion stings.

i. wash the wound

ii. apply cold pack

iii. seek medical attention

b) Ticks.

i. Use a tweezers to SLOWLY pull tick out of skin

ii. Grasp tick as close to the skin as possible before removing

iii. DO NOT attempt to burn tick off with matches or hot objects

iv. DO NOT attempt other home remedies such as coating ticks with Vaseline

v. seek medical attention at the first signs or symptoms

vi. seek medical attention if you have difficulty removing tick

G.8.d. Insect stings (bees, wasps, hornets).

1) Insect stings can be very painful.

2) For those with allergic reactions to bees or wasps, a bite may be fatal.

3) Control (insect stings).

a) Thorough clearing and grubbing of work areas will help to reduce nesting areas. Use insect control sprays to clear out nesting areas.

b) If work is conducted near nesting areas. Personnel should be requested to identify allergies before entering the site.

c) Antivenin must be individual prescribed for sensitive individual and must be carried at all times. All personnel entering the site must complete the emergency medical information data sheet.

4) Signs and symptoms.

a) stinger may be present

b) pain

c) swelling

d) allergic reaction (extreme symptoms)

5) First Aid.

a) Remove stingers by scrapping it out with the edge of knife blade, tweezers tips (DO NOT SQUEEZE the stinger), credit card, or similar device.

b) DO NOT use a tweezers to grasp a stinger to remove it (this may inject more poison)

c) wash wound

d) cover

e) apply cold pack

f) watch for allergic reaction

g) seek medical attention if allergic reaction develops

h)

G.8.e. Domestic and wild animal bites, rabies, and plague

1) Bites inflicted by domestic and wild animals primarily pose a serious risk of infection. In some cases they may carry rabies as well.

2) Controls.

a) In order to prevent problems arising from these bites it is essential that site personnel stay away from all wild or domestic animals.

b) Dead animals shall be handled using equipment whenever possible.

c) Sanitize equipment or handle remains using the PPE and sanitizing practices in G.8.a above.

3) First Aid (domestic and wild animal bites).

a) If bleeding is minor—wash the wound.

b) Control bleeding.

c) Apply antibiotic ointment.

d) Cover the wound.

e) Get medical attention.

G.8.f. Snake bites (poisonous).

Bites inflicted by snakes may be handled as with any other wild animal bite. This section is concerned with bites from poisonous snakes.

1) Control (poisonous snake bites).

a) Clearing and grubbing of work areas will help reduce the risk by removing hiding spots and making it easier to spot snakes.

b) In order to prevent problems arising from these bites it is essential that site personnel be made aware of poisonous snakes which may be found in their area and avoid them to the extent possible.

c) The primary North American snakes found in the United States include:

Table G.8.f Poisonous Snakes
Coral Snakes. These are slender snake with black noses and alternating, brightly colored black/yellow/red/yellow bands—refer to Red Cross photos for training. Coral snakes are found mostly in the southern or eastern USA.
Pit Vipers—including rattlesnakes, copperheads and cotton mouths. These snakes all have triangular head with facial pits between each nostril and eye, the eyes have vertically elliptical pupils (i.e., "cat's eyes"), and two front fangs—refer to Red Cross photos for training.
Rattlesnakes. This is a type of pit viper as described above, most have rattles (species found on Santa Catalina Island and juveniles may not) with thick bodies, and diamond patterns on back. They are widely spread throughout the USA except Maine and Delaware.
Copperheads are also a type of pit viper as described above, with thick bodies, and copper colored heads. One of the most common sources of bites, copperheads are widely spread throughout the USA and have a tendency to invade human habitations. The swelling from a copperhead may be less dramatic because they are the least venomous of the common poisonous snakes.
Cottonmouths or "Water Moccasins." This is also a type of pit viper as described above, with very heavy, short bodies, and white colored mouths. These snakes are typically found near warm water environments.

Fig. G.8.f: Signs and Symptoms of Snake Bites

Symptom	Percentage of cases
fang marks	100% of cases
swelling	74% of cases
weakness	70% of cases
pain	65% of cases
numbness of tongue and mouth	63% of cases
changes in pulse	60% of cases
faintness or dizziness	57% of cases
numbness of affected area	57% of cases
blood pressure changes	54% of cases
bruising	51% of cases

2) See Figure G.8.f for signs and symptoms (poisonous snake bites).

3) First Aid ***DON'Ts*** for poisonous snake bites.

a) DO NOT apply ice packs.

b) DO NOT attempt to capture snakes for identification.

c) DO NOT apply a constrictive bandages or tourniquets (Exception: in isolated locations three to four hours away from help and only as directed by medical personnel).

d) DO NOT cut the wound and/or attempt to suck out the poison (Exception: in isolated locations one or more hours away from help—preferably using a snake bite kit—and only as directed by medical personnel by phone).

e) DO NOT panic (to the extent possible), run or even walk to get help (this will only help to circulate the poison). Use radio or buddy to summon help and wait for assistance to come to you.

f) DO NOT elevate the bitten part of the body.

4) First Aid ***DO's*** for poisonous snake bites.

a) **DO** wash the wound.

b) **DO** keep the bitten part as still as possible.

c) **DO** keep the bitten part of the body below heart level.

d) **DO** get the victim to medical assistance as soon as possible.

G.9. Sanitation and Hygiene

G.9.a. Drinking Water

1) An adequate supply of potable water will be provided on site.

2) Portable water containers will be capable of being tightly closed and equipped with a tap.

3) Water shall not be dipped from containers for drinking purposes. Single service, disposable drinking cups will be provided.

4) No one shall place any objects (e.g. soda pop, ice tea, etc.) in coolers.

G.9.b. Restrooms and hygiene facilities

From Table D-65.2 of 29 CFR 1926.65	
Number of Employees	**Minimum Number of Facilities**
20 or fewer	One.
21 to 199	One toilet seat and one urinal per 40 employees
200 or more	One toilet seat and one urinal per 50 employees

Toilet facilities (sanitary sewer w/flushing toilets, chemical toilets, recirculating toilets, or combustion toilets) including hand washing stations will be provided in accordance with 29 CFR 1926.65(n) and Table D-65.2.

G.10. Decontamination

Equipment and personnel decontamination are addressed in the attached contamination prevention plan document.

H. RECORDKEEPING

The health- and safety-related documents for the project will be handled in the following manner:

H.1. Training and Safety Meeting Records

Certificates of completion for all mandatory training for Envirocon and lower tier subcontractor employees will be maintained on site at this site. Minutes for safety and health meetings, including daily safety briefings, will also be maintained on site. These records are located in Envirocon's Safety Trailer office.

H.2. Injury/Illness

Copies of "Supervisor's Report of Injury or Illness" will be maintained on site. Envirocon's official OSHA 200 log is maintained at the Corporate office. See the emergency procedures below for accident reporting procedures. A first aid log will be used to document first aid cases as described below in the log keeping section.

H.3. Accident reports

Accident investigation reports will be maintained on site. All injuries will be reported to the client as well. See the emergency procedures below for accident reporting procedures.

H.4. Medical Surveillance Records

All medical records received on site will be forwarded to the corporate office after review. No medical records will be maintained on site; Fitness For Duty forms, however, will be available on site for all personnel.

H.5. Written Programs

Written programs for compliance with the OSHA standards, such as respiratory protection, hearing conservation, and certain chemical exposure are maintained at the corporate office.

H.6. Health and Safety Plans

At least one copy of the plan and any amendments will be maintained on site.

H.7. Employee Access

All employees have a right to access most of the documents related to health and safety. Medical and training records are available only to individuals requesting their own records. Employees can receive copies of their medical records or air monitoring exposure records upon written request. Medical information can only be released upon the written consent of the individual.

H.8. Health and Safety and Related Logs

The health and safety officer is responsible for maintaining logs of health and safety activities, including safety inspections.

H.8.a. Health and Safety Log

This is a bound log of daily inspections and health and safety issues kept by the project health and safety officer.

H.8.b. First Aid Log

Employees are required to report all injuries and illness regardless of how minor the incident may seem. These reports shall be documented on an injury/illness report form, or in the project first aid log where diagnosis and treatments involve only simple first aid diagnosis and/or treatments.

1) Treatment/diagnosis by 3rd party EMTs, physicians, nurses, or other medical professionals shall be reported using the injury/illness reporting procedures. Determination of OSHA recordability/first-aid shall be determined by the Corporate Director of Health and Safety in these cases.

2) This First Aid Los is a log of all reported injuries and/or illnesses reported to supervisors and/or the health and safety officer. This log shall document the report, date, name of the injured employee, nature of the injury/illness, diagnosis and the treatment given.

3) If no treatment is given the incident shall still be noted in the log. This shall include any dispensing of first aid supplies or administered by a supervisor, safety officer or other first aid trained employee.

4) Non-work related injuries/illness reports and use of prescription drugs should also be noted in this log.

5) Self-medication by employees with respect to non-prescription (i.e., Over The Counter (OTC)) pharmaceuticals unrelated for colds headaches or other non-work related ailments need not be documented.

H.8.c. Equipment Free Release Decon Log

Decontamination and release of equipment from site shall be logged. Use of form 1403.017.a may be used for this purpose.

I. INCIDENT AND EMERGENCY PROCEDURES.

This section documents procedures to be followed in the event of incidents and certain emergencies. Where possible these have been formatted to individual sheets for response training and ready reference when needed.

I.1. General Emergency Procedures

This subsection describes procedures which are common to a variety of incidents.

I.1.a. Responsibilities

1) The site supervisor is responsible for the overall conduct of emergency procedures. This includes maintaining an orderly succession of supervision; making necessary reports to all concerned parties; ensuring that the causes of accidents are identified and corrected; and ensuring that injured personnel (with or without life threatening injuries) are escorted to medical treatment by the site safety officer or other supervisory personnel.

2) The HSO has the responsibility for ensuring that the provisions of this HASP are adequate and implemented in the field. Changing field conditions may require decisions to be made concerning adequate protection procedures. The HSO is also responsible for conducting site inspections on a regular basis to ensure the emergency readiness. The HSO shall be notified of any on-site emergencies and shall be responsible for ensuring that the appropriate procedures are followed.

I.1.b. First Aid

1) First Aid Kits are located in each Envirocon pickup, trailer; and decon facility.

2) A first aid trained individual will be on site at all times.

3) Emergency eye wash and showers will be located at the decon facility.

I.1.c. Evacuation Procedures

The site safety officer shall select and maintain appropriate assembly points for evacuations. These shall be posted and employees informed of their locations. At least one primary and one secondary assembly point shall be established.

1) When an evacuation is called for, employees shall proceed in an orderly fashion to the primary or secondary evacuation assembly points.

2) Turn off equipment whenever possible. Avoid leaving hazardous conditions in the process of evacuating.

3) Evacuate in the safest direction indicated by wind, smoke, fire, or other hazards.

4) Take a head count and report to the supervisor.

5) Do not leave the assembly area without reporting to the supervisor.

I.2. Reporting and Investigating Incidents

All incidents at the site shall be reported. It is hoped that most incidents will be small and/or near misses. It is essential that these events be reported as well more serious incidents in order to learn from them and avoid the more serious accidents.

I.2.a. Project and facility requirements

1) An incident is defined as follows:

   a) A work-related injury or illness

   b) An exposure to a hazardous substance above the allowable exposure limit

   c) Property/vehicle/equipmentdamage

   d) A uncontrolled fire or explosion

   e) An unplanned spill or release (including air releases) to the environment

   f) A permit exceedence

   g) Any unexpected contact or damage to aboveground or below ground utilities

   h) A "near miss" or an unplanned event that has a reasonable probability in resulting in one of the outcomes described above had the circumstances been different and for which modifications to management programs will reduce the probability of occurrence or the severity of the outcome.

2) Verbal Notifications

   a) In addition to immediate verbal (oral) reporting of all incidents to the client's project manager.

   b) A "serious" incident includes the following:

      i. Imminent danger safety violations

      ii. Any incident involving the general public or visitors

      iii. Exposure to a hazardous substance above the allowable exposure limit

      iv. Work related injury requiring more than First Aid

      v. Work related illness

      vi. Spills of hazardous material in excess of 1 gallon or Reportable Quantity (RQ)

      vii. Any unplanned fire.

3) Incident investigations. An incident investigation shall be performed for all incidents for which a report is required. The supervisor and the designated HSS shall perform the investigation and shall include participation by others as necessary. The investigation is to be initiated as soon as possible after the incident.

I.2.b. Reporting Incidents

Report all unplanned, unexpected, events or changes in conditions. Some examples include:

1) Personnel incidents such as:
   a) injuries,
   b) illnesses,
   c) first aid cases,
   d) fights or other acts or threats of violence,
   e) fatalities, or
   f) any personnel injuries or incidents which might be the result of acts of other contractors, subcontractors, or facility personnel.
2) Accidents such as:
   a) motor vehicle accidents (with or without damages),
   b) equipment accidents (with or without damages), or
   c) property damage (including fires).
3) New, previously unknown, or unexpected potential hazards such as:
   a) buried drums, cylinders, or hazardous materials containers,
   b) unusual soil conditions (e.g., previously disturbed soils, soils with unusual odors, soils with unusual coloration),
   c) floating contaminants (e.g., oil, chemicals, or sheens on water).
4) Environmental incidents such as:
   a) oil or chemical spills,
   b) dead or injured wildlife on the site, or
   c) disturbed habitats.
5) Unauthorized personnel in work areas such as:
   a) unauthorized workers on site,
   b) unescorted public visitors,
   c) media personnel, or
   d) unescorted government visitors.

I.2.c. Procedures for Reporting Incidents

1) First Responder's Report

   a) If your work is involved with the incident of interest, STOP WORK IMMEDIATELY!

   b) DO NOT PICK UP ANYTHING YOU DID NOT DROP YOURSELF!

   c) Ensure the safety of the area from any imminent hazards.

   d) Report to your immediate supervisor by radio or phone if at all possible.

   e) If you must leave the area to make a report, find someone to help secure the area if at all possible.

2) Supervisors

   a) Control imminent hazards as necessary.

   b) Ensure that injuries are being taken care of, and assign someone to escort injured employees leaving the site for medical evaluation/treatment.

   c) Ensure that the area is adequately secured.

   d) Ensure that the scene is not further disturbed.

   e) Visit the accident scene as soon as possible.

   f) Interview injured workers and witnesses as soon as possible.

3) Reporting requirements

   a) Report all incidents verbally to the client as soon as the area has been secured.

   b) Follow up with a written report before the close of business.

   c) Follow up with a written investigation report within 48 hours.

I.3. Personnel Injury

I.3.a. First Aid

1) The PM (or senior supervisor on site) and/or HSO shall ensure necessary first aid or medical attention is obtained. First aid shall be provided by qualified first aid providers or site Fire Department EMTs.

2) If personnel need medical evaluation, ensure that a safety officer or supervisor is assigned to escort the employee.

3) Do not allow injured personnel to drive themselves unless a doctor determines they are fit to do so.

4) If a doctor prescribes medication determine if that medication limits ability to drive. Do not allow employees to drive themselves if the medication impacts on driving safety. (If an employee wants to drive themselves and has been prescribed

medication that will impact on driving safety the employee can wait to take the medicine at home if the doctor allows this.)

I.3.b. Hazard assessment

The PM (or senior supervisor on site) and/or HSO shall immediately investigate the nature and cause of injury in order to assess the hazard to ongoing site work. This should include consideration of working short handed if the injured person can not resume work right away. It is the senior supervisor's responsibility to stop work if necessary to make corrective changes.

I.4. Heavy weather

I.4.a. High winds

Outdoor equipment operations will be suspended at wind speeds of 40 mph or when dust control measures are no longer effective. Crane operations, work with sheet materials (e.g., liners); or work with large profile materials will be stopped at 25 mph.

I.4.b. Lightning.

Outdoor operations will be suspended when lightning is within a 5 second count of the site (i.e., the time difference between seeing a lightning strike and hearing the sound). High profile equipment operations shall be suspended when lightning is within 15 seconds of the site.

1) High profile operations include crane operations, drilling operations, or electrical wiring tasks.
2) Equipment operators shall stop their equipment and park it safely before heading for shelter.
3) No personnel will be left on the ground in an exposed location.
4) Preferred shelter is a permanent building. Personnel may also take shelter in trailers or low profile rubber tired equipment (e.g., pickups). Avoid driving pickups or any other equipment except to help evacuate personnel.
5) Work will resume after a 30 minute period without lightning.

I.5. Ticks and spiders

I.5.a. symptoms

1) Insect bites may cause localized pain, and in some cases an allergic reaction. Of greatest concern is tick bites (deer ticks carrying Lyme disease, and wood ticks carrying Rocky Mountain Spotted Fever).
2) Poisonous spider bites
   - bite marks
   - swelling
   - pain

- nausea
- difficulty breathing, or
- difficulty swallowing.

3) Ticks.

- body of tick remains
- painful joints
- fever
- unusual rashes
- flu - like symptoms

I.5.b. First Aid.

a) Poisonous spider bites

- wash the wound
- apply cold pack
- seek medical attention

b) Ticks.

- Use a tweezers to SLOWLY pull tick out of skin
- Grasp tick as close to the skin as possible before removing
- DO NOT attempt to burn tick off with matches or hot objects
- DO NOT attempt other home remedies such as coating ticks with Vaseline
- seek medical attention at the first signs or symptoms
- seek medical attention if you have difficulty removing tick

I.6. Insect stings (bees, wasps, hornets).

I.6.a. Symptoms

- Insect stings can be very painful.
- For those with allergic reactions to bees or wasps, a bite may be fatal.
- stinger may be present
- pain
- swelling
- allergic reaction (extreme symptoms)

I.6.b. First Aid.

1) Remove stingers by scrapping it out with the edge of knife blade, tweezers tips (DO NOT SQUEEZE the stinger), credit card, or similar device.
2) DO NOT use a tweezers to grasp a stinger to remove it (this may inject more poison)
3) wash wound
4) cover
5) apply cold pack
6) watch for allergic reaction
7) seek medical attention if allergic reaction develops

I.7. Cactus and Poisonous plants

Cactus are the primary concern at this site, Poison ivy, poison oak, and poison sumac may cause varying degrees of allergic reaction in different individuals but are not typically found on site.

I.7.a. Signs and symptoms.

1) imbedded needles
2) itching
3) rash
4) weeping sores

I.7.b. First Aid.

1) use tweezers to pull cactus needles
2) gently but thoroughly wash the affected area and all around it
3) baking soda paste may be applied to sores
4) calamine or caladryl lotions helps soothe irritation
5) benadryl or antihistamines help dry up sores
6) if condition continues to get worse or affect large portions of the body, seek medical attention

I.8. Domestic and wild animal bites, rabies, and plague

Bites inflicted by domestic and wild animals primarily pose a serious risk of infection. In some cases they may carry rabies as well.

I.8.a. First Aid (domestic and wild animal bites).

1) If bleeding is minor—wash the wound.
2) Control bleeding.

3) Apply antibiotic ointment.

4) Cover the wound.

5) Get medical attention.

I.9. Snake bites (poisonous).

Bites inflicted by snakes may be handled as with any other wild animal bite. This section is concerned with bites from poisonous snakes.

I.9.a. Signs and symptoms

- fang marks
- swelling
- weakness
- pain
- numbness of tongue and mouth
- changes in pulse
- faintness or dizziness
- numbness of affected area
- blood pressure changes
- Bruising

I.9.b. First Aid DON'Ts for poisonous snake bites.

- DO NOT apply ice packs.
- DO NOT attempt to capture snakes for identification.
- DO NOT apply a constrictive bandages or tourniquets (Exception: in isolated locations three to four hours away from help and only as directed by medical personnel).
- DO NOT cut the wound and/or attempt to suck out the poison (Exception: in isolated locations one or more hours away from help—preferably using a snake bite kit—and only as directed by medical personnel by phone).
- DO NOT panic (to the extent possible), run or even walk to get help (this will only help to circulate the poison). Use radio or buddy to summon help and wait for assistance to come to you.
- DO NOT elevate the bitten part of the body.

I.9.c. First Aid DO's for poisonous snake bites.

- **DO** wash the wound.
- **DO** keep the bitten part as still as possible.
- **DO** keep the bitten part of the body below heart level.
- **DO** get the victim to medical assistance as soon as possible.

I.10. Phone Threats

This includes bomb threats, threats against personnel, threats of violence or any other threatening communications made by phone or radio.

I.10.a. Do not hang up

Try to remain calm. It is important not to hang up on threatening callers. This may provoke an act of violence.

1) Listen carefully to background noises or conversations.
2) Take notes on the callers exact words if possible.
3) Try to get someone else to report the call immediately to the phone company on another line before the caller hangs up.

I.10.b. Report the call immediately to the senior Envirocon supervisor on site.

1) DO NOT discuss the call with anyone else.
2) The Envirocon supervisor shall immediately bring the call to the attention of the senior client's representative.
3) The senior supervisors from Envirocon and the client's project manager shall be responsible for determining if an evacuation will be called.

I.10.c. Hazards

1) Biological hazards (e.g., bloodborne pathogens)
2) Fuel spills and fires
3) Hazardous materials

I.10.d. Procedures

1) Report incident immediately to supervisor
2) Primary first aid and emergency medical support to be provided by this site Fire Department. Approach survivors ONLY to address imminent, lift threatening conditions.
3) Approach survivors with caution.
4) Do not move survivors unless they are in immenent danger such as fire.
5) Wear bloodborne pathogens PPE.
   - gloves and safety glasses (minimum)
   - faceshield
   - disposable outer garments
   - PVC boots

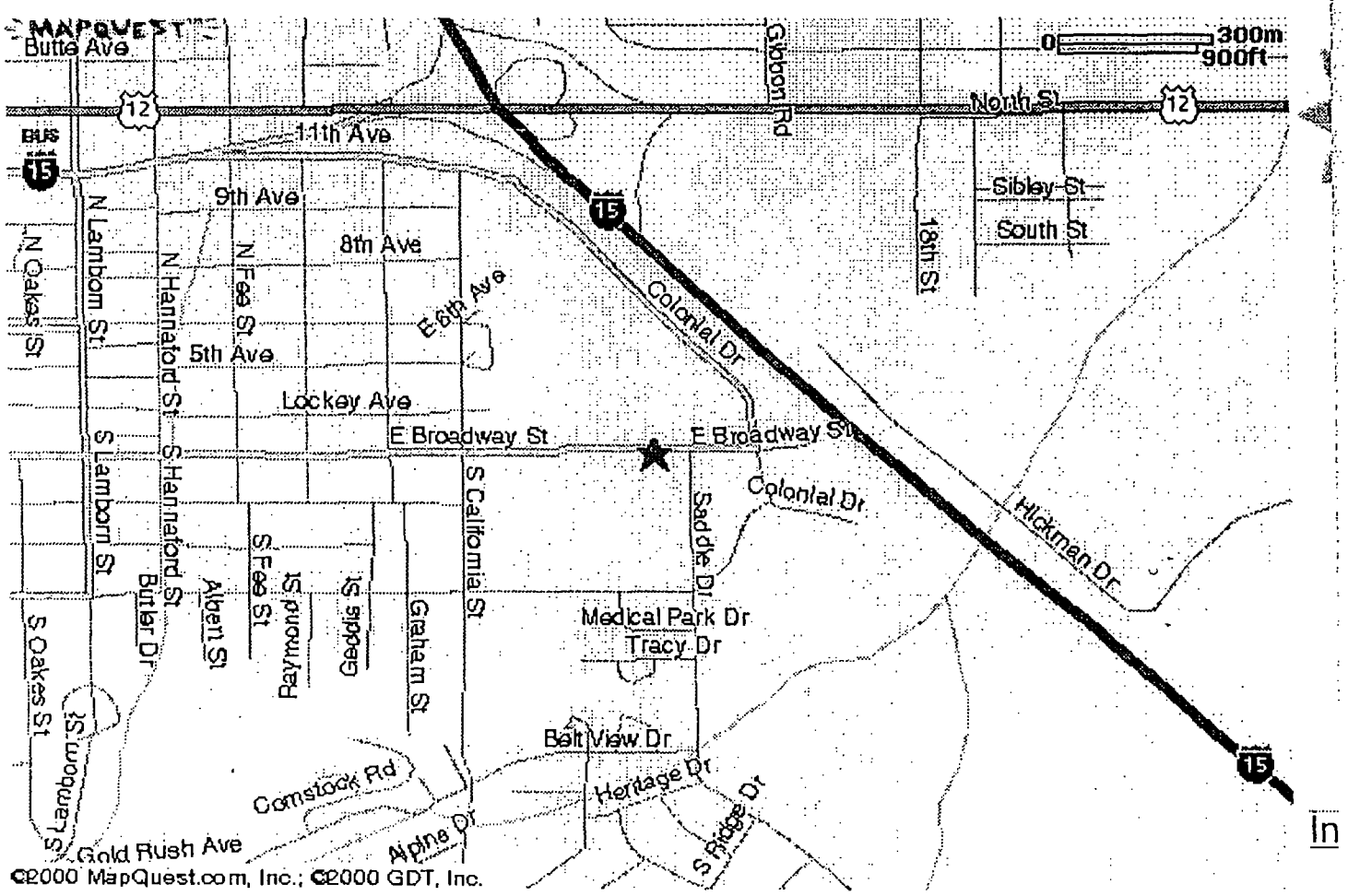
I.10.e. Supervisors

1) As soon as possible, radio central dispatch to report conditions on CH #1
2) Client and Envirocon supervisors to meet at location immediately.
3) Reassess fuel and hazmat leaks, fire conditions, and survivors.
4) Establish and enforce a first responder exclusion zone
5) Establish and enforce a staging area for incoming multijurisdiction resources (this will probably be the trailer area.

I.11. Emergency Contacts for Site

Important / Emergency Contacts		
Fire Department		
Ambulance		
Police		
Hospital	St. Peters Hospital 2475 E. Broadway	(406) 442-2480
Hydrometrics Site Manager		
Hydrometrics Health and Safety		
Hydrometrics Project Engineer		
Hydrometrics Construction Engineer		
Envirocon Program Manager		
Envirocon Project Manager	Kurt Wierenga	Cell (303) 538-4480
Envirocon Site Superintendant	T J Finley	
Envirocon Site Safety Supervisor	Tim Tierney	(406) 523-1150
Envirocon Site Safety Officer	John Serich	(406) 523-1150
Envirocon Corp. Dir Health & Safety	Joe Ocken	(406)-523-1194
Envirocon Corp Ofc. Missoula, MT		(406) 523-1150
ENVIROCON SAFETY HOTLINE:		800-224-7389
Agency for Toxic Substances and Disease Registry (ATSDR) for chemical exposures		404-639-0615 (emergency) 404-639-6360/ 6000 (non-emergency)

★ 2475 East Broadway, Helena, MT 59601-4928



In

Appendix A: Voluntary Employee's Emergency Information Data Sheet

The following information is being gathered to help us respond to an emergency. **All questions are optional.** You may answer any of the questions you like or leave any blank. The original copy is sent to the Corporate safety office, and a copy will be maintained on site. If the information provided changes, you should submit a new sheet.

Emergency Contacts (name as many as you like)

In the event of an emergency who should we contact to let them know? _____

_____

What City and State do they live in? _____

What is their phone number? _____

What is their relationship to you? _____

Emergency Contact for YOU !

How can we get in touch with you for project recalls, shutdowns, emergencies etc.?

_____

Where are you staying while on site? _____

What is the phone number there? _____

Medical Conditions

Are you alergic to any medications? ❑yes/❑no.

What are they? _____

Are you alergic to insect bites or stings? ❑yes/❑no.

What are they? _____

Do you carry treatments or medicine(s) (e.g., insulin, sugar/candy/food, bee sting kits) that needs to be given in an emergency? ❑yes/❑no.

What are they? _____

Where is it kept? _____

Are you or do you have:

- ❑yes/❑no: Hypertension (Is it uncontrolled? ❑yes/❑no)
- ❑yes/❑no: Asthma (Is it uncontrolled? ❑yes/❑no)
- ❑yes/❑no: Diabetes (Is it uncontrolled? ❑yes/❑no)
- ❑yes/❑no: Hypoglycemia
- ❑yes/❑no: Epilepsy/seizures
- ❑yes/❑no: Fainting spells
- ❑yes/❑no: Irregular heart beat
- ❑yes/❑no: Narcolepsi (sleeping spells)

Safety Officer's Notes:

Appendix B: ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ACM	Asbestos Containing Materials
ADA	Americans with Disabilities Act
AGA	American Gas Association
AHA	Activity Hazard Analysis
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
APR	Air-Purifying Respirator
ASSE	American Society of Safety Engineers
ASTM	American Society for Testing Materials
BEMA	Bald Eagle Management Area
CAS	Chemical Abstracts Service (Number)
CDL	Commercial Drivers License
CERCLA	Comprehensive Environment Response, Compensation and Liability Act
cfm	Cubic feet per minute
CFR	Code of Federal Regulations
CGA	Compressed Gas Association
CSA	Canadian Standard Association
CWA	Clean Water Act
dB	Decibels
dB(A)	Decibels A-Scale
DFG	Deutsche Forschungsgemeinschaft(German Standards)
DIN	Deutsches Institut fur Normung (German Standards Institute)
DOL	Department of Labor
DOT	Department of Transportation
EPA	Environmental Protection Agency
ESCBA	Escape Self-Contained Breathing Apparatus
FID	Flame Ionization Detector
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
FM	Factory Mutual
FR	Federal Register

GC	Gas Chromatography
GFCI	Ground Fault Circuit Interrupter
GFI	see GFCI (Ground Fault Circuit Interrupter)
gpm	Gallons per minute
H2S	Hydrogen Sulfide
HASP	site-specific Health And Safety Plan (also referred to as SHSP)
HAZ COMM	Hazardous Communication Standard
HDPE	High-Density Polyethylene
HEPA	High-Efficiency Particulate Air (filtration)
Hg	Mercury
HHE	Human Health Exceedance
HPLC	High Performance Liquid Chromatography
IARC	International Agency for Research on Cancer
IDLH	Immediately Dangerous to Life and Health
ISEA	Industrial Safety Equipment Association
ISO	International Organization for Standardization
LEL	Lower Explosive Limit
lpm	Liters per minute
LUST	Leaking Underground Storage Tank
mg/m3	Milligrams per meter cubed
mil	One mil equals 1/1000 of a unit
mppcf	Million particles per cubic foot
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
MUTCD	Manual for Uniform Traffic Control Devices
NEMA	National Electrical Manufacturer's Association
NEPA	National Environmental Policy Act
NFC	National Fire Code
NFPA	National Fire Protection Association
NIOSH	National Institute of Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System

Appendix B: ACRONYMS

NRR	Noise Reduction Rating
NTP	National Toxicology Program OR Normal Temperature and Pressure
OSHA	Occupational Safety and Health Administration
OV	Organic Vapor (e.g., respirator cartridges)
OVA	Organic Vapor Analyzer
PAPR	Powered Air-Purifying Respirator
PCB	Polychlorinated Biphenyl
PEL	Permissible Exposure Limit (OSHA exposure standard)
PID	Photo Ionization Detector
ppb	Parts per billion, 1 x 10-9
PPE	Personal Protective Equipment
ppm	Parts per million, 1 x 10-6
psi	Pounds per square inch
psig	Pounds per square inch gauge
PVA	Polyvinyl Alcohol
PVC	Polyvinyl Chloride
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH equivalent of the OSHA PEL)
ROD	EPA Record of Decision
SARA	Superfund Amendment and Reauthorization Act
SCBA	Self-Contained Breathing Apparatus
SEI	Safety Equipment Institute
SPCC	Spill Prevention, Control and Countermeasures
SQI	Submersible Quench Incinerator Facility
STEL	Short-Term Exposure Limit (typically 15 minutes)
SHSP	Site-specific Health and Safety Plan (also referred to as HASP)
TLV	Threshold Limit Value (ACGIH equivalent of the OSHA PEL)
TSCA	Toxic Substance Control Act
TWA	Time Weighted Average (typically 8 hours)
UEL	Upper Explosive Limit
UFC	Uniform Fire Code

Appendix B: ACRONYMS

UL	Underwriter's Laboratory
UST	Underground Storage Tank
UV	Ultraviolet
UXO	Unexploded Ordinance
VOC	Volatile Organic Compound
WBGT	Wet Bulb Globe Temperature
WEEL	Workplace Environmental Exposure Limit
ZIP	Zero Incident Performance

Appendix C: Decontamination Log Form for Equipment Release

Envirocon Inc.

Equipment Decontamination Log

Project Name: _____

Contaminants:

Envirocon Project number: _____

Method	Decon Method Description:
Method 1	
Alternate Method 2	
Method 3	

DECONTAMINATION ACTIVITIES						INSPECTION ACTIVITIES	
Date & time	Equipment Description, Model, and serial number Owner			Decon Method	Decon Supervisor	Inspector	Notes
date time	Description Owner	Make	Model serial	☐ Method 1 ☐ alternate 2 ☐ Method 3	name sig	name sig	☐sat ☐unsat
date time	Description Owner	Make	Model serial	☐ Method 1 ☐ alternate 2 ☐ Method 3	name sig	name sig	☐sat ☐unsat
date time	Description Owner	Make	Model serial	☐ Method 1 ☐ alternate 2 ☐ Method 3	name sig	name sig	☐sat ☐unsat
date time	Description Owner	Make	Model serial	☐ Method 1 ☐ alternate 2 ☐ Method 3	name sig	name sig	☐sat ☐unsat
date time	Description Owner	Make	Model serial	☐ Method 1 ☐ alternate 2 ☐ Method 3	name sig	name sig	☐sat ☐unsat
date time	Description Owner	Make	Model serial	☐ Method 1 ☐ alternate 2 ☐ Method 3	name sig	name sig	☐sat ☐unsat

ENVIROCON

ENVIROCON, INC.
500 TAYLOR STREET / 59802
POST OFFICE BOX 16655
MISSOULA, MT 59808-6655
(406) 523-1150
(406) 543-7987 FAX
www.envirocon.com

May 3, 2001

Mr. Darrell Shew
Asarco, Inc.
100 Smelter Road
East Helena, MT 59635

Subject: Initial Project Submittals, CAMU Construction Project, East Helena

Dear Mr. Shew:

Enclosed you will find one copy each, of the following submittals for your review, with their applicable sections referenced from the specifications:

1. Traffic Control Plan per Section 618.03.2 (MT DOT Specs)
2. Dust Control Plan, per Section 203.07.6

Should you have any questions, feel free to contact me at (406) 523-1150.

Sincerely

Alfred Brule'
Project Director

cc: K. Wieringa
P. Joy

Traffic Control Plan
Asarco-East Helena CAMU Construction
prepared by Envirocon, Inc.

The Asarco CAMU project site is located on the southwest corner of the East Helena smelter, in East Helena, Montana. The CAMU cell will be constructed on Asarco property, but is separated from the smelter works (and waste materials to be placed in the cell) by the BN Rail Line and the South Smelter Road, a county maintained road running north and south. The unpaved county road provides access to at least one business and a few residential properties located to the south of the Asarco facility.

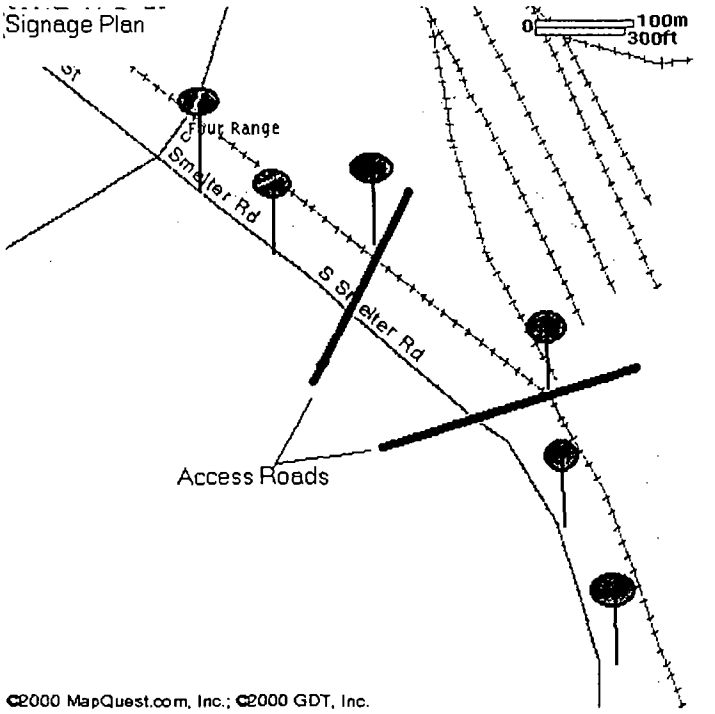
The CAMU construction project can be separated into 5 primary activities:

1. Mobilization, Site Preparation and Construct Access Roads
2. Excavation and Stockpiling of Materials
3. Construct Liner Systems
4. Place Source Area Materials in CAMU
5. Construct CAMU Cap and Site Restoration

Project traffic control will be required primarily during:

- Construction of CAMU cell access roads; and
- Hauling waste materials from the smelter works, across the rail line and county road, to the CAMU.

These activities pose the greatest potential for interference with/danger to public traffic and rolling stock. The focus of this potential danger is the intersection of Project access roads, South Smelter Road, and the MRL spur line. To mitigate this potential danger, Envirocon intends to install three sets of warning signs, per the following layout:



Envirocon will pay particular attention to the areas indicated on the schematic. The majority of anticipated Project traffic will comprise articulating haul trucks crossing back and forth between the smelter site and the CAMU.

"Construction Ahead" signs will be posted on South Smelter Road at both the north and south approaches to the Project site. These signs will be located approximately 700 feet before each intersection with a Project access road. Approximately 500 feet from these intersections, "Truck Crossing" signs will be posted. Each sign will be secured to a 4"x 4" post set in the shoulder of the road. "Truck Crossing" signs will also be posted on the east end of the north and south Project access roads leading between the smelter complex and the CAMU.

Envirocon personnel will instructed regarding safe driving requirements when approaching and crossing the rail line and county road. flag persons (Flaggers) are not planned, given the low volume of train traffic anticipated. However, all Envirocon drivers will adhere to a strict policy of:

- stopping at each crossing,
- looking for an approaching train, as well as vehicular traffic, and
- ensuring that the crossing is clear before proceeding through the intersection.

All drivers will be notified that "running the rail crossing" is cause for termination. Speed limits will be established for all construction vehicles and initially limited to 15-mph maximum until conditions warrant a change – either up or down. This plan will be reviewed with each employee, and the signage installed, prior to commencing work on the Project.

DUST CONTROL PLAN

E. HELENA ASARCO SMELTER
CAMU PHASE I CELL

This work plan addresses dust control during all phases of constructing, filling, and capping the CAMU Phase I Cell. The Bid Specification sections on dust control requirements are attached as Appendx A. The tentative Order of Work is listed below, with **activities/tasks requiring dust control in bold type**:

Site Layout Surveys
Install Site Access Controls (temporary fence and gates)
Install Stormwater BMPs (temporary diversion ditch, silt fence...)
RR Crossing Improvements (by MRL)
Construct Access Roads with Culverts
Strip & Stockpile Topsoil and Subsoil
Excavate Base of CAMU Cell
Grade, Roll, & Compact CAMU Subgrade
Place & Compact Clay Liner (CCL)
Grade & Roll CCL Surface for HDPE
Install Secondary Containment HDPE
Install Secondary Containment Geonet
Install Secondary Containment Leachate Removal System
Install Primary Containment HDPE
Install Primary Containment Geonet
Install Primary Containment Leachate Removal System
Crush or Break Oversized Concrete Debris to < 2-feet Dimensions
Haul Road Maintenance & Continuous Sweeping
Load & Haul Waste Soil and Debris from plant
Place & Compact Waste Soil and Debris in CAMU
Salvage & Stockpile Designated Items on the plant
Install Gas Migration Layer & Venting System
Implement & Maintain Surface Water Controls During Waste Placement
Sweep clean the Paved on-plant areas under Removed Waste Piles
Place & Compact Clay Cover (CC)
Grade & Roll Surface of CC
Grade & Compact Subgrade for Cap at Former Southeast Stockpile Area
Spread, Grade & Compact Clay Cover (Cap)- Fmr. Southeast Stockpile Area
Install HDPE Cap on CAMU
Install Cap Drain Material
Install Drainage Geotextile on Drain Material
Place & Compact Lower Cover Soil Layers (16" Subsoils)
Place & Compact Upper Cover Soil Layers (8" Topsoils)
Construct Permanent Diversion Ditch; Remove Temporary Diversion Ditch
Prepare Surface of CAMU Topsoil & Other Distrubed Areas: mulch, seed & fertilize
Install Perimeter Chainlink Fence, Gates & Signs.

During the waste excavation, transport and placement in the CAMU, Envirocon intends to haul the waste material in both articulating off-road haul trucks, and/or 10-wheel end dumps. Both types of trucks will be equipped with automatic tarps that will be engaged whenever material is being transported from one area to another. In addition, Envirocon plans to avoid creating and spreading dust by wetting exposed soils and by collecting and removing potentially-contaminated soils, from paved haul routes with a street sweeper. This unit will be fully self-contained including vacuum, brush, and wetting capabilities. The sweeper unit will be operating whenever waste materials are being transported over the access roads.

A water truck equipped with spray bars and/or "fire hose" will be used to control dust during most activities on the excavation sites. Dust that could be generated during load-out of the finer-grained lake sediments, will be controlled using stationary misters connected to a separate stand-alone tank and pumping system. Non-potable water will be obtained from the existing "J" stand located inside the main plant area, adjacent to the south access gate. Another potential water source for misting the lake sediment pile is "grey" water generated from the personnel decon trailer. Potable water for the decon trailer will be obtained from a plant source, yet to be identified, and transported between the source and the trailer using the on-site water truck.

The potentially dust-producing work tasks identified in the list above, are listed below by planned dust suppression technique:

Water Truck alone (unless additional measures prove necessary):

- Construct Access Roads (subgrade and base courses)
- Strip & Stockpile Topsoil and Subsoil
- Excavate Base of CAMU Cell
- Place & Compact Clay Liner (CCL)
- Crush or Break Oversized Concrete Debris (fire hose, as necessary)
- Place & Compact Waste Soil and Debris in CAMU
- Place & Compact Clay Cover (CC)
- Grade & Compact Subgrade for Cap at Former Southeast Stockpile Area
- Spread, Grade & Compact Clay Cover (Cap)- Fmr. Southeast Stockpile Area
- Place & Compact Lower Cover Soil Layers (16" Subsoils)
- Place & Compact Upper Cover Soil Layers (8" Topsoils)
- Construct Permanent Diversion Ditch; Remove Temporary Diversion Ditch
- Prepare Surface of CAMU Topsoil & Other Distrubed Areas

Dry Vacuum Street Sweeper (continuously operated until shortly after last haul of the work day; if insufficient, a water truck will supplement the street sweeper; haul trucks will all be solid-bottomed with intact gate seals):

- Haul Road Maintenance & Continuous Sweeping
- Load & Haul Waste Soil and Debris from plant
- Sweep clean the Paved on-plant areas under Removed Waste Piles

Stationary Misters (this system will be available and will be employed if the water trucks prove inadequate:

- load-out of the finer-grained lake sediments

Attachment A

Dust Control Bid Specifications

Sections:

- 109.11.17
- 109.11.18
- 203.07.6_

- Construct all temporary gates needed to control access to the site;
- Gates in existing fences at access road crossings are under a separate item;
- All work necessary to prevent public and wildlife access to the CAMU site;
- Construct and maintain detour routes as needed;
- Provide water as needed for compaction and dust suppression;
- Conduct layout, quality control and as-built field surveys under a separate item; and
- Provide all labor, tools, equipment, materials, and incidentals necessary to complete the work as specified.

(c) Measurement and Payment. No measurement of this bid item will be made. This item will be paid for at the contract lump sum price bid for Site Access & Traffic Controls. Interim payments will be prorated to percent of project completion.

109.11.17 Dust Control

(a) General. Perform work in accordance with the following Standard Specifications:
- Section 203 Excavation and Embankment

(b) Work Included.
- Dust Control Plan preparation, submittal, and revisions as required for owner approval;
- Minimize the creation and spread of dust during the excavating and loading on the plant, and placing and compacting activities in the CAMU and stockpiles;
- The Owner will supply non-potable water for compaction and dust suppression at fill station standpipes on the plant. The Contractor will be required to transport water to the point of use;
- A fine mist of water will be utilized to minimize dust during loading activities;
- Dust control for hauling operations on paved access roads is under a separate item;
- Watering will be required during hauling, placing and compacting activities as needed for dust control; and
- Provide all labor, tools, equipment, materials, and incidentals necessary to complete the work as specified.

(c) Measurement and Payment. No measurement of this bid item will be made. This item will be paid for at the contract lump sum price bid for Dust Control. Interim payments will be prorated to percent of project completion.

109.11.18 Haul Road Maintenance

(a) General. Perform work in accordance with the following Standard Specifications:
- Section 203 Excavation and Embankment

(b) Work Included.

- Dust Control Plan preparation and submittal is under a separate item;
- The Contractor will conduct continuous sweeping of the access roads using a dry vacuum sweeper during hauling operations;
- The Owner will supply non-potable water for compaction and dust suppression at fill station standpipes on the plant;
- Solid bottom hauling vehicles will be used to minimize leakage potential;
- Road maintenance as required to maintain the surface without ruts, potholes or other deterioration;
- Watering for suppression if sweeping alone is not able to control dust; and
- Provide all labor, tools, equipment, materials, and incidentals necessary to complete the work as specified.

(c) Measurement and Payment. No measurement of this bid item will be made. This item will be paid for at the contract lump sum price bid for Haul Road Maintenance. Interim payments will be prorated to percent of project completion.

109.11.19 Load, Haul & Place Waste Materials

(a) General. Perform work in accordance with the following Standard Specifications:

- Section 201 Clearing and Grubbing
- Section 202 Removal of Structures and Obstructions
- Section 203 Excavation and Embankment
- Section 206 Haul

(b) Work Included.

- Load, haul, place, spread and compact waste materials and debris in CAMU;
- Use two feet of Lower Lake sediments as a cushion soil against bottom and sides of cell liner above the geotextile and approximately 1.5 feet of sediments above the waste material below the compacted clay cover;
- Cut and flatten metal items as necessary to minimize voids;
- No voids greater than one cubic foot will be allowed;
- Owner will require placement of debris with soils in a manner that forms a homogeneous waste in CAMU (i.e. not all debris placed together but mixed relatively evenly throughout the CAMU);
- No additional expenses will be allowed to consolidate waste materials to Owner's satisfaction;
- Haul trucks will be covered and will have gate seals. The contractor is required to apply gasket material or otherwise modify haul truck gates to ensure that the gates are tightly sealed. The Contractor is required to maintain gates in this condition;
- Place long debris items (e.g., timbers, pipe, steel beams, etc.) horizontally in the fill lifts;
- Salvage, roll and stockpile Lower Lake sediment cover after stockpile is totally removed;

B. **Protection of Property.** The Contractor shall protect adjacent property and avoid damage to such property. Adjacent property damaged due to the Contractor's operations shall be repaired or replaced. The repairs and/or replacement shall be equal to existing improvements and shall match existing finish and dimensions.

C. **Utilities.** The Contractor is responsible for obtaining utility locations as required by law. He will notify the Engineer prior to digging adjacent to utilities.

203.07.4 Subgrade and Fill Protection

During construction, fills and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times.

Finished subgrade shall not be disturbed by traffic or other operations and shall be protected and maintained by the Contractor until completion and acceptance of the work. The storage or stockpiling of materials on the finished subgrade will not be permitted.

203.07.5 Site Drainage

Excavation, fill and backfill work areas shall be continually and effectively drained. Water shall not be permitted to accumulate in excavations or foundation areas. The Contractor shall construct suitable dikes, drains or provide pumping equipment, as required, to divert water flows away from the work areas.

203.07.6 Dust Control and Haul Road Maintenance

Control all dust produced from the project site. Prevent the spread of dust and avoid creation of a nuisance in the surrounding area. The Contractor shall prepare and submit a Dust Control Plan to the Owner for approval 30 days before construction begins. The Dust Control Plan will address methods to be used to minimize dust during sodding, hauling waste placement, grading and earthwork operations. It will also describe haul road sweeping and maintenance operations.

203.07.7 Excavation

A. **General Requirements.** The Contractor shall excavate every type of material encountered within the limits of the project, to the lines, grades and elevations indicated and as specified herein. Test pit and boring logs for the CAMU site are available from the Engineer.

beams) will be placed horizontally in the fill lifts and care will be taken to compact adjacent fill. If determined unsuitable for placement in the landfill, large metal debris (e.g. abandoned equipment) will be stockpiled at a designated plant area for subsequent management by the Owner. Plastic, ceramic and glass materials will be crushed in the compaction process to minimize voids. Special care will be taken near the sides of the cell to place source soil from the Lower Lake stockpile that will act as a cushion or operation layer to protect the liner systems against damage. A layer of fine-grained Lower Lake sediments (approximately 1.5 feet thick) will be placed above other waste materials in the cell to provide a protective cushion below the compacted clay cap.

A dust control program will be implemented to minimize the creation and spread of dust during the excavating, loading, hauling, placing and compacting activities. A fine mist of water will be utilized to minimize dust during loading activities. Haul trucks will be covered and will have gate seals. Solid bottom hauling vehicles will be used to minimize leakage potential. Haul routes will be swept continuously during hauling operations with a dry vacuum sweeper and watered, as needed, to minimize dust. Watering will be required during placing and compacting activities as needed for compaction and dust suppression.

The existing reinforced PVC cover over the Lower Lake stockpile will be salvaged by the Contractor after removal of the stockpiled waste material. The cover will be rolled and stored by the Contractor at a designated plant area.

3. Closure of Landfill

A cap drainage system consisting of a 1-foot thick layer of drain gravel constructed with minimum slope of 3 percent will be installed on the top of the 40 mil HDPE cap. The drain gravel will be overlain with a drainage geotextile. This layer drains to a corrugated drainpipe embedded in a gravel-filled trench at the toe of the landfill cap slope. The cap drain pipe outlets to a shallow detention pond adjacent to the landfill that provides drainage water disposal by infiltration and evaporation. A surface water drainage channel will be installed around the toe of the CAMU that will also drain to the runoff control pond.

The topsoil cover provides frost protection to the cap composite liner and, after seeding, protects the surface of the landfill from erosion. It consists of 8-inches of topsoil overlying 16-inches of subsoil (from CAMU excavations) installed above the cap drainage system. The project specifications require the organic rich topsoil to be salvaged and stockpiled separate from the underlying subsoil to ensure a proper medium for seeding with grasses. The CAMU cover has been designed with a top slope of 3 percent and fairly flat side slopes of 5:1 to resist erosion and minimize maintenance.

Copy - J. Nichol
D-Shaw

COPY

Montana Department of
ENVIRONMENTAL QUALITY

Judy H. Martz, Governor

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.state.mt.us

STORM WATER DISCHARGE PERMIT AUTHORIZATION MTR100854

J. R. SHAW
MAY 03 2001

April 30, 2001

Asarco Incorporated
Attn: John Shaw
P.O. Box 1230
East Helena, MT 59635

Envirocon, Inc.
Attn: Kris Kok
500 Taylor Street
Missoula, MT 59802

Re: Permit MTR100854 to Discharge Under the May 19, 1997 "General Discharge Permit for Storm Water Associated with Construction Activity" for the Asarco CAMU Project located in Lewis & Clark County

Dear Permit Applicants:

The Montana Department of Environmental Quality (DEQ) has reviewed the application for a Montana Pollutant Discharge Elimination System (MPDES) Storm Water Discharge Permit Authorization for the Asarco Corrective Action Management Unit (CAMU) Project located in Lewis & Clark County.

DEQ has determined the proposed project qualifies to discharge storm water under the State of Montana's May 19, 1997 "General Discharge Permit for Storm Water Associated with Construction Activity" (hereafter referred to as "General Permit").

The project Owner (Asarco Incorporated) and Contractor (Envirocon, Inc.) are Co-Permittees for this Permit Authorization. Project design, permitting documents, and the permit fee were provided in the Permit Application and Erosion Control Plan received by the DEQ on April 11, 2001 and April 27, 2001.

Authorization is granted to discharge at the above-referenced location only, under the provisions of the attached May 19, 1997 "General Discharge Permit for Storm Water Associated with Construction Activity". The General Permit is valid only when accompanied by this General Permit Authorization letter and a copy must be made available to inspectors upon request. This Permit Authorization is granted based upon the information submitted to the DEQ as stated in the preceding paragraph.

The Permittees are subject to the self-monitoring and reporting requirements of Part III (page 11), compliance inspections and all other provisions of the General Permit. The applicant's Storm Water Erosion Control Plan for construction has been approved and shall be implemented at the beginning of construction activity and continue through final stabilization.

All storm water discharges covered under this General Permit shall meet numeric and narrative water quality standards, including non-degradation, for the receiving water body(s). Field inspections by the DEQ, the Department of Fish, Wildlife and Parks or other interested/involved parties may result in the DEQ requesting additional erosion control measures or Permit Authorization changes.

A violation of, or non-compliance with, any provision of the General Permit is subject to enforcement action pursuant to the Montana Water Quality Act. Issuance of authorization under this General Permit also does not waive obligations to obtain other permits that may be required.

Attached are project specific permit stipulations which the Permittees must incorporate into their storm water and erosion control project management actions.

Should you have any questions, feel free to contact me at (406) 444-5310 or the Water Protection Bureau at (406) 444-3080.

Sincerely,

Brian Heckenberger
Storm Water Program Coordinator
Water Protection Bureau

attachments: General Permit
Permit Stipulations

cc: Adel Johnson; DEQ AWMB (with copy of General Permit)

ASARCO CAMU PROJECT
STORM WATER DISCHARGE PERMIT AUTHORIZATION NO. MTR100854

DEQ PERMIT AUTHORIZATION STIPULATIONS

1. The Permittees should strip and stockpile the majority of existing topsoil from project disturbance areas. The salvaged topsoil should be reused and spread over the areas to be revegetated in such a manner as to maximize the stability of the reclaimed site.

2. Best Management Practices (BMPs), such as silt fencing, straw bales, gravel filter or earth berms, must be placed as close as feasible to earth disturbance areas and vegetative buffer zones used to protect nearby drainages and waters. If large areas of potential runoff exist upslope of disturbance areas, upgradient runoff control BMPs (berms, ditches, ponds, etc.) should be considered. BMPs must be maintained in place until such time as the areas have established a vibrant (70% of native density) cover of vegetation and final stabilization has been achieved. As a general rule, the Permittees should also consider using two inch-square wire rabbit fence backing for silt fencing where wind or water action could jeopardize the effectiveness of the silt-fencing. For areas where livestock could jeopardize the long-term stability of BMPs, barbed wire strands between steel fence posts may be necessary to limit damages.

3. If soil seeding is undertaken outside of the favorable, locally accepted, fall or spring seeding window of time, then supplemental erosion control methods must be incorporated wherever bare soils could erode excessively. Supplemental erosion control measures could include any one, or a combination, of the following vegetative enhancement and erosion control features:
   a) supplemental irrigation systems;
   b) slope roughening (e.g. bulldozer grouser tracks perpendicular to slope, contour mulching or discing, other soil roughening techniques, slope benching, etc.); and
   c) soil and erosion control amendments (e.g. mulching, tacifiers, mats, blankets, geotextiles).

4. The Permittees will preserve as much existing vegetation as practicable during all phases of construction, reclamation and staging work. This includes preserving existing vegetation and minimizing clearing except where development designs call for clearing and or major construction and earthmoving activities.

5. The Permittees must make sure that all required erosion control features (BMP) are in place prior to creating surface disturbances which could generate storm water runoff that could adversely affect off-site property or state surface water.

6. Fuels stored at the site must be placed in bermed areas designed to contain 110% of the volumetric holding capacity of all vessels stored inside the bermed area. All fueling and fuel storage must be done at a minimum distance of 100 feet from state surface waters. In addition, the Permittees are encouraged to place some form of impervious membrane under all potential fuel spillage areas in order to minimize soil contamination.

Storm Water GDP
Permit No.: MTR100000

GENERAL DISCHARGE PERMIT FOR

STORM WATER ASSOCIATED WITH CONSTRUCTION ACTIVITY

MONTANA DEPARTMENT OF
ENVIRONMENTAL QUALITY

AUTHORIZATION TO DISCHARGE UNDER THE

MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with Section 75-5-101 et seq., MCA, ARM 17.30.1301 et seq., and ARM 17.30.601 et seq., applicants with an authorization letter for this "Storm Water Associated with Construction Activity General Discharge Permit," are permitted to discharge storm water resulting only from construction activities, to state waters in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I, II, III and IV hereof.

This permit shall become effective on the date of issuance.

This permit shall expire at midnight, August 31, 2002.

FOR THE MONTANA DEPARTMENT OF
ENVIRONMENTAL QUALITY

Frederick C. Shewman

Frederick C. Shewman, P. E., Supervisor
Water Permits Section
Water Protection Bureau
Permitting & Compliance Division

Dated this 19th day of May, 1997

PREAMBLE

The purpose of this preamble is to provide the permit holder with some understanding of what is required for compliance under this permit.

The basic principle of the permit is to identify areas or activities which may contribute pollutants to surface waters and consider practical methods to reduce such pollutants from your operation. The degree of pollution control needed will vary depending on the site and the situation. For example, if you are constructing a road on perfectly flat ground in which there are no surface waters in close proximity to your activities, the potential to cause pollution of surface water is minimal and only minimal erosion controls would be expected. On the other hand, if you are constructing a highway and there are several stream drainages, wetlands, etc. in close proximity to your project, very comprehensive and complete pollution controls would be expected.

The major pollutant that will be a problem for construction sites will be sediment discharges from increased erosion. If the project will impact a "live" water body (a stream , lake, reservoir, etc. that has water year round), you must insure that sediment does not reach state waters by using appropriate erosion control practices. The discharge of discolored water could cause a violation of this permit. Adequate erosion control practices must also be used to prevent sediment discharges to wetlands, riparian areas, and ephemeral drainages.

Other pollutants most likely to be a problem at construction sites are fuels, lubricating oils, construction materials, fertilizers and pesticides. The bottom line is store these materials properly and well away from surface waters, to prevent spills of these materials, and by not dumping in the first place.

The basic requirements of the "Storm Water Erosion Control Plan" are provided in Part II.

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PART I.

I. COVERAGE UNDER THIS PERMIT

A. Permit Area

The permit applies to all areas of the State of Montana except Indian Reservations.

B. Sources Covered Under This Permit

The permit covers construction activities including clearing, grading, and excavating of a total of five (5) or more acres that is a part of a common plan for development or sale or greater than one acre of contiguous clearing, grading and excavating, any part of which is located within one hundred (100) feet of state waters.

The permit may also authorize storm water discharges from support activities related to a construction site (e.g. concrete or asphalt batch plants, equipment staging yards, material storage areas, etc.) Provided:

1. the support activity is not a commercial operation serving multiple unrelated construction projects, and does not operate beyond the completion of the construction activity; and

2. appropriate controls and measures are identified in the storm water erosion control plan for the discharge from the support activity.

All discharges shall be in accordance with the "approved" erosion control plan and the provisions of this permit. Any other direct waste discharge to public waters is prohibited unless covered by another MPDES permit.

This permit does not relieve the permittee from responsibility for compliance with any other applicable federal, state, or local law, rule, standard, ordinance, order, judgement, or decree.

C. Application Procedures

1. Application Due Dates: At least thirty (30) days prior to construction taking place, the permittee (see definitions) of the construction activity shall submit an application as provided by the Department. For the purposes of this permit, both the owner and the contractor(s) are equally responsible for obtaining coverage under the general permit and shall be co-permittees.

2. Application Form: The application form requires, at a minimum, the following information:

   1) Name and address of contractor;
   2) Construction site address and name of owner/operator (for MDT projects, project number and designation);
   3) Contact person and telephone number;
   4) The nature of the construction activity;
   5) Total area of the site and the area that will be disturbed;
   6) Site location (County, Township, Range, Section, 1/4 Section);
   7) The best management practices to be used during construction to control sediment and erosion.
   8) The best management practices to be used to control pollutants in storm water after construction is completed;
   9) Name of receiving water and indicate if discharging to a municipally owned storm sewer;
   10) A detailed erosion control plan must be approved prior to construction taking place;
   11) A site map and a drainage map (with drainage patterns indicated).

3. Application Submittal: A signed state application form shall be submitted to:

Montana Department of Environmental Quality
Water Protection Bureau
1520 East Sixth Avenue
PO Box 200901
Helena, MT 59620-0901

4. **Authorization to Discharge:** Construction activities covered under this permit are authorized to begin construction and implement the "approved" erosion control plan in accordance with the permit upon receipt of an authorization under the general permit issued by the Department. An authorization is generally issued within 30 days of receipt of a complete application and an adequate Storm Water Erosion Control Plan.

5. **Additional Notification:** A copy of the authorization letter; a local contact telephone number/address for public access to view the erosion control plan; and a brief description of the project shall be posted at the construction site in a prominent place for public viewing (alongside the building permit if the building permit is required to be displayed).

PART II.

II. SPECIAL CONDITIONS

A. Prohibitions on Non-storm Water Discharges

All discharges covered by this permit shall be composed entirely of storm water. Discharges of material other than storm water runoff must be in compliance with an MPDES permit (other than this permit) issued for the discharge.

B. Releases in Excess of Reportable Quantities

The discharge of hazardous substances or oil in the storm water discharge(s) from construction activities shall be minimized in accordance with the applicable Erosion Control Plan for the project. Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR 110, 40 CFR 117 or 40 CFR 302, occurs during a 24 hour period:

(1) The person in charge of the construction project is required to notify the National Response Center (800-424-8802) and the Water Protection Bureau (444-5338) as soon as he or she has knowledge of the discharge;

(2) The permittee shall submit, within 7 calendar days of knowledge of the release, a report with a description of the release (including the type and estimate of the amount of material released), the circumstances leading to the release, and steps to be taken to remediate environmental contamination associated with the release to the Montana Department of Environmental Quality at the address provided in Part III.C.; and

(3) The Storm Water Erosion Control Plan described below must be modified within 7 calendar days of knowledge of the release to: provide a description of the release and the circumstances leading to the release; and to identify and provide for the implementation of steps to prevent the reoccurrence of such releases and to respond to remediation of such releases.

C. Storm Water Erosion Control Plan

Prior to commencement of construction the permittee shall prepare and implement an Erosion Control Plan. The objective of the plan is to minimize the erosion of disturbed land during the construction and post construction activities and to minimize pollutants such as fuels, oil, grease, fertilizer, pesticides, concrete truck washout, etc. from discharging to surface waters.

The plan shall:

(a) be submitted to the Department 30 days prior to construction for approval;

(b) be signed in accordance with the signatory requirement in Part IV.G.;

(c) a copy shall also be maintained at the construction site in accordance with part III.D. of this permit; and

(d) provide for compliance with the terms and schedule of the plan once approved by the Department and updated as appropriate.

1. a) The contractor of a construction project covered by this permit shall maintain a copy of the erosion control plan on-site and a copy of the plan shall be made available upon request to the owner, the Montana Department of Fish, Wildlife and Parks, local officials, and a municipal operator if the discharge is through a municipal system.

b) The plan must be approved by the Department and implemented at the

beginning and throughout the lifespan of the project. The Department may notify the permittee at any time that the plan does not meet one or more of the minimum requirements of this part. After such notification from the Department, the permittee shall make changes to the plan and submit a written certification that the requested changes have been made to the Department. Unless otherwise provided by the Department, the permittee shall have 7 days after such notification to make the required changes.

c) The permittee shall amend the plan whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the potential for the discharge of pollutants to waters of the state or if the erosion control plan proves to be ineffective in achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity.

2. The plan may include the use of sediment basins, berms, barriers, filter strips, covers, diversion structures, seeding, sodding, and/or other control structures or best management practices (BMPs). Any plan which requires engineered structures, such as detention ponds or diversion structures, or which is prepared for a construction activity which includes 20 acres or more in total land disturbance, shall be prepared by a registered professional engineer. The erosion control plan shall include at least the following items:

a. Site Description. Each plan shall, at a minimum, provide a description of the following:

(1) The nature of the construction activity, including a proposed timetable for major activities;

(2) Estimates of the total area of the site, and all other sites if a phased development project, and the area of the site that is expected to undergo clearing, excavation, and/or grading;

(3) A site map indicating areas of total development and, as a minimum, all areas of soil disturbance, areas of cut and fill, drainage patterns and approximate slopes anticipated after major grading activities, areas used for the storage of soils or wastes, location of all erosion control facilities or structures and areas where vegetative practices are to be implemented, the location of impervious structures (including buildings, roads, parking lots, outdoor storage areas, etc.) after construction is completed, springs, wetlands and other surface waters, and the boundary of 100-year flood plain, if determined;

(4) The nature of fill material to be used, the existing soils located at the site, and the erodibility of such soils: and

(5) The names of the receiving water(s) and the size, type and location of each outfall or, if the discharge is to a municipal separate storm sewer, a letter of approval from the municipality which authorizes use of the storm sewer and the location of any storm sewer discharge to public waters.

b. Controls

Each operator covered by this permit shall develop, as part of the erosion control plan, a description of controls appropriate for the site and shall implement such controls. The following minimum components shall be addressed along with a schedule for implementation, unless approved otherwise in writing by the permit issuing agency:

(1) A description, including a schedule of implementation, of stabilization practices designed to preserve existing vegetation where practicable and re-vegetate open areas as soon as practicable after grading or construction. In developing vegetative practices, the operator shall consider: temporary seeding, permanent seeding, mulching, sod stabilization, vegetative buffer/filter strips, grassed waterways, erosion control blankets and tree and shrub planting.

(2) A description of structural practices which indicates how, to the degree practicable, the permittee will divert flows from exposed soil, store flows, or otherwise limit runoff from exposed areas of the site. In developing structural practices, the operator shall consider the appropriateness of: straw bale dikes, silt fences, earth dikes, brush barriers, drainage swales, check dams, subsurface drains, pipe slope drains, rock outlet protection, drain inlet and outlet protection, temporary drain diversions, sediment traps, temporary sediment basins, infiltration trenches or basins, and retaining walls. None of the temporary control structures, including silt fences and straw bale dikes, shall be removed until permanent vegetation and site stabilization has taken place.

(3) For sites in which the tracking of sediment onto public or private roads during the wet season (November - June) will be a problem, the site shall have graveled access entrance and exit drives and parking areas. All unpaved roads on the site carrying more than 25 vehicle trips per day shall be graveled.

(4) When trucking saturated soils from the site, either tight trucks shall be used or loads shall be required to drain until drippage has been reduced to less than 1 gallon per hour before leaving the site.

3. Visible or measurable erosion which leaves the construction site or enters state waters is prohibited. Visible or measurable erosion is defined as:

a. Deposits of mud, dirt, sediment or similar material exceeding 1/2 cubic foot in volume in any area of 100 square feet or less on public or private streets, adjacent property, or into the storm and surface water system, either by direct deposit, dropping, discharge, or as a result of the action of erosion; or

b. Evidence of concentrated flows of water over bare soils; turbid or sediment laden flows; or evidence of on-site erosion such as rivulets on bare soil slopes, where the flow of water is not filtered or captured on the site using the techniques in the approved erosion control plan; or

c. Earth slides, mud flows, earth sloughing, or other earth movement which leaves the construction site.

4. If any visible or measurable quantities of sediment leave the site because of the failure of the erosion control facilities, the sediment shall be immediately (within 24 hours of discovery) cleaned up and placed back on the site or disposed of in a manner approved by the Department. Under no conditions shall the sediment be washed into the storm sewers, drainageways or state waters.

5. All non-regulated wastes composed of building material must be removed from the site or disposed in approved disposal facility. Building material wastes or unused materials may not be dumped or discharged at the site. The State Solid Waste Program should be contacted concerning proper disposal of waste materials.

6. A description of measures to control pollutants in storm water discharges that will occur after construction operations have been completed shall be addressed in the erosion control plan. Such practices may include: storm water detention structures (including wet ponds); storm water retention structures; flow attenuation by use of open vegetated swales and natural depressions; and infiltration of runoff on site.

PART III.

III. MONITORING, RECORDING AND REPORTING REQUIREMENTS

A. Monitoring Requirements

During the period beginning immediately and lasting through the duration of the permit, the permittee is authorized to discharge from outfall(s) as required within the erosion control plan. Such discharges shall be limited and monitored by the permittee as specified below:

1. All erosion control facilities shall be inspected and maintained by or under the direction of the permittee at least once every seven calendar days and within 24 hours after any storm event.

2. During stormy periods or periods of snow melt when runoff occurs daily, all erosion control facilities shall be inspected and maintained by or under the direction of the permittee daily.

3. Storm water runoff discharges shall be visually monitored at the above frequency to evaluate the effectiveness of the pollution control facilities or practices. If any measurable quantities of sediment are leaving the project or entering state waters, corrective action shall be taken within 24 hours of discovery to reduce the discharge of sediments.

B. Recording Requirements

The operator shall keep a record of inspections, the date and time inspected, and the name of the person performing the inspection. Uncontrolled releases of mud or muddy water or measurable quantities of sediment found off the site or entering into state waters shall be recorded with a brief explanation as to the measures taken to prevent future releases as well as any measures taken to clean up the sediment that has left the site. This record shall be made available to the Department upon request and shall be signed in accordance with the signatory and certification requirements of Parts IV.G. and IV.H.

C. Reporting Requirements

If the construction activity lasts more than 12 months, an annual inspection of the site shall be conducted to identify areas which may be contributing pollutants to storm water discharges. The annual inspection report shall be submitted to the Department 30 days after the inspection has taken place. Inspection results shall be reported in writing to the Department address below:

Montana Department of Environmental Quality
Water Protection Bureau
1520 East Sixth Avenue
PO Box 200901
Helena, MT 59620-0901
Phone (406) 444-4323

D. Records Retention

All records and information resulting from the monitoring activities required by this permit shall be retained for a minimum of three (3) years, or longer if requested by the Department.

E. Noncompliance Reporting

If, for any reason, the permittee does not comply with or will be unable to comply with any condition specified in this permit, the permittee shall notify as soon as possible by phone and provide the Department with the following information, in writing, within five (5) days of becoming aware of such condition:

a. A description of the discharge and cause of noncompliance; and

b. The period of noncompliance, including exact dates and times; or, if not correct, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate and prevent recurrences of the non complying discharge.

F. Penalties for Tampering

The Montana Water Quality Act provides that any person who falsifies, tampers with, or knowingly renders
inaccurate, any monitoring device, method or practice required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $25,000 per day of violation or imprisonment for not more than 1 year, or both.

PART IV.

IV. STANDARD PERMIT CONDITIONS

A. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application. The permittee shall give the Department advance notice of any planned changes at the permitted facility or of an activity which may result in permit noncompliance.

The Montana Water Quality Act (MCA 75-5-631) and the Federal Clean Water Act (section 309) provide significant penalties for any person who violates a permit condition. Any person who violates any condition of this permit is subject to a civil penalty not to exceed $25,000 per day of such violation, as well as any other appropriate sanction provided by section 309 of the Clean Water Act.

B. Continuation of the Expired Permit

An expired general permit continues in full force and effect until a new general permit is issued for all permittees who have current authorization under the expiring general permit.

C. Continuation of Authorization Following Rewal of the Expired General Permit

In order to obtain authorization under the renewed general permit, applicants must submit a new application for coverage in accordance with ARM 17.30.1341.

D. Need to Halt or Reduce Activity not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

E. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

F. Duty to Provide Information

The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Department, upon request, copies of records required to be kept by this permit.

G. Other Information

When the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or any report to the Department, it shall promptly submit such facts or information.

H. Signatory Requirements

All applications, reports or information submitted to the Department shall be signed and certified.

1. All permit applications shall be signed as follows:

a. For a corporation: by a responsible corporate officer;

b. For a partnership or sole proprietorship: By a general partner or the proprietor, respectively;

c. For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

2. All reports required by the permit and other information requested by the Department shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described above and submitted to the Department, and,

b. The authorization specified either an individual or a position having responsibility for the over- all operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

3. Changes to authorization. If an authorization under paragraph IV.G.2. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph IV.G.2. must be submitted to the Department prior to or together with any reports, information, or applications to be signed by an authorized representative.

I. Certification

Any person signing a document under this section shall make the following certification:

"I certify under penalty of the law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

J. Penalties for Falsification of Reports

The Montana Water Quality Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance shall, upon conviction be punished by a fine of not more than $25,000 per day, or by imprisonment for not more than 1 year per violation, or by both.

K. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Clean Water Act.

L. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

M. Severability

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

N. State Laws

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by section 510 of the Act.

O. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of erosion control plans. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a permittee only when necessary to achieve compliance with the conditions of the permit.

P. Inspection and Entry

The permittee shall allow the Department or the Regional Administrator, or authorized representative thereof, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and,

4. Sample or monitor at reasonable times, for the purpose of assuring permit compliance, any substances or parameters at any location.

Q. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or notification of planned changes or anticipated noncompliance, does not stay any permit condition.

R. Reopener Provision

If there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with construction activity covered by this permit, the owner or operator may be required to obtain an individual permit or an alternate general permit or the permit may be modified to include different limitations and/or requirements.

S. Notice of Termination

Where a site has been finally stabilized in accordance with the criteria established by DEQ dated September 22, 1994 or where the operator or contractor at a site changes, the operator or contractor of the construction site shall submit a Notice of Termination that is signed in accordance with Part IV.G. The Notice of Termination shall include the following information:

1. The mailing address of the construction site. Where a mailing address for the site is not available, the location of the site must be described as County, Township, Range, Section, and 1/4 Section;

2. The name, address and telephone number of the owner and contractor(s) involved with the site;

3. The MPDES permit number for the construction site;

4. Documentation of whether the site has been permanently stabilized or the contractor(s) of the project has changed; and

5. The Notice of Termination must be certified and signed in accordance with Part IV.G. and IV.H.

The Notice of Termination shall be sent to the following address:

Montana Department of Environmental Quality
Water Protection Bureau
1520 East Sixth Avenue
PO Box 200901
Helena, MT 59620-0901

The Department shall respond in writing to the permittee once the authorization has been terminated.

Failure to submit a Notice of Termination shall result in additional annual permit fee accumulation until notification has been received.

T. Definitions

1. The "Act" means the Federal Clean Water Act.

2. "Best Management Practices" ("BMPs") means schedule of activities, prohibition of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of state waters. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

3. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility or a BMP.

4. The "Department" means the Montana Department of Environmental Quality.

5. "Permittee" for construction activity means both the owner of the property and the contractor(s) conducting the construction activity. For the purposes of this permit, the owner and the contractor(s) will be co-permittees under the storm water general permit.

6. The "receiving water" is the river, stream, lake, etc. which receives the discharge from your site.

7. "Severe Property Damage" means substantial physical damage to property, damage to treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

8. "Storm Water" means storm water runoff, snow melt runoff, and surface runoff and drainage.

COPY

EROSION CONTROL PLAN
for
STORM WATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION ACTIVITY
(Revised 3/15/99)

Note: This site-specific signed erosion control plan must be submitted to the department for approval, along with the signed application and application fees, at least thirty (30) days prior to beginning construction activities (including clearing, grading, excavating).

A copy of this plan must be kept at the construction site.

Any plan which requires engineered structures, such as detention ponds or diversion structures, or which would result in soil and vegetative disturbs of 20 acres or more, must be prepared under the direction of and certified by a registered professional engineer.

The erosion control plan shall include at least the following items:

A. PROJECT TRACKING SUMMARY

1. General Discharge Permit # MTR _____
2. Project Name CAMU (RCRA Landfill) - Phase 1 Cell
   Project # _____
3. Project Address Asarco East Helena
   P.O. Box 1230
   East Helena, MT 59635
   County Lewis & Clark
   Township 10 N Range 3W Section(s) 36 1/4 Section(s) SW
   GIS Coordinates (if available) See project plan sheets (attached)

4. Owner & Contractor Name & Address:
   a. Owner: ASARCO Incorporated
      P.O. Box 1230
      East Helena, MT 59635

   b. Contractor Envirocon, Inc.
      500 Taylor Street
      Missoula, MT 59802

5. What is the total area (acres) of the site? 25

What area (acres) will undergo clearing, grading or excavating during the lifespan of the project 25

6. Site Location: County Lewis & Clark County

Township 10N Range 3W Section 36 1/4 Section SW

7. Name(s) of receiving water(s): Prickly Pear Creek

Will storm waters discharge from the project to a municipal storm sewer? No: x Yes: _____
If treated storm water will be discharged to a municipally owned storm sewer, a letter of authorization from the municipality must accompany this application. (Attach the letter.)

8. Attach a site map and a drainage map (**with drainage patterns indicated**) or a topographic map that includes the location of nearby state waters.

9. Attach a detailed erosion control plan that describes the best management practices that will be used during, and after, construction to control erosion and sedimentation. **The department must approve the erosion control plan before construction activities (including land clearing) take place. This plan shall be submitted along with the application form and application fees at least thirty (30) days before the start of construction.**

I CERTIFY UNDER PENALTY OF THE LAW THAT THIS DOCUMENT AND ALL ATTACHMENTS WERE PREPARED UNDER MY DIRECTION OR SUPERVISION IN ACCORDANCE WITH A SYSTEM DESIGNED TO ASSURE THAT QUALIFIED PERSONNEL PROPERLY GATHER AND EVALUATE THE INFORMATION SUBMITTED. BASED ON MY INQUIRY OF THE PERSON OR PERSONS WHO MANAGE THE SYSTEM, OR THOSE PERSONS DIRECTLY RESPONSIBLE FOR GATHERING THE INFORMATION, THE INFORMATION SUBMITTED IS, TO THE BEST OF MY KNOWLEDGE AND BELIEF, TRUE, ACCURATE, AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT FOR KNOWING VIOLATIONS.

John Shaw
Owners Name (Print)

Plant Manager
Title

Owners Signature (**Note: Part IV.H.1., page 15 of permit number MTR100000 specifies who must sign here**)

4/11/2007
Date

Kris Kok
Contractors Name (Print)

Envirocon, Inc.
Company Name (Print)

Contractors Signature (**Note: Part IV.H.1., page 15 of permit number MTR100000 specifies who must sign here**)

4-10-01
Date

Regional Manager
Title

Application Number: _____
Date Received: _____

MONTANA POLLUTANT DISCHARGE ELIMINATION SYSTEM APPLICATION FOR AUTHORIZATION TO DISCHARGE UNDER THE GENERAL PERMIT FOR STORM WATER ASSOCIATED WITH CONSTRUCTION ACTIVITY

Return to: Attention: Storm Water Program
Montana Department of Environmental Quality
Water Protection Bureau
PO Box 200901
Helena, MT 59620-0901

Note that a complete application includes this signed application form, its signed accompanying site-specific erosion control plan, and the correct application fee. The applicant must submit the complete application to the department at least thirty (30) days prior to construction (including clearing).

Please print or type:

1. Owner's Name and Address

   Asarco Incorporated
   P.O. Box 1230
   East Helena, MT 59635

   Contractor Name and Address

   Envirocon, Inc.
   500 Taylor Street
   Missoula, MT 59802

2. Construction Site Address

   East Helena, Montana

   If an MDT project, list project number N/A and name NA

3. Contact Person Darrell Shew Telephone Number (406) 227-7173

4. Describe the nature of the construction

   Construct, Fill and close an RCRA landfill (CAMU - Phase 1 Cell)

   When is construction planned to start? 5/7/01 When is construction planned to end 11/1/01

Part II.C. 2.a. Site & Project Description

(1) Describe the overall nature of the construction & soil disturbance activities

Construct, fill and close an RCRA landfill

(Camu - Phase 1 Cell)

Provide a timetable for major construction and earth disturbance activities.
See attached Construction Schedule

(2) Total area of the site (acres) 25

Acreage of associated development (e.g. phased development project) 25

Area expected to undergo clearing, excavation, grading 25

(If total land disturbance > 20 acres, a registered professional engineer shall develop ECP.)

(3) Develop Erosion Control Map(s) indicating, as a minimum: (check all features shown on map):

(a) Overview map.

x project boundaries & limits of disturbances.

x *define state waters (e.g. ephemeral, intermittent, perennial streams;* ponds, lakes, wetlands, springs, 100 year flood-plain etc.)

(b) ECP BMP Detailed Map.

x define soil salvage and stockpile (soil & subsoil) areas, define cut and fill slopes greater than 5' in vertical height, drainage patterns (upslope, project area & discharges), approximate slopes anticipated after major grading activities, location of all erosion control facilities or structures, vegetative controls (e.g. buffer strips, enhancement areas, outflows), major impervious structures (e.g. buildings, roads, parking lots, etc.),

Are sand & gravel excavation and/or crushing operations associated with project?

____ Yes x No However, there's a large amont of excavation

Are temporary asphalt batch plant operations associated with this project?

____ Yes x No

Attach a site map for each borrow pit and asphalt batch plant operation indicating the location of state waters, crushing & asphalt plants, stockpiles, chemical or waste storage areas, and BMP's to control storm water runoff. See attached plan sheets.

(4) Describe the nature of the fill material, existing site soils, and their erodability.

Silty, clayey sands in excavation area.

(5) Describe the location of each outfall and the name and distance to the receiving water to which it discharges. (Note: It is helpful to reviewers to have project areas defined relative to drainage, ponds, ditches, lakes, streams and rivers -- see PART II.C.2.a.(3)(2) maps).

See attached drawings .

Part II.C.2.b Controls

(1) Describe in detail, plans for topsoil salvage, stockpiling, sub soil and topsoil regrading, EC BMPs, and vegetative controls to minimize soil erosion from all disturbed areas.

See attached drawings.
Entire site is surrounded by erorsion control fence.
Construct a storm water containment pond and install BMP (diversion ditches)
Salvage and stockpile top 8" of topsoil. Excavate & stockpile remainder of landfill cell. Construct 3 ft. compacted clay liner. Install 2 HDPE liners and assorted geonet and geotextiles. Haul and place waste soils from within the fenced plant boundary (North of the CAMU site).
Place a gas migration layer & compacted clay cap.
Construct 2 ft. compacted clay cap, 40 mil HDPE liner, drainage layer and topsoil cover.
Grade, seed, fertilize & mulch all disturbed areas. (Agricultural areas will receive seed and mulch only).

(2) Describe runoff flow, and runoff management practices and structural features to minimize storm water pollution.

(See attached drawings). Permanent grass/vegetable cover. Permanent storm water containment pond to hold run off from the CAMU during a 25 year - 24 Hour storm. Permanent up slope runoff diversion ditch.

(a) Which of the Following Temporary Stabilization Practices Will Be Used on Project (Please indicate on project site map all BMPs checked herein or explain reasoning):

_____	Slope roughening	_____	Vegetative buffer strips
x	Silt fences	x	Straw bale dikes
_____	Erosion control blankets/mats	_____	Temporary drain diversions
_____	Minimizing clearing	x	Temporary sediment basins/traps
x	Mulching	_____	Temporary seeding
_____	Brush barriers	x	Up slope runoff diversions/controls
_____	Inlet/Outlet protection	_____	Disturbance area runoff diversions/controls
_____	Water way protection	_____	Ditch runoff flow dispersers (e.g. Level spreaders)/flow inhibitors.

Other temporary practices:

(b) Permanent and Structural Stabilization Practices:

x	permanent seeding		check dams*
	retaining walls		drain inlet protection
x	rock outlet protection	x	drainage swales
	sediment basin & traps		earth dikes*
	manmade EC structures		grassed waterways
	sod stabilization		infiltration trenches, basins
	subsurface drains		level spreader
	terraced slopes		tree and shrub planting
x	pipe slope drains		vegetative buffer strips
	detention ponds*	x	containment ponds* **see attached**

*** Provide the runoff coefficient for large runoff diversion and detention structures.**
(1) Roadway Borrow ditch culvert crossings are riprapped @ both ends

(c) Other permanent and structural stabilization practices:

(3) Vehicle tracking of sediment onto roads: Describe measures that will be used to prevent sediment tracking from the construction site onto roads.

_____ graveled access entrance and exit drives and parking areas ***(required from November - June)***

_____ tire wash pad at exit drive

Other measure to prevent sediment tracking:
Haul routes will be paved. The haul route will bee maintained daily with sweepers.

(4) When trucking saturated soils from the site, either tight trucks shall be used or loads shall be required to drain until drippage has been reduced to less than 1 gallon per hour before leaving the site.

Will. saturated soils be trucked from the site? _____ Yes ___x___ No

(5) Provide a schedule of implementation for the minimum control components listed above.
See attached construction schedule.

Part II.C.3. Visible or measurable erosion which results in sediment leaving the construction site or entering state waters is prohibited. (Refer to Page 10 of general permit MTR100000 for a definition of visible or measurable erosion.)

Part II.C.4. If any visible or measurable quantities of sediment leave the site because of the failure of the erosion control facilities, the sediment shall be immediately (within 24 hours of discovery) cleaned up and placed back on the site or disposed of in a manner approved by the department. Under no conditions shall the sediment be washed into the storm sewers, drainage ways or state waters.

Part II.C.5. **Waste Management:** List waste management methods for the following (write NA where not applicable):

Construction Materials Checklist that could impact state waters (write NA where applicable):

_____	Concrete	_____	Masonry Blocks	_____	Solvents
_____	Detergents	_____	Metal Studs	_____	Roofing Shingles
x	Fertilizers	_____	Paints	_____	Tar
x	Fuel	_____	Pesticides	_____	Lumber
_____	Petroleum-based Products				
_____	Other materials (describe)				

Describe product-specific storage practices to be followed on site for:

Petroleum and Paint Products: **Not stored on site.**

Fertilizers and Pesticides: **Not stored on site.**

Hazardous Materials: **All soils with elevated metal concentrations will be placed in the CAMU landfill.**

Concrete Truck Wastewater Disposal: **N/A**

Solid Waste: **All construction waste will be placed in the CAMU landfill.**

Septic Waste: **Septic wastes from portable outhouses will be regularly pumped to a tanker truck & removed from the site.**

Part II.C.6. Describe man-made and natural measures to control pollutants in storm water discharges after construction operations have been completed:

_____ vegetative waterways and natural landscape

_____ infiltration trenches or basins

_____ storm water detention structures,

_____ wet ponds or man-made wetlands,

__x__ storm water containment structures, etc

Additional Discussion (Please Reference section & add additional pages as necessary):

OWNER CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

John R. Shaw	Plant Manager
Owner's Name (Print)	Title
	4/11/2001
Owner's Signature	Date

(Note: Part IV.H.1., page 15 of permit number MTR100000 specifies who must sign here)

CONTRACTOR CERTIFICATION

I certify under penalty of law that I understand the terms and conditions of the general Montana Pollutant Discharge Elimination System (MPDES) permit that authorizes the storm water discharges associated with construction activity from the construction site identified as part of this certification. Further, by my signature, I understand that I am becoming a co-permittee, along with the owner(s) and other contractors and subcontractors signing such certifications, to the general MPDES permit for the storm water discharges associated with construction activity from the identified site. As a co-permittee, I understand that I, and my company, are legally required under the Clean Water Act, to ensure compliance with the terms and conditions of the storm water erosion control plan developed under the MPDES permit and the terms of the MPDES permit.

Kris Kok	Envirocon, Inc.
Contractor's Name (Print)	Company Name (Print)
	4-10-01
Contractor's Signature	Date

(Note: Part IV.H.1., page 15 of permit number MTR100000 specifies who must sign here)

Regional Manager

Title

ASARCO EAST HELENA CAMU-PHASE 1 CELL CONSTRUCTION PROJECT

SURFACE WATER ISSUES

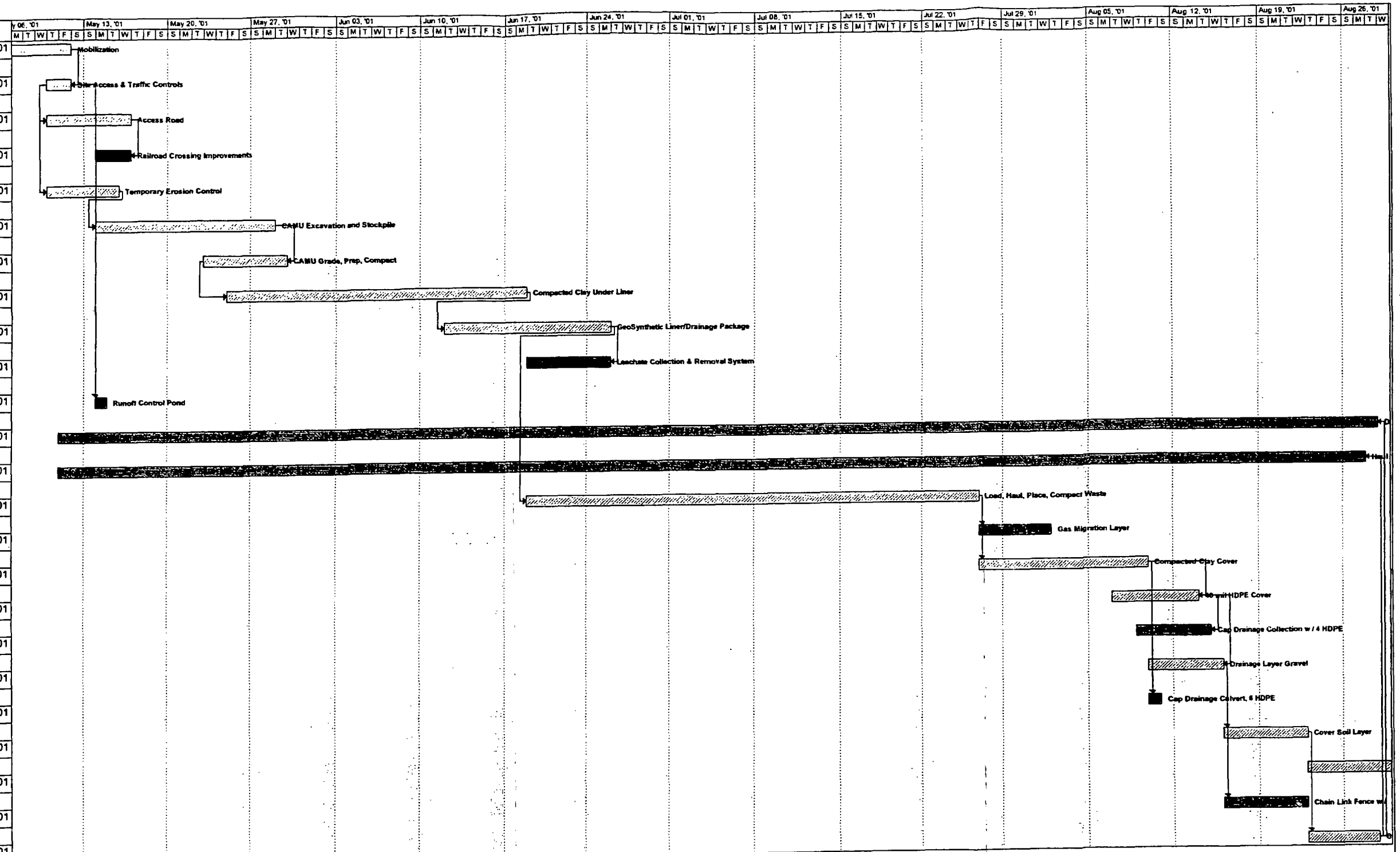
Prickly Pear Creek flows along the east edge of Asarco's property boundary, but is over 2,000 feet from the landfill site. The floodplain boundary for Prickly Pear Creek coincides with the edge of Upper Lake, which is over 800 feet from the site. Small drainage gullies to the southeast and northwest of the site collect runoff and empty into a storm water ditch that bounds the northeast side of the site. This ditch directs storm water to Upper Lake.

The Phase 1 cell site lies within a drainage area of 8.57 acres with an average slope of about 3 percent and a longest flow path of 1300 feet. The soils in this drainage are classified as hydrologic soil group B. Based on a calculated time of concentration of 0.53 hours, a basin lag time of 0.319 hours, a 25-year, 24-hour precipitation event of 2.3 inches, and a Type 1 storm distribution, a peak run-on of 0.4 cfs was calculated to produce 0.24 acre-feet of run-on that will be diverted around the site.

The Phase 1 cell cap occupies approximately 4.2 acres with an average slope of about 13 percent and a longest flow path of 311 feet. The cap soils are classified as hydrologic soil group B. Based on a calculated time of concentration of 0.08 hours, a basin lag time of 0.05 hours, a 25-year, 24-hour precipitation of 2.3 inches, and a Type 1 storm distribution, a peak runoff of 0.4 cfs was calculated to produce 0.12 acre-feet of runoff. To provide adequate storage until the cap cover vegetation is established, a storm water containment pond that will hold 0.26 acre-feet of runoff will be constructed.

COPY

ID	Task Name	Duration	Start	Finish
1	Mobilization	5 days	05/07/01	05/11/01
	Access & Traffic Controls	2 days	05/10/01	05/11/01
5	Access Road	5 days	05/10/01	05/16/01
6				
7	Railroad Crossing Improvements	3 days	05/14/01	05/16/01
8				
9	Temporary Erosion Control	4 days	05/10/01	05/15/01
10				
11	CAMU Excavation and Stockpile	11 days	05/14/01	05/28/01
12				
13	CAMU Grade, Prep, Compact	5 days	05/23/01	05/29/01
14				
15	Compacted Clay Under Liner	17 days	05/25/01	06/18/01
16				
17	GeoSynthetic Liner/Drainage Package	10 days	06/12/01	06/25/01
18				
19	Leachate Collection & Removal System	5 days	06/19/01	06/25/01
20				
21	Runoff Control Pond	1 day	05/14/01	05/14/01
22				
23	Dust Control	78 days	05/11/01	08/28/01
24				
25	Haul Road Maintenance	77 days	05/11/01	08/27/01
26				
27	Load, Haul, Place, Compact Waste	28 days	06/19/01	07/26/01
28				
	as Migration Layer	4 days	07/27/01	08/01/01
	Compacted Clay Cover	10 days	07/27/01	08/09/01
32				
33	40 mil HDPE Cover	5 days	08/07/01	08/13/01
34				
35	Cap Drainage Collection w / 4 HDPE	4 days	08/09/01	08/14/01
36				
37	Drainage Layer Gravel	4 days	08/10/01	08/15/01
38				
39	Cap Drainage Culvert, 6 HDPE	1 day	08/10/01	08/10/01
40				
41	Cover Soil Layer	5 days	08/16/01	08/22/01
42				
43	Seed & Mulch - Ag. & Off-Plant	5 days	08/23/01	08/29/01
44				
45	Chain Link Fence w / Appurtenances	5 days	08/16/01	08/22/01
46				
47	Compacted Clay Cap @ SW Stockpile	4 days	08/23/01	08/28/01



Project: ProjBase
Date: 04/03/01

Task | Task Progress | Critical Task | Critical Task Progress | Milestone | Summary | Rolled Up Task | Rolled Up Critical Task | Rolled Up Milestone | Rolled Up Progress | Split | External Tasks | Project Summary

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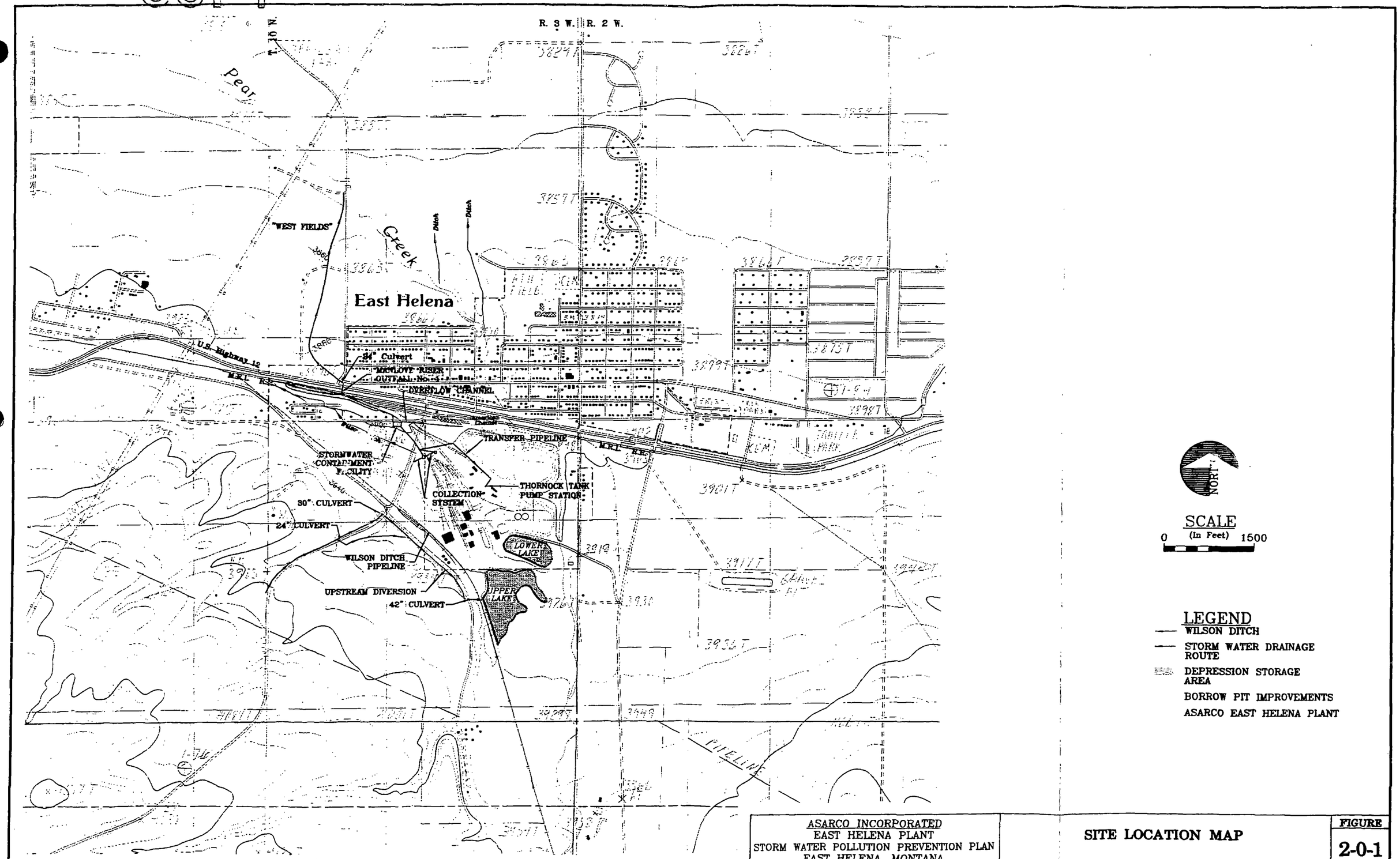

ASARCO INCORPORATED
EAST HELENA PLANT
STORM WATER POLLUTION PREVENTION PLAN
EAST HELENA, MONTANA

SITE LOCATION MAP

FIGURE
2-0-1

UPDATE TIME: 1:05PM

Hydrometrics, Inc.

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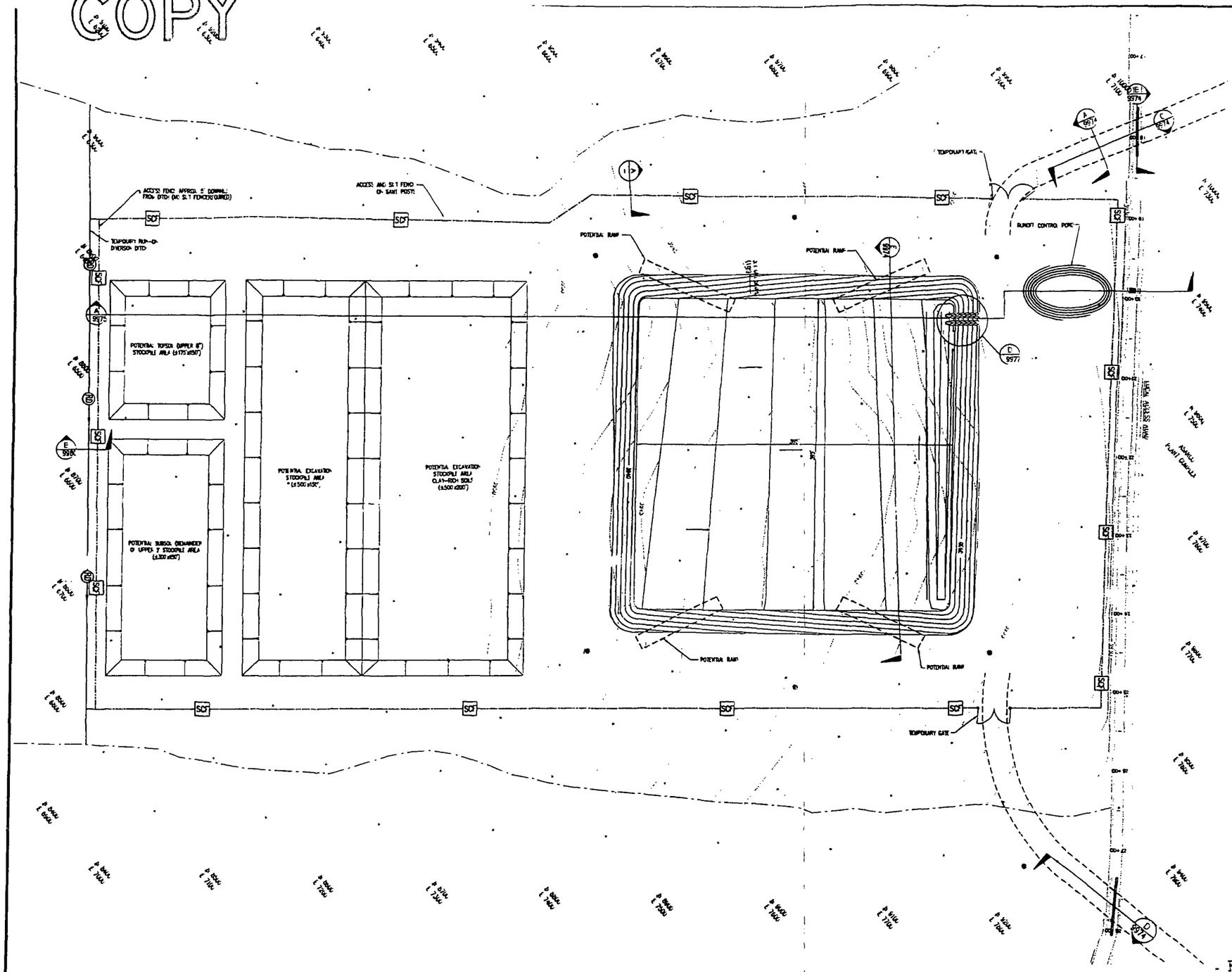
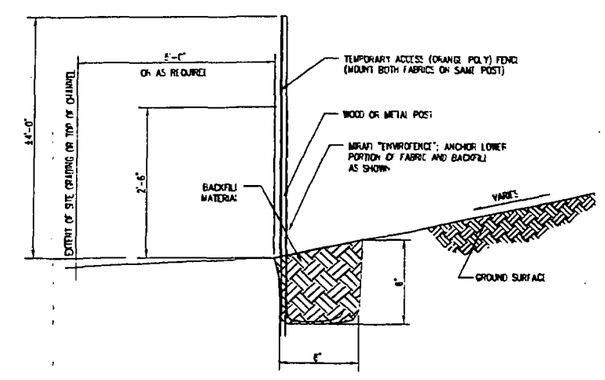


SCALE
(In Feet)
60 0 60 120 180

LEGEND

- LOCAL ACCESS ROAD
- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- GRADE BREAK
- ROAD CULVERT
- PROPOSED GRAVEL ACCESS ROAD
- SCF — SEDIMENT CONTROL & SAFETY FENCE
- RD — RUN-ON DIVERSION DITCH
- RIPRAP SLOPE DRAIN
- DRAINAGE FLOW DIRECTION
- MONITORING WELL

NOTES:
1. BEGIN EXCAVATION AT NORTH END OF POND.
2. MAINTAIN POSITIVE DRAINAGE TO LOW POINT AT NORTH END. STANDING WATER AT LOW POINT TO BE PUMPED INTO EROSION CONTROL POND.
3. STOCKPILES SHOWN AT AVERAGE PILE DEPTH OF 10 FEET.
4. DO NOT DISTURB EXISTING MONITORING WELLS
5. ESTIMATED VOLUMES INCLUDE A 15% SWELL FACTOR



SECTION A
SCALE: NTS
ACCESS AND SEDIMENT CONTROL FENCE DETAIL

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- FOR BID PURPOSES ONLY -

EROSION CONTROL PLAN – EXCAVATION PHASE

SCALE: 1"=60'

Prepared By:
Hydrometrics, Inc.
Consulting Scientists, Engineers, and Contractors

DWG. NO	TITLE
9970	DRAWING REFERENCE LIST

REFERENCES

DWG. NO.	TITLE

REFERENCED

NO.	BY	DATE	DESCRIPTION
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3			
2			
1			
0			

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4			
3			
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1			
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PRELIMINARY
REVISED—DESTROY PREVIOUS ISSUE
RELEASED FOR CONSTRUCTION
ISSUED BY:
DATE:

SCALE	AS-NOTED	
DRAWN BY	0072	9/27/00
CHECKED BY	SMT	10/11/00
APPROVED	MJD	10/12/00

MICHAEL J. DUDICH 12345 REGISTERED PROFESSIONAL ENGINEER

ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA 59635

ASARCO INCORPORATED–EAST HELENA PLANT
CAMU (RCRA LANDFILL) – PHASE I CELL
EXCAVATION SITE PLAN AND
EROSION CONTROL PLAN – EXCAVATION PHASE

ASARCO

DRAWING NUMBER: 08-1-9973
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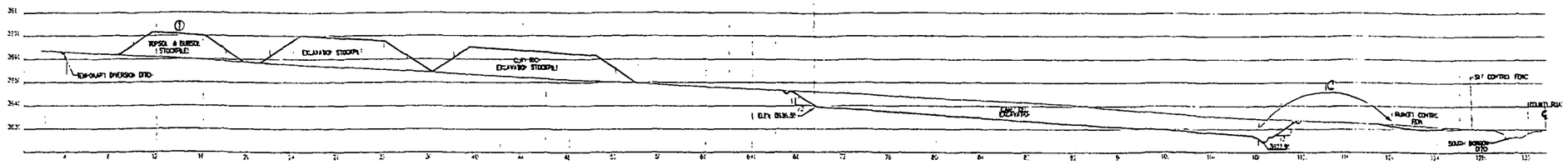
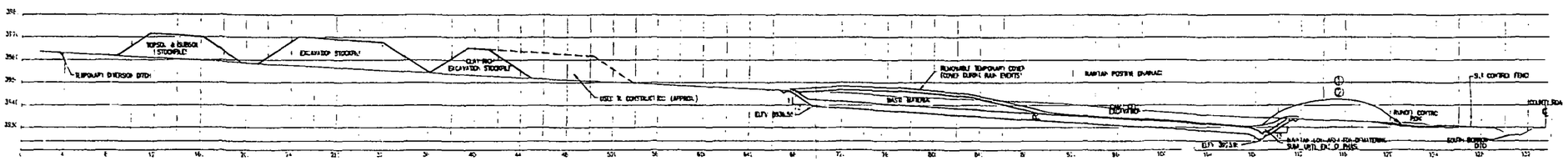


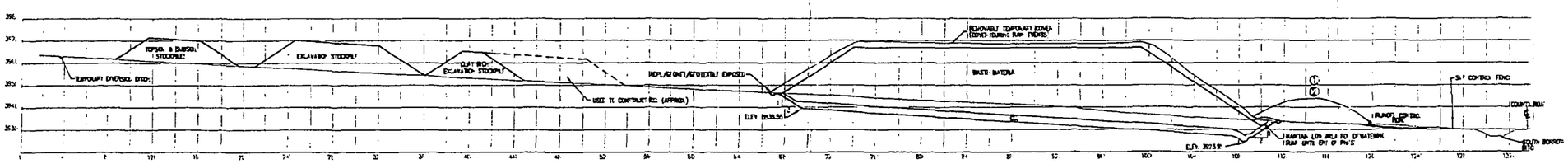
SECTION 1 EXCAVATION PHASE
SCALE: (H) 1"=50' (V) 1"=25'

① EXCAVATE STOCKPILE TOPSOIL AND SUBSOIL BEFORE EXCAVATION CELL.
② DIRECT CLEAN WATER AROUND DISTURBED AREAS TO BORROW DITCH
③ WATER THAT CONTACTS DISTURBED AREAS IS ROUTED TO RUNOFF CONTROL POND.



SECTION 2 DURING INTERMEDIATE WASTE MATERIAL PLACEMENT PHASE
SCALE: (H) 1"=50' (V) 1"=25'

① DIRECT CLEAN WATER AROUND DISTURBED AREAS TO BORROW DITCH. WATER POND ON TEMPORARY BERM WILL BE PUMPED TO RUNOFF CONTROL POND.
② WATER THAT CONTACTS DISTURBED AREAS IS ROUTED TO RUNOFF CONTROL POND. MAINTAIN LOW AREA SUMP.



SECTION 3 FINAL WASTE MATERIAL PLACEMENT PHASE
SCALE: (H) 1"=50' (V) 1"=25'

① DIRECT CLEAN WATER AROUND DISTURBED AREAS TO BORROW DITCH. WATER POND ON TEMPORARY BERM WILL BE PUMPED TO RUNOFF CONTROL POND.
② WATER THAT CONTACTS DISTURBED AREAS IS ROUTED TO RUNOFF CONTROL POND. MAINTAIN LOW AREA SUMP.

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Prepared By:
Hydrometrics, Inc.
Consulting Scientists Engineers and Contractors

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PRELIMINARY
REVISED—DESTROY PREVIOUS ISSUE
RELEASED FOR CONSTRUCTION
ISSUED BY
DATE

SCALE	AS-NOTED	
DRAWN BY	DJ45	8/26/00
CHECKED BY	SWJ	10/12/00
APPROVED		10/13/00

MICHAEL GERDES 57858 MONTANA

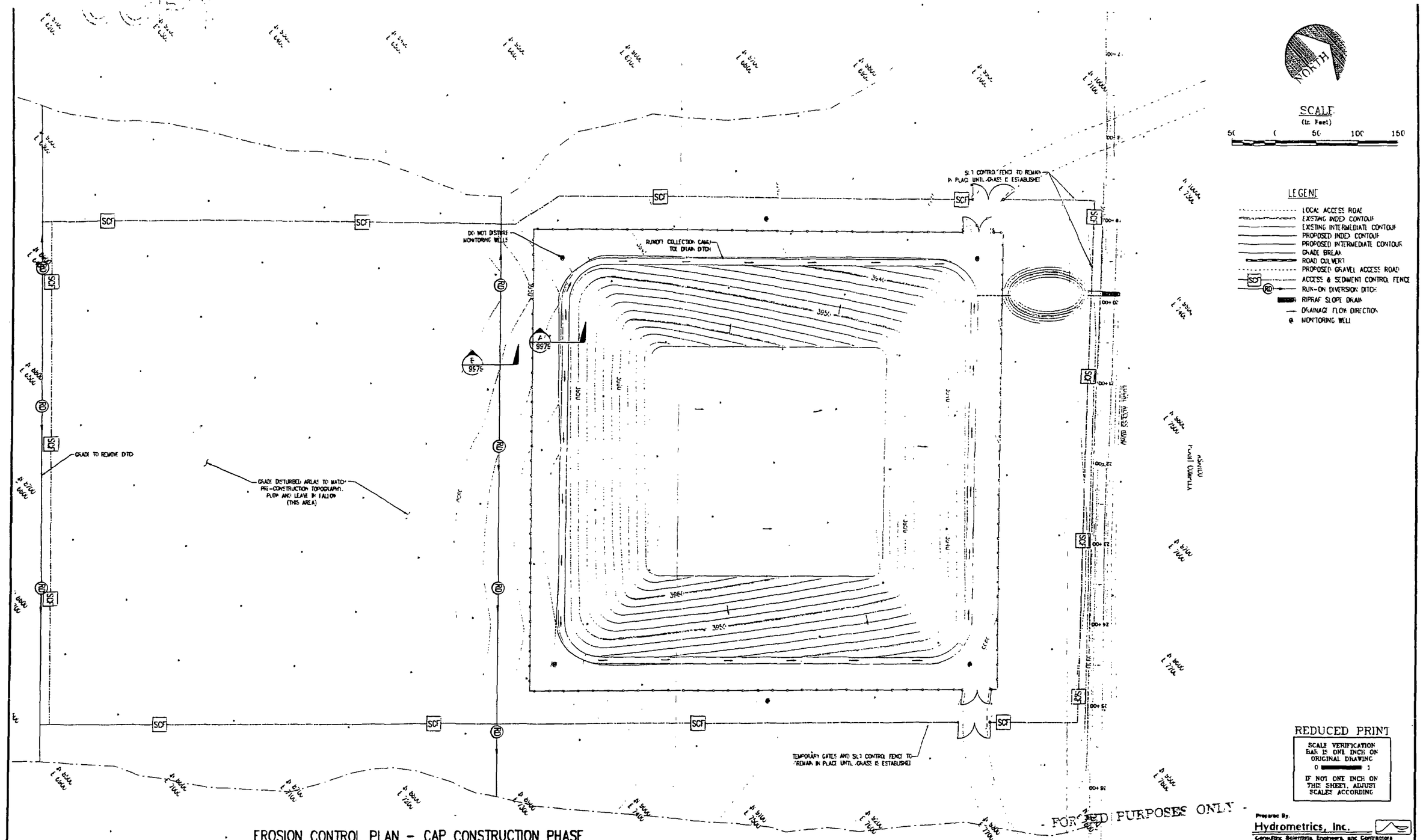
ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA 59635

ASARCO INCORPORATED - EAST HELENA PLANT
CAMU (FORA LANDFILL) - PHASE I CELL
EROSION CONTROL PLAN - WASTE PLACEMENT PHASE

U.S. APPROV. NO. | PLANT NO.

ASARCO

DRAWING NUMBER: 08-1-9975
REV. △



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EROSION CONTROL PLAN - CAP CONSTRUCTION PHASE

SCALE: 1"=50'

Prepared By:
Hydrometrics, Inc.
Consulting Scientists, Engineers, and Contractors

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9970	DRAWING REFERENCE LIST

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NO.	BY	DATE	DESCRIPTION

PRELIMINARY
REVISED-DESTROY PREVIOUS ISSUE
RELEASED FOR CONSTRUCTION
ISSUED BY
DATE

SCALE	AS-NOTED	
DRAWN BY	0072	9/24/00
CHECKED BY	SMT	10/11/00
APPROVED		10/12/00

ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA 59635

ASARCO INCORPORATED-EAST HELENA PLANT
CAMU (RCRA LANDFILL) - PHASE I CELL
EROSION CONTROL PLAN -
CAP CONSTRUCTION PHASE

N.T. APPROV. NO. | PLANT NO.

ASARCO

DRAWING NUMBER: 08-1-9978 | REV. △

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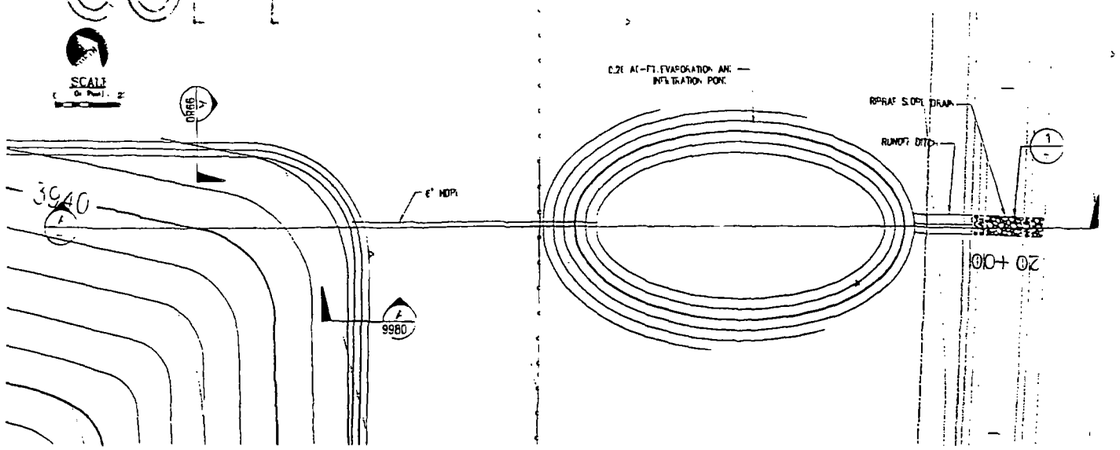
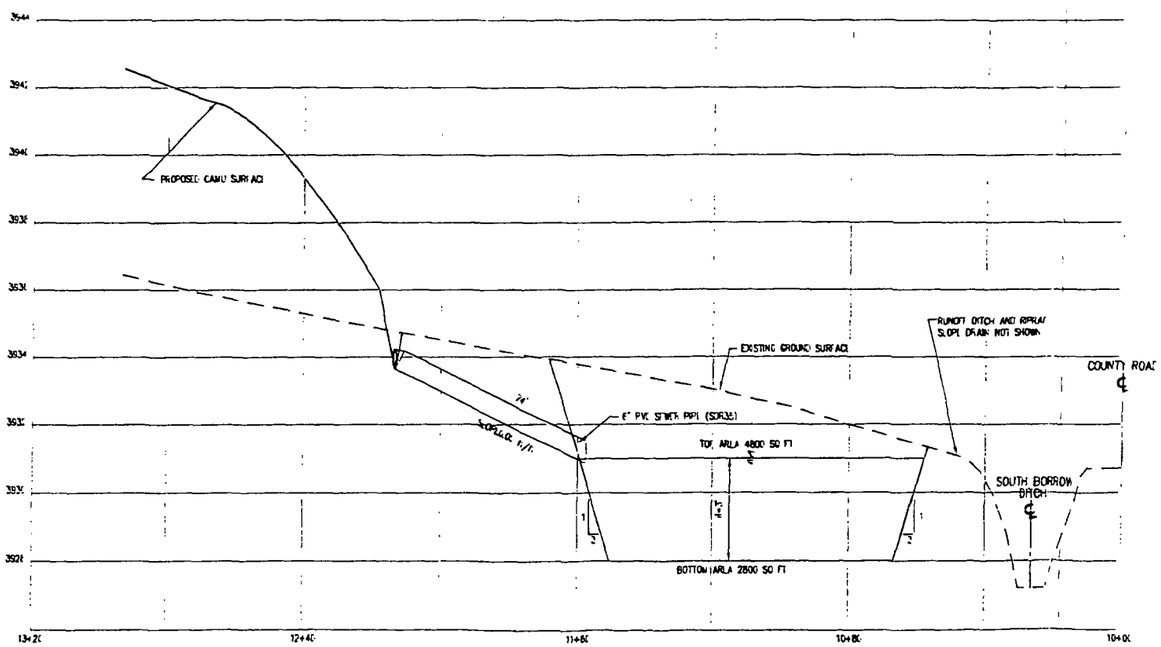


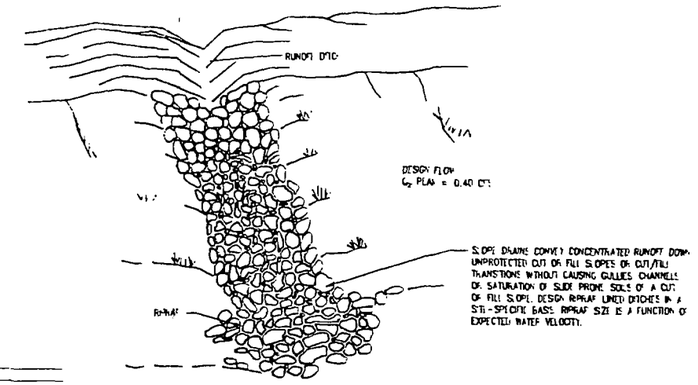
RUNOFF CONTROL POND PLAN VIEW

SCALE: 1"=20'



SECTION (A) RUNOFF CONTROL POND

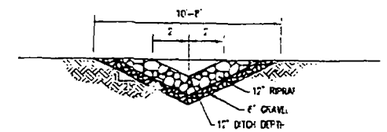
SCALE: (H) 1"=20 (V) 1"=2'



DETAIL (1) RIPRAP SLOPE DRAIN

SCALE: NTS

ITEMIZED QUANTITIES FOR CONSTRUCTION ACTIVITIES (Incorp. Quantities for Bidding Only)			
Remove Top Soil =	(Ac) x 2feet (27 cu/yd)		
	= 207.02 x 2 / 27	=	15,330 cy
	Top 6"	5,115 cy	
	Next 12"	10,225 cy	
Excavate Cut =	(Vc / 27 cu/yd) - Top So		
	= 1,816,250 / 27	16,336 =	61,856 cy
		Total excavation	67,492 cy
Grade Bottom & Compact Subgrade =	(Ac) x 0.5 feet / 27 cu/yd		
	= 207.76 x 0.5 / 27 cu/yd =		3,850 cy
			22,500 sy
Clay Liner =	(Ac) x 2 feet / 27 cu/yd		
	= 207.76 x 2 / 27	=	22,500 cy
FML 2nd layer =	(Ac)		
	= 192,000 sf	=	21,334 sy
FML Geogrid =	(Ac)		
	= 192,000 sf	=	21,334 sy
FML primary =	(Ac)		
	= 192,000 sf	=	21,334 sy
LCS Geogrid =	(Ac)		
	= 192,000 sf	=	21,334 sy
		Both layers =	42,668 sy
		Both geogrids =	42,668 sy
Leachate Collection			
12" perforated pipe @ 450' = 900'		gravel (8 cy) =	216 cy
Includes headpipes		sand (5 cy) =	140 cy
Gas Migration Layer =	(Ac) x 0.5 feet / 27 cu/yd		
	84,100 x 0.5 / 27	=	1,557 cy
Clay Liner cap =	(Ac) x 2 feet / 27 cu/yd		
	210,815 x 2 / 27	=	15,616 cy
40 mil FML cap	= Ac		
	210,815 sf	=	23,424 sy
Drain Gravel cap =	(Ac) x 1 feet / 27 cu/yd		
	220,405 x 1 / 27	=	8,163 cy
Cover Soil	= Ac x 2 feet / 27 cu/yd		
	240,225 x 2 / 27	=	17,790 cy
Geotextile	= Separator + Drainage		
	= 192,000 + 220,405 =	412,405 / 9 =	45,823 sy
OA Plant Revegetation			
Seed & Fertilize	(CAMU area permanent cover)	370,500 sf	8.51 acre
Seed, Fertilize & Mulch	CAMU below permanent cover)	500,700 sf	11.49 acre
		Total Disturbed Areas =	20.00 acre
Chain Link Fence	= 4' (455+256)	=	1,380 lf
Area inside fence	= 570 lf	=	324,500 sf
			7.45 acre
Access Roads			
North	60 lf	30 ft / 9	200 sy
South	60 lf	30 ft / 9	200 sy
			400 sy
Total Landfill Volume Required			
Lower Lake Sediments (ROK)			27,000 cy
Area Between Upper & Lower Lake			17,000 cy
Lower Ore Storage Area			24,000 cy
Shim Rock Soil			30,000 cy
Other			11,000 cy
		Total	113,000 cy



NOTE:
BANK PROTECTION TO BE TYPE 2
USI CLASS I RIPRAP

DETAIL (2) RIPRAP SLOPE DRAIN TYPICAL SECTION

SCALE: NTS

REDUCED PRINT

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALE ACCORDING

FOR BID PURPOSES ONLY

Prepared By:
Hydrometrics, Inc.
Consulting Scientists, Engineers, and Contractors

REFERENCES	DWG. NO	TITLE
	9570	DRAWING REFERENCE LIST

REFERENCES	DWG. NO	TITLE

REVISIONS	NO.	BY	DATE	DESCRIPTION
	1			
	2			
	3			
	4			
	5			

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	4			
	5			

PRELIMINARY
REVISED—DESTROY PREVIOUS ISSUE
RELEASED FOR CONSTRUCTION
ISSUED BY
DATE

SCALE	AS-NOTED	
DRAWN BY	007Z	5/1/00
CHECKED BY	SMT	10/11/00
APPROVED	MICHAEL J. OCURICH	10/12/00

MICHAEL J. OCURICH 5/1/00 STATE OF MONTANA

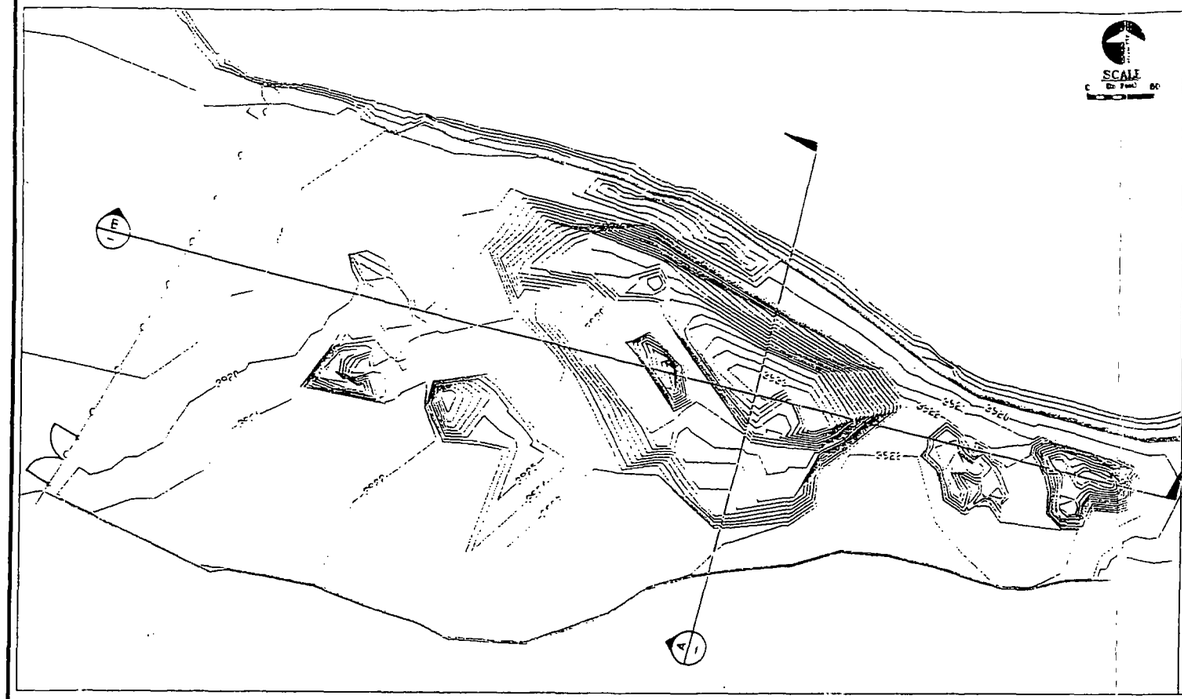
ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, 59635

ASARCO INCORPORATED—EAST HELENA PLANT
CAMU (ROKA LANDFILL) - PHASE I CELL
RUNOFF CONTROL POND PLAN AND
RIPRAP SLOPE DRAIN DETAILS

N.T. APPROV. NO. | PLANT NO.

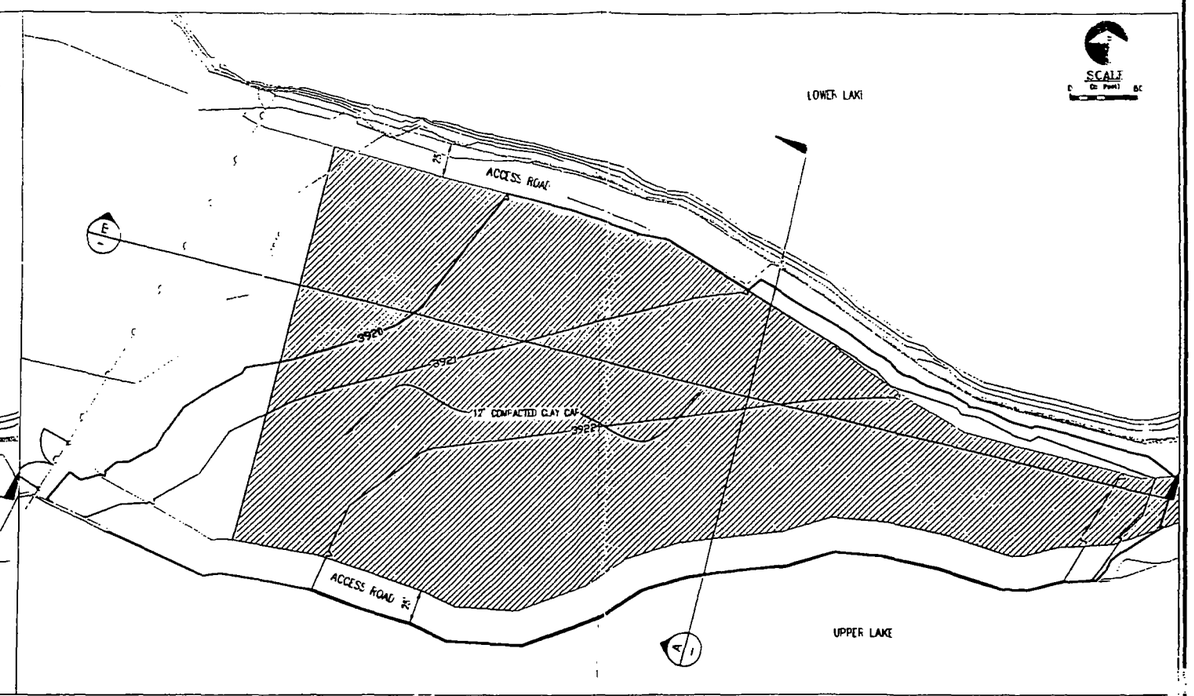
ASARCO

DRAWING NUMBER: 08-1-9979
REV. △



EXISTING SOUTHEAST LOWER LAKE PLAN VIEW

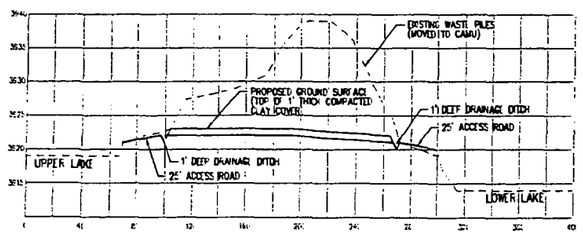
SCALE: 1"=50'



PROPOSED SOUTHEAST LOWER LAKE PLAN VIEW

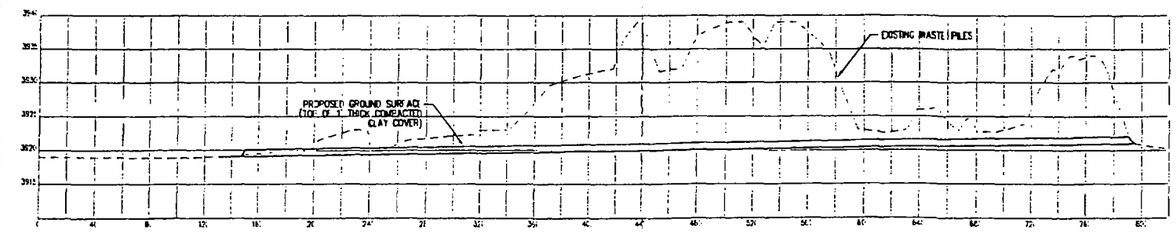
SCALE: 1"=50'

NOTE:
FINAL GRADES TO BE STAKED IN FIELD AFTER EXISTING WASTE PILES REMOVED TO GROUND LEVEL



SECTION A

SCALE: (H)1"=50' (V)1"=20'



SECTION E

SCALE: (H)1"=20' (V)1"=50'

NOTE:
GRADE AND COMPACT SUBGRADE TO 90% MAX DRY DENSITY AT DEPTH OF 6" PRIOR TO PLACING CAP MATERIAL

REDUCED PRINT

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDING

FOR BID PURPOSES ONLY

Prepared By:
Hydrometrics, Inc.
Consulting Scientists, Engineers, and Contractors

REFERENCES	DWG. NO.	TITLE
	9970	DRAWING REFERENCE LIST

REFERENCES	DWG. NO.	TITLE

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REVISIONS	NO.	BY	DATE	DESCRIPTION
	1			
	2			
	3			
	4			
	5			

PRELIMINARY	
REVISED—DESTROY PREVIOUS ISSUE	
RELEASED FOR CONSTRUCTION	
ISSUED BY	
DATE	

SCALE	AS-NOTED	
DRAWN BY	OOTZ	8/25/00
CHECKED BY	SWY	10/16/00
APPROVED		10/16/00

MICHAEL OLLROGGE 12345 PROFESSIONAL ENGINEER MONTANA

ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA 59635

ASARCO INCORPORATED - EAST HELENA PLANT
CAMU (RCRA LANDFILL) - PHASE I CELL
SOUTHEAST LOWER LAKE AREA
GRADING PLAN AND CAP SECTIONS

B.T. APPRO. NO. | PLANT NO.

ASARCO

DRAWING NUMBER: 08-1-9983 | REV. △

COPY

ENVIROCON

Erosion Control Monitoring Log
ASARCO – East Helena, MT

Date	Comments	Inspected By
08-04-01	High winds 08-03-01 - Fence / Control Intact	[illegible]
08-05-01	Afternoon Rains/Flooded Sump on 8-4, AM 8-5 Control Intact	[illegible]
08-06-01	A.m Inspection - Control Intact	[illegible]
8/13/01	All looks [illegible]	[illegible]
8/21/01	All Fence is up and Looks good	[illegible]
8/29/01	Light Rain [illegible] Control Intact	[illegible]
09/06/01	Heavy Rain During Week - Control Intact	[illegible]
09/14/01	Control Intact - Fences/Drainage OK	[illegible]
09/18/01	Control Intact - Moderate Winds	[illegible]
09/25/01	Control Intact - All Fences OK	[illegible]
10/01/01	Control Intact - Fences/Drainages OK	[illegible]
10/9/01	All work OK - No Rain	[illegible]
10/14	Rain on 10/14 Sunday - All Control Looks OK	[illegible]
10/22	Very Little rain. all Looks OK	[illegible]
10/29	All OK	[illegible]
11/1	Pm Rain - All OK	[illegible]
11/9	Project end - Turn over to ASARCO	[illegible]

Erosion Control Monitoring Log
ASARCO East Helena

Date	Comments	Inspected By
5/30/01	Project Start	
6/1/01	Install temp silt fence around stockpiles and drainages	
6/4/01	Silt fence inspection after weekend rain/snow	KW
6/11/01	All silt fence installed and OK	KW
6/19/01	All fence [illegible] - need fence above + below culverts	KW
6/25/01	All fence OK - Installed New fence along Pavement	TJ
6/26/01	PM thunderstorms 6/27 - Fence checked and OK	KW
7/5/01	All fence OK -	TJ
7/13/01	All fence OK - Pumped [illegible] Cell Sump.	TJ
7/14/01	Friday PM storm All fence Looks [illegible]	
7/17/01	Tuesday AM Insp[illegible] Pumped water	TJ
7/18/01	PM Thunderstorms All Fence Looks Fine. [illegible]	KW
7/19/01	Previous nights rain - Control intact	DMT
7/20/01	Previous night rain - " "	DMT
7/21/01	Previous night rain - " "	DMT
07/23/01	Monday A.M. Inspection - Control Intact	DMT
07/25/01	Wednesday A.M. Inspection " "	DMT
07/31/01	Tuesday night Rain Pump water fences Checked OK	TJ
07/30/01	Monday night Heavy Rain, Control Intact	DMT
08/04/01	Saturday A.M. Inspection - Control Intact	

COPY

Erosion Control Monitoring Log
ASARCO East Helena

Date	Comments	Inspected By
5/31/01	Project Start	
6/1/01	Install temp silt fence around stockpiles and drainages	
6/4/01	Silt fence inspection after weekend rain/snow	KW
6/11/01	All silt fence installed and O.K.	KW
6/18/01	All Fence Looks good - Need Fence above + below culverts	KW
6/25/01	All fence OK - Installed New fence along Pavement	[illegible]
6/26/01	PM thunderstorms 6/27 - Fence checked and OK	KW
7/5/01	All fence ok -	[illegible]
7/13/01	All fence ok - Pumped water from Cell Sump,	[illegible]
7/14/01	Friday pm storm All Fence Looks OK.	[illegible]
7/17/01	Tuesday AM Inspection, Pumped water	[illegible]
7/18/01	PM Thunderstorms All fence Looks Fine - Pumping Cell	KW
7/19/01	Previous night rains - Control intact	[illegible]
7/20/01	Previ. night rain - " "	[illegible]
7/21/01	Previous night rain - " "	[illegible]
07/23/01	Monday A.M. Inspection - Control Intact	[illegible]
07/25/01	Wednesday A.M Inspection - " "	[illegible]
07/31/01	Tuesday night Rain, Pump water fences checked ok	[illegible]
07/30/01	Monday night Heavy Rain, Control Intact	[illegible]

Erosion Control Monitoring Log
ASARCO East Helena

Date	Comments	Inspected By
5/31/01	Project Start	
6/1/01	Install temp silt fence around stockpiles and drainages	
6/4/01	Silt fence inspection after weekend rain/snow	KW
6/11/01	All silt fence installed and O.K.	KW.
6/18/01	All Fence looks good - need fence above + below culverts	KW
6/25/01	All fence OK - Installed New fence along Pavement	[illegible]
6/28/01	Pm thunderstorms 6/27 - Fence checked and OK	KW

COPY FOR: HYDROMETRICS

REVISED WITH ADDITIONS: NOV. 15TH, 2001

TABLE 104-1 SUBMITTAL SCHEDULE

SUB ID NO.	SPEC PARA NO. OR DRWG NO.	TYPE OF SUBMITTAL	DESCRIPTION OF MATERIAL	TIME OF SUBMITTAL	DATE REC. FROM CONTR	TO CONTR APPROVED/ DISAPPROVED	RESUBMITTAL DUE FROM CONTRACTOR	REMARKS
Section	III							
1		Notification	NonCollusion Affidavit	With Bid	11-30-00	DD Shew		
2		Notification	Subcontactor and Equipment/Material Listing	With Bid	11-30-00	DD Shew		
3		Notification	Subcontractor Qualifications	With Bid	11-30-00	DD Shew		
4		Notification	Summary of Insurance Requirements	With Bid	11-30-00	DD Shew		
Section	VIII							
5	PART 6	For Approval	Evidence that all indebtedness connected with work has been paid.	Prior to final payment			LIEN RELEASE CURRENTLY PENDING - ASARCO PAYMENT OF LAST INVOICES	
6	PART 7	For Approval	Certificate of Insurance	Prior to mobilization	3-27-01	DD Shew		
Section	X							
7	PART 3	For Approval	All Contractor Drawings for project	15 Days PBC	OK-ON GOING	DD Shew		
8	PART 3	For Approval	Any shop drawings, detail sheets, fabrication details, installation diagrams for any phase of the work.	15 Days PBC	OK-RECIEVED AT DIFFERENT TIMES-PRIOR TO INSTALLATIONS	DD Shew		
9	PART 3	Final	Final As Built Drawings	30 Days AFI	N.A.	-- CREDIT RECIEVED	-FOR AS BUILTS -	BY ASARCO
10	PART 3	For Approval	O&M Instructions and Manuals	Prior to shipping	OK	DD Shew		
11	PART 4	For Approval	Detailed work schedule and work plan	15 Days after Contract Award	4-18-01	DD Shew		
12	PART 35	For Approval	Notice of Interference with Owner Operations	3 Days prior to work	N.A.	DD Shew		
13	PART 42	For Approval	Provide Engineer with sample of material to be used, product data to demonstrate material adherance to specifications.	Prior to ordering material	OK	DD Shew		
14	PART 42	For Approval	Provide Engineer with list of materials to be used.	15 Days PBC	OK	DD Shew		
Section								
15	104.09	Notification	Project photographs	Monthly	OK-RECIEVED	DD Shew - ALSO WAS PROVIDED	-VIDEO DISC.	
16	104.09	For Approval	Acceptable Quality Control Plan	15 Days after Contract Award	4-24-01	DD Shew		
17	109.11.04	For Approval	County Road Crossing permits	15 Days PBC	5-1-01 -	PROVIDED BY ASARCO - WITH CREDIT FROM ENVIROCON		
18	109.11.05	For Approval	Railroad submittals	15 Days PBC	OK-5-1-01	DD Shew		
19	110.02.5	For Approval	Certification of Worker Medical Testing and compliance.	5 Days PBC	MAY & JUNE 2001	DD Shew		
20	110.02.6	For Approval	Certification of Worker Training and Compliance	Prior to attending site specific training	MAY & JUNE 2001	DD Shew		
21	110.02.8	For Approval	Site Health and Safety Plan	10 days ANP	5-1-01	DD Shew		
22	111.01	Cert of Compliance	Documentation from seed supplier showing actual bulk weight of individual seed types.	3 Days prior to use	11-13-01	DD Shew		
23	111.01	Cert of Compliance	Fertilizer Certificates	3 Days prior to use	11-13-01	DD Shew		
24	111.01	Cert of Compliance	Seed Certification	3 Days prior to use	11-13-01	DD Shew		
25	203.07.1	Notification	All survey data	1 day after survey conducted	RECIEVED AS REQUIRED	DD Shew		
26	203.07.2	For Approval	Surveyor to meet with Engineer prior to commencing layout survey of specific areas	5 Days PBC	OK	DD Shew		

TABLE 104-1 SUBMITTAL SCHEDULE

SUB ID NO.	SPEC PARA NO. OR DRWG NO.	TYPE OF SUBMITTAL	DESCRIPTION OF MATERIAL	TIME OF SUBMITTAL	DATE REC. FROM CONTR	TO CONTR APPROVED/ DISAPPROVED	RESUBMITTAL DUE FROM CONTRACTOR	REMARKS
27	203.07.3	Notification	Utility Companies for locates	15 Days PBC	6-4-01	DD Shew		
28	203.07.3	Notification	Construction near utility systems	Prior to digging	6-4-01	DD Shew		
29	203.07.6	For Approval	Dust Control Plan	30 Days PBC	5-4-01	DD Shew	RE-SUBMITTED & APPROVED 5-29-01	
30	208.03.2	For Approval	Erosion Control Plan to MDHES	30 Days PBC	5-1-01	DD Shew		
31	208.03.2	For Approval	Water Control Plan to Engineer	30 Days PBC	5-1-01	DD Shew		
32	301.03.1	For Approval	Sampling and Testing Aggregate	Upon installation completion	6-14-01	DD Shew		
33	401.03.1	For Approval	Asphalt concrete mix design	15 Days prior to use	6-14-01	DD Shew		
34	401.03.1	For Approval	Sampling and Testing Aggregate FOR ASPHALT HAUL ROADS	Upon installation completion	AGREED NOT REQUIRED	DD Shew		
35	402.03.2	For Approval	Asphalt concrete mix design certification	Upon installation completion	N.A.- PER	DD Shew		
36	402.03.2	For Approval	Quality Control Plan	Upon installation completion	4-24-01	DD Shew	RESUBMITTED/APPROVED 5-29-01	
37	402.03.2	For Approval	Sampling and Testing Bituminous Material	Upon installation completion	N.A.-PER-	DD Shew		
38	618.03.2	For Approval	Traffic Control Plan	30 Days PBC	5-4-01	DD Shew	RESUBMITTED/APPROVED 5-29-01	
39	623.03.A	For Approval	Installer's Quality Control Manual	3 Weeks prior to installation	6-27-01	DD Shew		
40	623.03.A	For Approval	Liner installation instructions	3 Weeks prior to installation	6-27-01	DD Shew		
41	623.03.A	For Approval	Panel layout drawings	3 Weeks prior to installation	6-27-01	DD Shew		
42	623.03.A	For Approval	Qualifications of installer	3 Weeks prior to installation	6-27-01	DD Shew		
43	623.03.B	Notification	Geomembrane data	Prior to shipment to site	6-27-01	DD Shew		
44	623.03.B	Notification	Polymer compound data	Prior to shipment to site	6-27-01	DD Shew		
45	623.03.C	Cert of Compliance	Certificate of subgrade acceptance	Prior to installation	7-26-01	DD Shew		
46	623.03.C	For Approval	Warranties for material and installation	Prior to installation			WARRANTIES PENDING	FINAL PAYMENT BY ASARCO TO ENVIROCON
47	623.03.D	Notification	Certified test results from quality control testing.	During installation	7-26-01	DD Shew		
48	623.03.E	Cert of Compliance	Installation Certification	Upon installation completion	JULY-AUG. 2001	DD Shew		
49	623.03.E	For Approval	As-Built Drawings	Upon installation completion	JULY-AUG. 2001	DD Shew		
50	623.03.E	Notification	Warranties from manufacturer, fabricator and installer.	Upon installation completion			WARRANTIES-PENDING FINAL ASARCO PAYMENT TO ENVIROCON	
51	624.03E	Cert of Compliance	Certificate of subgrade acceptance	Prior to installation	6-27-01	DD Shew		
52	624.03E	Cert of Compliance	Installation Certification	Upon installation completion	6-27-01	DD Shew		
53	624.03E	For Approval	As-Built Drawings	Upon installation completion	OK	DD Shew		
54	624.03E	For Approval	Certified test results showing geonet meets specs - certification documentation	3 Weeks prior to installation	6-27-01	DD Shew		
55	624.03E	For Approval	Installer's Quality Control Manual	3 Weeks prior to installation	6-27-01	DD Shew		

TABLE 104-1 SUBMITTAL SCHEDULE

SUB ID NO.	SPEC PARA NO. OR DRWG NO.	TYPE OF SUBMITTAL	DESCRIPTION OF MATERIAL	TIME OF SUBMITTAL	DATE REC. FROM CONTR	TO CONTR APPROVED/ DISAPPROVED	RESUBMITTAL DUE FROM CONTRACTOR	REMARKS
56	624.03E	For Approval	Liner installation instructions	3 Weeks prior to installation	6-27-01	DD Shew		
57	624.03E	For Approval	Panel layout drawings	3 Weeks prior to installation	6-27-01	DD Shew		
58	624.03E	For Approval	Qualifications of installer	3 Weeks prior to installation	6-27-01	DD Shew		
59	624.03E	For Approval	Warranties for material and installation	Prior to installation			PENDING FINAL ASARCO PAYMENT	
60	624.03E	Notification	Certified test results from quality control testing.	During installation	6-27-01	DD Shew		
61	624.03E	Notification	Geomembrane data	Prior to shipment to site	6-27-01	DD Shew		
62	624.03E	Notification	Polymer compound data	Prior to shipment to site	6-27-01	DD Shew		
63	624.03E	Notification	Warranties from manufacturer, fabricator and installer.	Upon installation completion			WARRANTIES-PENDING FINAL ASARCO PAYMENT TO ENVIROCON	
NOTES: AFT - ANP - ATT - BD - PBC - PFI - PPC - PT -	 After Final Inspection After Notice To Proceed After Test is Taken Before Delivery Prior to Beginning Construction Prior to Final Inspection Prior to Project Construction Prior to Testing/Task							
ADDED-FOR SCOPE CHANGE-ADD G.C.L. TOP LINER OF 2 FT	SUBMITTALS G.C.L. TOP SYSTEM-INSTEAD TOP CLAY LINER	FOR APPROVAL	LOT-MANUFACTURERS SUBMITTALS TYPICAL AS ABOVE FROM G.C.L.-MANUFACTURER	PRIOR TO SHIPMENT	SEPT. 2001	NOTE: DD Shew	10 YEAR WARRANTY DUE FROM CETCO-PENDING FINAL ASARCO PAYMENT TO ENVIROCON	

APPENDIX B

QA/QC TESTS

B.1 COMPACTED CLAY LINER TESTS

- A. SOIL TEST DATA SUMMARY
- B. COMPACTION SOIL DENSITY SUMMARY
- C. MOISTURE-DENSITY RELATION REPORTS
- D. COMPACTION SAND CONE SUMMARY
- E. HWA GEOSCIENCES, INC.

B.2 60 MIL HDPE LINER, GEONET, GEOTEXTILE FABRIC

- A. PRECISION GEOSYNTHETIC LAB – HDPE SEAM TEST RESULTS
- B. NORTHWEST LININGS – FIELD TESTS

B.3 40 MIL HDPE LINER

- A. PRECISION GEOSYNTHETIC LAB – HDPE SEAM TEST RESULTS
- B. NORTHWEST LININGS – FIELD TESTS

B.4 GEOSYNTHETIC CLAY LINER (GCL)

ASARCO EAST HELENA
CAMU--QA/QC TESTS

SOIL TEST DATA SUMMARY

Soil Indentification	Laboratory Number	Date Sampled	Date Tested	Report Date	Depth	Source	Unified Classification System ASTM D 2487	Description	INITIAL HYDRAULIC CONDUCTIVITY (1) ASTM D 5084	FINAL HYDRAULIC CONDUCTIVITY (2) ASTM D 5084	REMOLDED SAMPLE PARAMETERS ASTM D 698		GRAIN SIZE FRACTIONS ASTM D 422 (% Passing)												ATTERBURG LIMITS ASTM D 4318			MOISTURE-DENSITY ASTM D 698	
											Density pcf	Moisture %	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#16	#40	#80	#100	#200	LL %	PL %	PI %	Max DD= pcf	OM = %
HWA GEOSCIENCES INC, LYNNWOOD, WA																													
HC - 01	01 - 02	06/15/01	06/29/01	07/26/01		Excavation	SC	Clayey sand with gravel	$1.2x10^{-6}$	$4.4x10^{-8}$	117.5	13.0													32.0	17.0	15.0	124.7	12.3
HC - 02	01 - 03	06/15/01	06/29/01	07/26/01		Excavation	CL	Sandy lean clay with gravel	$1.3x10^{-5}$	$5.9x10^{-8}$	103.6	17.5													38.0	20.0	18.0	109.7	17.5
HC - 03	01 - 04	06/18/01	06/29/01	07/26/01		Excavation	CL	Sandy lean clay with gravel	$1.8x10^{-6}$	$4.5x10^{-7}$	101 7	17.5													34.0	18.0	16.0	107.1	17.5
HC - 04	01 - 05	06/18/01	07/06/01	07/31/01		Excavation	CL	Sandy lean clay	$6.2x10^{-7}$	$2.2x10^{-7}$	100.0	14.5													31.0	18.0	13.0	105.5	14.5
HC - 05	01 - 06	06/25/01	07/06/01	07/31/01		Excavation	CL	Sandy lean clay	$5.3x10^{-7}$	$1.8x10^{-7}$	105.9	16.3													31.0	16.0	15.0	110.6	16.3
HC - 06	01 - 07	06/27/01	07/19/01	08/21/01		Excavation	CL	Sandy lean clay	$3.1x10^{-7}$	$4.5x10^{-8}$	102.9	17.5													37.0	19.0	18.0	108.7	16.8
HC - 07	01 - 11	06/29/01	07/24/01	09/06/01		Excavation	CL	Sandy lean clay	$6.5x10^{-7}$	$3.7x10^{-8}$	107.3	16.0													36.0	18.0	18.0	111.7	16.0
HYDROMETRICS INC, HELENA MT																													
HC - 01	01 - 02	06/15/01	06/15/01	07/11/01	3939.38	Excavation	SC	Clayey Sand, Sand Clay Mixture					100	100	100	100	98	92	91	89	69	55	49	34.9	31.0	17.0	14.0		
HC - 02	01 - 03	06/15/01	06/15/01	07/11/01	3938.95	Excavation	CL	Lean Clay, Sandy or Silty Clay					100	100	100	97	96	95	89	75	73	71	61	51.2	36.0	22.0	14 0		
HC - 03	01 - 04	06/18/01	06/18/01	07/11/01		Excavation	SC	Clayey Sand, Sand Clay Mixture					100	100	96	94	91	86	81	77	67	54	51	37.1	32.0	19.0	13.0		
HC - 04	01 - 05	06/18/01	06/18/01	07/11/01	3933.50	Excavation	SC	Clayey Sand, Sand Clay Mixture					100	100	100	98	97	95	92	89	73	50	45	27.6	29.0	19.0	10.0		
HC - 05	01 - 06	06/25/01	06/29/01	07/11/01		Excavation	CL	Lean Clay, Sandy or Silty Clay					100	100	100	100	100	97	95	92	80	66	63	53.4	30.0	22.0	8.0		
HC - 06	01 - 07	06/27/01	06/29/01	07/11/01	3940.88	Excavation	CL	Lean Clay, Sandy or Silty Clay					100	100	100	100	100	95	92	89	81	69	66	50.7	32.0	22.0	10.0		
HC - 07	01 - 11	06/29/01	06/29/01	07/11/01		Excavation	SC	Clayey Sand, Sand Clay Mixture					100	100	100	99	97	96	92	87	81	63	60	48.8	29.0	18.0	11.0		
L - 1	01 - 12	06/29/01	06/29/01	07/11/01	+6" subgrade	CCL	SC	Clayey Sand, Sand Clay Mixture					100	100	96	93	91	85	77	70	47	43	42	35.8	32.0	19.0	13.0		
L - 2	01 - 13	06/30/01	06/30/01	07/11/01	+12" subgrade	CCL	SC	Clayey Sand, Sand Clay Mixture					100	100	98	96	95	92	89	85	70	53	50	37.6	31.0	20.0	11.0		
MD - 01	01 - 01	06/07/01	06/07/01	06/08/01		CAMU Excavation	SC	Clayey Sand, Sand Clay Mixture					100.0	99.0	98.0	89.0	86.0	80	75	70	56	39	36	23.4	34.2	22.2	12.0	110.5	17.0
MD - 02	01 - 08	06/07/01	06/08/01	07/11/01		CAMU Excavation	SC	Clayey Sand, Sand Clay Mixture					100	100	100	100	98	94	88	79	66	41	38	27.2	35.0	23.0	12.0	112	14.5
MD - 104	01 - 09	06/27/01	06/27/01	06/27/01		Stockpile	CL	Lean Clay, Sandy or Silty Clay					100	100	100	99	98	96	93	90	82	70	68	58.0	36.3	20.8	15.5	104.2	19.3
MD - 03	01 - 10	06/27/01	06/27/01	06/27/01		Stockpile	CL	Lean Clay, Sandy or Silty Clay					100	100	100	98	95	93	91	88	76	64	62	53.4	34.0	20.0	14.0	107.9	17.1

ASARCO EAST HELENA
CAMU--QA/QC TESTS

SOIL TEST DATA SUMMARY

Soil Indentification	Laboratory Number	Date Sampled	Date Tested	Report Date	Depth	Source	Unified Classification System ASTM D 2487	Description	INITIAL HYDRAULIC CONDUCTIVITY (1) ASTM D 5084	FINAL HYDRAULIC CONDUCTIVITY (2) ASTM D 5084	REMOLDED SAMPLE PARAMETERS ASTM D 698		GRAIN SIZE FRACTIONS ASTM D 422 (% Passing)												ATTERBURG LIMITS ASTM D 4318			MOISTURE-DENSITY ASTM D 698	
											Density pcf	Moisture %	1 1/2"	1"	3/4"	1/2"	3/8"	#4	#10	#16	#40	#80	#100	#200	LL %	PL %	PI %	Max DD= pcf	OM = %
MD - 04	01 - 14	07/02/01	07/02/01	07/03/01		Stockpile	CL	Lean Clay, Sandy or Silty Clay					100	100	100	98	97	95	93	91	85	75	72	60.0	32.0	21.0	11.0	106.5	19.0
MD - 05	01 - 15	07/10/01	07/10/01	07/12/01		Screened Stockpile	SC	Clayey Sand, Sand Clay Mixture					100	100	100	100	99	95	92	89	79	66	63	49.1	29.0	20.0	9.0	111	16.6
MD - 06	01 - 16	07/10/01	07/10/01	07/12/01		Screened Stockpile	SC	Clayey Sand, Sand Clay Mixture					100	100	100	100	100	97	93	89	77	63	58	44.8	27.0	18.0	9.0	111	16.6
MD - 07	01 - 17	07/12/01	07/12/01	07/13/01		Screened Stockpile	SC	Clayey Sand, Sand Clay Mixture					100	100	100	95	95	92	88	84	70	52	48	30.4	30.0	21.0	9.0	109.5	17.8
MD - 08	01 - 18	07/14/01	07/15/01	07/16/01		Screened Stockpile	SC	Clayey Sand, Sand Clay Mixture					100	96	96	94	92	88	84	80	65	45	41	26.0	31.0	23.0	8.0	110.8	16.3
MD - 09	01 - 22	07/20/01	07/22/01	07/23/01		Belt Sample	SC	Clayey Sand, Sand Clay Mixture					100	100	100	99	97	94	90	86	73	55	51	33.8	32.0	21.0	11.0	112.3	16.5

L1 Indicates Lift #1, which is 0 to 6"
L2 Indicates Lift #2, which is approximately 6" to 12"
MD Moisture-Density
HC Hydraulic Conductivity
** HC Test still in progress, results not yet abvailable

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Project Name: CAMU
Project Location: ASARCO EAST HELENA
Client: ASARCO INCORPORATED

Date Reported: 8/3/01

Lab #(s) 01-01,01-08,01-10,01-11, 01-14,01-15,01-16,01-17,01-22

COMPACTION SOIL DENSITY SUMMARY

Test #	Date Tested	Location of Test	Elevation or Depth	Description of Soil	Lab M-D Results: Max. Dry Density (pcf)	Lab M-D Results: Optimum Moisture (%)	Method of Test	Field Test Results: Dry Density (pcf)	Compaction: % Actual	Compaction: % Spec.	Moisture: % Actual	Moisture: ± Optimum	Pass or Fail
0607-01	6/7/01	South Haul Road @10+08 24RT	-1.5	Clayey Sand	110.5	17.0	D 2922	103.0	93	95	15.3	(1.7)	Fail
0607-02	6/7/01	South Haul Road @10+16 C/L	-1.5	Clayey Sand	110.5	17.0	D 2922	104.6	95	95	15.9	(1.1)	Pass
0607-01A	6/7/01	South Haul Road @10+08 24RT	-1.5	Clayey Sand	110.5	17.0	D 2922	106.1	96	95	14.9	(2.1)	Pass
0611-03	6/11/01	North Haul Road @12+52 8LT	Grade	Clayey Sand	110.5	17.0	D 2922	110.3	100	95	12.6	(4.4)	Pass
0611-04	6/11/01	North Haul Road @10+37 1LT	Grade	Clayey Sand	110.5	17.0	D 2922	106.4	96	95	12.7	(4.3)	Pass
0626-05	6/26/01	Cell Subgrade	TOS	Clayey Sand	112.5	14.5	D 2922	113.4	101	90	8.6	(5.9)	Pass
0626-06	6/26/01	Cell Subgrade	TOS	Clayey Sand	112.5	14.5	D 2922	109.2	97	90	10.6	(3.9)	Pass
0627-07	6/27/01	Cell Subgrade	TOS	Clayey Sand	112.5	14.5	D 2922	104.3	93	90	10.4	(4.1)	Pass
0627-08	6/27/01	Cell Subgrade	TOS	Clayey Sand	112.5	14.5	D 2922	104.1	93	90	11.3	(3.2)	Pass
0627-09	6/27/01	Cell Subgrade	TOS	Clayey Sand	112.5	14.5	D 2922	103.2	92	90	13.3	(1.2)	Pass
0629-10	6/29/01	11+50 175RT	+6"	Clayey Sand	112.5	14.5	D 2922	111.8	99	95			Pass
0629-11	6/29/01	13+50 180RT	+6"	Clayey Sand	112.5	14.5	D 2922	104.1	93	95			Pass
0629-12	6/29/01	13+60 110RT	+6"	Lean Clay	107.9	17.1	D 2922	100.0	93	95	18.9	1.8	Pass
0629-14	6/29/01	12+50 C/L	+6"	Lean Clay	104.2	19.3	D 2922	100.5	96	95			Pass
0629-15	6/29/01	11+30 10RT	+6"	Lean Clay	104.2	19.3	D 2922	99.6	96	95	19.9	0.6	Pass
0629-16	6/29/01	13+65 130LT	+6"	Clayey Sand	112.5	14.5	D 2922	109.5	97	95			Pass
0629-17	6/29/01	11+45 110LT	+6"	Clayey Sand	112.5	14.5	D 2922	108.9	97	95	16.5	2.0	Pass
0629-18	6/29/01	13+10 25LT	+6"	Lean Clay	107.9	17.1	D 2922	103.5	96	95			Pass
0629-19	6/29/01	11+90 20LT	+6"	Lean Clay	107.9	17.1	D 2922	102.2	95	95	18.6	1.5	Pass
0629-20	6/29/01	11+20 78LT	+6"	Lean Clay	104.2	19.3	D 2922	100.0	96	95			Pass
0629-21	6/29/01	12+80 90LT	+6"	Lean Clay	104.2	19.3	D 2922	95.8	92	95	22.3	3.0	Pass
0629-22	6/29/01	14+00 85LT	+6"	Lean Clay	104.2	19.3	D 2922	100.5	96	95			Pass
0630-23	6/30/01	11+10 110LT	+6"	Lean Clay	104.2	19.3	D 2922	99.9	96	95	17.8	(1.5)	Pass
0630-24	6/30/01	12+15 115RT	+6"	Lean Clay	104.2	19.3	D 2922	100.7	97	95			

Reported to: Darrell Shew - ASARCO, Inc.

Submitted by: Dale Wells - Hydrometrics, Inc.

NOTE: Test numbers suffixed by a letter indicate a retest of that number.

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Project Name: CAMU
Project Location: ASARCO EAST HELENA
Client: ASARCO INCORPORATED

Date Reported: 8/3/01

Lab #(s) 01-01,01-08,01-10,01-11, 01-14,01-15,01-16,01-17,01-22

COMPACTION SOIL DENSITY SUMMARY

Test #	Date Tested	Location of Test	Elevation or Depth	Description of Soil	Lab M-D Results		Method of Test	Field Test Results					Pass or Fail
									Compaction		Moisture		
					Max. Dry Density (pcf)	Optimum Moisture (%)		Dry Density (pcf)	% Actual	% Spec.	% Actual	± Optimum	
0630-25	6/30/01	13+70 120LT	+6"	Lean Clay	107.9	17.1	D 2922	106.1	98	95	17.9	0.8	Pass
0630-26	6/30/01	14+00 150LT	+6"	Lean Clay	104.2	19.3	D 2922	97.5	94	95	18.2	(1.1)	Pass
0709-53	7/9/01	14+00 60RT	+6"	Lean Clay	107.9	17.1	D 2922	111.2	103	95	16.5	(0.6)	Pass
0709-54	7/9/01	12+60 120 RT	+6"	Lean Clay	107.9	17.1	D 2922	110.8	103	95	16.2	(0.9)	Pass
0710-55	7/10/01	14+00 SOUTH SLOPE	+6"	Lean Clay	107.9	17.1	D3017				15.9	(1.2)	Pass
0710-56	7/10/01	11+40 SOUTH SLOPE	+6"	Lean Clay	107.9	17.1	D3017				17.3	0.2	Pass
0710-57	7/10/01	12+10 5RT	+6"	Lean Clay	107.9	17.1	D 2922	103.9	96	95	16.2	(0.9)	Pass
0710-58	7/10/01	12+90 10LT	+6"	Lean Clay	107.9	17.1	D 2922	108.1	100	95	16.1	(1.0)	Pass
0710-59	7/10/01	13+85 65LT	+6"	Lean Clay	107.9	17.1	D 2922	109.3	101	95	15.9	(1.2)	Pass
0710-60	7/10/01	11+75 135LT	+6"	Lean Clay	107.9	17.1	D 2922	102.7	95	95	15.4	(1.7)	Pass
0710-61	7/10/01	13+45 40LT	+6"	Lean Clay	107.9	17.1	D 2922	104.2	97	95	16.7	(0.4)	Pass
0710-62	7/10/01	12+75 NORTH SLOPE	+6"	Lean Clay	107.9	17.1	D3017				17.4	0.3	Pass
0710-63	7/10/01	14+50 NORTH SLOPE	+6"	Lean Clay	107.9	17.1	D3017				17.6	0.5	Pass
0710-64	7/10/01	11+50 190RT	+12"	Clayey Sand	111.0	16.6	D3017				21.4	4.8	Pass
0710-65	7/10/01	12+10 185RT	+12"	Clayey Sand	111.0	16.6	D3017				17.7	1.1	Pass
0710-66	7/10/01	11+80 131RT	+12"	Clayey Sand	111.0	16.6	D3017				18.7	2.1	Pass
0710-67	7/10/01	12+70 119RT	+12"	Clayey Sand	111.0	16.6	D3017				25.2	8.6	Fail
0710-67A	7/10/01	121+70 119RT	+12"	Clayey Sand	111.0	16.6	D3017				18.9	2.3	Pass
0710-68	7/10/01	13+90 125RT	+12"	Clayey Sand	111.0	16.6	D3017				18.5	1.9	Pass
0710-69	7/10/01	11+95 190RT	+12"	Clayey Sand	111.0	16.6	D 2922	105.1	95	95	18.2	1.6	Pass
0710-70	7/10/01	12+85 164RT	+12"	Clayey Sand	111.0	16.6	D 2922	105.6	95	95	16.8	0.2	Pass
0710-71	7/10/01	13+95 150RT	+12"	Clayey Sand	111.0	16.6	D 2922	104.9	95	95	16.4	(0.2)	Pass
0710-72	7/10/01	13+75 95RT	+12"	Clayey Sand	111.0	16.6	D 2922	108.3	98	95	16.3	(0.3)	Pass
0710-73	7/10/01	12+15 105RT	+12"	Clayey Sand	111.0	16.6	D 2922	108.9	98	95	15.9	(0.7)	Pass

Reported to: Darrell Shew - ASARCO, Inc.

Submitted by: Dale Wells - Hydrometrics, Inc.

NOTE: Test numbers suffixed by a letter indicate a retest of that number.

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Project Name: CAMU
Project Location: ASARCO EAST HELENA
Client: ASARCO INCORPORATED

Date Reported: 8/3/01

Lab #(s) 01-01,01-08,01-10,01-11, 01-14,01-15,01-16,01-17,01-22

COMPACTION SOIL DENSITY SUMMARY

Test #	Date Tested	Location of Test	Elevation or Depth	Description of Soil	Lab M-D Results: Max. Dry Density (pcf)	Lab M-D Results: Optimum Moisture (%)	Method of Test	Field Test Results: Dry Density (pcf)	Compaction: % Actual	Compaction: % Spec.	Moisture: % Actual	Moisture: ± Optimum	Pass or Fail
0710-74	7/10/01	11+10 85RT	+12"	Clayey Sand	111.0	16.6	D 2922	103.8	94	95	17.3	0.7	Pass
0711-75	7/11/01	13+10 185RT	+18"	Clayey Sand	111.0	16.6	D3017				18.8	2.2	Pass
0711-76	7/11/01	11+75 190RT	+18"	Clayey Sand	111.0	16.6	D3017				19.9	3.3	Pass
0711-77	7/11/01	11+10 180RT	+18"	Clayey Sand	111.0	16.6	D3017				16.8	0.2	Pass
0711-78	7/11/01	13+85 10LT	+12"	Clayey Sand	111.0	16.6	D 2922	102.9	93	95	16.7	0.1	Pass
0711-79	7/11/01	11+75 5LT	+12"	Clayey Sand	111.0	16.6	D 2922	106.1	96	95	16.8	0.2	Pass
0711-80	7/11/01	12+90 C/L	+12"	Clayey Sand	111.0	16.6	D 2922	106.7	96	95	16.9	0.3	Pass
0711-81	7/11/01	11+25 180RT	+18"	Clayey Sand	111.0	16.6	D3017				17.2	0.6	Pass
0711-82	7/11/01	12+85 100RT	+18"	Clayey Sand	111.0	16.6	D 2922	110.1	99	95	16.6	0.0	Pass
0711-83	7/11/01	13+75 90RT	+18"	Clayey Sand	111.0	16.6	D 2922	106.1	96	95	18.7	2.1	Pass
0711-84	7/11/01	11+55 105RT	+18"	Clayey Sand	111.0	16.6	D 2922	107.8	97	95	17.5	0.9	Pass
0712-85	7/12/01	13+80 70RT	+18"	Clayey Sand	111.0	16.6	D 2922	113.6	102	95	15.3	(1.3)	Pass
0712-86	7/12/01	14+20 100RT	+18"	Clayey Sand	111.0	16.6	D 2922	106.7	96	95	17.1	0.5	Pass
0712-87	7/12/01	12+95 5RT	+18"	Clayey Sand	111.0	16.6	D 2922	106.5	96	95	15.0	(1.6)	Pass
0712-88	7/12/01	12+80 30RT	+18"	Clayey Sand	111.0	16.6	D 2922	103.7	93	95	18.3	1.7	Pass
0712-89	7/12/01	12+60 75RT	+18"	Clayey Sand	111.0	16.6	D 2922	112.0	101	95	16.1	(0.5)	Pass
0712-90	7/12/01	14+60 190RT	+24"	Clayey Sand	111.0	16.6	D3017				17.2	0.6	Pass
0712-91	7/12/01	13+95 185RT	+24"	Clayey Sand	111.0	16.6	D3017				15.7	(0.9)	Pass
0712-92	7/12/01	11+65 180RT	+24"	Clayey Sand	111.0	16.6	D 2922	103.8	94	95	16.7	0.1	Pass
0712-93	7/12/01	12+70 190RT	+24"	Clayey Sand	111.0	16.6	D 2922	107.7	97	95	16.2	(0.4)	Pass
0712-94	7/12/01	13+95 170RT	+24"	Clayey Sand	111.0	16.6	D 2922	106.8	96	95	17.5	0.9	Pass
0714-95	7/14/01	11+80 190RT	+30"	Clayey Sand	110.4	16.9	D 2922	108.7	98	95	17.2	0.3	Pass
0714-96	7/14/01	13+00 170RT	+30"	Clayey Sand	110.4	16.9	D 2922	106.8	97	95	15.0	(1.9)	Pass
0714-97	7/14/01	14+20 130RT	+30"	Clayey Sand	110.4	16.9	D3017				19.1	2.2	Pass

Reported to: Darrell Shew - ASARCO, Inc.

Submitted by: Dale Wells - Hydrometrics, Inc.

NOTE: Test numbers suffixed by a letter indicate a retest of that number.

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Project Name: CAMU
Project Location: ASARCO EAST HELENA
Client: ASARCO INCORPORATED

Date Reported: 8/3/01

Lab #(s) 01-01,01-08,01-10,01-11, 01-14,01-15,01-16,01-17,01-22

COMPACTION SOIL DENSITY SUMMARY

Test #	Date Tested	Location of Test	Elevation or Depth	Description of Soil	Lab M-D Results: Max. Dry Density (pcf)	Lab M-D Results: Optimum Moisture (%)	Method of Test	Field Test Results: Dry Density (pcf)	Compaction: % Actual	Compaction: % Spec.	Moisture: % Actual	Moisture: ± Optimum	Pass or Fail
0714-98	7/14/01	14+00 180RT	+30"	Clayey Sand	110.4	16.9	D 2922	113.1	102	95	17.6	0.7	Pass
0714-99	7/14/01	12+80 120RT	+24"	Clayey Sand	110.4	16.9	D 2922	113.7	103	95	16.2	(0.7)	Pass
0714-100	7/14/01	13+40 90RT	+24"	Clayey Sand	110.4	16.9	D3017				17.4	0.5	Pass
0714-101	7/14/01	14+10 100RT	+24"	Clayey Sand	110.4	16.9	D3017				18.2	1.3	Pass
0714-102	7/14/01	11+10 120RT	+24"	Clayey Sand	110.4	16.9	D 2922	113.6	103	95	16.9	0.0	Pass
0714-103	7/14/01	11+00 50RT	+24"	Clayey Sand	110.4	16.9	D 2922	107.8	98	95	17.1	0.2	Pass
0714-104	7/14/01	12+50 70RT	+24"	Clayey Sand	110.4	16.9	D 2922	106.0	96	95	16.5	(0.4)	Pass
0715-105	7/15/01	11+20 C/L	+24"	Clayey Sand	110.4	16.9	D 2922	112.4	102	95	17.3	0.4	Pass
0715-106	7/15/01	12+80 10LT	+24"	Clayey Sand	110.4	16.9	D 2922	108.7	98	95	17.6	0.7	Pass
0715-107	7/15/01	14+75 50LT	+12"	Clayey Sand	110.4	16.9	D 2922	108.2	98	95	18.2	1.3	Pass
0715-108	7/15/01	14+70 150RT	+12"	Clayey Sand	110.4	16.9	D 2922	109.0	99	95	17.6	0.7	Pass
0715-109	7/15/01	11+50 180RT	+36"	Clayey Sand	110.4	16.9	D3017				16.9	0.0	Pass
0715-110	7/15/01	13+10 175RT	+36"	Clayey Sand	110.4	16.9	D3017				18.8	1.9	Pass
0715-111	7/15/01	14+00 50LT	+24"	Clayey Sand	110.4	16.9	D 2922	112.0	101	95	17.6	0.7	Pass
0715-112	7/15/01	11+30 190RT	+36"	Clayey Sand	110.4	16.9	D 2922	114.1	103	95	16.4	(0.5)	Pass
0715-113	7/15/01	13+60 190RT	+36"	Clayey Sand	110.4	16.9	D 2922	113.2	103	95	16.9	0.0	Pass
0715-114	7/15/01	14+70 180RT	+18"	Clayey Sand	110.4	16.9	D 2922	112.0	101	95	18.2	1.3	Pass
0716-115	7/16/01	14+65 120LT	+24"	Clayey Sand	110.4	16.9	D 2922	110.6	100	95	17.1	0.2	Pass
0716-116	7/16/01	14+60 50RT	+24"	Clayey Sand	110.4	16.9	D 2922	107.8	98	95	17.6	0.7	Pass
0716-117	7/16/01	13+80 SOUTH SLOPE	+12"	Clayey Sand	110.4	16.9	D 2922	112.0	101	95	16.0	(0.9)	Pass
0716-118	7/16/01	12+35 SOUTH SLOPE	+12"	Clayey Sand	110.4	16.9	D 2922	108.9	99	95	16.4	(0.5)	Pass
0716-119	7/16/01	14+10 C/L	+30"	Clayey Sand	110.4	16.9	D3017				17.1	0.2	Pass
0716-120	7/16/01	13+35 35RT	+30"	Clayey Sand	110.4	16.9	D3017				17.4	0.5	Pass
0716-121	7/16/01	11+90 25RT	+30"	Clayey Sand	110.4	16.9	D3017				18.5	1.6	Pass

Reported to: Darrell Shew - ASARCO, Inc.

Submitted by: Dale Wells - Hydrometrics, Inc.

NOTE: Test numbers suffixed by a letter indicate a retest of that number.

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Project Name: CAMU
Project Location: ASARCO EAST HELENA
Client: ASARCO INCORPORATED

Date Reported: 8/3/01

Lab #(s) 01-01,01-08,01-10,01-11, 01-14,01-15,01-16,01-17,01-22

COMPACTION SOIL DENSITY SUMMARY

Test #	Date Tested	Location of Test	Elevation or Depth	Description of Soil	Lab M-D Results: Max. Dry Density (pcf)	Lab M-D Results: Optimum Moisture (%)	Method of Test	Field Test Results: Dry Density (pcf)	Field Test Results: Compaction % Actual	Field Test Results: Compaction % Spec.	Field Test Results: Moisture % Actual	Field Test Results: Moisture ± Optimum	Pass or Fail
0716-122	7/16/01	11+50 35RT	+30"	Clayey Sand	110.4	16.9	D 2922	106.3	96	95	17.5	0.6	Pass
0716-123	7/16/01	12+70 30RT	+30"	Clayey Sand	110.4	16.9	D 2922	103.7	94	95	18.6	1.7	Pass
0716-124	7/16/01	13+30 C/L	+30"	Clayey Sand	110.4	16.9	D 2922	105.9	96	95	17.1	0.2	Pass
0716-125	7/16/01	12+85 105RT	+30"	Clayey Sand	110.4	16.9	D 2922	107.6	97	95	18.2	1.3	Pass
0716-126	7/16/01	14+05 70RT	+30"	Clayey Sand	110.4	16.9	D 2922	105.1	95	95	18.2	1.3	Pass
0719-127	7/19/01	11+25 60LT	+12"	Clayey Sand	110.4	16.9	D 2922	111.9	101	95	17.3	0.4	Pass
0719-128	7/19/01	12+70 50LT	+12"	Clayey Sand	110.4	16.9	D 2922	106.0	96	95	17.5	0.6	Pass
0719-129	7/19/01	13+90 45LT	+12"	Clayey Sand	110.4	16.9	D 2922	104.6	95	95	19.6	2.7	Pass
0719-130	7/19/01	14+00 85LT	+12"	Clayey Sand	110.4	16.9	D 2922	113.1	102	95	15.7	(1.2)	Pass
0719-131	7/19/01	12+85 120LT	+12"	Clayey Sand	110.4	16.9	D 2922	110.9	100	95	16.9	0.0	Pass
0719-132	7/19/01	11+40 105LT	+12"	Clayey Sand	110.4	16.9	D 2922	103.9	94	95	17.2	0.3	Pass
0719-133	7/19/01	14+10 175LT	+12"	Clayey Sand	110.4	16.9	D 2922	106.4	96	95	18.0	1.1	Pass
0719-134	7/19/01	13+15 180LT	+12"	Clayey Sand	110.4	16.9	D 2922	110.9	100	95	17.1	0.2	Pass
0719-135	7/19/01	11+25 190LT	+12"	Clayey Sand	110.4	16.9	D 2922	109.0	99	95	17.3	0.4	Pass
0719-136	7/19/01	13+85 65RT	+30"	Clayey Sand	110.4	16.9	D 2922	112.1	102	95	16.4	(0.5)	Pass
0719-137	7/19/01	12+60 50RT	+30"	Clayey Sand	110.4	16.9	D 2922	109.9	100	95	16.5	(0.4)	Pass
0719-138	7/19/01	11+50 75RT	+30"	Clayey Sand	110.4	16.9	D 2922	112.3	102	95	17.1	0.2	Pass
0720-139	7/20/01	13+60 SOUTH SLOPE	+18"	Clayey Sand	110.4	16.9	D 2922	104.5	95	95	17.3	0.4	Pass
0720-140	7/20/01	12+20 SOUTH SLOPE	+18"	Clayey Sand	110.4	16.9	D 2922	108.7	98	95	16.1	(0.8)	Pass
0720-141	7/20/01	13+95 SOUTH SLOPE	+24"	Clayey Sand	110.4	16.9	D3017				18.7	1.8	Pass
0720-142	7/20/01	12+45 SOUTH SLOPE	+24"	Clayey Sand	110.4	16.9	D3017				17.3	0.4	Pass
0720-143	7/20/01	11+10 60 LT	+18"	Clayey Sand	110.4	16.9	D3017				17.6	0.7	Pass
0720-144	7/20/01	12+35 50LT	+18"	Clayey Sand	110.4	16.9	D3017				17.1	0.2	Pass
0720-145	7/20/01	11+10 55LT	+18"	Clayey Sand	110.4	16.9	D 2922	111.8	101	95	15.9	(1.0)	Pass

Reported to: Darrell Shew - ASARCO, Inc.

Submitted by: Dale Wells - Hydrometrics, Inc.

NOTE: Test numbers suffixed by a letter indicate a retest of that number.

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Project Name: CAMU
Project Location: ASARCO EAST HELENA
Client: ASARCO INCORPORATED

Date Reported: 8/3/01

Lab #(s) 01-01,01-08,01-10,01-11, 01-14,01-15,01-16,01-17,01-22

COMPACTION SOIL DENSITY SUMMARY

Test #	Date Tested	Location of Test	Elevation or Depth	Description of Soil	Lab M-D Results: Max. Dry Density (pcf)	Lab M-D Results: Optimum Moisture (%)	Method of Test	Field Test Results: Dry Density (pcf)	Field Test Results: Compaction % Actual	Field Test Results: Compaction % Spec.	Field Test Results: Moisture % Actual	Field Test Results: Moisture ± Optimum	Pass or Fail
0720-146	7/20/01	12+80 75LT	+18"	Clayey Sand	110.4	16.9	D 2922	112.1	102	95	16.9	0.0	Pass
0720-147	7/20/01	13+70 95LT	+18"	Clayey Sand	110.4	16.9	D 2922	109.4	99	95	17.5	0.6	Pass
0720-148	7/20/01	13+95 110LT	+18"	Clayey Sand	110.4	16.9	D 2922	113.1	102	95	17.6	0.7	Pass
0720-149	7/20/01	11+10 SOUTH SLOPE	+24"	Clayey Sand	110.4	16.9	D 2922	103.6	94	95	18.6	1.7	Pass
0720-150	7/20/01	12+95 SOUTH SLOPE	+24"	Clayey Sand	110.4	16.9	D 2922	109.8	99	95	16.6	(0.3)	Pass
0720-151	7/20/01	13+70 SOUTH SLOPE	+24"	Clayey Sand	110.4	16.9	D 2922	111.3	101	95	17.3	0.4	Pass
0720-152	7/20/01	11+30 170LT	+18"	Clayey Sand	110.4	16.9	D 2922	108.2	98	95	16.8	(0.1)	Pass
0720-152SC	7/20/01	11+30 170LT	+18"	Clayey Sand	110.4	16.9	D1556	107.8	98	95	17.3	0.4	Pass
0720-153	7/20/01	11+65 SOUTH SLOPE	+30"	Clayey Sand	110.4	16.9	D 2922	109.3	99	95	17.3	0.4	Pass
0720-154	7/20/01	13+95 SOUTH SLOPE	+30"	Clayey Sand	110.4	16.9	D 2922	107.5	97	95	17.6	0.7	Pass
0721-155	7/21/01	11+35 100RT	+36"	Clayey Sand	110.4	16.9	D 2922	104.8	95	95	16.8	(0.1)	Pass
0721-156	7/21/01	12+40 110RT	+36"	Clayey Sand	110.4	16.9	D 2922	110.4	100	95	16.6	(0.3)	Pass
0721-157	7/21/01	13+15 90RT	+36"	Clayey Sand	110.4	16.9	D 2922	110.1	100	95	17.5	0.6	Pass
0721-158	7/21/01	13+90 70RT	+36"	Clayey Sand	110.4	16.9	D 2922	106.4	96	95	17.3	0.4	Pass
0721-159	7/21/01	14+80 C/L	+30"	Clayey Sand	110.4	16.9	D 2922	108.5	98	95	17.4	0.5	Pass
0721-160	7/21/01	14+70 100RT	+30"	Clayey Sand	110.4	16.9	D 2922	103.8	94	95	17.5	0.6	Pass
0721-161	7/21/01	12+25 SOUTH SLOPE	+36"	Clayey Sand	110.4	16.9	D3017				17.1	0.2	Pass
0721-162	7/21/01	12+35 SOUTH SLOPE	+36"	Clayey Sand	110.4	16.9	D 2922	105.1	95	95	16.9	0.0	Pass
0721-163	7/21/01	11+75 10LT	+36"	Clayey Sand	110.4	16.9	D 2922	110.8	100	95	17.9	1.0	Pass
0721-164	7/21/01	13+90 SOUTH SLOPE	+36"	Clayey Sand	110.4	16.9	D 2922	110.4	100	95	17.6	0.7	Pass
0721-165	7/21/01	14+85 130RT	+36"	Clayey Sand	110.4	16.9	D 2922	104.6	95	95	17.3	0.4	Pass
0722-166	7/22/01	14+70 180RT	+36"	Clayey Sand	110.4	16.9	D3017				18.9	2.0	Pass
0722-167	7/22/01	14+70 60RT	+36"	Clayey Sand	110.4	16.9	D 2922	102.8	93	95	17.5	0.6	Pass
0722-168	7/22/01	WEST SLOPE 135 RT	+6"	Clayey Sand	110.4	16.9	D 2922	105.5	96	95	17.3	0.4	Pass

Reported to: Darrell Shew - ASARCO, Inc.

Submitted by: Dale Wells - Hydrometrics, Inc.

NOTE: Test numbers suffixed by a letter indicate a retest of that number.

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Project Name: CAMU
Project Location: ASARCO EAST HELENA
Client: ASARCO INCORPORATED

Date Reported: 8/3/01

Lab #(s) 01-01,01-08,01-10,01-11, 01-14,01-15,01-16,01-17,01-22

COMPACTION SOIL DENSITY SUMMARY

Test #	Date Tested	Location of Test	Elevation or Depth	Description of Soil	Lab M-D Results: Max. Dry Density (pcf)	Lab M-D Results: Optimum Moisture (%)	Method of Test	Field Test Results: Dry Density (pcf)	Field Test Results: Compaction % Actual	Field Test Results: Compaction % Spec.	Field Test Results: Moisture % Actual	Field Test Results: Moisture ± Optimum	Pass or Fail
0722-169	7/22/01	WEST SLOPE C/L	+12"	Clayey Sand	110.4	16.9	D 2922	109.6	99	95	16.9	0.0	Pass
0722-170	7/22/01	14+80 160 RT	+36"	Clayey Sand	110.4	16.9	D3017				18.7	1.8	Pass
0722-171	7/22/01	14+75 C\L	+36"	Clayey Sand	110.4	16.9	D3017				17.9	1.0	Pass
0723-172	7/23/01	EAST SLOPE 110' RT	+6"	Clayey Sand	112.3	16.5	D2922	107.7	96	95	17.5	1.0	Pass
0723-173	7/23/01	WEST SLOPE 75' RT	+30"	Clayey Sand	112.3	16.5	D2922	103.8	92	95	17.1	0.6	Pass
0723-174	7/23/01	WEST SLOPE 5'RT	+30"	Clayey Sand	112.3	16.5	D2922	104.6	93	95	18.0	1.5	Pass
0724-175	7/24/01	EAST SLOPE 110' RT	+18"	Clayey Sand	112.3	16.5	D2922	108.9	97	95	17.9	1.4	Pass
0724-176	7/24/01	EAST SLOPE 105' RT	+24"	Clayey Sand	112.3	16.5	D2922	107.2	95	95	18.7	2.2	Pass
0726-177	7/26/01	EAST SLOPE 120' RT	+36"	Clayey Sand	112.3	16.5	D2922	99.0	88	95	18.4	1.9	Fail
0726-178	7/26/01	11+30 50' LT	+24"	Clayey Sand	112.3	16.5	D2922	111.6	99	95	17.5	1.0	Pass
0726-178SC	7/26/01	11+30 50' LT	+24"	Clayey Sand	112.3	16.5	D1556	110.7	99	95	17.6	1.1	Pass
0726-179	7/26/01	11+20 100' LT	+24"	Clayey Sand	112.3	16.5	D2922	111.8	100	95	17.2	0.7	Pass
0726-180	7/26/01	12+80 130' LT	+24"	Clayey Sand	112.3	16.5	D2922	110.5	98	95	16.8	0.3	Pass
0726-181	7/26/01	14+20 180' LT	+30"	Clayey Sand	112.3	16.5	D2922	104.4	93	95	17.8	1.3	Pass
0726-177A	7/26/01	EAST SLOPE 120' RT	+36"	Clayey Sand	112.3	16.5	D2922	108.2	96	95	17.5	1.0	Pass
0727-182	7/27/01	11+00 185' LT	+30"	Clayey Sand	112.3	16.5	D 2922	106.9	95	95	16.0	(0.5)	Pass
0727-182M	7/27/01	11+00 185' LT	+30"	Clayey Sand	112.3	16.5	D 2216				15.8	(0.7)	Pass
0727-183	7/27/01	13+00 180' LT	+30"	Clayey Sand	112.3	16.5	D 2922	105.7	94	95	15.7	(0.8)	Pass
0728-184	7/28/01	11+80 150' LT	+30"	Clayey Sand	112.3	16.5	D 2922	98.3	88	95	20.7	4.2	Fail
0728-185	7/28/01	No. Slope 13+80 220' LT	+12"	Clayey Sand	112.3	16.5	D 2922	107.8	96	95	18.4	1.9	Pass
0728-186	7/28/01	No. Slope 11+00 220' LT	+12"	Clayey Sand	112.3	16.5	D 2922	106.6	95	95	18.7	2.2	Pass
0728-184A	7/28/01	11+80 150' LT	+30"	Clayey Sand	112.3	16.5	D 2922	104.7	93	95	18.4	1.9	Pass
0728-187	7/28/01	13+00 140' LT	+30"	Clayey Sand	112.3	16.5	D 2922	109.9	98	95	17.1	0.6	Pass
0728-188	7/28/01	East Slope 15+00 100' LT	+36"	Clayey Sand	112.3	16.5	D 2922	106.1	94	95	19.3	2.8	Pass

Reported to: Darrell Shew - ASARCO, Inc.

Submitted by: Dale Wells - Hydrometrics, Inc.

NOTE: Test numbers suffixed by a letter indicate a retest of that number.

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Project Name: CAMU
Project Location: ASARCO EAST HELENA
Client: ASARCO INCORPORATED

Date Reported: 8/3/01

Lab #(s) 01-01,01-08,01-10,01-11, 01-14,01-15,01-16,01-17,01-22

COMPACTION SOIL DENSITY SUMMARY

Test #	Date Tested	Location of Test	Elevation or Depth	Description of Soil	Lab M-D Results: Max. Dry Density (pcf)	Lab M-D Results: Optimum Moisture (%)	Method of Test	Field Test Results: Dry Density (pcf)	Compaction: % Actual	Compaction: % Spec.	Moisture: % Actual	Moisture: ± Optimum	Pass or Fail
0728-189	7/28/01	West Slope 10+60, 50' LT	+12"	Clayey Sand	112.3	16.5	D 2922	106.0	94	95	18.7	2.2	Pass
0728-190	7/28/01	West Slope 10+60, 150"LT	+24"	Clayey Sand	112.3	16.5	D 2922	107.4	96	95	18.3	1.8	Pass
0729-91	7/29/01	11+50, 100' LT	+36"	Clayey Sand	112.3	16.5	D 2922	107.4	96	95	16.1	(0.4)	Pass
0729-192	7/29/01	12+80, 50' LT	+36"	Clayey Sand	112.3	16.5	D 2922	108.6	97	95	16.3	(0.2)	Pass
0729-193	7/29/01	14+30, 25' LT	+36"	Clayey Sand	112.3	16.5	D 2922	112.0	100	95	17.2	0.7	Pass
0729-194	7/29/01	11=20, 130' LT	+36"	Clayey Sand	112.3	16.5	D 2922	111.2	99	95	17.0	0.5	Pass
0729-195	7/29/01	13+80, 90' LT	+36"	Clayey Sand	112.3	16.5	D 2922	109.5	98	95	17.3	0.8	Pass
0729-195M	7/29/01	13+80, 130'LT	+36"	Clayey Sand	112.3	16.5	D 2216		0		17	0.5	Pass
0729-196	7/29/01	North Slope 13+00, 220' LT	+24"	Clayey Sand	112.3	16.5	D 2922	103.2	92	95	17.4	0.9	Fail
0729-197	7/29/01	North Slope 13+00, 220' LT	+24"	Clayey Sand	112.3	16.5	D 2922	104.4	93	95	16.6	0.1	Pass
0729-198	7/29/01	13+10, 190' LT	+30"	Clayey Sand	112.3	16.5	D 3017				17.7	1.2	Pass
0801-199	8/1/01	14+30, 180' LT	+30"	Clayey Sand	112.3	16.5	D 2922	109.2	97	95	16.3	(0.2)	Pass
0801-200	8/1/01	13+00, 180' LT	+30"	Clayey Sand	112.3	16.5	D 2922	106.5	95	95	16.5	0.0	Pass
0801-201	8/1/01	11+00, 175' LT	+30"	Clayey Sand	112.3	16.5	D 2922	105.5	94	95	15.1	(1.4)	Pass
0801-201SC	8/1/01	11+00, 175' LT	+30"	Clayey Sand	112.3	16.5	D1556	106.5	95	95	15.5	(1.0)	Pass
0802-202	8/2/01	11+10, 195' LT	+36"	Clayey Sand	112.3	16.5	D 2922	103.6	92	95	15.6	(0.9)	Fail
0802-203	8/2/01	11+80, 130' LT	+36"	Clayey Sand	112.3	16.5	D 2922	107.8	96	95	15.8	(0.7)	Pass
0802-204	8/2/01	14+30, 185' LT	+36"	Clayey Sand	112.3	16.5	D 2922	108.0	96	95	15.9	(0.6)	Pass
0802-205	8/2/01	North Slope 13+00, 210' LT	+36"	Clayey Sand	112.3	16.5	D 2922	108.2	96	95	15.7	(0.8)	Pass
0802-206	8/2/01	North Slope 11+20, 215' LT	+36"	Clayey Sand	112.3	16.5	D 2922	107.1	95	95	16.5	0.0	Pass
0802-202A	8/2/01	11+10, 195' LT - Retest #202	+36"	Clayey Sand	112.3	16.5	D 2922	108.2	96	95	16.3	(0.2)	Pass

Reported to: Darrell Shew - ASARCO, Inc.

Submitted by: Dale Wells - Hydrometrics, Inc.

NOTE: Test numbers suffixed by a letter indicate a retest of that number.

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

REPORT OF
MOISTURE-DENSITY RELATIONS

CLIENT: ASARCO INCORPORATED
EAST HELENA, MT

PROJECT: CAMU (RCRA) LANDFILL

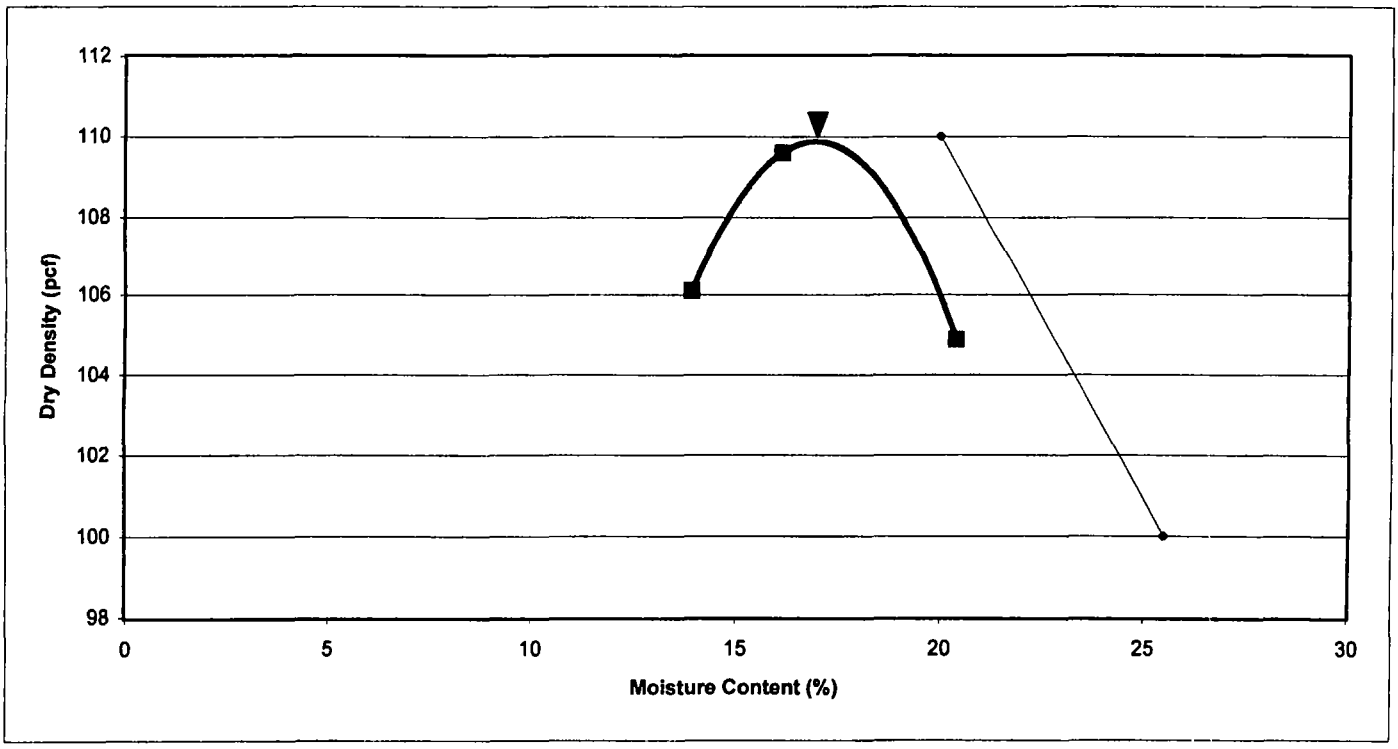
PROJECT NO.:	1237
LAB NO.:	01-01
DATE OF SERVICE:	6/7/01
REPORT DATE:	6/8/01
AUTHORIZATION:	ASARCO, INCORPORATED

SERVICES: Obtained sample of material used for construction, prepare samples and perform moisture-density relations test to establish the maximum density and optimum moisture of the material.

PROJECT DATA

CONTRACTOR:	Envirocon	TEST DATE:	6/7/01
DATE SAMPLED:	6/7/01	MATERIAL:	Road Sub Base
SAMPLED BY:	D. Wells	CLASSIFICATION:	Clayey Sand (SC)
TEST FOR:	CAMU Excavation	MATERIAL PREPARATION METHOD:	Dry
SAMPLE LOCATION:	North end of CAMU Site	RAMMER TYPE:	Manual
		METHOD OF TEST:	ASTM D698-B

TEST RESULTS



MAXIMUM DENSITY, PCF	110.5	Specific Gravity	2.70
OPTIMUM MOISTURE (%):	17.0	Liquid Limit	12
		Plasticity Index	34

	Dry Density	Moisture
	109.6	16.1
	104.9	20.4
	106.1	13.9
maximum	110.5	17.2

zero air voids curve

Dry Density	Moisture
110	20
100	25.5

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

REPORT OF MOISTURE-DENSITY RELATIONS

CLIENT: ASARCO INCORPORATED
EAST HELENA, MT

PROJECT: CAMU (RCRA) LANDFILL

PROJECT NO.:	1237
LAB NO.:	01-08
DATE OF SERVICE:	6/26/01
REPORT DATE:	6/28/01
AUTHORIZATION:	ASARCO, INCORPORATED

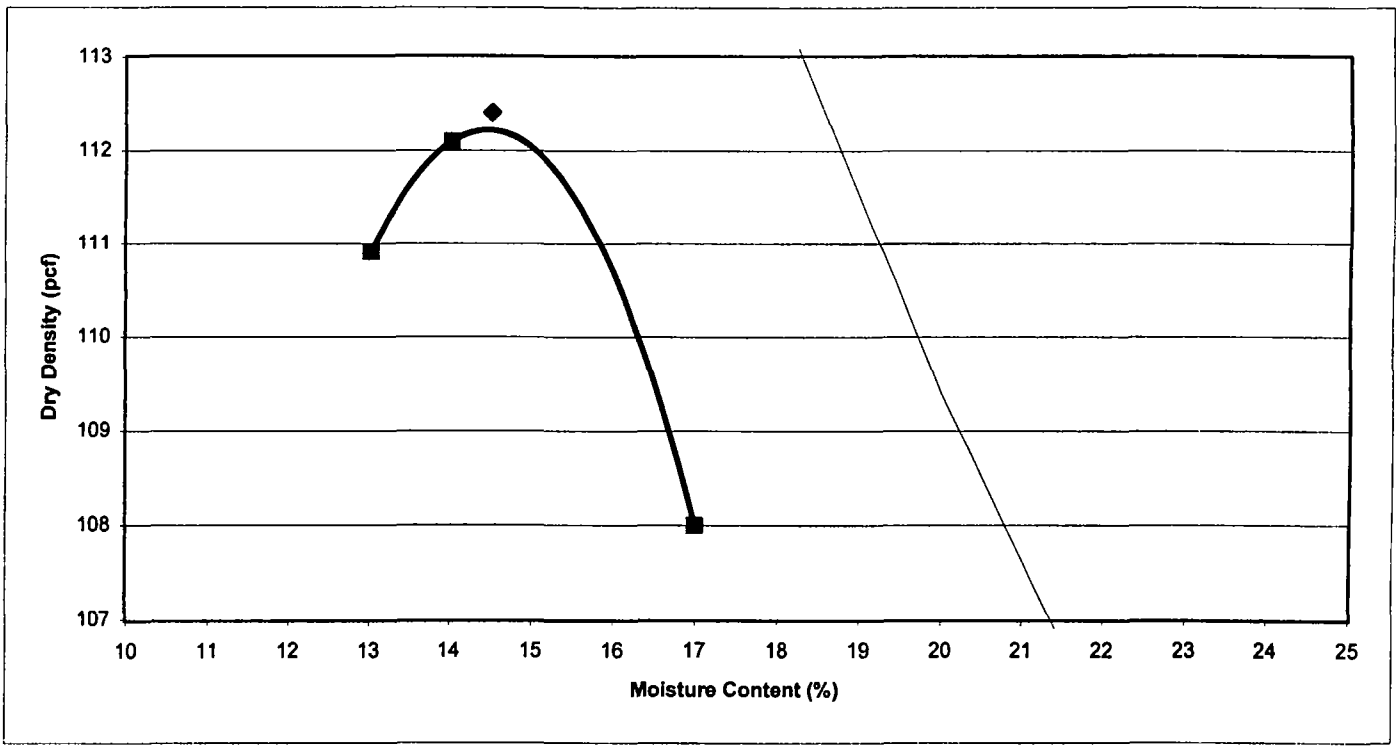
SERVICES: Obtained sample of material used for construction, prepare samples and perform moisture-density relations test to establish the maximum density and optimum moisture of the material.

PROJECT DATA

CONTRACTOR:	Envirocon
DATE SAMPLED:	6/25/01
SAMPLED BY:	D. Wells
TEST FOR:	CAMU Subgrade
SAMPLE LOCATION:	North end of CAMU Site

TEST DATE:	6/26/01
MATERIAL:	CAMU Subgrade
CLASSIFICATION:	Clayey Sand (SC)
MATERIAL PREPARATION METHOD:	Dry
RAMMER TYPE:	Manual
METHOD OF TEST:	ASTM D698-B

TEST RESULTS



MAXIMUM DENSITY, PCF	112.5	Specific Gravity	2.70
OPTIMUM MOISTURE (%):	14.5	Liquid Limit	35
		Plasticity Index	12

	Dry Density	Moisture
	110.9	13
	108	17
	112.1	14
maximum	112.4	14.5

zero air voids curve

Dry Density	Moisture		
112	19		
110	20		
2.7	5	62.4	148.44
2.7	10	62.4	132.66
2.7	15	62.4	119.91
2.7	20	62.4	109.40
2.7	25	62.4	100.59
2.7	30	62.4	93.08
2.7	35	62.4	86.62
2.7	40	62.4	81.00
2.7	45	62.4	76.06
2.7	50	62.4	71.69

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

REPORT OF
MOISTURE-DENSITY RELATIONS

CLIENT: ASARCO INCORPORATED
EAST HELENA, MT

PROJECT: CAMU (RCRA) LANDFILL

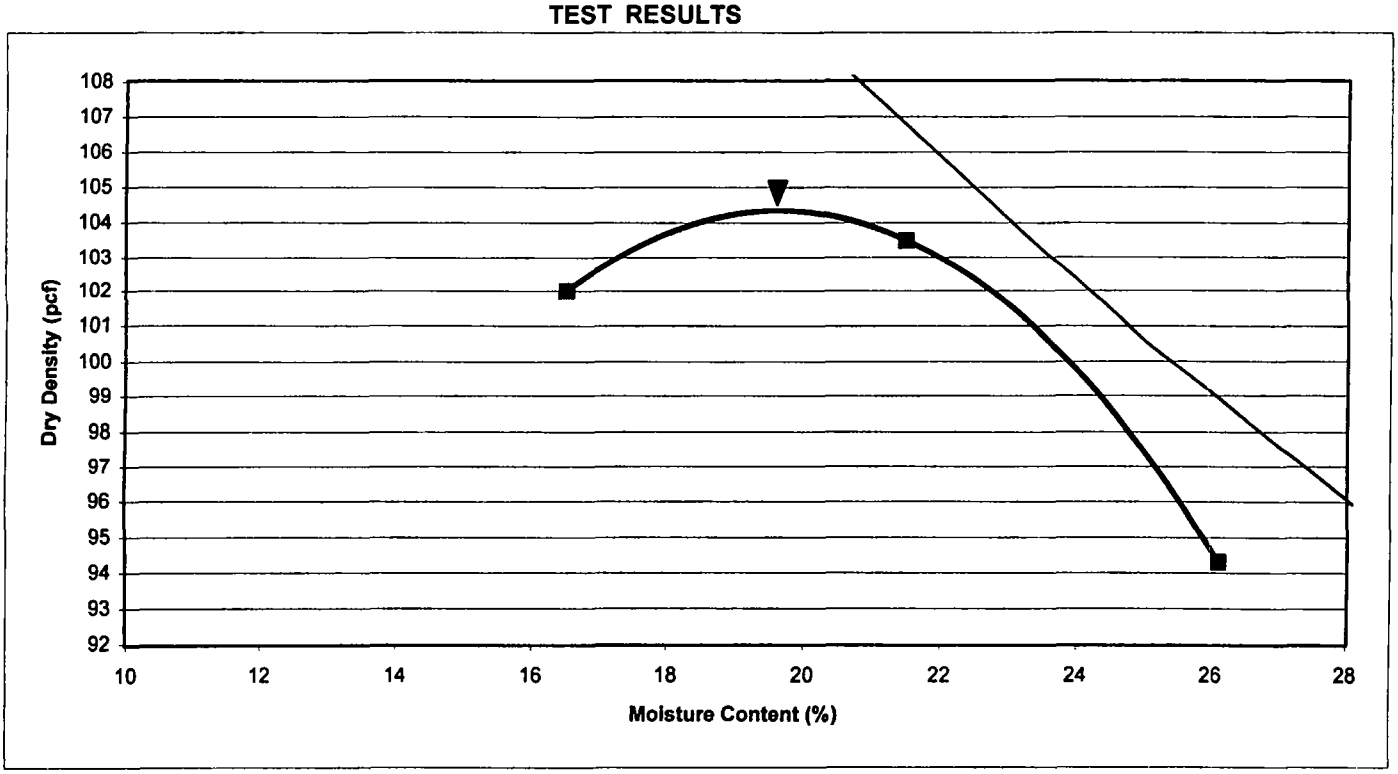
PROJECT NO.:	1237
LAB NO.:	01-09
DATE OF SERVICE:	6/30/01
REPORT DATE:	7/3/01
AUTHORIZATION:	ASARCO, INCORPORATED

SERVICES: Obtained sample of material used for construction, prepare samples and perform moisture-density relations test to establish the maximum density and optimum moisture of the material.

PROJECT DATA

CONTRACTOR:	Envirocon	TEST DATE:	7/2/01
DATE SAMPLED:	6/30/01	MATERIAL:	Clay Liner
SAMPLED BY:	D. Wells	CLASSIFICATION:	Lean Clay (CL)
TEST FOR:	Clay Liner	MATERIAL PREPARATION METHOD:	Dry
SAMPLE LOCATION:	Stockpile	RAMMER TYPE:	Manual
		METHOD OF TEST:	ASTM D698-B

TEST RESULTS



MAXIMUM DENSITY, PCF	104.2	Specific Gravity	2.65
OPTIMUM MOISTURE (%):	19.3	Liquid Limit	36
		Plasticity Index	16

	Dry Density	Moisture
	102	16.5
	103.5	21.5
	94.3	26.1
maximum	106.5	19

zero air voids curve

Dry Density	Moisture		
112	19		
110	20		
2.7	5	62.4	148.44
2.7	10	62.4	132.66
2.7	15	62.4	119.91
2.7	20	62.4	109.40
2.7	25	62.4	100.59
2.7	30	62.4	93.08
2.7	35	62.4	86.62
2.7	40	62.4	81.00
2.7	45	62.4	76.06
2.7	50	62.4	71.69

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

REPORT OF MOISTURE-DENSITY RELATIONS

CLIENT: ASARCO INCORPORATED
EAST HELENA, MT

PROJECT: CAMU (RCRA) LANDFILL

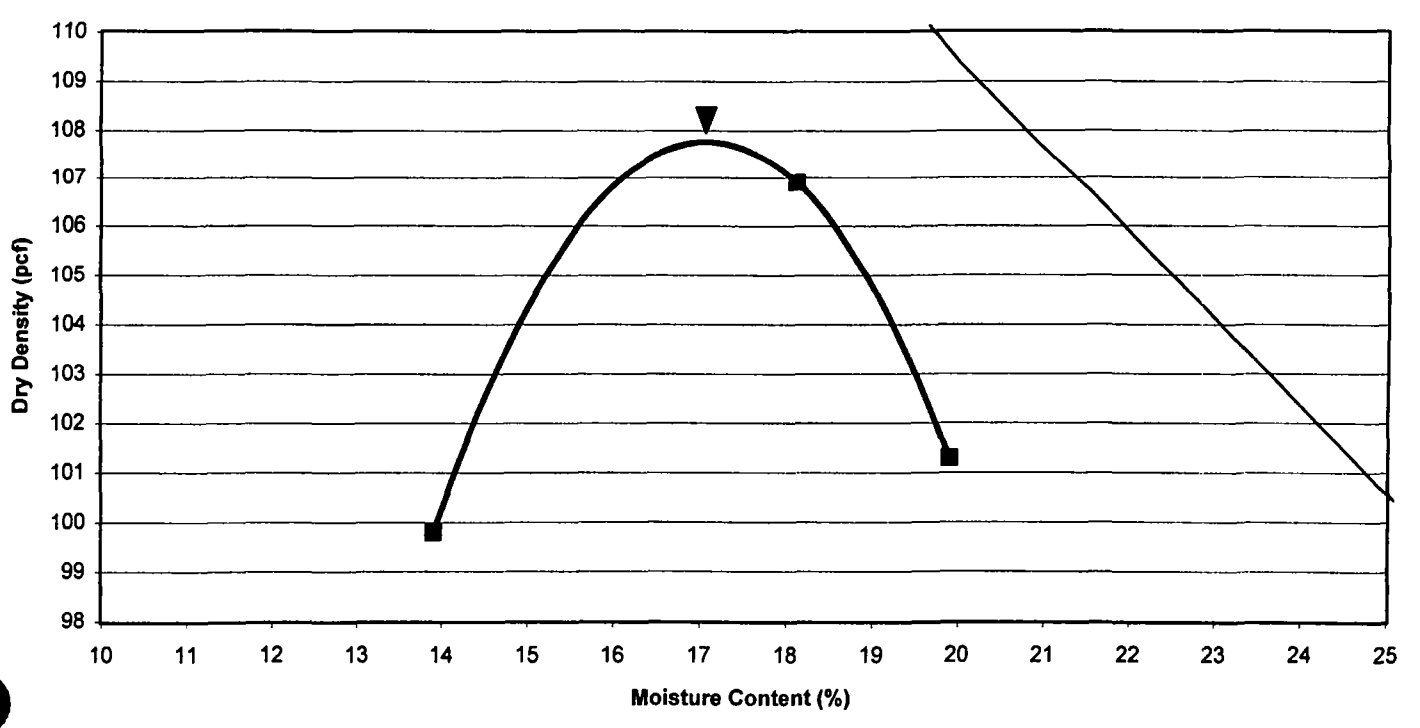
PROJECT NO.:	1237
LAB NO.:	01-10
DATE OF SERVICE:	6/29/01
REPORT DATE:	6/30/01
AUTHORIZATION:	ASARCO, INCORPORATED

SERVICES: Obtained sample of material used for construction, prepare samples and perform moisture-density relations test to establish the maximum density and optimum moisture of the material.

PROJECT DATA

CONTRACTOR:	Envirocon	TEST DATE:	6/28/01
DATE SAMPLED:	6/28/01	MATERIAL:	Clay Liner
SAMPLED BY:	D. Wells	CLASSIFICATION:	Lean Clay (CL)
TEST FOR:	Clay Liner	MATERIAL PREPARATION METHOD:	Dry
SAMPLE LOCATION:	Stockpile	RAMMER TYPE:	Manual
		METHOD OF TEST:	ASTM D698-B

TEST RESULTS



MAXIMUM DENSITY, PCF:	107.9	Specific Gravity	2.70
OPTIMUM MOISTURE (%):	17.1	Liquid Limit	34
		Plasticity Index	14

	Dry Density	Moisture
	99.8	13.9
	106.9	18.1
	101.3	19.9
maximum	107.9	17.1

zero air voids curve

Dry Density	Moisture		
112	19		
110	20		
2.7	5	62.4	148.44
2.7	10	62.4	132.66
2.7	15	62.4	119.91
2.7	20	62.4	109.40
2.7	25	62.4	100.59
2.7	30	62.4	93.08
2.7	35	62.4	86.62
2.7	40	62.4	81.00
2.7	45	62.4	76.06
2.7	50	62.4	71.69

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

REPORT OF MOISTURE-DENSITY RELATIONS

CLIENT: ASARCO INCORPORATED
EAST HELENA, MT

PROJECT: CAMU (RCRA) LANDFILL

PROJECT NO.: 1237
LAB NO.: 01-14
DATE OF SERVICE: 6/30/01
REPORT DATE: 7/3/01
AUTHORIZATION: ASARCO, INCORPORATED

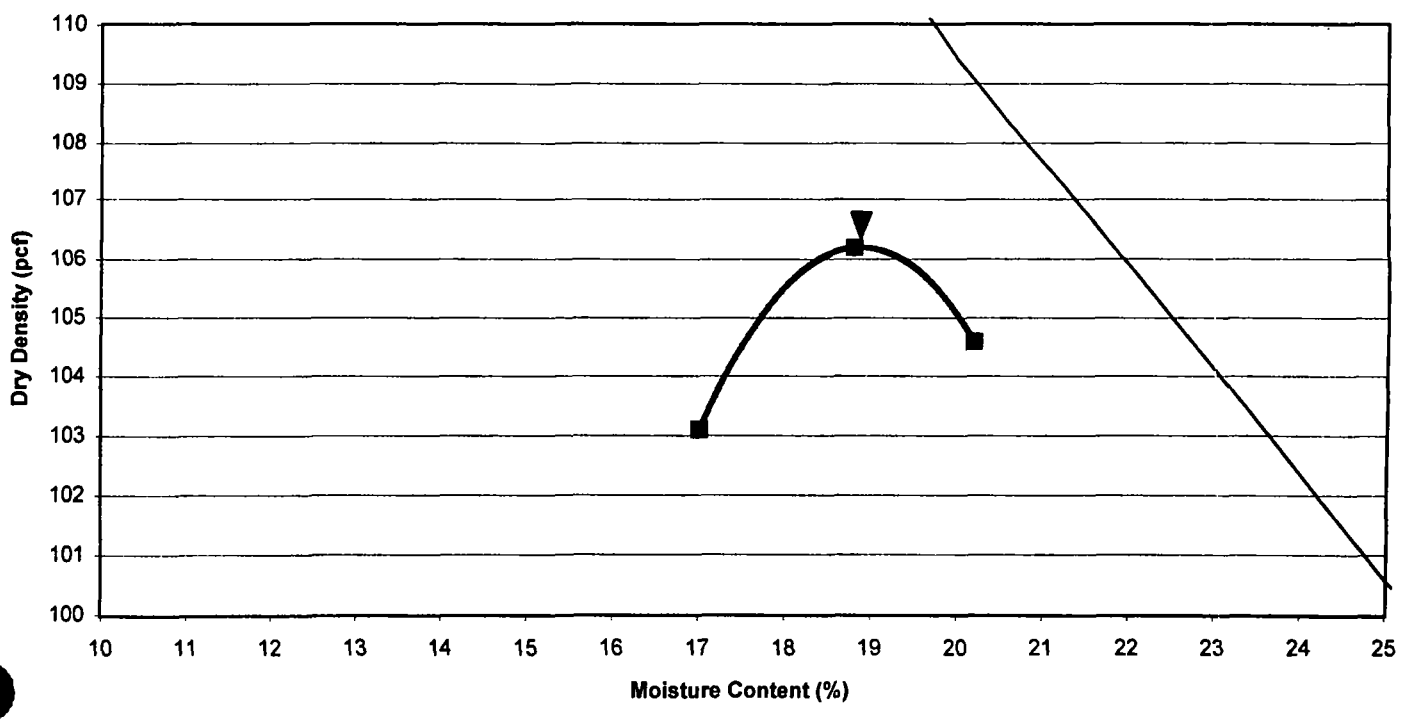
SERVICES: Obtained sample of material used for construction, prepare samples and perform moisture-density relations test to establish the maximum density and optimum moisture of the material.

PROJECT DATA

CONTRACTOR: Envirocon
DATE SAMPLED: 6/30/01
SAMPLED BY: D. Wells
TEST FOR: Clay Liner
SAMPLE LOCATION: Stockpile

TEST DATE: 7/2/01
MATERIAL: Clay Liner
CLASSIFICATION: Lean Clay
MATERIAL PREPARATION METHOD: Dry
RAMMER TYPE: Manual
METHOD OF TEST: ASTM D698-B

TEST RESULTS



MAXIMUM DENSITY, PCF: 106.5
OPTIMUM MOISTURE (%): 19.0

Specific Gravity 2.70
Liquid Limit 32
Plasticity Index 11

	Dry Density	Moisture
	103.1	17
	106.2	18.8
	104.6	20.2
maximum	106.5	19

zero air voids curve

Dry Density	Moisture		
112	19		
110	20		
2.7	5	62.4	148.44
2.7	10	62.4	132.66
2.7	15	62.4	119.91
2.7	20	62.4	109.40
2.7	25	62.4	100.59
2.7	30	62.4	93.08
2.7	35	62.4	86.62
2.7	40	62.4	81.00
2.7	45	62.4	76.06
2.7	50	62.4	71.69

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

REPORT OF MOISTURE-DENSITY RELATIONS

CLIENT: ASARCO INCORPORATED
EAST HELENA, MT

PROJECT: CAMU (RCRA) LANDFILL

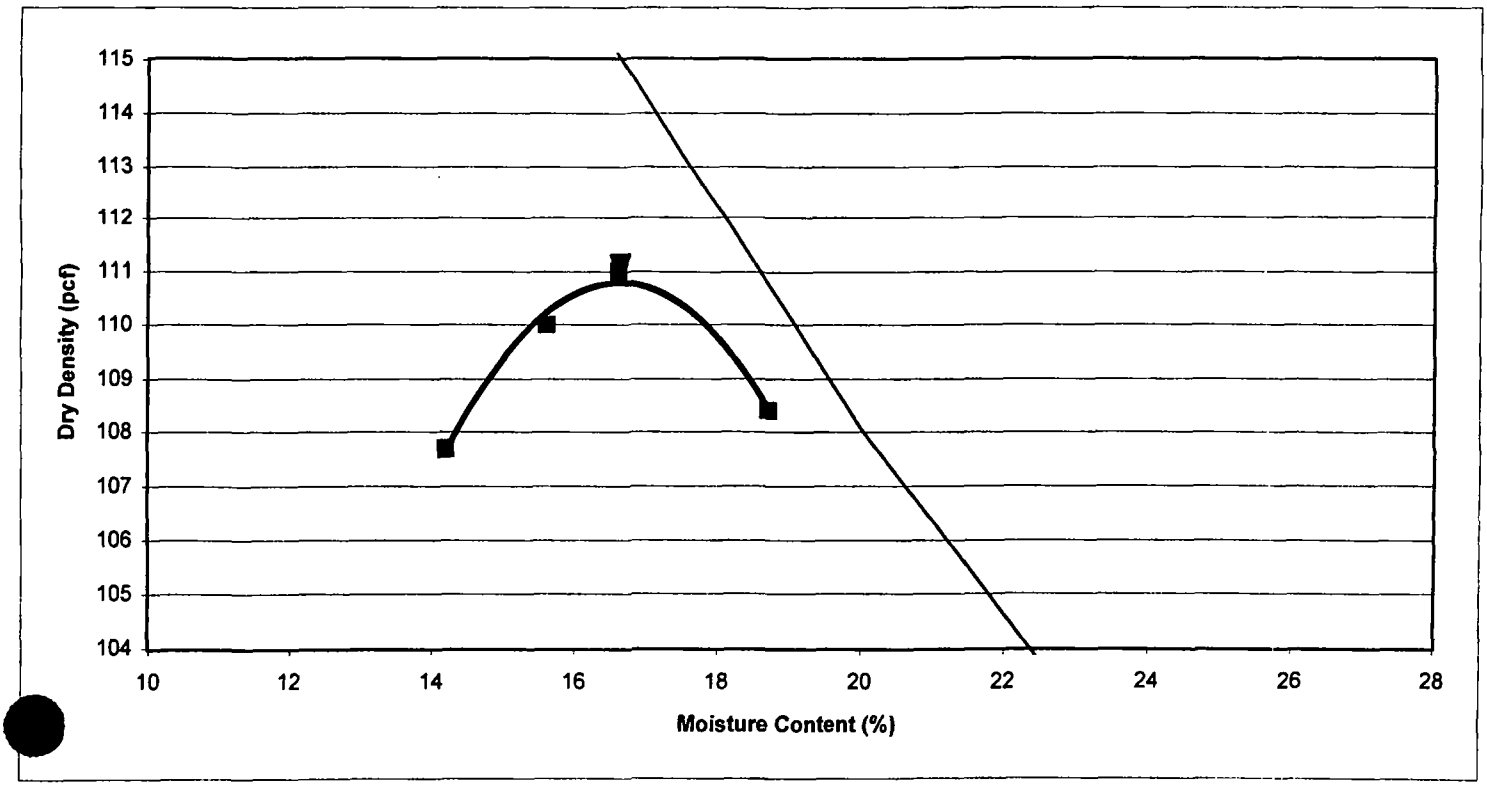
PROJECT NO.:	1237
LAB NO.:	01-15
DATE OF SERVICE:	7/10/01
REPORT DATE:	7/10/01
AUTHORIZATION:	ASARCO, INCORPORATED

SERVICES: Obtained sample of material used for construction, prepare samples and perform moisture-density relations test to establish the maximum density and optimum moisture of the material.

PROJECT DATA

CONTRACTOR:	Envirocon	TEST DATE:	7/10/01
DATE SAMPLED:	7/9/01	MATERIAL:	Clay Liner
SAMPLED BY:	D. Wells	CLASSIFICATION:	Clayey Sand (SC)
TEST FOR:	Clay Liner	MATERIAL PREPARATION METHOD:	Dry
SAMPLE LOCATION:	Windrow	RAMMER TYPE:	Manual
		METHOD OF TEST:	ASTM D698-B

TEST RESULTS



MAXIMUM DENSITY, PCF:	111	Specific Gravity	2.65
OPTIMUM MOISTURE (%):	16.6	Liquid Limit	29
		Plasticity Index	9

	Dry Density	Moisture
	110	15.6
	108.4	18.7
	107.7	14.2
maximum	111	16.6

zero air voids curve

Dry Density	Moisture		
112	19		
110	20		
2.65	5	62.4	146.01
2.65	10	62.4	130.72
2.65	15	62.4	118.33
2.65	20	62.4	108.08
2.65	25	62.4	99.46
2.65	30	62.4	92.12
2.65	35	62.4	85.79
2.65	40	62.4	80.27
2.65	45	62.4	75.42
2.65	50	62.4	71.12

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

REPORT OF MOISTURE-DENSITY RELATIONS

CLIENT: ASARCO INCORPORATED
EAST HELENA, MT

PROJECT: CAMU (RCRA) LANDFILL

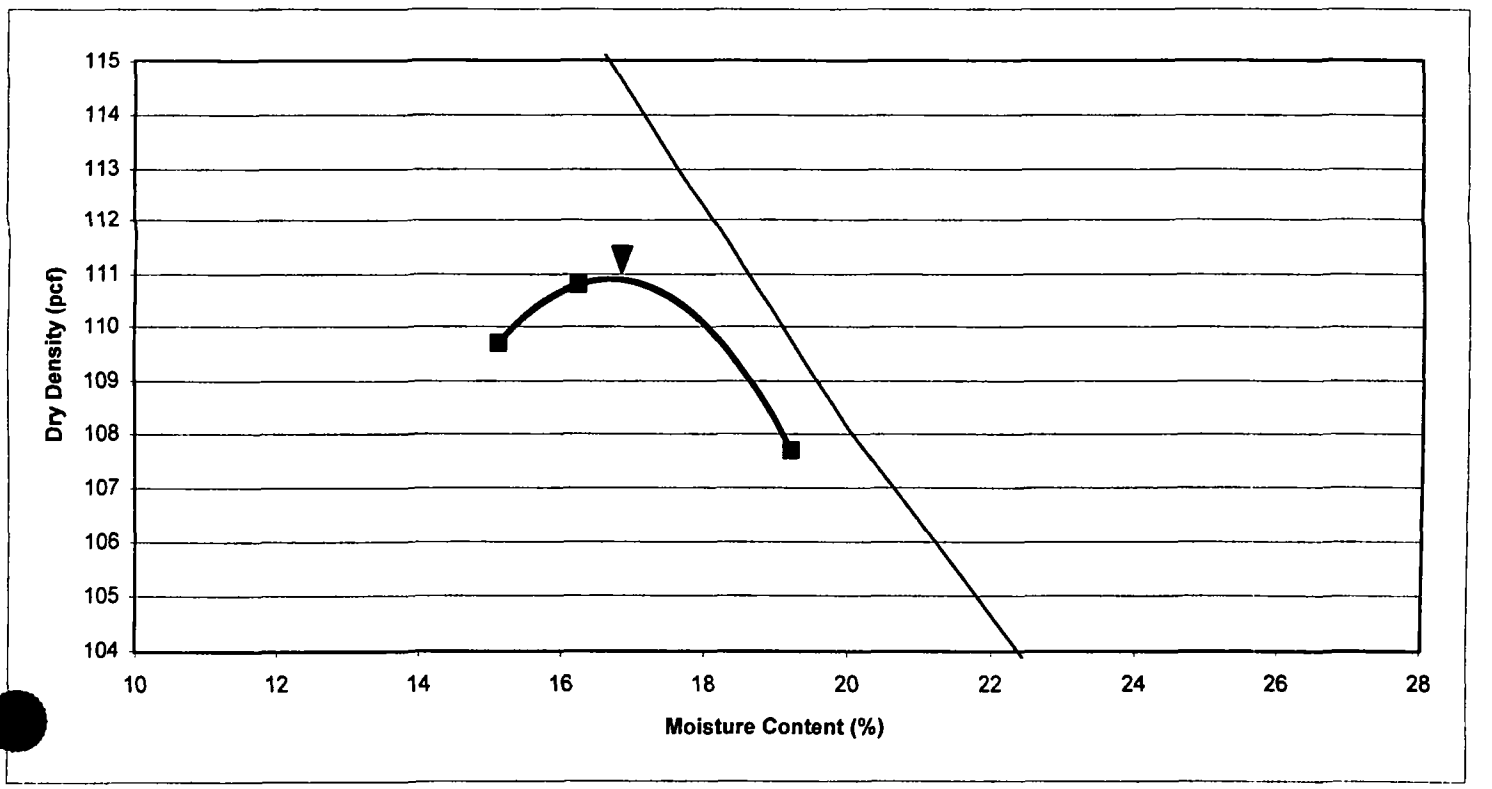
PROJECT NO.:	1237
LAB NO.:	01-16
DATE OF SERVICE:	7/10/01
REPORT DATE:	7/10/01
AUTHORIZATION:	ASARCO, INCORPORATED

SERVICES: Obtained sample of material used for construction, prepare samples and perform moisture-density relations test to establish the maximum density and optimum moisture of the material.

PROJECT DATA

CONTRACTOR:	Envirocon	TEST DATE:	7/10/01
DATE SAMPLED:	7/9/01	MATERIAL:	Clay Liner
SAMPLED BY:	D. Wells	CLASSIFICATION:	Clayey Sand (SC)
TEST FOR:	Clay Liner	MATERIAL PREPARATION METHOD:	Dry
SAMPLE LOCATION:	Screened Stockpile	RAMMER TYPE:	Manual
		METHOD OF TEST:	ASTM D698-B

TEST RESULTS



MAXIMUM DENSITY, PCF:	111	Specific Gravity	2.65
OPTIMUM MOISTURE (%):	16.6	Liquid Limit	27
		Plasticity Index	9

	Dry Density	Moisture
	109.7	15.1
	110.8	16.2
	107.7	19.2
maximum	111	16.7

zero air voids curve

Dry Density	Moisture		
112	19		
110	20		
2.65	5	62.4	146.01
2.65	10	62.4	130.72
2.65	15	62.4	118.33
2.65	20	62.4	108.08
2.65	25	62.4	99.46
2.65	30	62.4	92.12
2.65	35	62.4	85.79
2.65	40	62.4	80.27
2.65	45	62.4	75.42
2.65	50	62.4	71.12

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

REPORT OF MOISTURE-DENSITY RELATIONS

CLIENT: ASARCO INCORPORATED
EAST HELENA, MT

PROJECT: CAMU (RCRA) LANDFILL

PROJECT NO.: 1237
LAB NO.: 01-17
DATE OF SERVICE: 7/13/01
REPORT DATE: 7/13/01
AUTHORIZATION: ASARCO, INCORPORATED

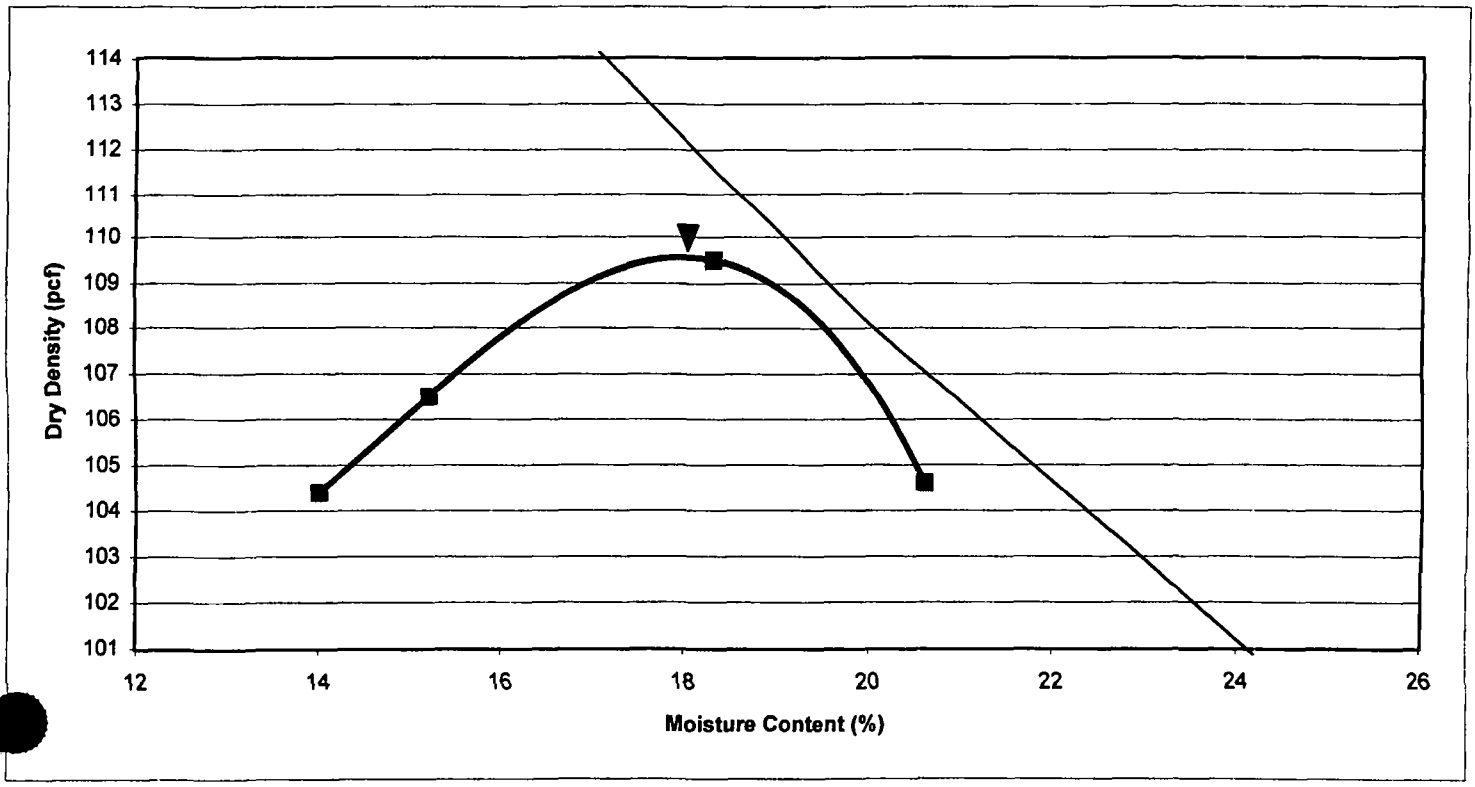
SERVICES: Obtained sample of material used for construction, prepare samples and perform moisture-density relations test to establish the maximum density and optimum moisture of the material.

PROJECT DATA

CONTRACTOR: Envirocon
DATE SAMPLED: 7/11/01
SAMPLED BY: D. Wells
TEST FOR: Clay Liner
SAMPLE LOCATION: Screened Stockpile

TEST DATE: 7/13/01
MATERIAL: Clay Liner
CLASSIFICATION: Clayey Sand (SC)
MATERIAL PREPARATION METHOD: Dry
RAMMER TYPE: Manual
METHOD OF TEST: ASTM D698-B

TEST RESULTS



MAXIMUM DENSITY, PCF: 109.5
OPTIMUM MOISTURE (%): 17.8

Specific Gravity 2.65
Liquid Limit 30
Plasticity Index 9

	Dry Density	Moisture
	104.6	20.6
	109.5	18.3
	106.5	15.2
	104.4	14
maximum	109.5	17.8

zero air voids curve

Dry Density	Moisture		
112	19		
110	20		
2.65	5	62.4	146.01
2.65	10	62.4	130.72
2.65	15	62.4	118.33
2.65	20	62.4	108.08
2.65	25	62.4	99.46
2.65	30	62.4	92.12
2.65	35	62.4	85.79
2.65	40	62.4	80.27
2.65	45	62.4	75.42
2.65	50	62.4	71.12

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

REPORT OF MOISTURE-DENSITY RELATIONS

CLIENT: ASARCO INCORPORATED
EAST HELENA, MT

PROJECT: CAMU (RCRA) LANDFILL

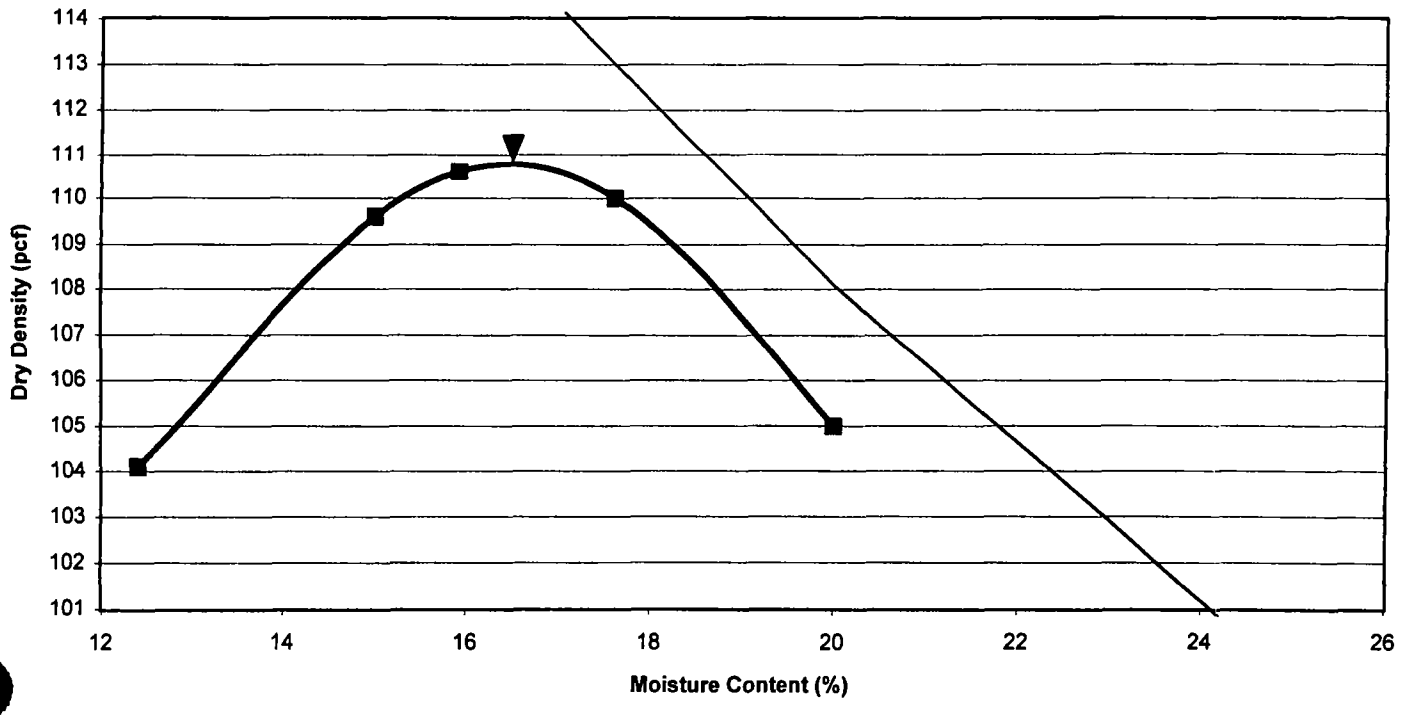
PROJECT NO.:	1237
LAB NO.:	01-18
DATE OF SERVICE:	7/14/01
REPORT DATE:	7/16/01
AUTHORIZATION:	ASARCO, INCORPORATED

SERVICES: Obtained sample of material used for construction, prepare samples and perform moisture-density relations test to establish the maximum density and optimum moisture of the material.

PROJECT DATA

CONTRACTOR:	Envirocon	TEST DATE:	7/15/01
DATE SAMPLED:	7/14/01	MATERIAL:	Clay Liner
SAMPLED BY:	D. Wells	CLASSIFICATION:	Clayey Sand (SC)
TEST FOR:	Clay Liner	MATERIAL PREPARATION METHOD:	Dry
SAMPLE LOCATION:	Windrow	RAMMER TYPE:	Manual
		METHOD OF TEST:	ASTM D698-B

TEST RESULTS



MAXIMUM DENSITY, PCF:	110.8	Specific Gravity	2.65
OPTIMUM MOISTURE (%):	16.3	Liquid Limit	31
		Plasticity Index	8

	Dry Density	Moisture
	104.1	12.4
	109.6	15
	110.6	15.9
	110	17.6
	105	20
maximum	110.8	16.3

zero air voids curve

Dry Density	Moisture		
112	19		
110	20		
2.65	5	62.4	146.01
2.65	10	62.4	130.72
2.65	15	62.4	118.33
2.65	20	62.4	108.08
2.65	25	62.4	99.46
2.65	30	62.4	92.12
2.65	35	62.4	85.79
2.65	40	62.4	80.27
2.65	45	62.4	75.42
2.65	50	62.4	71.12

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

REPORT OF MOISTURE-DENSITY RELATIONS

CLIENT: ASARCO INCORPORATED
EAST HELENA, MT

PROJECT: CAMU (RCRA) LANDFILL

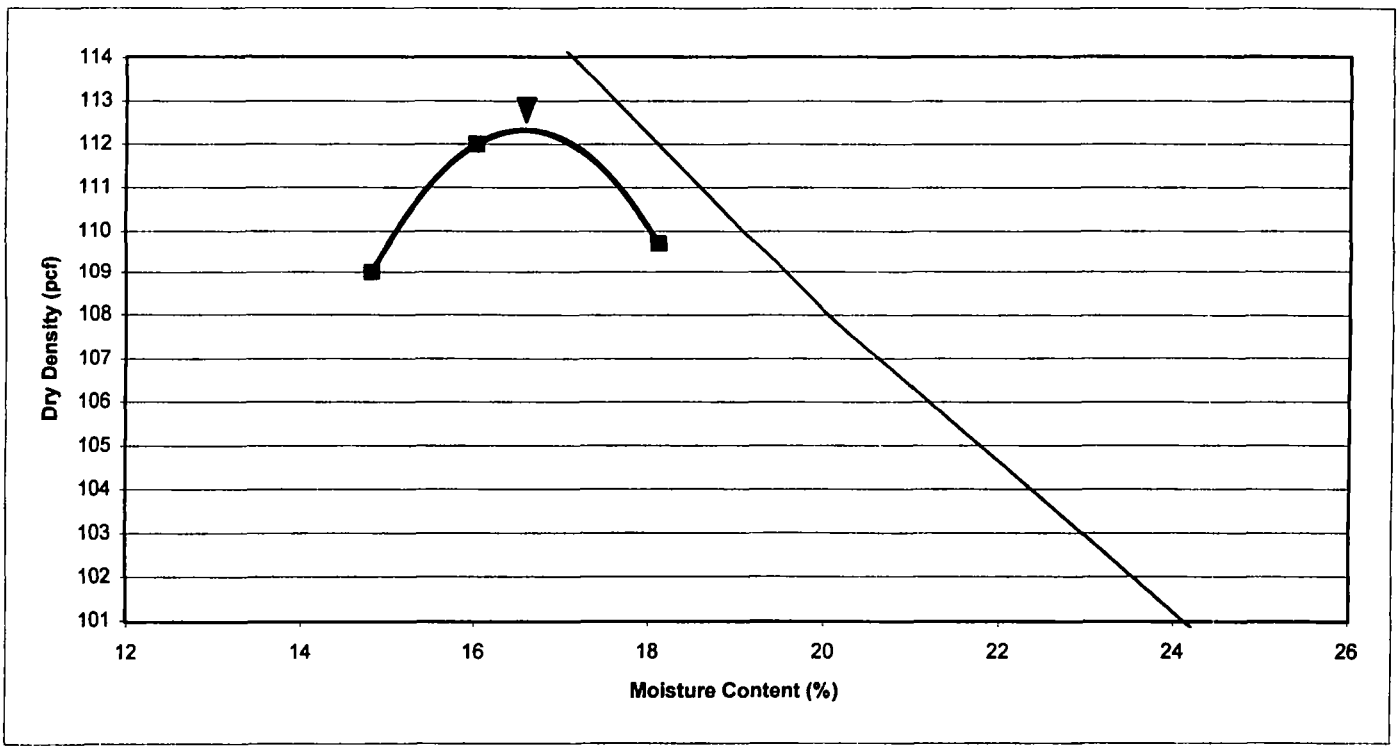
PROJECT NO.:	1237
LAB NO.:	01-22
DATE OF SERVICE:	7/22/01
REPORT DATE:	7/23/01
AUTHORIZATION:	ASARCO, INCORPORATED

SERVICES: Obtained sample of material used for construction, prepare samples and perform moisture-density relations test to establish the maximum density and optimum moisture of the material.

PROJECT DATA

CONTRACTOR:	Envirocon	TEST DATE:	7/22/01
DATE SAMPLED:	7/20/01	MATERIAL:	Clay Liner
SAMPLED BY:	M. Rhodes	CLASSIFICATION:	Clayey Sand (SC)
TEST FOR:	Clay Liner	MATERIAL PREPARATION METHOD:	Dry
SAMPLE LOCATION:	Belt Sample	RAMMER TYPE:	Manual
		METHOD OF TEST:	ASTM D698-B

TEST RESULTS



MAXIMUM DENSITY, PCF	112.3	Specific Gravity	2.65
OPTIMUM MOISTURE (%):	16.5	Liquid Limit	32
		Plasticity Index	11

	Dry Density	Moisture
	109	14.8
	112	16
	109.7	18.1
maximum	110.8	16.3

zero air voids curve

Dry Density	Moisture
112	19
110	20

2.65	5	62.4	146.01
2.65	10	62.4	130.72
2.65	15	62.4	118.33
2.65	20	62.4	108.08
2.65	25	62.4	99.46
2.65	30	62.4	92.12
2.65	35	62.4	85.79
2.65	40	62.4	80.27
2.65	45	62.4	75.42
2.65	50	62.4	71.12

HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Project Name: CAMU
Project Location: ASARCO EAST HELENA
Client: ASARCO INCORPORATED

Date Reported: 7/17/01

Lab #(s) 01-01,01-08,01-10,01-11, 01-14,01-15,01-16

Page #: 1 of 1

COMPACTION SOIL DENSITY SUMMARY SAND CONES

Test #	Date Tested	Location of Test	Elevation or Depth	Description of Soil	Lab M-D Results: Max. Dry Density (pcf)	Lab M-D Results: Optimum Moisture (%)	Method of Test	Field Test Results: Dry Density (pcf)	Field Test Results: Compaction % Actual	Field Test Results: Compaction % Spec.	Field Test Results: Moisture % Actual	Field Test Results: Moisture ± Optimum	Pass or Fail
SC-01	6/30/01	11+40 150RT	+6"	Lean Clay	104.2	19.3	D1556	101.8	98	95	21.9	2.6	Pass
SC-02	7/12/01	13+80 70RT	+18"	Clayey Sand	111	16.1	D1556	111.3	100	95	15.7	(0.4)	Pass
SC-03	7/14/01	11+80 190RT	+30"	Clayey Sand	110.4	16.9	D1556	107.9	98	95	15.1	(1.8)	Pass
SC-04	7/15/01	14+00 50LT	+12"	Clayey Sand	110.4	16.9	D1556	109.7	99	95	17.8	0.9	Pass
SC-05	7/16/01	14+60 50RT	+24"	Clayey Sand	110.4	16.9	D1556	106.8	97	95	17.1	0.2	Pass

Reported to: Rod Kirschman - ASARCO, Inc.

Submitted by:

NOTE: Test numbers suffixed by a letter indicate a retest of that number.

HWA GEOSCIENCES INC.
19730-64TH AVE. W., SUITE 200
LYNNWOOD, WA 98036-5957
TEL. 425-774-0106
FAX. 425-774-2714
www.hwageosciences.com

SOIL LABORATORY TESTING REPORT

FOR THE

CAMU PROJECT
LOW PERMEABILITY BARRIER SOIL EVALUATION

HWA Project No. 2001-060
Report No. 3
July 24, 2001

Prepared For

Hydrometrics, Inc.
2727 Airport Road
Helena, Montana 59601

Attention: Mr. Mike Oelrich, P.E.

In accordance with your request, HWA GeoSciences, Inc., has undertaken and completed a laboratory testing program outlined by Ms. Sanna Yost, P.E. of Hydrometrics, Inc. for use during the construction as low permeability barrier soil. Herein we present the results of our laboratory analyses. The laboratory data is summarized in Table 1.

Laboratory Testing

Laboratory testing was conducted on three (3) bulk soil samples submitted by the client. The results are summarized in Table 1. The testing was conducted in accordance with the client's instructions and the procedures outlined below:

ATTERBERG LIMITS: The plastic limits, liquid limits, and plasticity indices for the submitted samples were determined in general accordance with **ASTM D 4318**. The results are presented in Figure 1.

MOISTURE-DENSITY RELATIONSHIP: The moisture-density (proctor) relationship for the submitted soil samples were determined in general accordance with **ASTM D 698 Method C**. Correction for oversize material was made in accordance with **ASTM D 4718**. The results are plotted on Figures 2 through 4.

HYDRAULIC CONDUCTIVITY: The vertical hydraulic conductivities's of three (3) remolded soil samples were measured in accordance with **ASTM D 5084**. Samples were remolded to approximately 95% of the Laboratory Maximum Dry Density (as determined

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TESTING & INSPECTION

per **ASTM D 698**) at optimum moisture content. Saturation was induced by subjecting the material to a flow gradient of 5 to 12 generated by a back-pressure differential of 1 to 2 psi for several days within a triaxial pressure chamber. Then each sample was subjected to an effective stress of 23 psi, and allowed to consolidate. The final permeability was then determined. Testing was conducted until inflow was equal to outflow (between 75 to 125%) and the permeability readings for the last 4 runs were within 50% of the average value of the last 4 runs. The results are presented in Table 1.

These tests were conducted utilizing the generally accepted laboratory procedures. Experience has shown that test values derived by these standard methods vary with each representative sample. In addition, it is typical that the engineering properties of soils vary over small distances of lateral or vertical extent. This report was prepared for the exclusive use and interpretation of Hydrometrics, Inc.'s engineers and design staff and should not be reproduced except in full.

Thank you for this opportunity to be of service. Should any questions arise, please do not hesitate to contact this office at your earliest convenience.

Sincerely,

HWA GEOSCIENCES INC.

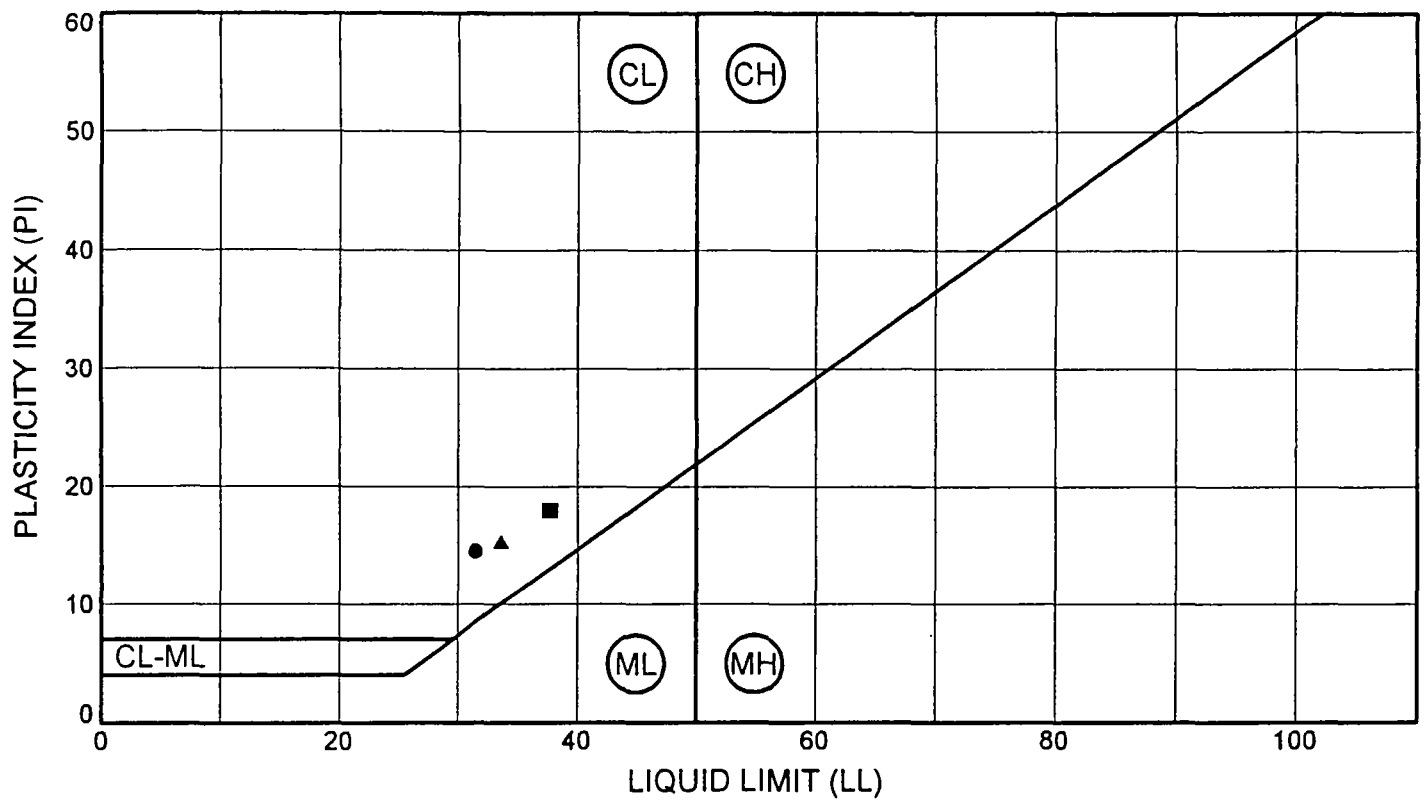
Steven E. Greene
Senior Engineering Geologist

Attachments:
Table 1 – Laboratory Testing Summary
Figure 1 – Plasticity Chart
Figures 2 through 4 – Laboratory Compaction Characteristics of Soil

TABLE 1
CAMU PROJECT – LOW PERMEABILITY BARRIER SOIL EVALUATION
LABORATORY TESTING SUMMARY

Sample Designation	UCS	Compaction Test Data (ASTM D 698)	Remolded Sample Parameters	Initial[1] Hydraulic Conductivity (cm/sec.)	Final[2] Hydraulic Conductivity (cm/sec.)
HC-1	SC	Max. DD= 124.7 pcf OM= 12.3%	117.5 pcf @ 13.0%	$k= 1.2 \times 10^{-6}$	$k= 4.4 \times 10^{-8}$
HC-2	CL	Max. DD= 109.7 pcf OM= 17.5%	103.6 pcf @ 17.5%	$k= 1.3 \times 10^{-5}$	$k= 5.9 \times 10^{-8}$
HC-3	CL	Max. DD= 107.1 pcf OM= 17.5%	101.7 pcf @ 17.5%	$k= 1.8 \times 10^{-6}$	$k= 4.5 \times 10^{-7}$

Notes: 1-Hydraulic conductivity measured after initial saturation prior to increase in effective stress and consolidation.
2-Hydraulic conductivity measured after increase of effective stress to 23 psi and resulting consolidation.



SYMBOL	SAMPLE		DEPTH (ft)	CLASSIFICATION	% MC	LL	PL	PI	% Fines
●	HC-1			(SC) Light yellowish brown, clayey SAND with gravel.	9	32	17	15	
■	HC-2			(CL) Light yellowish brown, sandy lean CLAY with gravel.	11	38	20	18	
▲	HC-3			(CL) Yellowish brown, sandy lean CLAY with gravel.	12	34	18	16	

HWA GEOSCIENCES INC.

ASARCO Camu Project
East Helena, Montana

PLASTICITY CHART

PROJECT NO.: 2001060 FIGURE: 1

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

(ASTM D 698, ASTM D 1557, ASTM D 4718)

HWA GEOSCIENCES INC.

CLIENT: *Hydrometrics, Inc.*

PROJECT: *ASARCO, Camu Project* SAMPLE ID: *HC-1*

PROJECT NO: *2001060* Sampled By: Client Tested By: *E.B.*

Date Sampled: *not indicated* Date Received: *6/26/2001* Date Tested: *6/29/2001*

MATERIAL TYPE OR DESCRIPTION: ***yellowish-brown, sandy clay with gravel, dry***

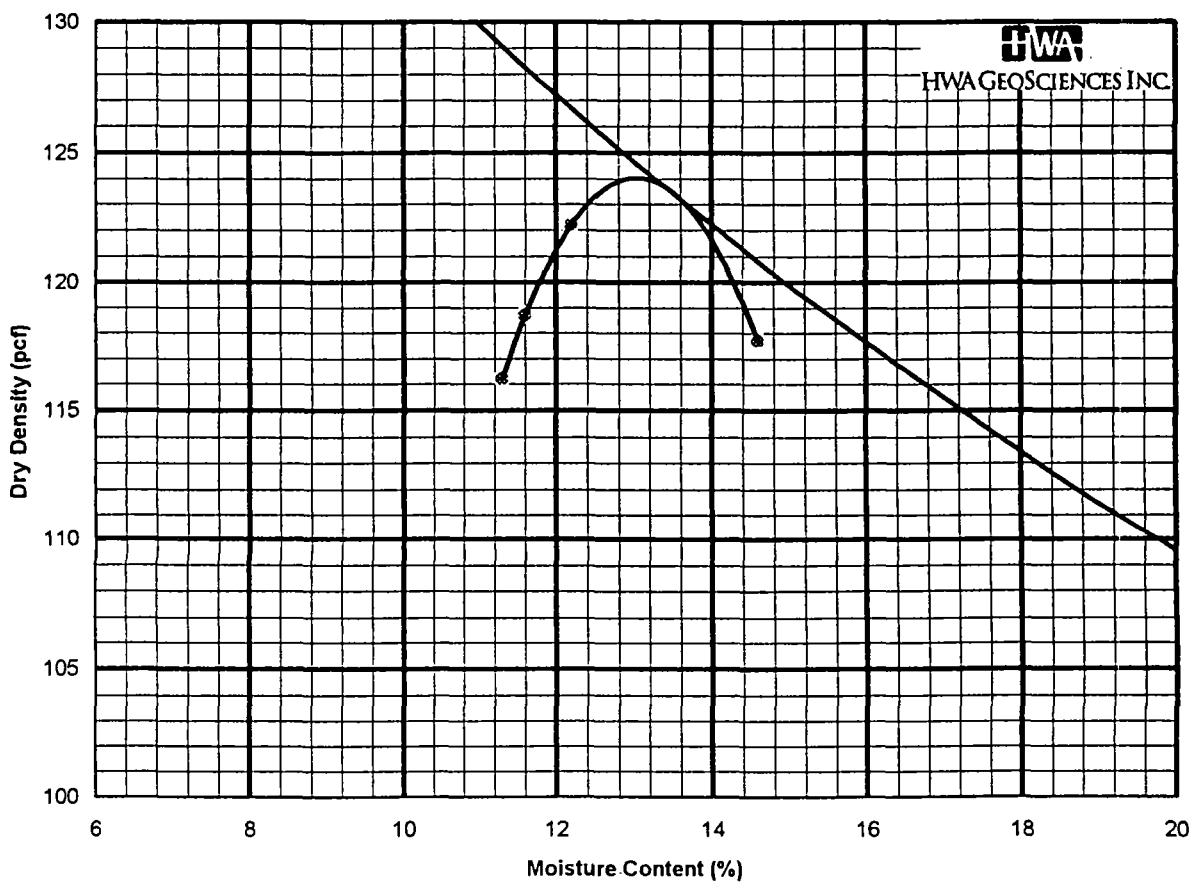
SAMPLE LOCATION AND DEPTH: ***not indicated***

Standard: [X] D698 [ ] D1557 Natural Moisture Content: *8.6* %

Method: [ ] A [ ] B [X] C Oversize *2* % retained on: *3/4* in.

Preparation: [X] Dry [ ] Moist Rammer: [X] Auto [ ] Manual Assumed S.G.: *2.7* %

Test Data					
Dry Density (pcf)		116.2	118.7	122.2	117.7
Moisture Content (%)		11.3	11.6	12.2	14.6



Data Summary:	
Percent Oversize	2.0%
Max. Dry Density (pcf)	124.7
Optimum Moisture (%)	12.3

Other Oversize Percentages						
0.0%	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%
124.0	125.7	127.4	129.1	130.9	132.8	134.7
12.5	11.9	11.4	10.8	10.2	9.6	9.1

Figure No: 2 Reviewed By: [signature]

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LABORATORY COMPACTION CHARACTERISTICS OF SOIL

(ASTM D 698, ASTM D 1557, ASTM D 4718)

HWA GEOSCIENCES INC.

CLIENT: *Hydrometrics, Inc.*

PROJECT: *ASARCO, Camu Project* SAMPLE ID: *HC-2*

PROJECT NO: *2001060* Sampled By: Client Tested By: *E.B.*

Date Sampled: *not indicated* Date Received: *6/26/2001* Date Tested: *6/29/2001*

MATERIAL TYPE OR DESCRIPTION: ***yellowish-brown, sandy clay with gravel, dry***

SAMPLE LOCATION AND DEPTH: ***not indicated***

Standard: [X] D698 [ ] D1557 Natural Moisture Content: *10.3* %

Method: [ ] A [ ] B [X] C Oversize *3.1* % retained on: *3/4* in.

Preparation: [X] Dry [ ] Moist Rammer: [X] Auto [ ] Manual Assumed S.G.: *2.7* %

Test Data					
Dry Density (pcf)		99.2	106.1	108.3	105.0
Moisture Content (%)		14.5	16.2	18.4	20.1

Data Summary:	
Percent Oversize	3.1%
Max. Dry Density (pcf)	109.7
Optimum Moisture (%)	17.5

Other Oversize Percentages						
0.0%	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%
108.5	110.5	112.5	114.6	116.8	119.1	121.5
18.0	17.2	16.3	15.5	14.6	13.8	12.9

Figure No: 3 Reviewed By: _____

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LABORATORY COMPACTION CHARACTERISTICS OF SOIL

(ASTM D 698, ASTM D 1557, ASTM D 4718)

HWA GEOSCIENCES INC.

CLIENT: *Hydrometrics, Inc.*

PROJECT: *ASARCO, Camu Project* SAMPLE ID: *HC-3*

PROJECT NO: *2001060* Sampled By: Client Tested By: *E.B.*

Date Sampled: *not indicated* Date Received: *6/26/2001* Date Tested: *6/29/2001*

MATERIAL TYPE OR DESCRIPTION: ***yellowish-brown, sandy clay with gravel, dry***

SAMPLE LOCATION AND DEPTH: ***not indicated***

Standard: [X] D698 [ ] D1557 Natural Moisture Content: *13* %

Method: [ ] A [ ] B [X] C Oversize *0* % retained on: *3/4* in.

Preparation: [X] Dry [ ] Moist Rammer: [X] Auto [ ] Manual Assumed S.G.: *2.65* %

Test Data					
Dry Density (pcf)	100.8	102.7	105.6	106.9	105.0
Moisture Content (%)	11.6	13.0	15.1	18.2	20.2

Data Summary:	
Percent Oversize	0.0%
Max. Dry Density (pcf)	107.1
Optimum Moisture (%)	17.5

Other Oversize Percentages						
0.0%	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%
107.1	109.0	111.0	113.1	115.2	117.5	119.8
17.5	16.7	15.9	15.0	14.2	13.4	12.6

Figure No: 4 Reviewed By: [signature]

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HWA GEOSCIENCES INC.
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SOIL LABORATORY TESTING REPORT

FOR THE

CAMU PROJECT
LOW PERMEABILITY BARRIER SOIL EVALUATION

HWA Project No. 2001-060
Report No. 4
July 31, 2001

Prepared For

Hydrometrics, Inc.
2727 Airport Road
Helena, Montana 59601

Attention: Mr. Mike Oelrich, P.E.

In accordance with your request, HWA GeoSciences, Inc., has undertaken and completed a laboratory testing program outlined by Ms. Sanna Yost, P.E. of Hydrometrics, Inc. for use during the construction as low permeability barrier soil. Herein we present the results of our laboratory analyses. The laboratory data is summarized in Table 1.

Laboratory Testing

Laboratory testing was conducted on three (2) bulk soil samples submitted by the client. The results are summarized in Table 1. The testing was conducted in accordance with the client's instructions and the procedures outlined below:

ATTERBERG LIMITS: The plastic limits, liquid limits, and plasticity indices for the submitted samples were determined in general accordance with **ASTM D 4318**. The results are presented in Figure 1.

MOISTURE-DENSITY RELATIONSHIP: The moisture-density (proctor) relationship for the submitted soil samples were determined in general accordance with **ASTM D 698 Method C**. Correction for oversize material was made in accordance with **ASTM D 4718**. The results are plotted on Figures 2 and 3.

HYDRAULIC CONDUCTIVITY: The vertical hydraulic conductivities's of two (2) remolded soil samples were measured in accordance with **ASTM D 5084**. Samples were remolded to approximately 95% of the Laboratory Maximum Dry Density (as determined per

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TESTING & INSPECTION

ASTM D 698) at optimum moisture content. Saturation was induced by subjecting the material to a flow gradient of 5 to 12 generated by a back-pressure differential of 1 to 2 psi for several days within a triaxial pressure chamber. Then each sample was subjected to an effective stress of 23 psi, and allowed to consolidate. The final permeability was then determined. Testing was conducted until inflow was equal to outflow (between 75 to 125%) and the permeability readings for the last 4 runs were within 50% of the average value of the last 4 runs. The results are presented in Table 1.

These tests were conducted utilizing the generally accepted laboratory procedures. Experience has shown that test values derived by these standard methods vary with each representative sample. In addition, it is typical that the engineering properties of soils vary over small distances of lateral or vertical extent. This report was prepared for the exclusive use and interpretation of Hydrometrics, Inc.'s engineers and design staff and should not be reproduced except in full.

Thank you for this opportunity to be of service. Should any questions arise, please do not hesitate to contact this office at your earliest convenience.

Sincerely,

HWA GEOSCIENCES INC.

Steven E. Greene
Senior Engineering Geologist

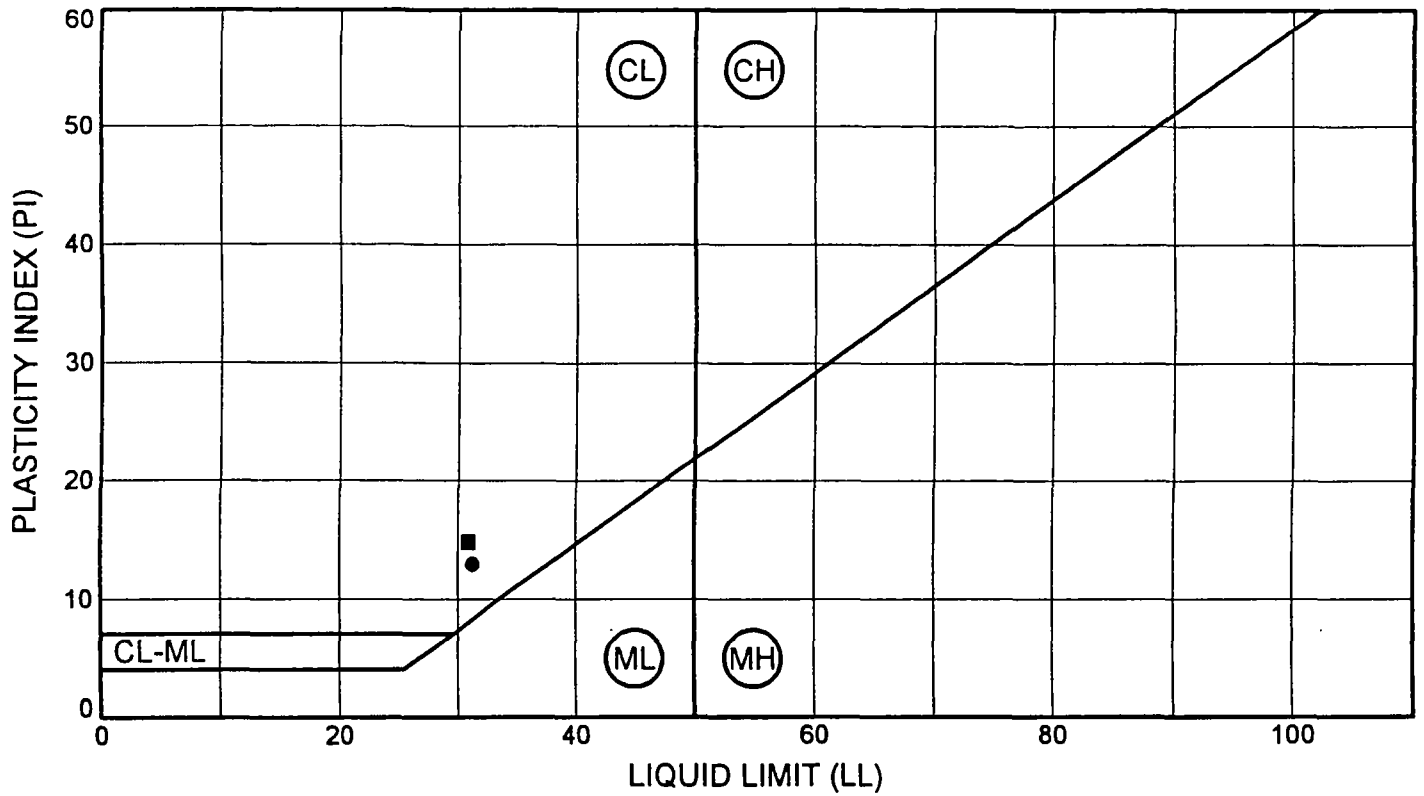
Attachments:
Table 1 – Laboratory Testing Summary
Figure 1 – Plasticity Chart
Figures 2 and 3 – Laboratory Compaction Characteristics of Soil

HWA GEOSCIENCES INC.

TABLE 1
CAMU PROJECT – LOW PERMEABILITY BARRIER SOIL EVALUATION
LABORATORY TESTING SUMMARY

Sample Designation	UCS	Compaction Test Data (ASTM D 698)	Remolded Sample Parameters	Initial[1] Hydraulic Conductivity (cm/sec.)	Final[2] Hydraulic Conductivity (cm/sec.)
HC-4	CL	Max. DD= 105.5 pcf OM= 14.5%	100.0 pcf @ 14.5%	$k= 6.2 \times 10^{-7}$	$k= 2.2 \times 10^{-7}$
HC-5	CL	Max. DD= 110.6 pcf OM= 16.3%	105.9 pcf @ 16.3%	$k= 5.3 \times 10^{-7}$	$k= 1.8 \times 10^{-7}$

Notes: 1-Hydraulic conductivity measured after initial saturation prior to increase in effective stress and consolidation.
2-Hydraulic conductivity measured after increase of effective stress to 23 psi and resulting consolidation.



SYMBOL	SAMPLE		DEPTH (ft)	CLASSIFICATION	% MC	LL	PL	PI	% Fines
●	HC-4			(CL) Light yellowish brown, sandy lean CLAY.	10	31	18	13	
■	HC-5			(CL) Light yellowish brown, sandy lean CLAY.	11	31	16	15	

HWA GEOSCIENCES INC.

ASARCO Camu Project
East Helena, Montana

PLASTICITY CHART

PROJECT NO.: 2001060 FIGURE: 1

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

(ASTM D 698, ASTM D 1557, ASTM D 4718)

HWA GEOSCIENCES INC.

CLIENT: *Hydrometrics, Inc.*

PROJECT: *ASARCO, Camu Project* SAMPLE ID: *HC-5*

PROJECT NO: *2001060* Sampled By: Client Tested By: *E.B.*

Date Sampled: *not indicated* Date Received: *7/5/2001* Date Tested: *7/6/2001*

MATERIAL TYPE OR DESCRIPTION: ***light yellowish-brown, sandy clay, dry***

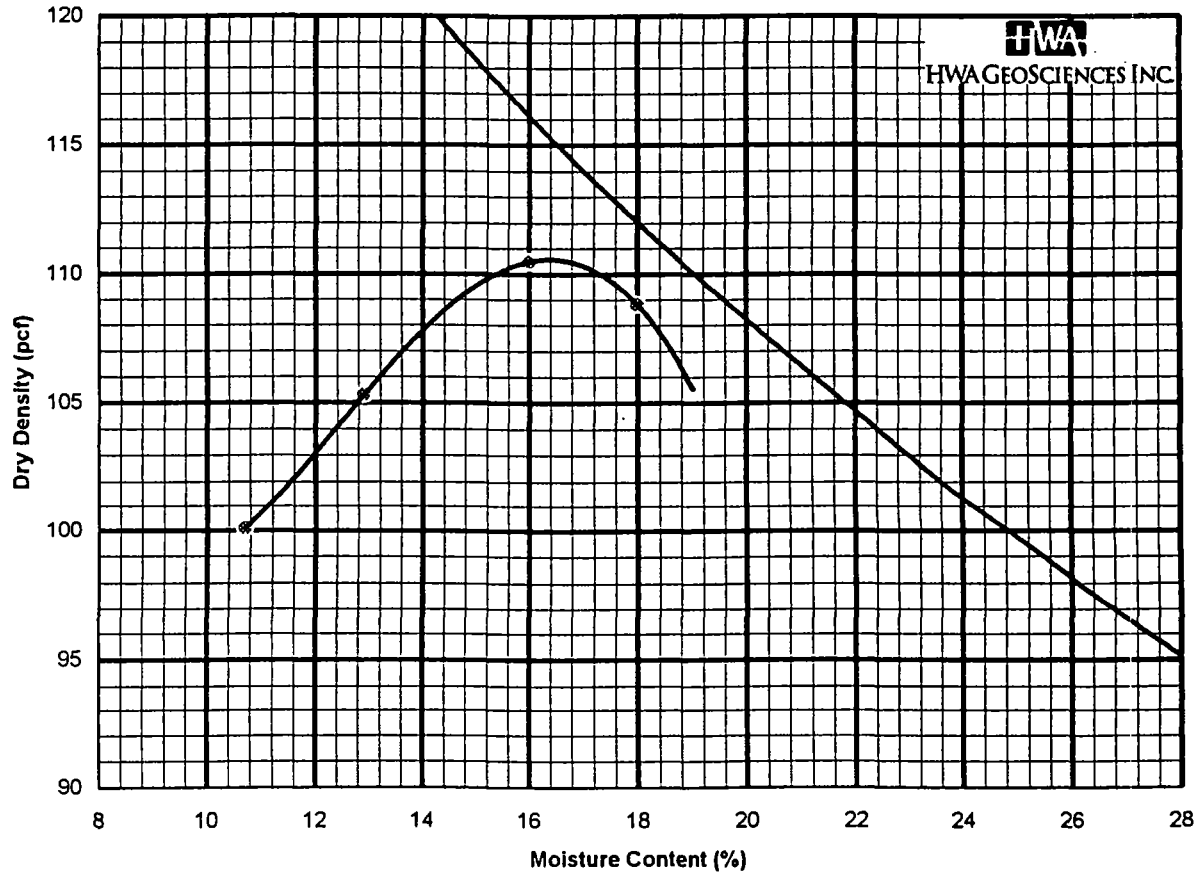
SAMPLE LOCATION AND DEPTH: ***not indicated***

Standard: [X] D698 [ ] D1557 Natural Moisture Content: ____ %

Method: [ ] A [ ] B [X] C Oversize *0* % retained on: *3/4* in.

Preparation: [X] Dry [ ] Moist Rammer: [X] Auto [ ] Manual Assumed S.G.: *2.65* %

Test Data					
Dry Density (pcf)	100.1	105.3	110.5	108.8	
Moisture Content (%)	10.7	12.9	16.0	18.0	
Zero Air Voids (hide)					



Data Summary:	
Percent Oversize	0.0%
Max. Dry Density (pcf)	110.6
Optimum Moisture (%)	16.3

Other Oversize Percentages						
0.0%	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%
110.6	112.5	114.4	116.4	118.5	120.6	122.8
16.3	15.5	14.8	14.0	13.2	12.5	11.7

Figure No: 3 Reviewed By: _____

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LABORATORY COMPACTION CHARACTERISTICS OF SOIL

(ASTM D 698, ASTM D 1557, ASTM D 4718)

HWA GEOSCIENCES INC.

CLIENT: *Hydrometrics, Inc.*

PROJECT: *ASARCO, Camu Project* SAMPLE ID: *HC-4*

PROJECT NO: *2001060* Sampled By: Client Tested By: *E.B.*

Date Sampled: *not indicated* Date Received: *7/5/2001* Date Tested: *7/6/2001*

MATERIAL TYPE OR DESCRIPTION: ***light yellowish-brown, sandy clay, dry***

SAMPLE LOCATION AND DEPTH: ***not indicated***

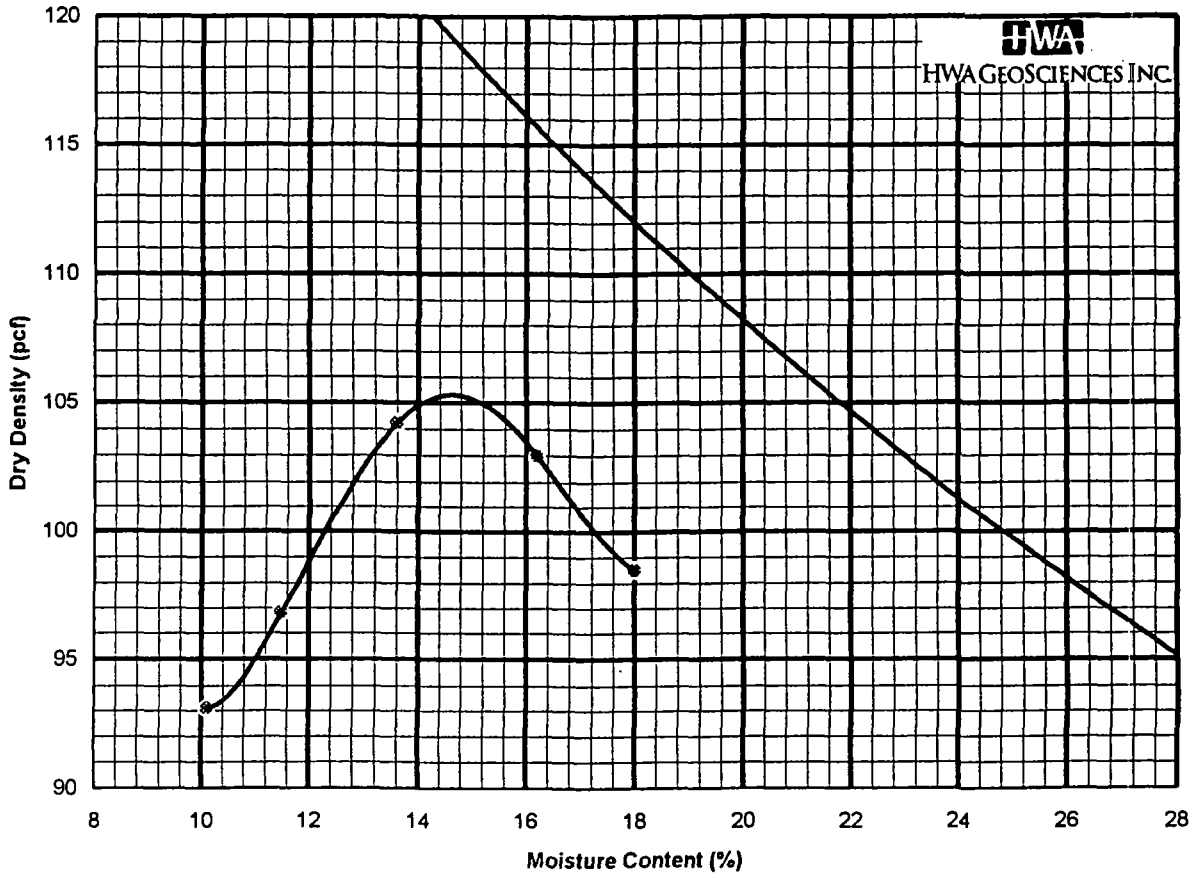
Standard: [X] D698 [ ] D1557 Natural Moisture Content: *10.1* %

Method: [ ] A [ ] B [X] C Oversize *0* % retained on: *3/4* in.

Preparation: [X] Dry [ ] Moist Rammer: [X] Auto [ ] Manual Assumed S.G.: *2.65* %

Test Data					
Dry Density (pcf)	93.1	96.8	104.2	103.0	98.5
Moisture Content (%)	10.1	11.5	13.6	16.2	18.0

~~Zero Air Voids (hide)~~



Data Summary:	
Percent Oversize	0.0%
Max. Dry Density (pcf)	105.5
Optimum Moisture (%)	14.5

Other Oversize Percentages						
0.0%	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%
105.5	107.4	109.5	111.6	113.7	116.0	118.4
14.5	13.8	13.2	12.5	11.8	11.1	10.5

Figure No: 2 Reviewed By:

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SOIL LABORATORY TESTING REPORT

FOR THE

CAMU PROJECT
LOW PERMEABILITY BARRIER SOIL EVALUATION

HWA Project No. 2001-060
Report No. 5
August 21, 2001

Prepared For

Hydrometrics, Inc.
2727 Airport Road
Helena, Montana 59601

Attention: Mr. Mike Oelrich, P.E.

In accordance with your request, HWA GeoSciences, Inc., has undertaken and completed a laboratory testing program outlined by Ms. Sanna Yost, P.E. of Hydrometrics, Inc. for use during the construction as low permeability barrier soil. Herein we present the results of our laboratory analyses. The laboratory data is summarized in Table 1.

Laboratory Testing

Laboratory testing was conducted on one (1) bulk soil sample submitted by the client. The results are summarized in Table 1. The testing was conducted in accordance with the client's instructions and the procedures outlined below:

ATTERBERG LIMITS: The plastic limits, liquid limits, and plasticity indices for the submitted sample was determined in general accordance with **ASTM D 4318**. The results are presented in Figure 1.

MOISTURE-DENSITY RELATIONSHIP: The moisture-density (proctor) relationship for the submitted soil sample was determined in general accordance with **ASTM D 698 Method C**. Correction for oversize material was made in accordance with **ASTM D 4718**. The results are plotted on Figure 2.

HYDRAULIC CONDUCTIVITY: The vertical hydraulic conductivity of one (1) remolded soil sample was measured in general accordance with **ASTM D 5084**. Sample was remolded to approximately 95% of the Laboratory Maximum Dry Density (as determined per **ASTM D 698**) at optimum moisture content. Saturation was induced by subjecting

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the material to a flow gradient of 5 to 12 generated by a back-pressure differential of 1 to 2 psi for several days within a triaxial pressure chamber. Then the sample was subjected to an effective stress of 23 psi, and allowed to consolidate. The final permeability was then determined. Testing was conducted until inflow was equal to outflow (between 75 to 125%) and the permeability readings for the last 4 runs were within 50% of the average value of the last 4 runs. The results are presented in Table 1.

These tests were conducted utilizing the generally accepted laboratory procedures. Experience has shown that test values derived by these standard methods vary with each representative sample. In addition, it is typical that the engineering properties of soils vary over small distances of lateral or vertical extent. This report was prepared for the exclusive use and interpretation of Hydrometrics, Inc.'s engineers and design staff and should not be reproduced except in full.

Thank you for this opportunity to be of service. Should any questions arise, please do not hesitate to contact this office at your earliest convenience.

Sincerely,

HWA GEOSCIENCES INC.

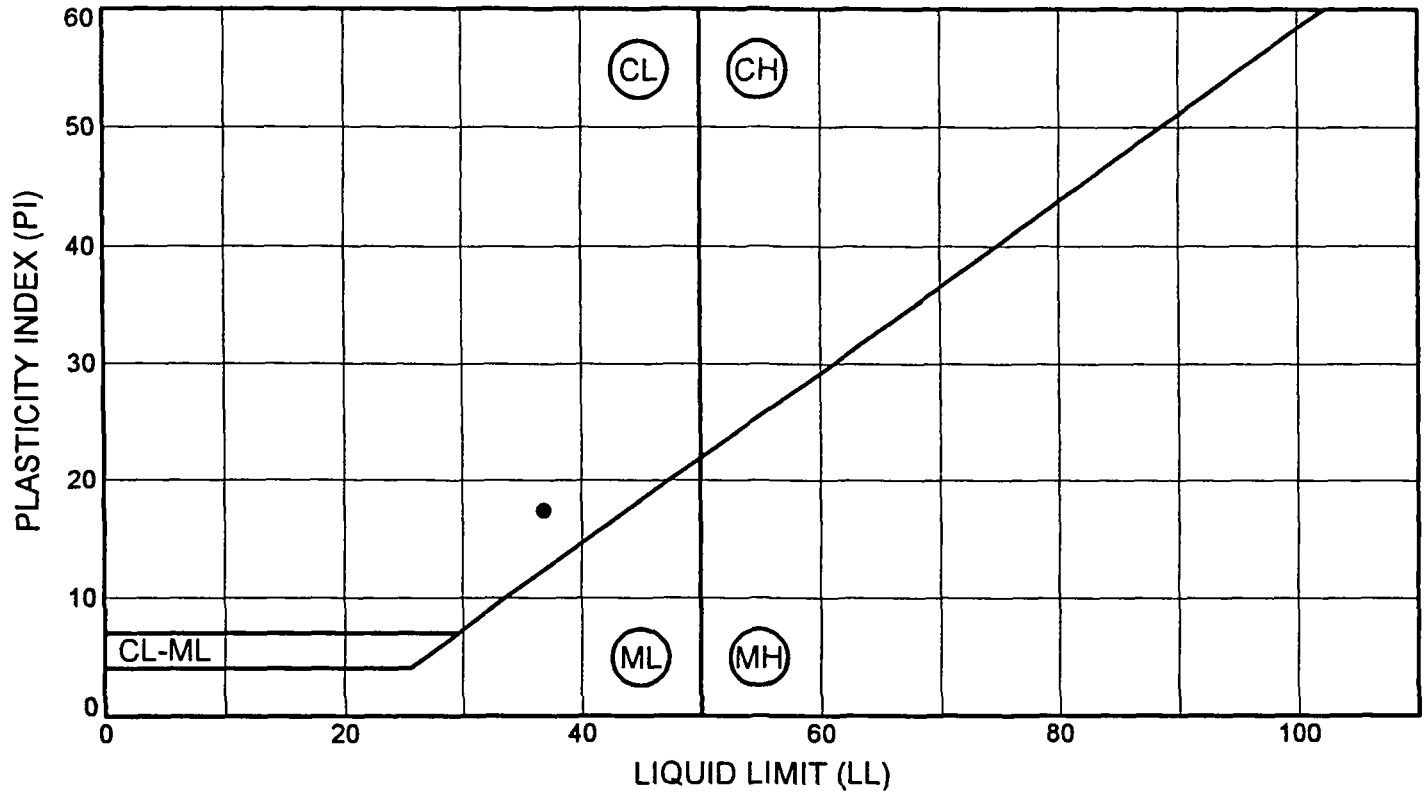
Steven E. Greene
Senior Engineering Geologist

Attachments:
Table 1 – Laboratory Testing Summary
Figure 1 – Plasticity Chart
Figure 2 – Laboratory Compaction Characteristics of Soil

TABLE 1
CAMU PROJECT –LOW PERMEABILITY BARRIER SOIL EVALUATION
LABORATORY TESTING SUMMARY

Sample Designation	UCS	Compaction Test Data (ASTM D 698)	Remolded Sample Parameters	Initial[1] Hydraulic Conductivity (cm/sec.)	Final[2] Hydraulic Conductivity (cm/sec.)
HC-6	CL	Max. DD= 108.7 pcf OM= 16.8%	102.9 pcf @ 17.5%	$k= 3.1 \times 10^{-7}$	$k= 4.5 \times 10^{-8}$

Notes: 1-Hydraulic conductivity measured after initial saturation prior to increase in effective stress and consolidation.
2-Hydraulic conductivity measured after increase of effective stress to 23 psi and resulting consolidation.



SYMBOL	SAMPLE		DEPTH (ft)	CLASSIFICATION	% MC	LL	PL	PI	% Fines
●	HC-6			(SC) yellowish brown, sandy lean CLAY with gravel	10	37	19	18	

HWA GEOSCIENCES INC.

ASARCO Camu Project
East Helena, Montana

PLASTICITY CHART

PROJECT NO.: 2001060 FIGURE: 1

HWAATTB 2001060.GPJ 8/21/01

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

(ASTM D 698, ASTM D 1557, ASTM D 4718)

HWA GEOSCIENCES INC.

CLIENT: *Hydrometrics, Inc.*

PROJECT: *ASARCO, Camu Project* SAMPLE ID: *HC-6*

PROJECT NO: *2001060* Sampled By: Client Tested By: *E.B.*

Date Sampled: *not indicated* Date Received: *7/5/2001* Date Tested: *7/19/2001*

MATERIAL TYPE OR DESCRIPTION: ***light brown, sandy clay, dry***

SAMPLE LOCATION AND DEPTH: ***not indicated***

Standard: [X] D698 [ ] D1557 Natural Moisture Content: ____ %

Method: [ ] A [ ] B [X] C Oversize 3 % retained on: 3/4 in.

Preparation: [X] Dry [ ] Moist Rammer: [X] Auto [ ] Manual Assumed S.G.: 2.65 %

Test Data					
Dry Density (pcf)	98.9	105.1	106.9	104.4	
Moisture Content (%)	13.9	15.4	18.3	20.2	

Zero Air Voids (hide)

Data Summary:	
Percent Oversize	3.0%
Max. Dry Density (pcf)	108.7
Optimum Moisture (%)	16.8

Other Oversize Percentages						
0.0%	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%
107.6	109.5	111.5	113.6	115.7	117.9	120.2
17.3	16.5	15.7	14.9	14.0	13.2	12.4

Figure No: 2 Reviewed By: _____

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SOIL LABORATORY TESTING REPORT

FOR THE

CAMU PROJECT
LOW PERMEABILITY BARRIER SOIL EVALUATION

HWA Project No. 2001-060
Report No. 6
September 10, 2001

Prepared For

Hydrometrics, Inc.
2727 Airport Road
Helena, Montana 59601

Attention: Mr. Mike Oelrich, P.E.

In accordance with your request, HWA GeoSciences, Inc., has undertaken and completed a laboratory testing program outlined by Ms. Sanna Yost, P.E. of Hydrometrics, Inc. for use during the construction as low permeability barrier soil. Herein we present the results of our laboratory analyses. The laboratory data is summarized in Table 1.

Laboratory Testing

Laboratory testing was conducted on one (1) bulk soil sample submitted by the client. The results are summarized in Table 1. The testing was conducted in accordance with the client's instructions and the procedures outlined below:

ATTERBERG LIMITS: The plastic limits, liquid limits, and plasticity indices for the submitted sample was determined in general accordance with **ASTM D 4318**. The results are presented in Figure 1.

MOISTURE-DENSITY RELATIONSHIP: The moisture-density (proctor) relationship for the submitted soil sample was determined in general accordance with **ASTM D 698 Method C**. Correction for oversize material was made in accordance with **ASTM D 4718**. The results are plotted on Figure 2.

HYDRAULIC CONDUCTIVITY: The vertical hydraulic conductivity of one (1) remolded soil sample was measured in general accordance with **ASTM D 5084**. Sample was remolded to approximately 95% of the Laboratory Maximum Dry Density (as determined per **ASTM D 698**) at optimum moisture content. Saturation was induced by subjecting

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the material to a flow gradient of 5 to 12 generated by a back-pressure differential of 1 to 2 psi for several days within a triaxial pressure chamber. Then the sample was subjected to an effective stress of 23 psi, and allowed to consolidate. The final permeability was then determined. Testing was conducted until inflow was equal to outflow (between 75 to 125%) and the permeability readings for the last 4 runs were within 50% of the average value of the last 4 runs. The results are presented in Table 1.

These tests were conducted utilizing the generally accepted laboratory procedures. Experience has shown that test values derived by these standard methods vary with each representative sample. In addition, it is typical that the engineering properties of soils vary over small distances of lateral or vertical extent. This report was prepared for the exclusive use and interpretation of Hydrometrics, Inc.'s engineers and design staff and should not be reproduced except in full.

Thank you for this opportunity to be of service. Should any questions arise, please do not hesitate to contact this office at your earliest convenience.

Sincerely,

HWA GEOSCIENCES INC.

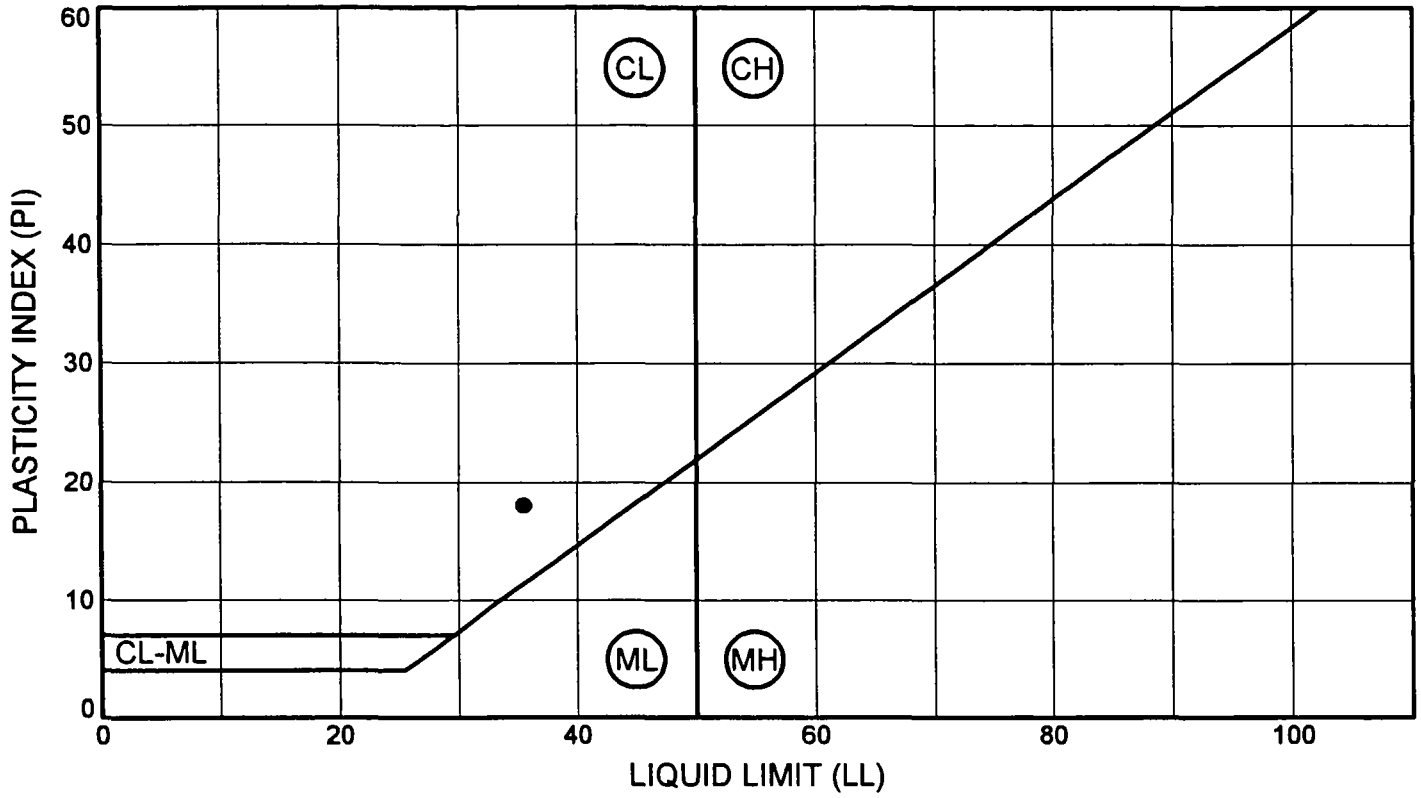
Steven E. Greene
Senior Engineering Geologist

Attachments:
Table 1 – Laboratory Testing Summary
Figure 1 – Plasticity Chart
Figure 2 – Laboratory Compaction Characteristics of Soil

TABLE 1
CAMU PROJECT – LOW PERMEABILITY BARRIER SOIL EVALUATION
LABORATORY TESTING SUMMARY

Sample Designation	UCS	Compaction Test Data (ASTM D 698)	Remolded Sample Parameters	Initial[1] Hydraulic Conductivity (cm/sec.)	Final[2] Hydraulic Conductivity (cm/sec.)
HC-7	CL	Max. DD= 111.7 pcf OM= 16.0%	107.3 pcf @ 16.0%	$k= 6.5 \times 10^{-7}$	$k= 3.7 \times 10^{-8}$

Notes: 1-Hydraulic conductivity measured after initial saturation prior to increase in effective stress and consolidation.
2-Hydraulic conductivity measured after increase of effective stress to 23 psi and resulting consolidation.



SYMBOL	SAMPLE		DEPTH (ft)	CLASSIFICATION	% MC	LL	PL	PI	% Fines
●	HC-7			(SC) yellowish brown, sandy lean CLAY	10	36	18	18	

HWA GEOSCIENCES INC.

ASARCO Camu Project
East Helena, Montana

PLASTICITY CHART

PROJECT NO.: 2001060 FIGURE: 1

HWAATTB 2001060.GPJ 9/10/01

LABORATORY COMPACTION CHARACTERISTICS OF SOIL

(ASTM D 698, ASTM D 1557, ASTM D 4718)

HWA GEOSCIENCES INC.

CLIENT: *Hydrometrics, Inc.*

PROJECT: *ASARCO, Camu Project* SAMPLE ID: *HC-7*

PROJECT NO: *2001060* Sampled By: Client Tested By: *E.B.*

Date Sampled: *not indicated* Date Received: *7/5/2001* Date Tested: *7/24/2001*

MATERIAL TYPE OR DESCRIPTION: ***light brown, sandy clay, dry***

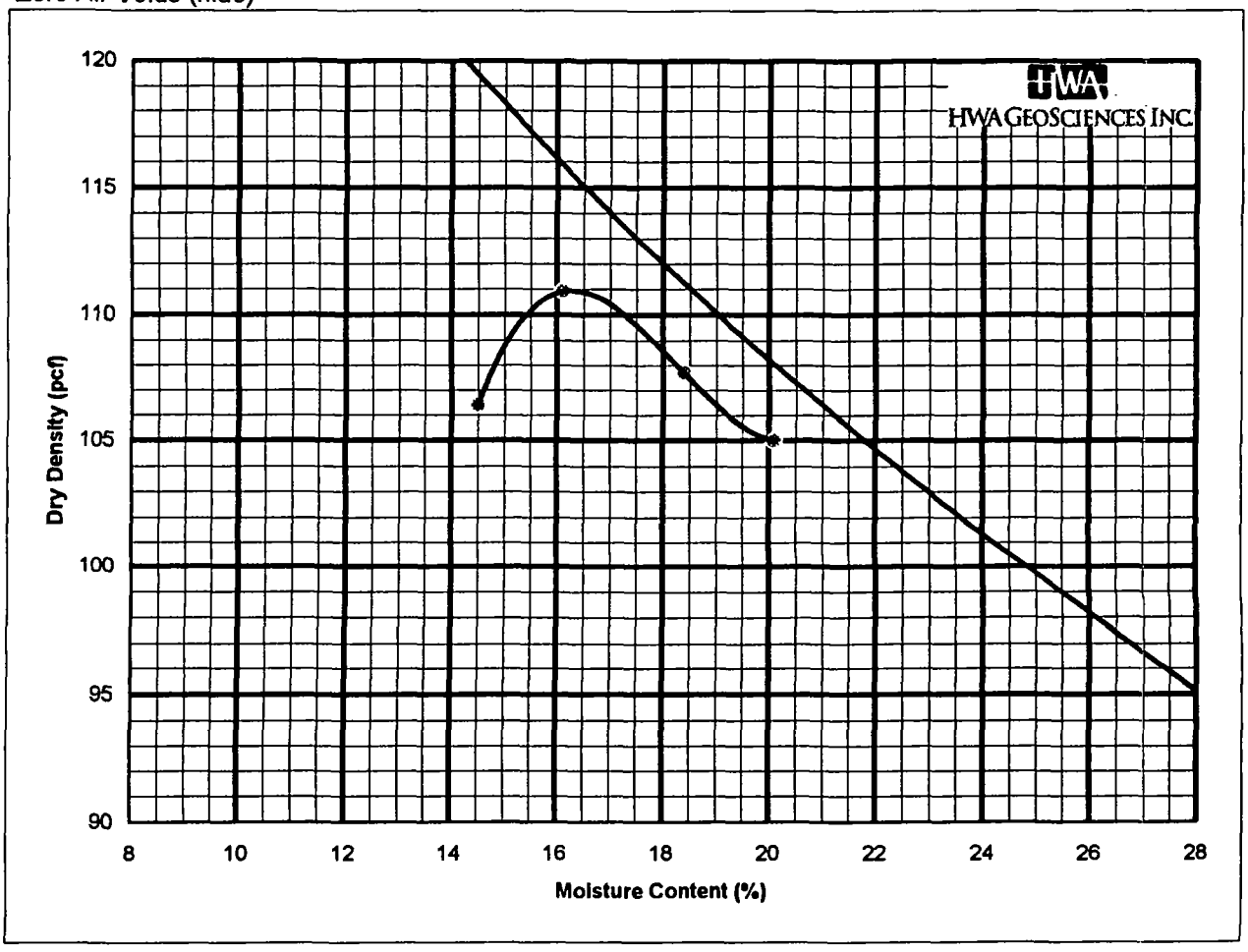
SAMPLE LOCATION AND DEPTH: ***not indicated***

Standard: [X] D698 [ ] D1557 Natural Moisture Content: *12.5* %

Method: [ ] A [ ] B [X] C Oversize *2* % retained on: *3/4* in.

Preparation: [X] Dry [ ] Moist Rammer: [X] Auto [ ] Manual Assumed S.G.: *2.65* %

Test Data					
Dry Density (pcf)	106.4	110.9	107.7	105.0	
Moisture Content (%)	14.5	16.1	18.4	20.1	
~~Zero Air Voids (hide)~~					



Data Summary:	
Percent Oversize	2.0%
Max. Dry Density (pcf)	111.7
Optimum Moisture (%)	16.0

Other Oversize Percentages						
0.0%	5.0%	10.0%	15.0%	20.0%	25.0%	30.0%
111.0	112.9	114.8	116.8	118.8	120.9	123.2
16.3	15.5	14.8	14.0	13.2	12.5	11.7

Figure No: 2 Reviewed By: _____

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Precision Geosynthetic Laboratories

ISO 9002

July 26, 2001

Sanna M. Yost, P.E.
HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Dear Yost: RE: Asarco East Helena CAMU / Proj# 1237.50.300

Thank you for consulting Precision Geosynthetic Laboratories for your material testing needs.

It should be noted that the test specimen and test sample used for this report was believed to be representative of the material produced under the designation herein stated. However, these results are indicative of only the specimens that were actually tested. The testing herein is based upon accepted industry practice as well as the test method listed. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the final use and purpose of the material.

By accepting the data and results represented on this report, 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 test(s) represented in this report, and Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liability in excess of the aforementioned limit.

The test data and all associated project information shall be held in confidence and disclosed to other parties only with the authorization of Client or Precision Geosynthetic Laboratories.

It is a company policy to keep the physical records of each job for 2 years since the receipt of the samples and keep the electronic file for 7 years. ***Failed seam samples are kept for 7 years; good seam samples are disposed after 2 weeks and conformance samples are disposed after 1 month.*** Should you need us to keep them longer, please advise us in writing.

If you have any questions or if we may be of further service, please do not hesitate to call at 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

Enclosure: (Job No. J010318)

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

Precision Geosynthetic Laboratories

ISO 9002

CLIENT: HYDROMETRICS, INC.
PROJECT: Asarco East Helena CAMU / Proj# 1237.50.300

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. J010318)

MATERIAL DESCRIPTION: 60 mil HDPE seam

DATE RECEIVED: June 26, 2001 **DATE REPORTED:** July 26, 2001

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
DS-3 P17/19	62093

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D4437	Seam Peel Adhesion
ASTM D4437	Bonded Seam Strength

TEST CONDITIONS: The sample was conditioned for a minimum 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. The units in which the data are reported are included on the table.

PRECISION GEOSYNTHETIC LABORATORIES

GAI-LAP
Initials: [illegible]#: 013
Date: 7/26/01

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

TABLE 1.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.** MATERIAL: **60 Mil HDPE** QC'd By: _____

PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300** SEAM TYPE: **Heat Fusion Weld** TEST METHOD: **ASTM D4437**

DATE REC'D: **26-Jul-01** PGL JOB #: **J010318** DATE REPORT: **26-Jul-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DS-3 P17/19	**62093**	160	>200		1 Outside	128	<10	SE1	
		167	>200		2 Outside	125	<10	SE1	
		153	>200		3 Outside	123	<10	SE1	
		147	>200		4 Outside	121	<10	SE1	
		184	>200		5 Outside	121	<10	SE1	
					AVG:	**124**			*70*
					STD. DEV.	**3**			
					1 Inside	152	<10	SE1	
					2 Inside	119	<10	SE1	
					3 Inside	117	<10	SE1	
					4 Inside	99	<10	SE1	
					5 Inside	136	<10	SE1	
	AVG.	**162**		*100*	***AVG:***	**125**			*70*
	STD. DEV.	**14**			*STD. DEV.*	**20**			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM [illegible] H BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SOM[illegible]AD [illegible]ION FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

Precision Geosynthetic Laboratories

ISO 9002

July 30, 2001

Sanna M. Yost, P.E.
HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Dear Yost: RE: Asarco East Helena CAMU / Proj# 1237.50.300

Thank you for consulting Precision Geosynthetic Laboratories for your material testing needs.

It should be noted that the test specimen and test sample used for this report was believed to be representative of the material produced under the designation herein stated. However, these results are indicative of only the specimens that were actually tested. The testing herein is based upon accepted industry practice as well as the test method listed. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the final use and purpose of the material.

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If you have any questions or if we may be of further service, please do not hesitate to call at 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

Enclosure: (Job No. J010329)

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

Precision Geosynthetic Laboratories

ISO 9002

CLIENT: HYDROMETRICS, INC.
PROJECT: Asarco East Helena CAMU / Proj# 1237.50.300

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. J010329)

MATERIAL DESCRIPTION: 60 mil HDPE seam

DATE RECEIVED: July 30, 2001 **DATE REPORTED:** July 30, 2001

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
DT-5 P20/22	62209

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D4437	Seam Peel Adhesion
ASTM D4437	Bonded Seam Strength

TEST CONDITIONS: The sample was conditioned for a minimum 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. The units in which the data are reported are included on the table.

PRECISION GEOSYNTHETIC LABORATORIES

GAI-LAP
Initials: #: 013
Date: 8/1/01

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

TABLE 1
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.** MATERIAL: **60 Mil HDPE** QC'd By: _____

PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300** SEAM TYPE: **Heat Fusion Weld** TEST METHOD: **ASTM D4437**

DATE REC'D: **30-Jul-01** PGL JOB #: **J010329** DATE REPORT: **30-Jul-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DT-5 P20/22	**62209**	173	>200		1 Outside	158	<10	SE1	
		178	>200		2 Outside	155	<10	SE1	
		182	>200		3 Outside	152	<10	SE1	
		159	>200		4 Outside	151	<10	SE1	
		193	>200		5 Outside	145	<10	SE1	
					AVG:	**152**			*70*
					STD. DEV.	**5**			
					1 Inside	153	<10	SE1	
					2 Inside	126	<10	SE1	
					3 Inside	121	<10	SE1	
					4 Inside	121	<10	SE1	
					5 Inside	104	<10	SE1	
	AVG.	**177**		*100*	***AVG:***	**125**			*70*
	STD. DEV.	**12**			*STD. DEV.*	**18**			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM [illegible] H BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SOM[illegible] AD[illegible] ION FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

Precision Geosynthetic Laboratories

ISO 9002

July 31, 2001

Sanna M. Yost, P.E.
HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Dear Yost: RE: Asarco East Helena CAMU / Proj# 1237.50.300

Thank you for consulting Precision Geosynthetic Laboratories for your material testing needs.

It should be noted that the test specimen and test sample used for this report was believed to be representative of the material produced under the designation herein stated. However, these results are indicative of only the specimens that were actually tested. The testing herein is based upon accepted industry practice as well as the test method listed. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the final use and purpose of the material.

By accepting the data and results represented on this report, 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 test(s) represented in this report, and Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liability in excess of the aforementioned limit.

The test data and all associated project information shall be held in confidence and disclosed to other parties only with the authorization of Client or Precision Geosynthetic Laboratories.

It is a company policy to keep the physical records of each job for 2 years since the receipt of the samples and keep the electronic file for 7 years. ***Failed seam samples are kept for 7 years; good seam samples are disposed after 2 weeks and conformance samples are disposed after 1 month.*** Should you need us to keep them longer, please advise us in writing.

If you have any questions or if we may be of further service, please do not hesitate to call at 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

Enclosure: (Job No. J010332)

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

Precision Geosynthetic Laboratories

ISO 9002

CLIENT: HYDROMETRICS, INC.
PROJECT: Asarco East Helena CAMU / Proj# 1237.50.300

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. J010332)

MATERIAL DESCRIPTION: 60 mil HDPE seam

DATE RECEIVED: July 31, 2001 **DATE REPORTED:** July 31, 2001

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
DT-8 P33/34	62213
DT-13 P42/43	62214

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D4437	Seam Peel Adhesion
ASTM D4437	Bonded Seam Strength

TEST CONDITIONS: The samples were conditioned for a minimum 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. The units in which the data are reported are included on the table.

PRECISION GEOSYNTHETIC LABORATORIES

GAI-LAP
Initials: [illegible]#: 013
Date: 7/31/01

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

TABLE 1:
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.** MATERIAL: **60 Mil HDPE** QC'd By: [illegible]
PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300** SEAM TYPE: **Heat Fusion Weld** TEST METHOD: **ASTM D4437**
DATE REC'D: **31-Jul-01** PGL JOB #: **J010332** DATE REPORT: **31-Jul-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DT-8 P33/34	**62213**	170	>200		1 Outside	123	<10	SE1	
		170	>200		2 Outside	124	<10	SE1	
		170	>200		3 Outside	125	<10	SE1	
		182	>200		4 Outside	118	<10	SE1	
		185	>200		5 Outside	130	<10	SE1	
					AVG:	**124**			*70*
					STD. DEV.	**4**			
					1 Inside	141	<10	SE1	
					2 Inside	146	<10	SE1	
					3 Inside	151	<10	SE1	
					4 Inside	119	<10	SE1	
					5 Inside	118	<10	SE1	
	AVG.	**175**		*100*	***AVG:***	**135**			*70*
	STD. DEV.	**7**			*STD. DEV.*	**15**			
DT-13 P42/43	**62214**	171	>200		1 Outside	158	<10	SE1	
		173	>200		2 Outside	156	<10	SE1	
		173	>200		3 Outside	150	<10	SE1	
		176	>200		4 Outside	135	<10	SE1	
		185	>200		5 Outside	149	<10	SE1	
					AVG:	**150**			*70*
					STD. DEV.	**9**			
					1 Inside	159	<10	SE1	
					2 Inside	128	<10	SE1	
					3 Inside	119	<10	SE1	
					4 Inside	111	<10	SE1	
					5 Inside	112	<10	SE1	
	AVG:	**176**		*100*	***AVG:***	**126**			*70*
	STD. DEV.	**6**			*STD. DEV.*	**20**			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM [illegible] BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SOM[illegible] ON FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

Precision Geosynthetic Laboratories

ISO 9002

August 2, 2001

Sanna M. Yost, P.E.
HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Dear Yost: RE: Asarco East Helena CAMU / Proj# 1237.50.300

Thank you for consulting Precision Geosynthetic Laboratories for your material testing needs.

It should be noted that the test specimen and test sample used for this report was believed to be representative of the material produced under the designation herein stated. However, these results are indicative of only the specimens that were actually tested. The testing herein is based upon accepted industry practice as well as the test method listed. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the final use and purpose of the material.

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If you have any questions or if we may be of further service, please do not hesitate to call at 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

Enclosure: (Job No. J010341)

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

Precision Geosynthetic Laboratories

ISO 9002

CLIENT: HYDROMETRICS, INC.
PROJECT: Asarco East Helena CAMU / Proj# 1237.50.300

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. J010341)

MATERIAL DESCRIPTION: 60 mil HDPE seam

DATE RECEIVED: August 2, 2001 **DATE REPORTED:** August 2, 2001

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
DT-8 P26T/27T	62287
DT-11 P29T/30T	62288

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D4437	Seam Peel Adhesion
ASTM D4437	Bonded Seam Strength

TEST CONDITIONS: The samples were conditioned for a minimum 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. The units in which the data are reported are included on the table.

PRECISION GEOSYNTHETIC LABORATORIES

Initials: EP #: 013
Date: 8/2/01

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

TABLE 1
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.** MATERIAL: **60 Mil HDPE** QC'd By: [illegible]
PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300** SEAM TYPE: **Heat Fusion Weld** TEST METHOD: **ASTM D4437**
DATE REC'D: **2-Aug-01** PGL JOB #: **J010341** DATE REPORT: **2-Aug-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DT-8 P26T/27T	**62287**	155	>200		1 Outside	157	<10	SE1	
		170	>200		2 Outside	152	<10	SE1	
		156	>200		3 Outside	151	<10	SE1	
		162	>200		4 Outside	147	<10	SE1	
		180	>200		5 Outside	152	<10	SE1	
					AVG:	**152**			*70*
					STD. DEV.	**4**			
					1 Inside	158	<10	SE1	
					2 Inside	153	<10	SE1	
					3 Inside	149	<10	SE1	
					4 Inside	131	<10	SE1	
					5 Inside	137	<10	SE1	
	AVG.	**165**		*100*	***AVG:***	**146**			*70*
	STD. DEV.	**10**			*STD. DEV.*	**11**			
DT-11 P29T/30T	**62288**	155	>200		1 Outside	143	<10	SE1	
		167	>200		2 Outside	131	<10	SE1	
		165	>200		3 Outside	127	<10	SE1	
		154	>200		4 Outside	120	<10	SE1	
		179	>200		5 Outside	116	<10	SE1	
					AVG:	**127**			*70*
					STD. DEV.	**11**			
					1 Inside	126	<10	SE1	
					2 Inside	136	<10	SE1	
					3 Inside	156	<10	SE1	
					4 Inside	143	<10	SE1	
					5 Inside	135	<10	SE1	
	AVG:	**164**		*100*	***AVG:***	**139**			*70*
	STD. DEV.	**10**			*STD. DEV.*	**11**			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM [illegible] BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SOM[illegible] ON FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

Precision Geosynthetic Laboratories

ISO 9002

August 3, 2001

Sanna M. Yost, P.E.
HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Dear Yost: RE: Asarco East Helena CAMU / Proj# 1237.50.300

Thank you for consulting Precision Geosynthetic Laboratories for your material testing needs.

It should be noted that the test specimen and test sample used for this report was believed to be representative of the material produced under the designation herein stated. However, these results are indicative of only the specimens that were actually tested. The testing herein is based upon accepted industry practice as well as the test method listed. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the final use and purpose of the material.

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Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

Enclosure: (Job No. J010348)

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

Precision Geosynthetic Laboratories

ISO 9002

CLIENT: HYDROMETRICS, INC.
PROJECT: Asarco East Helena CAMU / Proj# 1237.50.300

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. J010348)

MATERIAL DESCRIPTION: 60 mil HDPE seam

DATE RECEIVED: August 3, 2001 **DATE REPORTED:** August 3, 2001

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
DT-13 P41/42	62328
DT-16 P48/49	62329

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D4437	Seam Peel Adhesion
ASTM D4437	Bonded Seam Strength

TEST CONDITIONS: The samples were conditioned for a minimum 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. The units in which the data are reported are included on the table.

PRECISION GEOSYNTHETIC LABORATORIES

GAI-LAP
Initials: [illegible]#: 013
Date: 8/3/01

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

TABLE 1:
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.** MATERIAL: **60 Mil HDPE** QC'd By: _____
PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300** SEAM TYPE: **Heat Fusion Weld** TEST METHOD: **ASTM D4437**
DATE REC'D: **3-Aug-01** PGL JOB #: **J010348** DATE REPORT: **3-Aug-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DT-13 P41/42	**62328**	141	>200		1 Outside	125	<10	SE1	
		167	>200		2 Outside	122	<10	SE1	
		164	>200		3 Outside	122	<10	SE1	
		146	>200		4 Outside	121	<10	SE1	
		182	>200		5 Outside	122	<10	SE1	
					AVG:	**122**			*70*
					STD. DEV.	**2**			
					1 Inside	128	<10	SE1	
					2 Inside	135	<10	SE1	
					3 Inside	134	<10	SE1	
					4 Inside	114	<10	SE1	
					5 Inside	123	<10	SE1	
	AVG.	**160**		*100*	***AVG:***	**127**			*70*
	STD. DEV.	**17**			*STD. DEV.*	**9**			
DT-16 P48/49	**62329**	164	>200		1 Outside	138	<10	SE1	
		165	>200		2 Outside	128	<10	SE1	
		154	>200		3 Outside	121	<10	SE1	
		176	>200		4 Outside	116	<10	SE1	
		178	>200		5 Outside	120	<10	SE1	
					AVG:	**125**			*70*
					STD. DEV.	**9**			
					1 Inside	144	<10	SE1	
					2 Inside	146	<10	SE1	
					3 Inside	135	<10	SE1	
					4 Inside	138	<10	SE1	
					5 Inside	135	<10	SE1	
	AVG:	**167**		*100*	***AVG:***	**140**			*70*
	STD. DEV.	**10**			*STD. DEV.*	**5**			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM [illegible] BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SOM[illegible] ON FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

Precision Geosynthetic Laboratories

ISO 9002

August 7, 2001

Sanna M. Yost, P.E.
HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Dear Yost: RE: Asarco East Helena CAMU / Proj# 1237.50.300

Thank you for consulting Precision Geosynthetic Laboratories for your material testing needs.

It should be noted that the test specimen and test sample used for this report was believed to be representative of the material produced under the designation herein stated. However, these results are indicative of only the specimens that were actually tested. The testing herein is based upon accepted industry practice as well as the test method listed. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the final use and purpose of the material.

By accepting the data and results represented on this report, 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 test(s) represented in this report, and Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liability in excess of the aforementioned limit.

The test data and all associated project information shall be held in confidence and disclosed to other parties only with the authorization of Client or Precision Geosynthetic Laboratories.

It is a company policy to keep the physical records of each job for 2 years since the receipt of the samples and keep the electronic file for 7 years. ***Failed seam samples are kept for 7 years; good seam samples are disposed after 2 weeks and conformance samples are disposed after 1 month.*** Should you need us to keep them longer, please advise us in writing.

If you have any questions or if we may be of further service, please do not hesitate to call at 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

Enclosure: (Job No. J010357)

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

Precision Geosynthetic Laboratories

ISO 9002

CLIENT: HYDROMETRICS, INC.
PROJECT: Asarco East Helena CAMU / Proj# 1237.50.300

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. J010357)

MATERIAL DESCRIPTION: 60 mil HDPE seam

DATE RECEIVED: August 7, 2001 **DATE REPORTED:** August 7, 2001

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
DT-14 P44/45	62388
DT-16 P46/47	62389
DT-17 P51/50	62390
DT-18 P48/63	62391

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D4437	Seam Peel Adhesion
ASTM D4437	Bonded Seam Strength

TEST CONDITIONS: The samples were conditioned for a minimum 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 and 2. The units in which the data are reported are included on the tables.

PRECISION GEOSYNTHETIC LABORATORIES

GAI-LAP
Initials: [illegible] #: 013
Date: 8/7/01

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

TABLE 1:
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.** MATERIAL: **60 Mil HDPE** QC'd By: SJR
PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300** SEAM TYPE: **Heat Fusion Weld** TEST METHOD: **ASTM D4437**
DATE REC'D: **7-Aug-01** PGL JOB #: **J010357** DATE REPORT: **7-Aug-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DT-14 P44/45	**62388**	160	>200		1 Outside	153	<10	SE1	
		170	>200		2 Outside	162	<10	SE1	
		163	>200		3 Outside	154	<10	SE1	
		160	>200		4 Outside	152	<10	SE1	
		183	>200		5 Outside	152	<10	SE1	
					AVG:	**155**			
					STD. DEV.	**4**			
					1 Inside	151	<10	SE1	
					2 Inside	153	<10	SE1	
					3 Inside	149	<10	SE1	
					4 Inside	133	<10	SE1	
					5 Inside	97	<10	SE1	
	AVG.	**167**			***AVG:***	**137**			
	STD. DEV.	**10**			*STD. DEV.*	**24**			
DT-16 P46/47	**62389**	165	>200		1 Outside	132	<10	SE1	
		167	>200		2 Outside	127	<10	SE1	
		165	>200		3 Outside	122	<10	SE1	
		169	>200		4 Outside	122	<10	SE1	
		182	>200		5 Outside	129	<10	SE1	
					AVG:	**126**			
					STD. DEV.	**4**			
					1 Inside	127	<10	SE1	
					2 Inside	139	<10	SE1	
					3 Inside	135	<10	SE1	
					4 Inside	116	<10	SE1	
					5 Inside	125	<10	SE1	
	AVG:	**170**			***AVG:***	**128**			
	STD. DEV.	**7**			*STD. DEV.*	**9**			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM [illegible] BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SOME AD[illegible]ON FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

TABLE 2.
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.** MATERIAL: **60 Mil HDPE** QC'd By: [illegible]
PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300** SEAM TYPE: **Heat Fusion Weld** TEST METHOD: **ASTM D4437**
DATE REC'D: **7-Aug-01** PGL JOB #: **J010357** DATE REPORT: **7-Aug-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DT-17 P51/50	**62390**	168	>200		1 Outside	136	<10	SE1	
		170	>200		2 Outside	143	<10	SE1	
		166	>200		3 Outside	140	<10	SE1	
		165	>200		4 Outside	124	<10	SE1	
		181	>200		5 Outside	135	<10	SE1	
					AVG:	**136**			
					STD. DEV.	**7**			
					1 Inside	148	<10	SE1	
					2 Inside	147	<10	SE1	
					3 Inside	146	<10	SE1	
					4 Inside	122	<10	SE1	
					5 Inside	141	<10	SE1	
	AVG.	**170**			***AVG:***	**141**			
	STD. DEV.	**6**			*STD. DEV.*	**11**			
DT-18 P48/63	**62391**	156	>200		1 Outside	134	<10	SE1	
		156	>200		2 Outside	122	<10	SE1	
		150	>200		3 Outside	122	<10	SE1	
		169	>200		4 Outside	121	<10	SE1	
		168	>200		5 Outside	128	<10	SE1	
					AVG:	**125**			
					STD. DEV.	**6**			
					1 Inside	127	<10	SE1	
					2 Inside	126	<10	SE1	
					3 Inside	127	<10	SE1	
					4 Inside	123	<10	SE1	
					5 Inside	125	<10	SE1	
	AVG:	**160**			***AVG:***	**126**			
	STD. DEV.	**8**			*STD. DEV.*	**2**			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM [illegible] BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SOM[illegible] [illegible]ON FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655
Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell

SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell Date: 7/26/01

To: ASARCO, Inc. Attn: Darrell Shew
Phone: (406) 227-7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS
☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	623	Northwest Linings Daily Submittals

Enclosed Northwest Linings production data for 07/25/01:

Certificate of Acceptance of Soil Subgrade Surface
Trial Weld Form
Panel Placement Form
Daily Panel Layout
Panel Seaming Form
Repair Report
Non-Destructive Testing Form
Destructive Test Log
Certification of Acceptance

Remarks: These submittals have been reviewed by the QC Manager to ensure that they comply with the Project Specifications. Any variances are noted below:

Variances: Record drawings showing location of panels, seams, repairs, patches, destructive samples, including detailed measurements have not been submitted by Northwest Linings.

Signed: Douglas G. Tisdell Date: 07-26-01
QC Manager

A Washington Company

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc.

21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE

PROJECT: ASARCO E. HELENA RCRA LANDFILL CELL 1

LINER TYPE/QTY: 60 MIL HDPE

OWNER: ASARCO

LOCATION: E. HELENA

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

Northwest Linings & Geotextile Products, Inc. accepts no responsibility for the composition or character of the soil, nor any underlying conditions present at the site, including, but not limited to, those arising out of improper compaction, use of improper soil or materials, or the presence of underlying harmful objects of any kind. This acceptance is based solely upon a visual inspection of the completed subgrade preparation.

This acceptance is based upon the present condition of the subgrade preparation and Northwest Linings accepts no responsibility for restoration of the subgrade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal or machinery. Neither does Northwest Linings accept responsibility for restoration of the subgrade preparation upon the occurrence of any Act of God, including, but not limited to, rain, wind, hail, snow, flood or earthquake.

Area Being Accepted: E. SLOPE OUT ~~70~~' 75' OUT from NORTH SLOPE NOT READY PANELS 1-9

NORTHWEST LININGS REPRESENTATIVE:

Date: 07.25.01

Signature: [signature]

Name/Title: TROY JAY WOLD SUPERINTENDANT

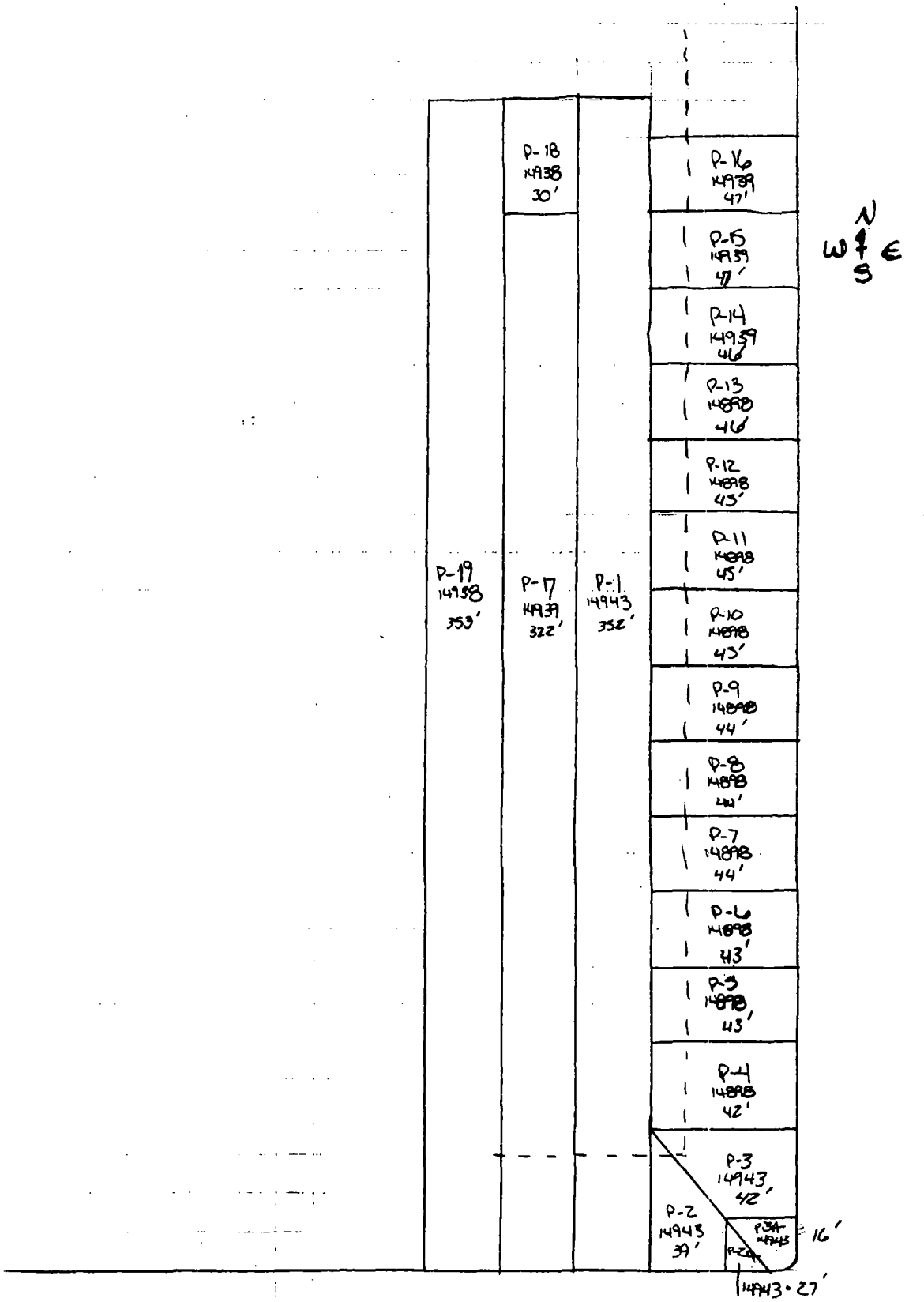
OWNERS REPRESENTATIVE:

Date: 7-25-01

Company: HYDROMETRICS

Signature: Mark W Rhodes

Name/Title: Mark Rhodes QA/QC Inspector


P-18
14938
30'
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42'
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14943
P-2A
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S

TRIAL WELD FORM

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT #
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 07/25/01

SHEET 1 OF ____

DATE/ TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS: BARREL TEMP	EXTRUSION WELDS: PREHEAT TEMP	EXTRUSION WELDS: PEEL / TENSILE	FUSION WELDS: WEDGE TEMP	FUSION WELDS: SET SPEED FT / MIN	FUSION WELDS: PEEL / TENSILE	PASS / FAIL	COMMENTS
07 RS 101 9:45	Soup	#108		SN				750	7.5	118 115 120 121 117 114	P	161-156
07125101 9:50	XB	#201		"				750	7.5	125 118 122 129 121 128	P	150-145
07125101 12:55	XB	#201		"				"	"	135 128 132 130 123 126	P	165 165
7 125101 1:00 PM	Soup	#108		"				750	7.5	123 131 117 120 121 139	P	159-160
7 125101 2:50 PM	Soup	XT#1			520	320	104 113 103				P	152-165
/ /												
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PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E Helena PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
07 25 01	1	14943	352'	23'	
07 25 01	2	14943	39'	23'	
07 25 01	3	14943	42'	23'	
07 25 01	4	14898	42'	23'	
07 25 01	5	14898	43'	23'	
07 25 01	6	14898	43'	23'	
07 25 01	7	14898	44'	23'	
07 25 01	8	14898	44'	23'	
07 25 01	9	14898	44'	23'	
07 25 01	10	14898	45'	23'	
07 25 01	11	14898	45'	23'	
07 25 01	12	14898	45'	23'	
07 25 01	13	14898	46'	23'	

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
07 25 01	14	14939	46'	23'	
07 25 01	15	14939	47'	23'	
07 25 01	16	14939	47'	23'	
07 25 01	17	14939	322'	23'	
07 25 01	18	14938	30'	23'	
07 25 01	19	14938	353'	23'	
07 25 01	2A	14943	27'	23'	
07 25 01	3A	14943	16'	23'	

PAGE 1 OF ____

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. Helena PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60mil HDPE

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
/25	1/2		41'	BX	#201	750	Sunny	10-15	75		
7/25	2/2A		29'	"	"	"	"	"	"		
7/25	2A/3A		15'	"	"	"	"	"	"		
7/25	3/3A/2A		38'	"	"	"	"	"	"		
7/25	3/4		42'	Soup	#108	750	"	"	75		
7/25	4/5		42'	BX	#201	750	"	"	"		
7/25	5/6		45'	"	"	"	"	"	"		
7/25	6/7		45'	"	"	"	"	"	"		
7/25	7/8		44'	"	"	"	"	"	"		
7/25	8/9		45'	"	"	"	"	"	"		
7/25	9/10		44'	"	"	"	"	"	"		
7/25	10/11		46'	"	"	"	"	"	"		
7/25	11/12		46'	"	"	"	"	"	"		
7/25	12/13		44'	Soup	#108	"	"	"	"	DS-1	
7/25	13/14		44'	"	"	"	"	"	"		

PAGE Z OF

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
7-25	14/15		46'	Soup	#108	750	Sunny	10-15	75		
7-25	15/16		47'	"	"	"	"	"	"		
7-25	2-16/1		352'	BX	#201	750	Sunny	10-15	75		
7-25	1/17		322	"	"	"	"	"	"	DS-2	
7-25	1/18		30'	Soup	#108	750	"	"	"		
7-25	17/18		23'	"	"	"	"	"	"		
7-25	19/18		30	"	"	"	"	"	"		
7-25	17/19		322'	Soup	#108	750	"	"	"		

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY STAYWOLD
MATERIAL DESCRIPTION: 60 MIL HOPE

DATE: 7/25/01

SHEET 1 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/25/01	R-1	P-17-18-19	#1	Soup	2'X3' Patch Butt Seam		
7/25/01	2	P-1-17-18	1	"	2X3' Patch Butt Seam		
7/25/01	3	P-16-15-1	#1	Soup	2X2' Patch Butt Seam		
7/25/01	4	P-15-14-1	#1	"	1X2' Patch Butt Seam		
7/25/01	5	P-14-13-1	#1	"	2X2' Patch Butt Seam		
7/25/01	6	P-12-13	#1	"	2X4 Patch DS-1 Stop of Toe 15'		
7/25/01	7	P-12-11-1	#1	"	1X2 Patch Butt Seam		
7/25/01	8	P-11-10-1	#1	"	1X1' Patch Butt Seam		
7/25/01	9	P-10-1	#1	K.K	1X1 Patch Seam Burn		
7/25/01	10	P-10-9-1	#1	"	1X1 Patch Butt Seam		
7/25/01	11	P-9-8-1	#1	"	2X3 Patch Butt Seam		
7/25/01	12	P-1-17	#1	"	2X3 Patch		
7/25/01	13	P-8-7-1	#1	"	3X5' Patches and Burn Butt Seam		
7/25/01	14	P-7-6-1	#1	"	1X1 Patch Butt Seam		
7/25/01	15	P-6-5-1	#1	"	1X1 Patch Butt Seam		
7/25/01	16	P-5-4-1	#1	KK	1X2 Patch Butt Seam		

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 7/25/01

SHEET 2 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/25/01	R-17	P-4-3-21	# 1	SP	3X8 Patches Inter Section		
7/25/01	18	P-3-4	# 1	SP	1X1 Patch		
7/25/01	19	P2-2A-3	# 1	SP	1X1 Patch Butt Seam		
7/25/01	20	B-3-3A-2A	# 1	SP	1X2' Patch Butt Seam		
7/25/01	21	P-17-19	# 1	SP	2X4 Patch DS-3 5' off Toe		
7/25/01	22	P-1-17	# 1	SP	2X4 Patch DS-2		
/ /							
/ /							
/ /							
/ /							
/ /							
/ /							
/ /							
/ /							
/ /							

NON DESTRUCTIVE TESTING FORM

PAGE 1 OF ___

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	+/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-25-01	16/15	VP	35	33	2	1144	1149	P		
7/25	15/14	VP	35	33	2	1144	1149	P		
7/25	14/13	VP	35	34	1	1144	1149	P		
7/25	13/12	VP	34	34	0	1238	1243	P		
7-25	12/11	VP	32	30	2	1156	1201	P		
7-25	11/10	VP	32	30	2	1157	1202	P		
7-25	10/9	VP	34	34	0	1245	1250	P		
7-25	9/8	VP	32	31	1	1255	1:00	P		
7-25	8/7	VP	30	29	1	1255	1:00	P		
7-25	7/6	VP	31	30	1	1255	1:00	P		
7-25	6/5	VP	33	31	2	1255	1:00	P		
7-25	5/4	VP	30	30	0	1:02	1:07	P		
7-25	3/3A	VP	35	35	0	1:02	1:07	P		
7-25	3A/2A	VP	35	33	2	1:02	1:07	P		
7-25	2A/3	VP	32	32	0	1:02	1007	P		Butt Seam
7-25	2/2A	VP	34	34	0	1:20	1:25	P		
7-25	16/1	VP	31	30	1	145	150	P		Butt
7-25	15/1	VP	31	31	0	145	150	P		Butt
7-25	17/18	VP	34	33	1	1:58	2:03	P		Butt Seam
7-25	18/1	VP	33	31	2	1:50	200	P		
7-25	18/19	VP	32	32	0	147	152	P		
7-25	14/1	VP	30	30	0	203	208	P		Butt
7-25	13/1	VP	33	33	0	203	208	P		"
7/25	12/1	VP	32	30	2	204	209	P		"

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-25-01	11/1	[illegible]	30	29	1	204	209	P		Butt Seam
	10/1	[illegible]	30	30	0	210	215	P		"
	9/1	[illegible]	30	30	0	210	215	P		"
	8/1	[illegible]	34	34	0	211	216	P		"
	7/1	[illegible]	33	30	1	211	216	P		"
	6/1	[illegible]	33	31	2	220	225	P		"
	5/1	[illegible]	32	32	0	220	225	P		"
	4/1	[illegible]	34	34	0	221	226	P		Butt
	2/1	[illegible]	35	33	2	221	226	P		
	1/17	[illegible]	32	32	0	230	235	P		[illegible]
	1/17	[illegible]	32	32	0	230	235	P		
7-25-01	17/19	[illegible]	34	32	2	231	236	P		

Northwest Linings & Geotextile Products, Inc.

DESTRUCTIVE TEST LOG

PROJECT NAME:_____

NWLG PROJECT #_____

NWLG SUPERINTENDANT:_____

MATERIAL DESCRIPTION:_____

DATE: / /

SHEET ____ OF ____.

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN			TENSILE VALUE		LAB PASS / FAIL PEEL / TENSILE
						INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	LBS / IN	PASS / FAIL	
7 05101	DS-3	17/19	3096	VP	1	106	126	P	172	P	
					2	108	122	P	173	P	
					3	103	113	P	169	P	
					4	100	116	P	169	P	
					5	103	122	P	168	P	
/ /	DS-2	1/17	"	"	1	126	140	P	174	P	
					2	100	138	P	176	P	
					3	129	109	P	170	P	
					4	117	132	P	172	P	
					5	120	131	P	168	P	
/ /	DS-1	12/13	"	"	1	110	112	P	179	P	
					2	111	124	P	174	P	
					3	122	148	P	177	P	
					4	132	130	P	182	P	
					5	123	120	P	180	P	
/ /					1						
					2						
					3						
					4						
					5						
/ /					1						
					2						
					3						
					4						
					5						
/ /					1						
					2						
					3						
					4						
					5						

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 07 26 01

Project Location: E. HELENA MT.

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: Doug TISDELL

Owner's Representative: MARK RHODES

Authorized Representative:

I, the undersigned duly authorized representative of: HYDROMETRICS

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

Exceptions: Panels 1-19 60 mil HDPE prime.

Authorized Representative: MARK RHODES

Name	Signature	Title	Date
MARK RHODES	[illegible]	[illegible]	7-26-01

Northwest Linings Representative:

Name	Signature	Title	Date
Troy Jaywald	[illegible]	Superintendent	07 26 01

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655
Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell

SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell Date: 7/27/01

To: ASARCO, Inc. Attn: Darrell Shew
Phone: (406) 227-7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS
☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	623	Northwest Linings Daily Submittals

Enclosed Northwest Linings production data for 07/26/01:

Certificate of Acceptance of Soil Subgrade Surface
Panel Placement Form (Primary)
Panel Placement Form (Secondary)
Panel Layout Drawings

Remarks: These submittals have been reviewed by the QC Manager to ensure that they comply with the Project Specifications. Any variances are noted below:

Variances: Northwest Linings production data which requires next day, same page continuation will be submitted when the entire page is completed, by Hydrometrics representative approval.

Signed: Douglas G. Tisdell Date: 07-27-01

QC Manager

A Washington Company

NORTHWEST LININGS &
GEOTEXTILE PRODUCTS, Inc.
21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE

PROJECT: ASARCO E. HELENA

LINER TYPE/QTY: 60 MIL HDPE

OWNER: ASARCO

LOCATION: E. HELENA

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

Northwest Linings & Geotextile Products, Inc. accepts no responsibility for the composition or character of the soil, nor any underlying conditions present at the site, including, but not limited to, those arising out of improper compaction, use of improper soil or materials, or the presence of underlying harmful objects of any kind. This acceptance is based solely upon a visual inspection of the completed subgrade preparation.

This acceptance is based upon the present condition of the subgrade preparation and Northwest Linings accepts no responsibility for restoration of the subgrade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal or machinery. Neither does Northwest Linings accept responsibility for restoration of the subgrade preparation upon the occurrence of any Act of God, including, but not limited to, rain, wind, hail, snow, flood or earthquake.

Area Being Accepted: EAST SIDE OUT 137' from TOE of EAST SLOPE NORTH 75' NOT READY on N SIDE

NORTHWEST LININGS REPRESENTATIVE:

Date: 07-26-01

Signature: [signature]

Name/Title: TROY JAYWOLD SUPERINTENDANT

OWNERS REPRESENTATIVE:

Date: 7-26-01

Company: HYDROMETRICS

Signature: Mark W. Rhodes

Name/Title: MARK W. RHODES QA/QC INSPECTOR

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E Helena PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
07 25 01	1	XA943	352'	23'	
07 25 01	2	14943	39'	23'	
07 25 01	3	14943	42'	23'	
07 25 01	4	14898	42'	23'	
07 25 01	5	14898	43'	23'	
07 25 01	6	14898	43'	23'	
07 25 01	7	14898	44'	23'	
07 25 01	8	14898	44'	23'	
07 25 01	9	14898	44'	23'	
07 25 01	10	14898	45'	23'	
07 25 01	11	14898	45'	23'	
07 25 01	12	14898	45'	23'	
07 25 01	13	14898	46'	23'	

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

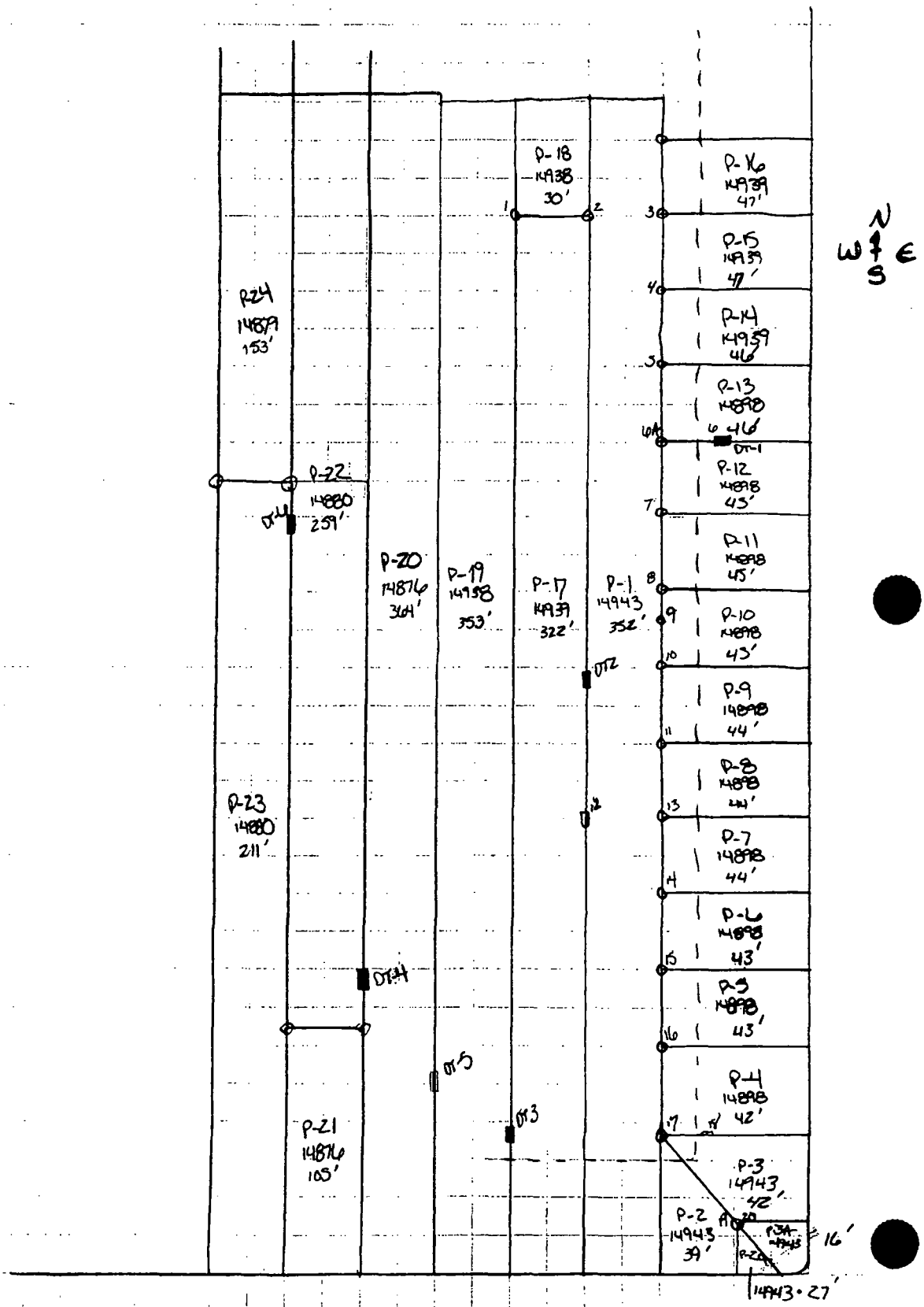
DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
07 25 01	14	14939	46'	23'	
07 25 01	15	14939	47'	23'	
07 25 01	16	14939	47'	23'	
07 25 01	17	14939	322'	23'	
07 25 01	18	14938	30'	23'	
07 25 01	19	14938	353'	23'	
07 25 01	2A	14943	27'	23'	
07 25 01	3A	14943	16'	23'	
07 26 01	20	14876	364'	23'	
07 26 01	21	14876	105'	23'	
07 26 01	22	14880	259'	23'	
07 26 01	23	14880	211'	23'	
07 26 01	24	14879	153'	23'	

PANEL PLACEMENT FORM

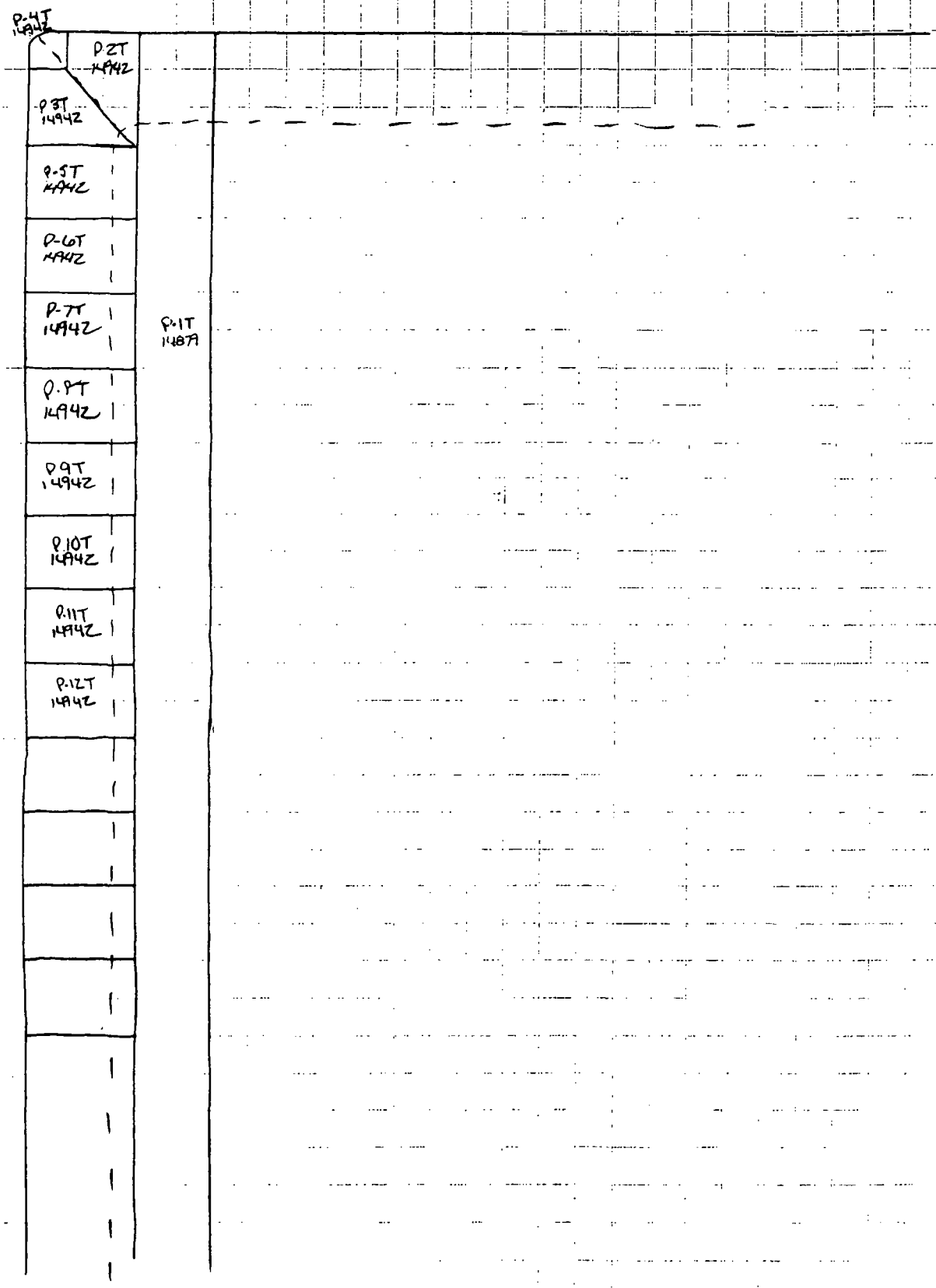
PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 07/26/01
SHEET 1 OF

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS / PANEL LOCATION
07/26/01	1T	14879		23'	
07/26/01	2T	14942	43'	23'	
07/26/01	3T	14942	42'	23'	
07/26/01	4T	14942	16'	23'	
07/26/01	5T	14942	43'	23'	
07/26/01	6T	14942	43'	23'	
07/26/01	7T	14942	43'	23'	
07/26/01	8T	14942	44'	23'	
07/26/01	9T	14942	44'	23'	
07/26/01	10T	14942	44'	23'	
07/26/01	11T	14942	44'	23'	
07/26/01	12T	14942	45'	23'	
/ /					
/ /					
/ /					



P-18
14938
30'
P-16
14939
47'
P-15
14939
47'
P-14
14939
46'
P-13
14898
46'
DT-1
P-12
14898
43'
P-11
14898
45'
P-10
14898
43'
P-9
14898
44'
P-8
14898
44'
P-7
14898
44'
P-6
14898
43'
P-5
14898
43'
P-4
14898
42'
P-3
14943
42'
P-2
14943
39'
P-24
14879
153'
P-22
14880
259'
DT-4
P-20
14876
364'
P-19
14938
353'
P-17
14939
322'
P-1
14943
352'
DT2
P-23
14880
211'
DT-4
DT-5
DT3
P-21
14876
105'
16'
14943 · 27'
N
W
E
S


P-4T
1494Z
P2T
1494Z
P3T
1494Z
P-5T
1494Z
P-6T
1494Z
P-7T
1494Z
P-1T
1487A
P-8T
1494Z
P9T
1494Z
P10T
1494Z
P11T
1494Z
P-12T
1494Z

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655, Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell

SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell
To: ASARCO, Inc.

Date: July 28, 2001
Attn: Darrell Shew
Phone: (406) 227-7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS
☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	623	Northwest Linings Daily Submittals

Enclosed Northwest Linings production data for the following dates:

Trial Weld Form	07/25/01, 07/26/01, 07/27/01
Panel Placement Form	07/26/01, 07/27/01
Panel Layout Drawings	07/27/01
Panel Seaming Form	07/26/01, 07/27/01
Repair Report	07/27/01
Non Destructive Testing Form	07/26/01, 07/27/01
Destructive Test Log	07/27/01

Remarks: These submittals have been reviewed by the QC Manager to ensure that they comply with the Project Specifications. Any variances are noted below:

Variances: None

Northwest Linings Material Installation Summary

Material:	60 mil. HDPE Geomembrane	200 mil. Geonet	Geotextile Fabric
Quantity Installed on 07/27/01	42,320 sq. ft.	54,600 sq. ft.	0 sq. ft.
Installation Quantity to Date	126,960 sq. ft.	94,500 sq. ft	0 sq. ft.

Signed: Douglas G. Tisdell Date: 07/28/01

QC Manager

A Washington Company

TRIAL WELD FORM

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT #
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 07/25/01

SHEET 1 OF ____

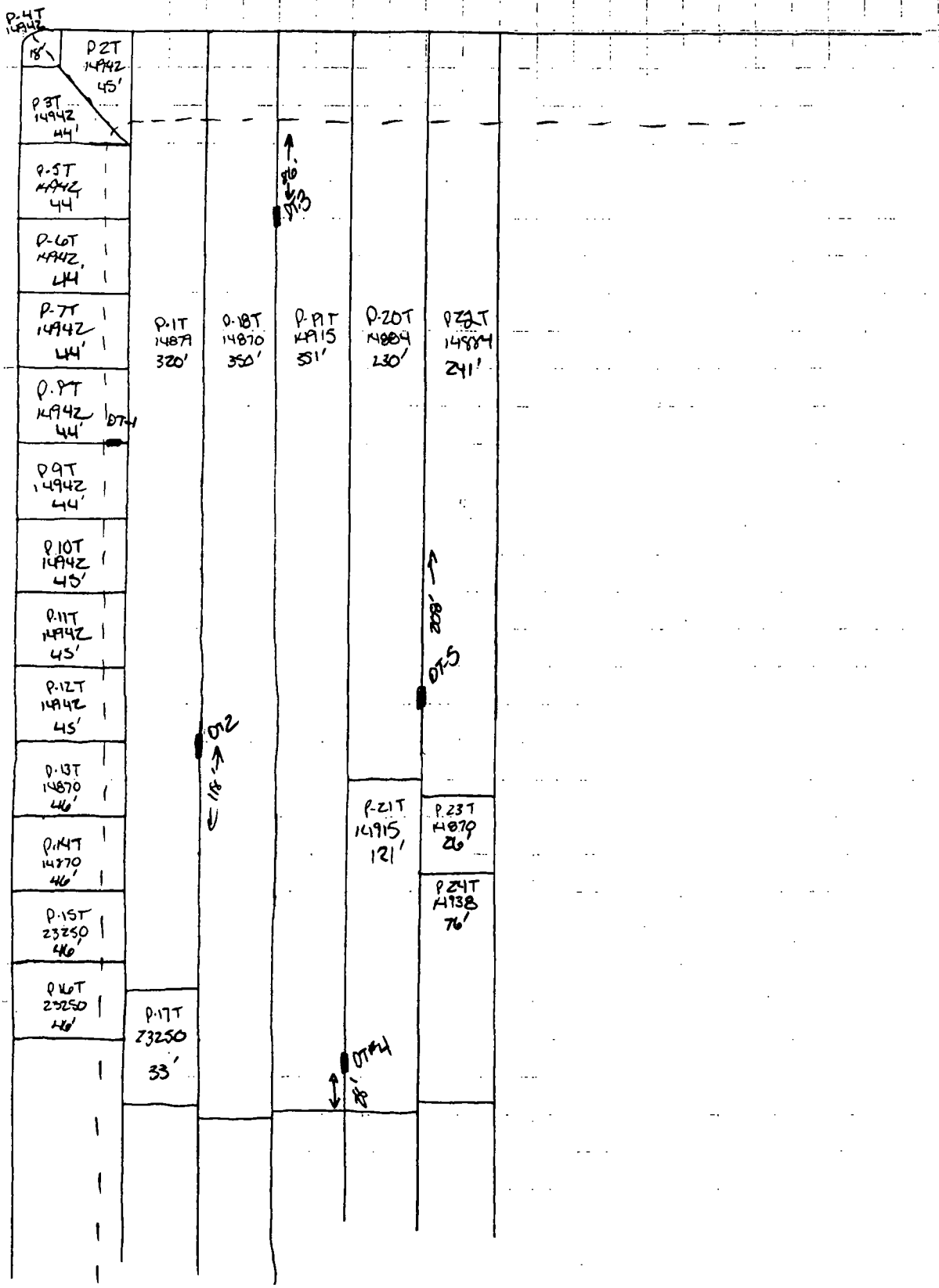
DATE/ TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS: BARREL TEMP	EXTRUSION WELDS: PREHEAT TEMP	EXTRUSION WELDS: PEEL / TENSILE	FUSION WELDS: WEDGE TEMP	FUSION WELDS: SET SPEED FT / MIN	FUSION WELDS: PEEL / TENSILE	PASS / FAIL	COMMENTS
07 25 01 9:45	Soup	#108		SN				750	7.5	118 115 120 117 114	P	161-156
07 25 01 9:50	XB	#201		"				750	7.5	125 118 122 121 124 124	P	150-145
07 25 01 12:55	XB	#201		"				"	"	135 128 132 130 123 126	P	165 165
7 25 01 1:00 PM	Soup	#108		"				750	7.5	123 131 121 120 139	P	159-160
7 25 01 2:50 PM	Soup	XT #1			520	320	104-113 103				P	152-165
7 26 01 10:45	XB	201						750	7.5	119 120 117 120	P	152-155
7 26 01 10:50	Soup	#108						750	7.5	129 122 132 132 129 121	P	176-153
7 26 01 1:00	XB	#201						750	7.5	135 137 136	P	150-158
7 26 01 1:20	Kham	XT #1			520	320	117-120 121				P	173-165
7 26 01 1:25	Soup	#108						750	7.5	119 118 120 125 120 119	P	161-170
7 27 01 8:00 AM	XB	#201						750	7.5	128 132 125 126 130	P	171-172
7 27 01 8:10 AM	Soup	#108		Sunny				750	7.5	124 107 109 123 116	P	180-189
7 27 01 11:00 AM	Soup	#XT-1		"	520	320	104-107 104				P	145-149
7 27 01 12:55 PM	Soup	#XT=1		"	520	320	106-108 98				P	139-138
/ /												

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 07/26 01
SHEET 1 OF

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS / PANEL LOCATION
07/26/01	1T	14879	320'	23'	
07/26/01	2T	14942	43'	23'	
07/26/01	3T	14942	42'	23'	
07/26/01	4T	14942	16'	23'	
07/26/01	5T	14942	43'	23'	
07/26/01	6T	14942	43'	23'	
07/26/01	7T	14942	43'	23'	
07/26/01	8T	14942	44'	23'	
07/26/01	9T	14942	44'	23'	
07/26/01	10T	14942	44'	23'	
07/26/01	11T	14942	44'	23'	
07/26/01	12T	14942	45'	23'	
07/27/01	13T	14870	45'		
07/27/01	14T	23250	45'		
07/27/01	15T	23250	46'		


P-4T 14942
18'
P2T 14942 45'
P3T 14942 44'
P-5T 14942 44
P-6T 14942 44'
P-7T 14942 44'
P-8T 14942 44'
DT-1
P9T 14942 44'
P10T 14942 45'
P-11T 14942 45'
P-12T 14942 45'
P-13T 14870 46'
P-14T 14870 46'
P-15T 23250 46'
P16T 23250 46'
P-1T 14879 320'
P-17T 23250 33'
P-18T 14870 350'
DT2
18'
P-19T 14915 351'
86'
DT-3
P-20T 14884 230'
P-21T 14915 121'
DT-4
18'
P22T 14884 241'
208'
DT-5
P23T 14870 26'
P24T 14938 76'

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOOD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 7/26/01

SHEET 1 OF ____

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
7/26/01	2T-4T		20'	BX	#201	750	Sunny	5-10	75	
7/26/01	3T/4T		14'	BX	"	"	"	"	"	
7/26/01	2T/3T		30'	BX	"	"	"	"	"	
7/26/01	1T/2T		42'	BX	"	"	"	"	"	
7/26/01	2T/12T/11T		229	BX	"	"	"	"	"	
7/26/01	3T/5T		41'	Soup	#108	750	"	"	"	
7/26/01	5T/6T		44'	"	"	"	"	"	"	
7/26/01	6T/7T		44'	XB	#201	"	"	"	"	
7/26/01	7T/8T		45'	Soup	#108	"	"	"	"	
7/26/01	8T/9T		44'	XB	#201	"	"	"	"	DT-1
7/26/01	9T/10T		43'	Soup	#108	"	"	"	"	
7/26/01	10T/11T		44'	XB	#201	"	"	"	"	
7/26/01	11T/12T		44'	XB	#201	"	"	"	"	
7/27/01	12T/13T		45'	Soup	#108	750	Sunny	5-10	75	
7/27/01	13T/14T		46'	"	"	"	"	"	"	

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. Helena (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Wood
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 07/27/01
SHEET 2 OF ____

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
07/27/01	14T/15T		46'	XB	#201	750	Sunny	5-10	75	
07/27/01	15T/16T		46'	XB	"	"	"	"	"	
07/27/01	1T/17T		23'	Soup	#108	"	"	"	"	
07/27/01	2T-16T/1T		333'	Soup	"	"	"	"	"	
07/27/01	1T/18T		328'	~~XB~~ Soup	"	"	"	"	"	DT-2
07/27/01	18T/19T		350'	Soup	"	"	"	"	"	DT-3
07/27/01	19T/20-21T		351'	XB	#201	"	"	"	"	DT-4
07/27/01	20-21T/22-23-24		346'	Soup	#108	"	"	"	"	DT-5
07/27/01	20T/21T		23'	XB	#201	"	"	"	"	
07/27/01	22T/23T		23'	XB	"	"	"	"	"	
07/27/01	23T/24T		23'	XB	"	"	"	"	"	
/ /										
/ /										
/ /										
/ /										

REPAIR REPORT

(T)

PROJECT NAME:
NWLG PROJECT #
NWLG SUPERINTENDANT:
MATERIAL DESCRIPTION:

DATE: 7 27/01

SHEET _____ OF _____.

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7 27/01	R-1	P-2-4-3	#1	K-K	2x3' Patch Butt Seam TOP of Slop		
/ /	2	P-1-2-3	1	"	1x2' Patch Butt Seam		
/ /	3	P-1-3-5	1	"	1x1 Patch Butt Seam		
/ /	4	P-1-5-2	1	"	2x4' Patch Butt Seam		
/ /	5	P-1-6-7	1	"	2x4' Patch Butt Seam		
/ /	6	P-1-7-8	1	SP	2x4 Patch Butt Seam		
/ /	7	P-1-8-9	1	"	2x3 Patch Butt Seam		
/ /	8	P-8-9	1	"	2x4 Patch DT#1 of Toe		
/ /	9	P-1-9-10	1	"	1x1 Patch Butt Seam		
/ /	10	P-1-10-11	1	"	1x2' Patch Butt Seam		
/ /	11	P-1-11-12	1	"	1x2 Patch Butt Seam		
/ /	12	P-1-12-13	1	"	4x4' Patch Butt Seam		
/ /	13	P-1-13-14	1	"	2x3' Patch Butt Seam		
/ /	14	P-1-14-15	1	"	1x1 Patch Butt Seam		
/ /	15	P-1-15-16	1	"	1x1 Patch Butt Seam		
7 27/01	16	P-1-17-16	1	"	1x2' Patch Butt Seam		

REPAIR REPORT

(T)

PROJECT NAME:
NWLG PROJECT #
NWLG SUPERINTENDANT:
MATERIAL DESCRIPTION:

DATE: 7/27/01

SHEET _____ OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7 27 01	R-17	P-1T-17T-18T	#1	SP	3x4' Patch Butt Seam		
/ /	18	P-1T-18T	#1	"	2x4' Patch DT #2		
/ /	19	P-1T-18T	#1	"	1x1 Patch Seam Burn Slot		
/ /	20	P-18T-19T	#1	KK	2x4 Patch DT #3		
/ /	21	P-19T-20T-21T	#1	"	1x1 Patch Butt Seam		
/ /	22	P-19T/21T	#1	"	2x4 Patch DT #4		
/ /	23	P19T-21T	#	"	2x3 Patch Seam Burn/ Air hole		
/ /	24	P-21T-23-24	#1	"	1x1 Patch Butt Seam		
/ /	25	P-21T-23T-22T	#1	"	1x1 Patch Butt Seam		
/ /	26	P-20T-22T-23T	#1	"	2x3 Patch Butt Seam		
/ /	27	P-20T-21T	#	"	1x1 Patch Seam Burn		
7 27 01	28	P-20T-22T	#1	"	2x4' Patch DT #5		
/ /							
/ /							
/ /							
/ /							

NON DESTRUCTIVE TESTING FORM

PAGE 17 OF ___

PROJECT NAME: ASARCO E. HELENA (T) PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7/26	2T/4T	VP	37	35	2	306	311	P		
7/26	4T/3T	VP	35	35	0	306	311	P		
7/26	2T/3T	VP	31	37	0	306	311	P		Butt
7/26	3T/5T	VP	33	32	1	305	310	P		
7/26	5T/6T	VP	32	32	0	252	257	P		
7/26	6T/7T	VP	32	30	2	252	257	P		
7/26	7T/8T	VP	32	31	1	252	257	P		
7/26	8T/9T	VP	34	33	1	252	257	P		
7/26	9T/10T	VP	30	29	1	251	256	P		
7/26	10T/11T	VP	33	31	2	301	306	P		
7/26	11T/12T	VP	34	33	1	301	306	P		
7/27	12T/1T	VP	31	31	0	1015	1020	P		Butt
7/27	1T/11T	VP	32	32	0	1015	1020	P		"
7/27	1T/10T	VP	35	33	2	1015	1020	P		"
7/27	1T/9T	VP	35	35	0	1015	1020	P		"
7/27	1T/8T	VP	31	31	0	1016	1021	P		"
7/27	1T/7T	VP	35	33	2	1016	1021	P		"
7/27	1T/6T	VP	34	34	0	1030	1035	P		"
7/27	1T/5T	VP	30	29	1	1030	1035	P		"
7/27	1T/2T	VP	32	32	0	1030	1035	P		"
7/27	1T/3T	VP	30	30	0	1030	1035	P		Butt
7/27	12/13	VP	33	33	0	1055	11:00	P		
7/27	1-13	VP	31	30	1	1055	11:00	P		Butt
7/27	[illegible]4	VP	33	31	2	1055	11:00	[illegible]		

NON DESTRUCTIVE TESTING FORM

PAGE 2 OF ___

PROJECT NAME: ~~ASARCO~~ E. Helena (T)

PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7/27	1-14	VP	35	33	2	1055	11:10	P		Butt
7/27	14-15	VP	33	31	2	1056	11:01	P		
7/27	15-16	VP	32	31	1	1056	11:01	P		
7/27	1-15	VP	30	29	1	1056	11:01	P		Butt
7/27	1-16	VP	35	34	1	1105	1110	P		"
7/27	1-17	VP	32	32	0	1105	1110	P		"
7/27	16-17	VP	30	30	0	1105	1110	P		Butt
7/27	17-18	VP	34	33	1	1112	1117	P		
7/27	1-18	VP	34	33	1	1112	1117	P		
7/27	18-19	VP	35	35	0	1120	1125	P		
7/27	19-20	VP	35	35	0	1125	1130	P		
7/27	20-21	VP	30	29	1	1125	1130	P		Butt Seam
7/27	19-21	VP	35	34	1	1125	1130	P		
7/27	21-24	VP	34	33	1	1145	1150	P		
7/27	23-24	VP	30	29	1	1145	1150	P		Butt
7/27	24-23	VP	34	34	0	1145	1150	P		
7/27	22-23	VP	33	33	0	1145	1150	P		Butt
7/27	22-21	VP	35	35	0	1145	1150	P		
7/27	20/22	VP	33	33	0	1150	1155	P		

Northwest Linings & Geotextile Products, Inc.

DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO ELIZABETHA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: / /

SHEET ____ OF ____.

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
07/27/01	1T	8T/9T	3096		1	102	122	P	148	P	
					2	112	97	P	150	P	
					3	98	102	P	141	P	
					4	110	119	P	149	P	
					5	113	110	P	152	P	
07/27/01	2T	1T/18T	3096		1	114	115	P	142	P	
					2	125	129	P	148	P	
					3	107	108	P	139	P	
					4	107	103	P	141	P	
					5	113	117	P	149	P	
07/27/01	3T	18T/19T	3096		1	118	111	P	137	P	
					2	122	119	P	139	P	
					3	126	129	P	145	P	
					4	107	126	P	147	P	
					5	133	126	P	147	P	
07/27/01	4T	19T/21T	3096		1	106	122	P	152	P	
					2	122	129	P	150	P	
					3	128	107	P	147	P	
					4	134	115	P	147	P	
					5	129	113	P	149	P	
07/27/01	5T	20T/22T	3096		1	136	122	P	144	P	
					2	129	128	P	138	P	
					3	126	108	P	147	P	
					4	104	118	P	153	P	
					5	132	120	P	154	P	
/ /					1						
					2						
					3						
					4						

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655, Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell

SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell
To: ASARCO, Inc.

Date: July 30, 2001
Attn: Darrell Shew
Phone: (406) 227-7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS
☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	623	Northwest Linings Daily Submittals

Enclosed Northwest Linings production data for the following dates:

Soil Subgrade Surface Acceptance	07/28/01
Panel Layout Drawings	07/28/01
Panel Seaming Form	07/28/01, 07/29/01
Repair Report	07/28/01, 07/29/01
Non Destructive Testing Form	07/25/01 through 07/29/01 (Revised/Updated)
Destructive Test Log	07/29/01

Northwest Linings Material Installation Summary

Material:	60 mil. HDPE Geomembrane	200 mil. Geonet	Geotextile Fabric
Approximate Quantity Installed on 07/28/01	40,020 sq. ft.	0 sq. ft	0 sq. ft.
Approximate Quantity Installed on 07/29/01	52,900 sq. ft.	8400 sq. ft.	0 sq. ft.
Approximate Quantity Installed to Date	219,880 sq. ft.	84,000 sq. ft. (Revised)	0 sq. ft.

Signed: Douglas G. Tisdell Date: 07/30/01

QC Manager

A Washington Company

NORTHWEST LININGS &
GEOTEXTILE PRODUCTS, Inc.
21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE

PROJECT: ASARCO

LINER TYPE/QTY: 60 MIL HDPE

OWNER: ASARCO

LOCATION: E. HELENA

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

Northwest Linings & Geotextile Products, Inc. accepts no responsibility for the composition or character of the soil, nor any underlying conditions present at the site, including, but not limited to, those arising out of improper compaction, use of improper soil or materials, or the presence of underlying harmful objects of any kind. This acceptance is based solely upon a visual inspection of the completed subgrade preparation.

This acceptance is based upon the present condition of the subgrade preparation and Northwest Linings accepts no responsibility for restoration of the subgrade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal or machinery. Neither does Northwest Linings accept responsibility for restoration of the subgrade preparation upon the occurrence of any Act of God, including, but not limited to, rain, wind, hail, snow, flood or earthquake.

Area Being Accepted: ½ of entire East side of Cell + 96'

NORTHWEST LININGS REPRESENTATIVE:

Date: 07 28 01

Signature:

Name/Title: Tom Jay Wolf

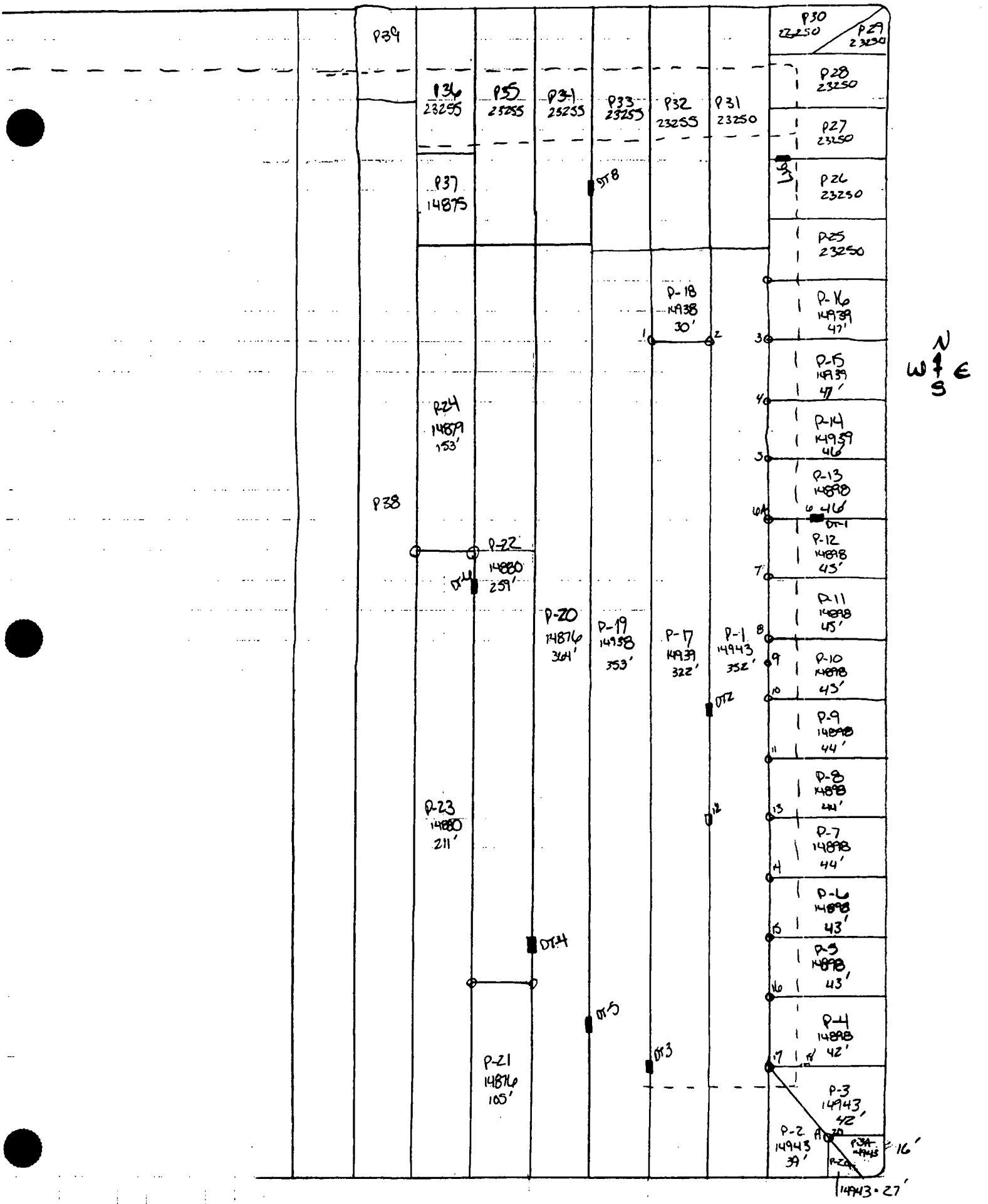
OWNERS REPRESENTATIVE:

Date: 7-28-01

Company: HYDROMETRICS

Signature: Mark W. Rhodes

Name/Title: MARK W RHODES QA/QC INSPECTOR


P34
P36 23255
P35 23255
P31 23255
P33 23255
P32 23255
P31 23250
P30 23250
P29 23250
P28 23250
P27 23250
P26 23250
P25 23250
P37 14875
DT8
P-18 14938 30'
P-16 14939 47'
P-15 14939 47'
P-14 14939 46'
P-13 14898 46'
P-12 14898 43'
P-11 14898 45'
P-10 14898 43'
P-9 14898 44'
P-8 14898 44'
P-7 14898 44'
P-6 14898 43'
P-5 14898 43'
P-4 14898 42'
P-3 14943 42'
P-2 14943 39'
16'
14943.27'
P-24 14879 153'
P38
P-22 14880 259'
DT4
P-20 14876 364'
P-19 14938 353'
P-17 14939 322'
P-1 14943 352'
DT2
P-23 14880 211'
DT1
DT5
DT3
P-21 14876 105'
N
W
E
S

PANEL SEAMING FORM

PROJECT NAME: ASARCO ELKLENA PROJECT NUMBER: 90404 MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
7-28	16/25		46'	Soup	#108	750	Sunny	10-15	75		
7-28	25/26		46'	XB	#201	750	"	"	"		
7-28	26/27		47'	Soup	108	"	"	"	"	DT-7	
7-28	27/28		47'	XB	201	"	"	"	"		
7-28	28/29		45'	Soup	108	"	"	"	"		
7-28	29/30		28'	XB	201	"	"	"	"		Butt Seam
7-28	25-30/31		119'	XB	201	"	"	"	"		
7-28	31/32		118'	Soup	108	"	"	"	"		
7-28	32/33		116'	Soup	108	"	"	"	"		
7-28	33/34		113'	XB	201	"	"	"	"	DT-8	
7-28	34/35		108'	Soup	108	"	"	"	"		
7-28	36-37/35		108'	Soup	108	"	"	"	"		
7-28	17-18-19-20-22-24/31-32-33-34-35-37		136'	XB	201	"	"	"	"		Butt Seam
7-28	24-36-37/38		470'	Soup	108	"	"	"	"	DT-9	
7/28	38/[illegible]		23'	XB	201	"	"	"	"		Butt Se[illegible]

PAGE _____ OF _____

PANEL SEAMING FORM

PROJECT NAME: ASARCO G. HELENA PROJECT NUMBER: 020404 MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
7-28	38-39 / 40		470'	XB	#201	750	Sunny	10-15	7-5	DT-10	
7-29	40-41		475'	Soup	#108	750	Cloudy	15-20	7.5	DT-11	
7-29	41-42		475'	XB	#201	750	"	"	"	DT-12	
7-29	42-43		475'	Soup	#108	750	"	"	"	DT-13	
7-29	43/44		475'	XB	#201	"	"	"	"	DT-14	
7-29	44-45		475'	XB	#201	"	"	"	"	DT-15	

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 7/25/01

SHEET 2 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/25/01	R. 17	P-4-3-21	#1	SP	3X8 Patches Inter Section	7-25	✓
7/25/01	18	P-3-4	#1	SP	1X1 Patch	7-25	✓
7/25/01	19	P2-2A-3	#1	SP	1X1 Patch Butt Seam	7-25	✓
7/25/01	20	P3-3A-2A	#1	SP	1X2' Patch Butt Seam	7-25	✓
7/25/01	21	P-17-19	#1	SP	2X4 Patch DS-3 5' of Toe	7-25	✓
7/25/01	22	P-1-17	#1	SP	2X4 Patch DS-2	7-25	✓
7/25/01	6A	P 13-12-1	#1	SP	1X1 Patch Burnseam	7-25	✓
7/26/01	23	P-19-20	#1	SP	2X4' Patch DT-5	7-26	✓
7/26/01	24	P-20-21-22	#1	SP	3X3 Patch Butt Seam	7-26	✓
7/26/01	25	P-20-22	#1	SP	2X4 Patch DS-4	7-26	✓
7/26/01	26	P-21-22-23	#1	SP	1X2 Patch Butt Seam	7-26	✓
7/26/01	27	P-22-23	#1	SP	2X4 Patch DS-6	7-26	✓
7/26/01	28	P-22-23-24	#1	SP	2X2 patch Butt Seam	7-26	✓
7/28/01	29	P-28-29-30	#1	KK	1X1 Patch Butt Seam	7-28	✓
7/28/01	30	P-28-30-31	#1	KK	1X1 Patch Butt Seam	7-28	✓
7/28/01	31	P-27-28-31	#1	KK	1X1 Patch Butt Seam	7-28	✓

REPAIR REPORT

PROJECT NAME: ASARCO @ HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 07/28/01

SHEET 3 OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/28/01	R. 32	P-27-31	#1	KK	2X4' Patch Burn out / Airhole	7-29	✓
7/28/01	33	P-26-27-31	#1	KK	1X1 Patch Butt Seam	7-29	✓
7/28/01	34	P-26-27	#1	KK	2X4 Patch DT #7	7-29	✓
7/28/01	35	P-25-26-31	#1	KK	1X1 Patch Butt Seam	7-29	✓
7/28/01	36	P-25-17-31	#1	KK	1X2' Patch Butt Seam	7-29	✓
7/28/01	37	P-16-25-17	#1	KK	3X4' Patch Butt Seam	7-29	✓
7/28/01	38	P-17-18 / 31-32	#1	SP	1X2' Patch Inter Section	7-29	✓
7/28/01	39	P-18-19 / 32-33	#1	SP	2X2' Patch Inter Section	7-29	✓
7/28/01	40	P-33-34	#1	SP	2X4' Patch DT #8	7-29	✓
7/28/01	41	P-19-20 / 33-34	#1	SP	1X2' Patch Inter Section	7-29	✓
7/28/01	42	P-20-21 / 34-35	#1	SP	3X5' Patches Inter Section	7-29	✓
7/28/01	43	P-22-24 / 35-37	#1	SP	1X2' Patch Inter Section	7-29	✓
7/28/01	44	P-24-37 / 38	#1	SP	1X2' Patch Butt Seam	7-29	✓
7/28/01	45	P-36-37 / 35	#1	KK	1X1 Patch Butt Seam	7-29	✓
7/28/01	46	P-36-37 / 38	#1	KK	1X1 Patch Butt Seam	7-29	✓
7/28/01	47	P-38-39 / 36	#1	KK	2X3' Patch Butt Seam	7-29	✓

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAYWOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 07/28/01

SHEET 4 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7 28 01	R-48	P-38-39/40	#1	KK	1X1' Patch Butt Seam	07 29 01	✓
7 29 01	49	P-29-30-29A	#1	SP	8X9 Patches P-29A		
7 29 01	50	P-34-35	#1	KK	1X1 Patch Burn out		
7 29 01	51	P-38-40	#1	KK	2X4' Patch DT # 10		
7 29 01	52	P-24-38	#1	KK	1X1' Patch Burn out		
7 29 01	53	P-24-38	#1	KK	1X1' Patch Burn out		
7 29 01	54	P-38-40	#1	KK	1X1' Patch Burn out		
7 29 01	55	P-23-24-38	#1	KK	1X1' Patch Butt Seam		
7 29 01	56	P-24-38	#1	KK	1X1' Patch Burn out		
7 29 01	57	P-24/38	#1	KK	2X4' Patch DT # 9		
7 29 01	58	P-24-38	#1	KK	1X1' Patch Burn out		
7 29 01	59	P-24-38	#1	KK	1X2' Patch Burn out		
7 29 01	60	P-38-40	#1	KK	1X2' Patch power off		
7 29 01	61	P-41-42	#1	SP	1X2' Patch Burn out		
7 29 01	62	P-43-44	#1	Soup	2X2 Patch Burnout		
7 29 01	63	P-41-42	#1	"	2X2 Patch Add Liner TO Anchor Trench		

REPAIR REPORT

PROJECT NAME:
NWLG PROJECT #
NWLG SUPERINTENDANT:
MATERIAL DESCRIPTION:

DATE: / /

SHEET _____ OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7 29 01	R-64	P-42-43	#1	Soup	2X3' Patch Add Linner TO Anchor Trench		
7 29 01	65	P-43-44	#1	Soup	1X2' Patch Add Linner TO Anchor Trench		
7 29 01	66	P-44-45	#1	"	2X2' Patch Add Linner TO Anchor Trench		
7 29 01	67	P-40-41	#1	"	2X4' Patch DT # 11		
7 29 01	68	P-41-42	#1	"	2X4' Patch DT # 12		
7 29 01	69	P-42-43	#1	"	2X4' Patch DT # 13		
7 29 01	70	P-43-44	#1	"	2X4 Patch DT # 14		
7 29 01	71	P-44-45	#1	Soup	2X4' Patch DT # 15		
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NON DESTRUCTIVE TESTING FORM

PAGE 1 OF ___

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-25-01	16/15	VP	35	33	2	1144	1149	P	P	
7/25	15/14	VP	35	33	2	1144	1149	P	P	
7/25	14/13	VP	35	34	1	1144	1149	P	P	
7/25	13/12	VP	34	34	0	1238	1243	P	P	
7-25	12/11	VP	32	30	2	1156	1201	P	P	
7-25	11/10	VP	32	30	2	1157	1202	P	P	
7-25	10/9	VP	34	34	0	1245	1250	P	P	
7-25	9/8	VP	32	31	1	1255	1:00	P	P	
7-25	8/7	VP	30	29	1	1255	1:00	P	P	
7-25	7/6	VP	31	30	1	1255	1:00	P	P	
7-25	6/5	VP	33	31	2	1255	1:00	P	P	
7-25	5/4	VP	30	30	0	1:02	1:07	P	P	
7-25	3/3A	VP	35	35	0	1:02	1:07	P	P	
7-25	3/2A	VP	35	33	2	1:02	1:07	P	P	
7-25	2A/3	VP	32	32	0	1:02	1:07	P	P	Butt Seam
7-25	2/2A	VP	34	34	0	1:20	1:25	P	P	
7-25	16/1	VP	31	30	1	145	150	P	P	Butt
7-25	15/1	VP	31	31	0	145	150	P	P	Butt
7-25	19/18	VP	34	33	1	1:58	2:03	P	P	Butt Seam
7-25	18/1	VP	33	31	2	1:50	200	P	P	
7-25	18/19	VP	32	32	0	147	152	P	P	
7-25	14/1	VP	30	30	0	203	208	P	P	Butt
7-25	13/1	VP	33	33	0	203	208	P	P	"
7/25	[illegible]/1	VP	32	30	2	204	209	P	P	"

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-25-01	11/1	VP	30	29	1	204	209	P	P	Butt Seam
7-25-01	10/1	VP	30	30	0	210	215	P	P	"
7-25-01	9/1	VP	30	30	0	210	215	P	P	"
7-25-01	8/1	VP	34	34	0	211	216	P	P	"
7-25-01	7/1	VP	33	30	1	211	216	P	P	"
7-25-01	6/1	VP	33	31	2	220	225	P	P	"
7-25-01	5/1	VP	32	32	0	220	225	P	P	"
7-25-01	4/1	VP	34	34	0	221	226	P	P	Butt
7-25-01	2/1	VP	35	33	2	221	226	P	P	
7-25-01	1/17	VP	32	32	0	230	235	P	P	[redacted]
7-25-01	1/17	VP	32	32	0	230	235	P	P	
7-25-01	17/19	VP	34	32	2	231	236	P	P	
7-26-01	19/20	VP	34	34	0	1250	1255	P	P	
7-26-01	20/22	VP	35	34	1	1251	1256	P	P	
7-26-01	20/21	VP	33	32	1	1204	1209	P	P	
7-26-01	21/22	VP	32	32	0	233	238	P	P	Butt
7/26	21/23	VP	30	30	0	233	238	P	P	
7/26	22/23	VP	30	30	0	233	238	P	P	
7/26	23/24	VP	32	30	2	240	245	P	P	Butt
7/26	22/24	VP	32	31	1	240	245	P	P	
7-28	16/25	VP	33	33	0	913	918	P	P	
7-28	25-26	VP	32	32	0	913	918	P	P	
7-28	25-31	VP	31	30	1	913	918	P	P	Butt
7-28	26-31	VP	32	31	1	913	918	P	P	Butt

NON DESTRUCTIVE TESTING FORM

PAGE 17 OF ___

PROJECT NAME: ASARCO ELHELENA (T) PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7/26	2T/4T	VP	37	35	2	306	311	P		
7/26	4T/3T	VP	35	35	0	306	311	P		
7/26	2T/3T	VP	31	31	0	306	311	P		Butt
7/26	3T/5T	VP	33	32	1	305	310	P		
7/26	5T/6T	VP	32	32	0	252	257	P		
7/26	6T/7T	VP	32	30	2	252	257	P		
7/26	7T/8T	VP	32	31	1	252	257	P		
7/26	8T/9T	VP	34	33	1	252	257	P		
7/26	9T/10T	VP	30	29	1	251	256	P		
7/26	10T/11T	VP	33	31	2	301	306	P		
7/26	11T/12T	VP	34	33	1	301	306	P		
7/27	12T/1T	VP	31	31	0	1015	1020	P		Butt
7/27	1T/11T	VP	32	32	0	1015	1020	P		"
7/27	1T/10T	VP	35	33	2	1015	1020	P		"
7/27	1T/9T	VP	35	35	0	1015	1020	P		"
7/27	1T/8T	VP	31	31	0	1016	1021	P		"
7/27	1T/7T	VP	35	33	2	1016	1021	P		"
7/27	1T/6T	VP	34	34	0	1030	1035	P		"
7/27	1T/5T	VP	30	29	1	1030	1035	P		"
7/27	1T/12T	VP	32	32	0	1030	1035	P		"
7/27	1T/3T	VP	30	30	0	1030	1035	P		Butt
7/27	12/13	VP	33	33	0	1055	11:00	P		
7/27	1-13	VP	31	30	1	1055	11:00	P		Butt
7/27	[illegible]14	VP	33	31	2	1055	11:00	[illegible]		

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ~~PSARCO~~ E. Helena T

PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7/27	1-14	VP	35	33	2	1055	11:00	P		Butt
7/27	14-15	VP	33	31	2	1056	11:01	P		
7/27	15-16	VP	32	31	1	1056	11:01	P		
7/27	1-15	VP	30	29	1	1056	11:01	P		Butt
7/27	1-16	VP	35	34	1	1105	1110	P		"
7/27	1-17	VP	32	32	0	1105	1110	P		"
7/27	16-17	VP	30	30	0	1105	1110	P		Butt
7/27	17-18	VP	34	33	1	1112	1117	P		
7/27	1-18	VP	34	33	1	1112	1117	P		
7/27	18-19	VP	35	35	0	1120	1125	P		
7/27	19-20	VP	35	35	0	1125	1130	P		
7/27	20-21	VP	30	29	1	1125	1130	P		Butt Seam
7/27	19-21	VP	35	34	1	1125	1130	P		
7/27	21-24	VP	34	33	1	1145	1150	P		
7/27	23-24	VP	30	29	1	1145	1150	P		Butt
7/27	21-23	VP	34	34	0	1145	1150	P		
7/27	22-23	VP	33	33	0	1145	1150	P		Butt
7/27	22-21	VP	35	35	0	1145	1150	P		
7/27	20-22	VP	33	33	0	1150	1155	P		

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-28	26/27	VP	31	29	2	914	919	P	P	
7-28	27/31	VP	31	31	0	914	919	P	P	Butt Seam
7-28	27/31	VP	30	30	0	926	931	P	P	Butt Seam
7-28	27/28	VP	33	33	0	935	940	P	P	
7-28	28/31	VP	30	30	0	935	940	P	P	Butt
7-28	28/29	VP	33	33	0	935	940	P	P	
7-28	29/30	VP	30	30	0	935	940	P	P	Butt
7-28	30/31	VP	31	30	1	935	940	P	P	
7-28	30/28	VP	32	31	1	935	940	P	P	Butt
7-28	32/33	VP	35	35	0	955	1000	P	P	
7-28	19/33	VP	32	31	1	955	1000	P	P	Butt
7-28	33/34	VP	35	35	0	955	1000	P	P	
7-28	20/34	VP	32	32	0	955	1000	P	P	Butt
7-28	34/35	VP	33	33	0	956	1001	P	P	
7-28	24/35	VP	33	32	1	956	1001	P	P	Butt
7-28	24/37	VP	34	34	0	1005	1010	P	P	Butt
7-28	35/37	VP	34	33	1	1005	1010	P	P	
7-28	35/36	VP	33	33	0	1005	1010	P	P	
7-28	36/37	VP	35	35	0	1005	1010	P	P	Butt
7-28	31/32	VP	35	35	0	1020	1025	P	P	
7-28	18/32	VP	35	33	2	1020	1025	P	P	Butt
7-28	17/31	VP	35	34	1	1020	1025	P	P	Butt
7-28	25/17	VP	35	35	0	1020	1025	P	P	Butt
7-28	[illegible]9	VP	35	35	0	1240	1245	P	P	

NON DESTRUCTIVE TESTING FORM

PAGE 4 OF ___

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-28	38-39	VP	30	29	1	1240	1245	P	P	Butt
7-28	36-38	VP	30	30	0	1240	1245	P	P	
7-28	37-38	VP	31	30	1	1240	1245	P	P	
7-28	39-40	VP	35	35	0	1240	1245	P	P	
7-28	38-40	VP	34	34	0	1240	1245	P	P	
7-28	24-38	VP	30	29	1	1247	1252	P	P	Burn out
7-28	24-38	VP	35	35	0	1247	1252	P	P	"
7-28	24-38	VP	30	30	0	1247	1252	P	P	"
7-28	24-38	VP	33	33	0	1:00	1:05	P	P	"
7-28	24-38	VP	34	34	0	1:00	1:05	P	P	"
7-28	24-38	VP	35	35	0	1:00	1:05	P	P	"
7-28	38-40	VP	35	34	1	1:00	1:05	P	P	Burn out
7-28	38-40	VP	35	35	0	1:07	1:12	P	P	Power off
7-28	38-40	VP	35	35	0	1:07	1:12	P	P	Burn out
7-29	40-41	VP	35	35	0	1:05	1:10	P		
7-29	41-42	VP	35	34	1	1:06	1:11	P		
7-29	41-42	VP	32	32	0	1:06	1:11	P		
7-29	42-43	VP	35	35	0	1:07	1:12	P		
7-29	43-44	VP	35	34	1	1:08	1:13	P		
7-29	43-44	VP	35	34	1	1:20	1:25	P		
7-29	44-45	VP	35	35	0	1:45	1:50	P		

Northwest L[illegible]ngs & Geotextile Products, Inc.

DESTRU[illegible]TIVE TEST LOG

PROJECT NAME: _____ DATE: / /

NWLG PROJECT # _____

NWLG SUPERINTENDANT: _____

MATERIAL DESCRIPTION: _____ SHEET ____ OF ____

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN			TENSILE VALUE		LAB PASS / FAIL PEEL / TENSILE
						INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	LBS / IN	PASS / FAIL	
7 129 01	DT-7	26/27	#3096	VP	1	123	118	P	208	P	
					2	126	129	P	207	P	
					3	114	108	P	217	P	
					4	123	106	P	205	P	
					5	124	121	P	212	P	
7 129 01	DT-8	33/34	"	"	1	139	131	P	205	P	
					2	123	136	P	213	P	
					3	128	118	P	215	P	
					4	125	133	P	209	P	
					5	114	124	P	214	P	
7 129 01	DT-9	24/38	"	"	1	110	127	P	209	P	
					2	116	120	P	206	P	
					3	114	117	P	210	P	
					4	123	126	P	213	P	
					5	115	106	P	199	P	
7 129 01	DT-10	38/40	"	"	1	128	121	P	214	P	
					2	127	133	P	206	P	
					3	113	114	P	217	P	
					4	122	128	P	202	P	
					5	114	117	P	214	P	
7 129 01	DT-11	40/41	"	"	1	110	124	P	171	P	
					2	133	103	P	179	P	
					3	133	103	P	152	P	
					4	123	104	P	177	P	
					5	104	123	P	175	P	
7 129 01	DT-12	41/42			1	130	125	P	181	P	
					2	108	132	P	180	P	
					3	104	136	P	180	P	
					4	106	136	P	177	P	
					5	127	109	P	171	P	

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655, Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell

SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell
To: ASARCO, Inc.

Date: August 02, 2001
Attn: Darrell Shew
Phone: (406) 227-7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS
☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	623	Northwest Linings Daily Submittals

Enclosed Northwest Linings production data for the following dates:

Trial Weld Form	07/28/01 through 08/01/01
Panel Placement Form	07/27/ 01 through 08/01/01
Panel Layout Drawings	07/29/01 through 08/01/01
Panel Seaming Form	08/01/01
Repair Report	08/01/01
Non Destructive Testing Form	08/01/01
Destructive Test Log	07/26/01, 08/01/01
Certificate of Acceptance	08/01/01

Northwest Linings Material Installation Summary

Material:	60 mil. HDPE Geomembrane	200 mil. Geonet	Geotextile Fabric
Approximate Quantity Installed on 07/30/01	0 sq. yd.	6766.57 sq. yd.	0 sq. yd.
Approximate Quantity Installed on 08/01/01	13,288.8 sq. yd.	4,666.6 sq. yd.	0 sq. yd.
Approximate Quantity Installed to Date	36,977.9 sq. yd.	20,766.27 sq. yd.	0 sq. yd.

Signed: Douglas G. Tisdell Date: 08-02-01

QC Manager

A Washington Company

TRIAL WELD FORM

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Wold
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 7/28/01

SHEET ____ OF ____

DATE/ TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS: BARREL TEMP	EXTRUSION WELDS: PREHEAT TEMP	EXTRUSION WELDS: PEEL / TENSILE	FUSION WELDS: WEDGE TEMP	FUSION WELDS: SET SPEED FT / MIN	FUSION WELDS: PEEL / TENSILE	PASS / FAIL	COMMENTS
~~7 128 01 6:45 AM~~	~~Soup~~	~~#108~~						~~750~~	~~7.5~~			
7 128 01 6:45	Soup	108						750	7.5	135 131 136 127 137 136	P	173-171
7 128 01 7:00 AM	XB	#201						750	75	140 156 145 150 150 153	P	188-187
7 128 01 12:45	XB	# 201						750	75	118 115 120 129 114 108	P	161-163
7 128 01 1:00 PM	Khan	Xt #1			520	320	114-128 109				P	156-159
7 129 01 6:45	Soup	# 1			520	320	113-120 117				P	173-168
7 129 01 7:20 AM	Soup	#108						750	7.5	118 131 114 137 124 129	P	176-177
7 129 01 9:30	XB	#201						750	75	119 124 128 126 118 136		189-180
7 129 01 1:00	Soup	108						750	75	110 109 107 115 112 102	P	160-163
7 129 01 1:10 PM	XB	201						750	7.5	114 103 114 120 119 120	P	165-169
8 1 01 6:30 AM	XB	201		Summer				750	75	136 141 120 132 138 126	P	172-174
8 1 01 9:50 AM	Soup	108		"				750	7.5	139 135 130 131 129 122	P	189-181
1 1 12:30 PM	"	108						750	75	124 130 128 128 130 132		165-168
1 1	XB	201						750	75	130 126 130 131 128 135		172-165
8 1 01 2:00	Soup	# 1			520	320	119-121 114				P	166-163

8/2/001 6:30 M # 1 138 140 136 750 176 158 169 P

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 07/26 01
SHEET 1 OF

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS / PANEL LOCATION
07 /26/01	1T	14879	320'	23'	
07 /26/01	2T	14942	43'	23'	
07 /26/01	3T	14942	42'	23'	
07 /26/01	4T	14942	16'	23'	
07 /26/01	5T	14942	43'	23'	
07 /26/01	6T	14942	43'	23'	
07 /26/01	7T	14942	43'	23'	
07 /26/01	8T	14942	44'	23'	
07 /26/01	9T	14942	44'	23'	
07 /26/01	10T	14942	44'	23'	
07 /26/01	11T	14942	44'	23'	
07 /26/01	12T	14942	45'	23'	
07 /27/01	13T	14870	45'	23'	
07 /27/01	14T	23250	45'	23'	
07/27/01	15T	23250	46'	25'	

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
07-28-01	25	23250	49'	23'	
072801	26	23250	49'	23'	
072801	27	23250	49'	23'	
072801	28	23250	49'	23'	
072801	29	23250	21'	23'	
072801	30	23250	49'	23'	
072801	31	23250	115'	23'	
072801	32	23255	115'	23'	
072801	33	23255	115'	23'	
072801	34	23255	115'	23'	
072801	35	23255	115'	23'	
072801	36	23255	115'	23'	
072801	37	14875	115'	23'	

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
072801	38	14875	397'	23'	
072801	39	23267	73'	23'	
07 29 01	40	23267	476'	23'	
07 29 01	41	23238	470'	23'	
07 29 01	42	14941	470'	23'	
07 29 01	43	23244	470'	23'	
07 29 01	44	14964	470'	23'	
07 29 01	45	14969	470'	23'	

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Trey Jay Ward
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 07/27/01
SHEET 2 OF

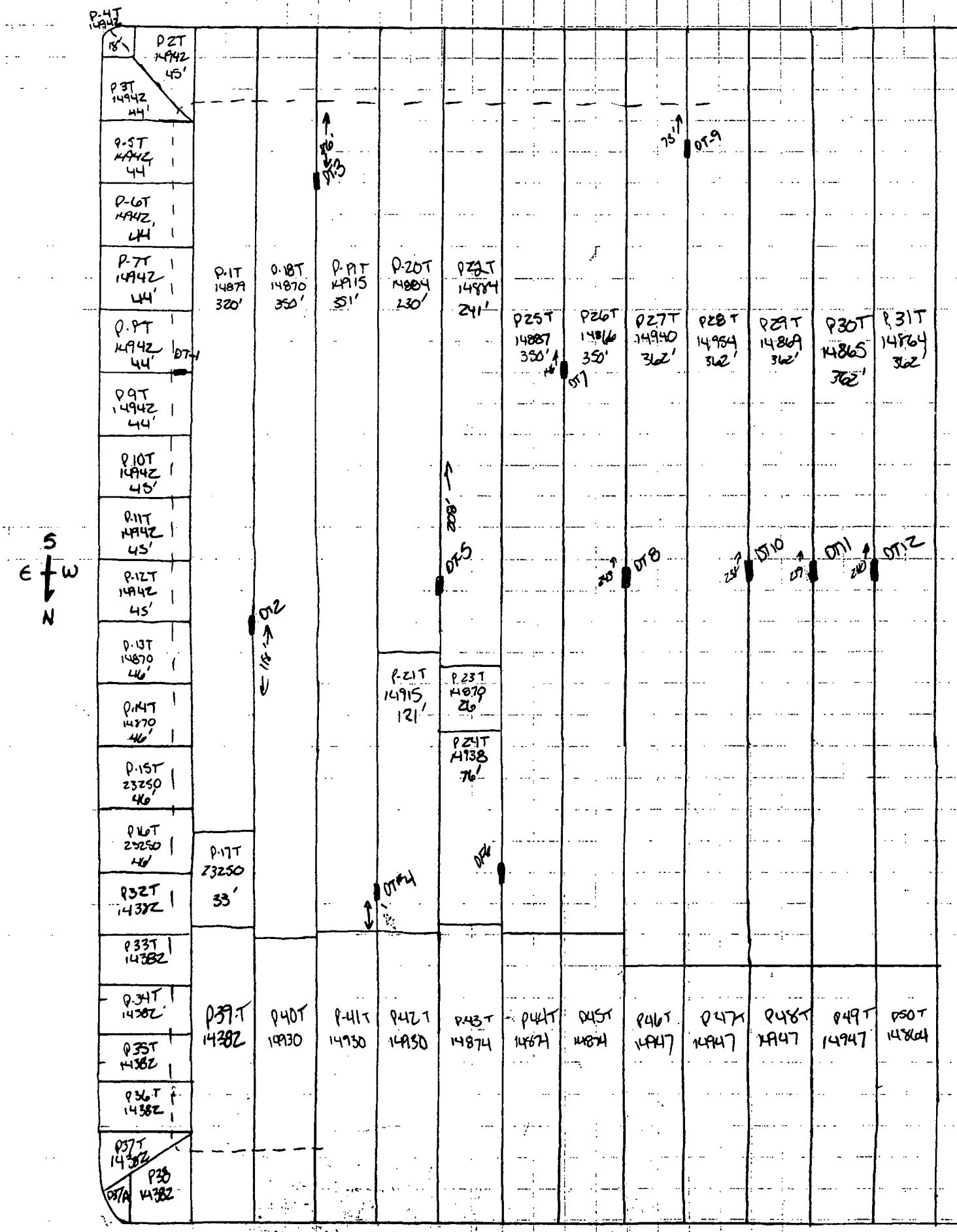
DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS / PANEL LOCATION
07/27/01	16T	23250	46'	23'	
07/27/01	17T	23250	33'	23'	
07/27/01	18T	14870	350'	23'	
07/27/01	19T	14915	351'	23'	
07/27/01	20T	14884	230'	23'	
07/27/01	21T	14915	121'	23'	
07/27/01	22T	14884	241'	23'	
07/27/01	23T	14870	26'	23'	
07/27/01	24T	14938	76'	23'	
08/01/01	25T	14887	350'	23'	
08/01/01	26T	14866	350'	23'	
08/01/01	27T	14940	362'	23'	
08/01/01	28T	14954	362'	23'	
08/01/01	29T	14869	362'	23'	
08/01/01	30T	14865	362'	23'	

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA (T) PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 MIL HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
08.01.01	31T	14864	362'	23'	
08 01 01	32T	14382	49'	23'	
08 01 01	33T	14382	49'	23'	
08 01 01	34T	14382	49'	23'	
08 01 01	35T	14382	49'	23'	
08 01 01	36T	14382	49'	23'	
08 01 01	37T	14382	49'	23'	
08 01 01	38T	14382	49'	23'	
08 01 01	39T	14382	145'	23'	
08 01 01	40T	14930	115'	23'	
08 01 01	41T	14930	115'	23'	
08 01 01	42T	14930	115'	23'	
08 01 01	43T	14974	115'	23'	


S
E
W
N
P-4T 14942
P2T 14942 45'
P3T 14942 44'
P-5T 14942 44'
P-6T 14942 44'
P-7T 14942 44'
P-8T 14942 44'
P9T 14942 44'
P10T 14942 45'
P-11T 14942 45'
P-12T 14942 45'
P-13T 14870 46'
P-14T 14870 46'
P-15T 23250 46'
P16T 23250 46'
P32T 14382
P33T 14382
P-34T 14382
P35T 14382
P36T 14382
P37T 14382
P38 14382
DT/A
P-17T 23250 33'
P-18T 14870 350'
P-19T 14915 351'
P-20T 14884 230'
P-21T 14915 121'
P22T 14884 241'
P23T 14879 26'
P24T 14938 76'
P25T 14887 350'
P26T 14866 350'
P27T 14940 362'
P28T 14954 362'
P29T 14869 362'
P30T 14865 362'
P31T 14864 362'
P39T 14382
P40T 14930
P-41T 14930
P42T 14930
P43T 14874
P44T 14874
P45T 14874
P46T 14947
P47T 14947
P48T 14947
P49T 14947
P50T 14864
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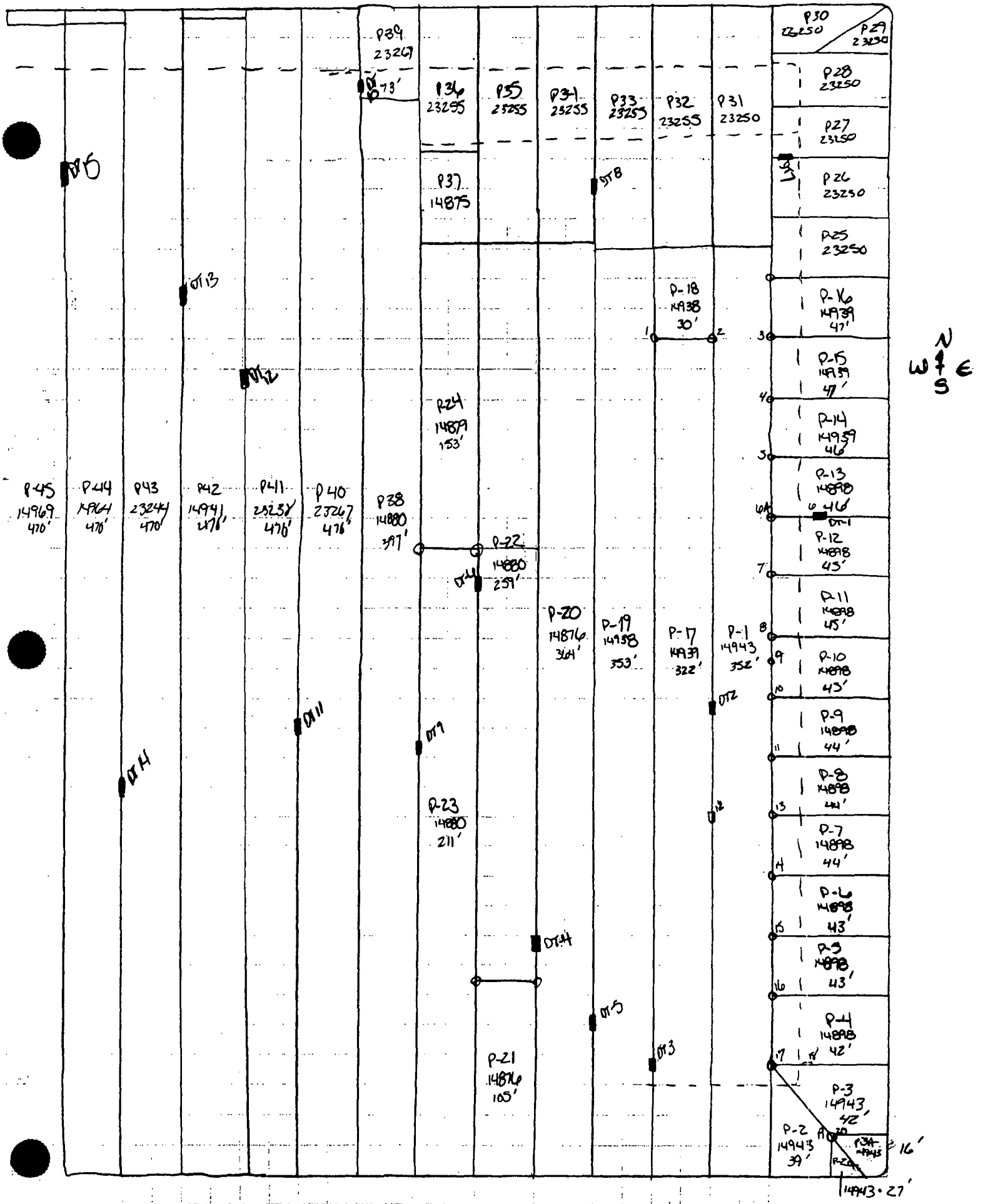
DT-9
DT-10
DT-11
DT-12


P39 23267
P36 23255
P35 23255
P34 23255
P33 23255
P32 23255
P31 23250
P30 23250
P29 23250
P28 23250
P27 23250
P26 23250
P25 23250
P37 14875
P24 14879 153'
P45 14969 470'
P44 14964 470'
P43 23244 470'
P42 14941 476'
P41 23238 476'
P40 23267 476'
P38 14880 397'
P-22 14880 259'
P-20 14876 364'
P-19 14958 353'
P-18 14938 30'
P-17 14939 322'
P-1 14943 352'
P-16 14939 47'
P-15 14939 47'
P-14 14959 46'
P-13 14898 46'
P-12 14898 43'
P-11 14898 45'
P-10 14898 45'
P-9 14898 44'
P-8 14898 44'
P-7 14898 44'
P-6 14898 43'
P-5 14898 43'
P-4 14898 42'
P-3 14943 42'
P-2 14943 39'
P-23 14880 211'
P-21 14876 105'
N
W
E
S
16'
14943 · 27'

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. Helena (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Ward
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 07/27/01
SHEET 2 OF

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
07/27/01	14T/15T		46'	XB	#201	750	Sunny	5-10	75	
07/27/01	15T/16T		46'	XB	"	"	"	"	"	
07/27/01	1T/17T		23'	Soup	#108	"	"	"	"	
07/27/01	2T-16T/1T		333'	Soup	"	"	"	"	"	
07/27/01	1T/18T		320'	~~XB~~	"	"	"	"	"	DT-2
07/27/01	18T/19T		350'	Soup	"	"	"	"	"	DT-3
07/27/01	19T/20-21T		351'	XB	#201	"	"	"	"	DT-4
07/27/01	20-21T/22-23 24		346'	Soup	#108	"	"	"	"	DT-5
07/27/01	20T/21T		23'	XB	#201	"	"	"	"	
07/27/01	22T/23T		23'	XB	"	"	"	"	"	
07/27/01	23T/24T		23'	XB	"	"	"	"	"	
08/01/01	[illegible]/25		350'	XB	201	750°	Sun	5-10	50°	DT 6
08/01/01	25/26		350'	Soup	108	750°	Sun	5-10	55°	DT7
08/01/01	26/27		350'	XB	201	750°	Sun	5-10	69°	DT8
08/01/01	27/28		362'	Soup	108	750°	Sun	5-10	73°	DT9

PANEL SEAMING FORM

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 08/01/01
SHEET 3 OF ____

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
08/01/01	28/29		362'	XB	201	750°	Sun	5-10	70°	
08/01/01	29/30		362'	SOUP	108	750°	Sun	5-10	70°	DT 11
08/01/01	30/31		362'	XB	201	750°	Sun	5-10	70°	DT 12
08/01/01	32/16		48'	XB	201	750°	Sun	5-10	80°	
08/01/01	32/33		48'	SOUP	108	750°	Sun	5-10	80°	
08/01/01	33/34		48'	SOUP	108	750°	Sun	10-15	80°	
08/01/01	34/35		49'	XB	201	750°	Sun	10-15	80°	
08/01/01	35/36		49'	XB	201	750°	Sun	10-15	80°+	
08/01/01	36/37		49'	XB	201	750°	Sun	10-15	80°+	
08/01/01	37/38		47'	SOUP	108	750°	Sun	10-15	80°+	
08/01/01	32-38/39		146'	SOUP	108	750°	Sun	10-15	80°+	
08/01/01	39/40		115'	XB	201	750°	Sun	10-15	80°	
08/01/01	40/41		115'	SOUP	108	750°	Sun	10-15	80°	
08/01/01	41/42		115'	XB	201	750	Sun	10-15	80°	
08/01/01	42/43		115'	SOUP	108	750	Sun	10-15	80°	

REPAIR REPORT

(T)

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WALD
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 7/27/01

SHEET 2 OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7 27 01	R-17	P-1T-17T-18T	#1	SP	3x4' Patch Butt Seam	7-27	✓
7 27 01	18	P-1T-18T	#1	"	2x4' Patch DT #2	7.27	✓
7 27 01	19	P-1T-18T	#1	"	1x1 Patch Seam Burn Stop	7.27	✓
7 27 01	20	P-18T-19T	#1	KK	2x4 Patch DT #3	7.27	✓
7 27 01	21	P-19T-20T-21T	#1	"	1x1 Patch Butt Seam	7.27	✓
7 27 01	22	P-19T/21T	#1	"	2x4 Patch DT #4	7.28	✓
7 27 01	23	P19T-21T	#	"	2x3 Patch Seam Burn/ Air hole	7.28	✓
7 27 01	24	P-21T-23T-24T	#1	"	1x1 Patch Butt Seam	7.28	✓
7 27 01	25	P-21T-23T-22T	#1	"	1x1 Patch Butt Seam	7.28	✓
7 27 01	26	P-20T-22T-23T	#1	"	2x3 Patch Butt Seam	7.28	✓
7 27 01	27	P-20T-21T	#	"	1x1 Patch Seam Burn	7.28	✓
7 27 01	28	P-20T-22T	#1	"	2x4' Patch DT #5	7.28	✓
8 1 01	29	P-24T/25T	#1	Soup	2x4' Patch DT #6	8-1	
8 1 01	30	P-23T-24T-25T	#1	"	1x1 Patch Butt Seam		
8 1 01	31	P-22T-23T-25T	#1	"	1x1 Patch Butt Seam		
8 1 01	32	P-22T-25T	#1	"	1x1 Patch Burn Out		

NON DESTRUCTIVE TESTING FORM

PAGE 2 OF ___

PROJECT NAME: ~~ASARCO~~ E. Helena T

PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7/27	1-14	VP	35	33	2	1055	11:00	P	P	Butt
7/27	14-15	VP	33	31	2	1056	11:01	P	P	
7/27	15-16	VP	32	31	1	1056	11:01	P	P	
7/27	1-15	VP	30	29	1	1056	11:01	P	P	Butt
7/27	1-16	VP	35	34	1	1105	1110	P	P	"
7/27	1-17	VP	32	32	0	1105	1110	P	P	"
7/27	16-17	VP	30	30	0	1105	1110	P	P	Butt
7/27	17-18	VP	34	33	1	1112	1117	P	P	
7/27	1-18	VP	34	33	1	1112	1117	P	P	
7/27	18-19	VP	35	35	0	1120	1125	P	P	
7/27	19-20	VP	35	35	0	1125	1130	P	P	
7/27	20-21	VP	30	29	[illegible]	1125	1130	P	P	Butt Seam
7/27	19-21	VP	35	34	1	1125	1130	P	P	
7/27	21-24	VP	34	33	1	1145	1150	P	P	
7/27	23-24	VP	30	29	1	1145	1150	P	P	Butt
7/27	21-23	VP	34	34	0	1145	1150	P	P	
7/27	22-23	VP	33	33	0	1145	1150	P	P	Butt
7/27	22-21	VP	35	35	0	1145	1150	P	P	
7/27	20-22	VP	33	33	0	1150	1155	P	P	
8.01	24/25	VP	34	33	1	1255	1:00	P		
8.01	25-26	VP	34	34	0	1256	1:01	P		
8.01	26-27	VP	34	32	2	1257	1:02	P		
8.01	27-28	VP	33	33	0	1238	1:03	P		
8.01	28-29	VP	35	35	0	1259	1:04	P		

Northwest Linings & Geotextile Products, Inc.

DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WARD
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 7/25/01

SHEET 1 OF ____

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
7 25/01	DS-3	17/19	3096	VP	1	106	126	P	172	P	
					2	108	122	P	173	P	
					3	103	113	P	169	P	
					4	100	116	P	169	P	
					5	103	122	P	168	P	
7 25/01	DS-2	1/17	"	"	1	126	140	P	174	P	
					2	100	138	P	176	P	
					3	129	109	P	170	P	
					4	117	130	P	172	P	
					5	120	131	P	168	P	
07/25/01	DS-1	12/13	"	"	1	110	112	P	179	P	
					2	111	124	P	174	P	
					3	122	148	P	177	P	
					4	132	130	P	182	P	
					5	123	120	P	180	P	
07/26/01	DT-4	22/20	3096	VP	1	108	106	P	145	P	
					2	98	101	P	141	P	
					3	109	100	P	142	P	
					4	111	97	P	144	P	
					5	100	106	P	145	P	
07/26/01	DT 5	19/20	3096	VP	1	116	112	P	178	P	
					2	120	137	P	188	P	
					3	113	129	P	192	P	
					4	118	122	P	187	P	
					5	131	130	P	198	P	
07/26/01	DT-6	22/23	3096	VP	1	131	122	P	183	P	
					2	126	136	P	194	P	
					3	117	119	P	189	P	
					4	130	124	P	192	P	
					5	142	137	P	195	P	

Northwest Linings & Geotextile Products, Inc.

DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO ELIZABETHTOWN (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Wold
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 7/27/01

SHEET 1 OF ____

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
07/27/01	1T	8T/9T	3096	VP	1	102	122	P	148	P	
					2	112	97	P	150	P	
					3	98	102	P	141	P	
					4	110	119	P	149	P	
					5	113	110	P	152	P	
07/27/01	2T	17T/18T	3096	"	1	114	115	P	142	P	
					2	125	129	P	148	P	
					3	107	108	P	139	P	
					4	107	103	P	141	P	
					5	113	117	P	149	P	
07/27/01	3T	18T/19T	3096	"	1	118	111	P	137	P	
					2	122	119	P	139	P	
					3	126	129	P	145	P	
					4	107	126	P	147	P	
					5	133	126	P	147	P	
07/27/01	4T	19T/21T	3096	"	1	106	122	P	152	P	
					2	122	129	P	150	P	
					3	128	107	P	147	P	
					4	134	115	P	147	P	
					5	129	113	P	149	P	
07/27/01	5T	20T/22T	3096	"	1	136	122	P	144	P	
					2	129	128	P	138	P	
					3	126	108	P	147	P	
					4	104	118	P	153	P	
					5	132	120	P	154	P	
8/01/01	6T	24T/25T	3096	VP	1	123	112	P	162	P	
					2	106	104	P	170	P	
					3	115	117	P	164	P	
					4	121	100	P	169	P	
					5	116	114	P	166	P	

Northwest L[illegible]ngs & Geotextile Products, Inc.

DESTRU[illegible]TIVE TEST LOG

(T)

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Thay JAY WARD
MATERIAL DESCRIPTION: LO MIL HDPE

DATE 08/01/01

SHEET 2 OF ____

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
8/1/01	DT-7 (T)	25T/26T	3096	VP	1	135	109	P	161	P	
					2	135	97	P	163	P	
					3	138	98	P	160	P	
					4	144	117	P	166	P	
					5	134	124	P	167	P	
8/1/01	D-8 (T)	26T/27T	"	"	1	138	135	P	161	P	
					2	143	136	P	159	P	
					3	144	135	P	152	P	
					4	138	141	P	160	P	
					5	140	141	P	161	P	
8/1/01	D-9 (T)	27T/28T	"	"	1	122	134	P	167	P	
					2	100	111	P	164	P	
					3	117	109	P	163	P	
					4	110	116	P	166	P	
					5	112	125	P	159	P	
8/1/01	DT-10 (T)	28T/29T	"	"	1	136	124	P	171	P	
					2	121	116	P	162	P	
					3	124	134	P	158	P	
					4	114	117	P	169	P	
					5	130	119	P	161	P	
8/1/01	DT-11 (T)	29T/30T	"	"	1	122	108	P	157	P	
					2	114	122	P	162	P	
					3	132	97	P	159	P	
					4	142	137	P	164	P	
					5	141	135	P	163	P	
8/1/01	DT-12 (T)	30T/31T	3096	VP	1	106	105	P	165	P	
					2	119	142	P	164	P	
					3	146	129	P	160	P	
					4	127	143	P	157	P	
					5	108	129	P	162	P	

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08·01·01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative:

I, the undersigned duly authorized representative of: HYDROMETRICS / ENVIROCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

Exceptions: PNLS 1-24T

~~Authorized~~ OWNERS Representative:

MARK W RHODES [illegible] [illegible] 8-01-01

Name Signature Title Date

~~Northwest Linings~~ ENVIROCON Representative:

[illegible] TISDELL [illegible] [illegible] [illegible]

Name Signature Title Date

NORTHWEST LININGS REPRESENTATIVE

TIM JAY WALD [illegible] SUPERINTENDANT 08 01 01

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655, Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell
SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell
Date: August 09, 2001
To: ASARCO, Inc.
Attn: Darrell Shew
Phone: (406) 227-7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS
☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	623	Northwest Linings Daily Submittals

Enclosed Northwest Linings production data for the following dates:

Soil Subgrade Surface Acceptance	08/03/01 – Cell 1 Total Subgrade Acceptance
Trial Weld Form	08/02/01 through 08/06/01
Panel Seaming Form	08/02/01 through 08/04/01
Repair Report	08/02/01 through 08/06/01
Non Destructive Testing Form	08/02/01 through 08/06/01
Destructive Test Log	08/02/01 through 08/06/01
Certificate of Acceptance	08/02/01 through 08/06/01

Northwest Linings Material Installation Summary

Note: Material summary is based on material inventory, and does not reflect billable yardage.

Material:	60 mil. HDPE Geomembrane	200 mil. Geonet	Geotextile Fabric
Approximate Quantity Installed on 08/02/01	0 sq. yd.	8866.5 sq. yd.	8500.0 sq. yd.
Approximate Quantity Installed on 08/03/01	5877.7 sq. yd.	5599.9 sq. yd	0.0 sq. yd
Approximate Quantity Installed on 08/04/01	1763.3 sq. yd	2333.3 sq. yd	5500.0 sq. yd
Approximate Quantity Installed on 08/05/01	2351.1 sq. yd	1866.6 sq. yd	3500.0 sq. yd
Approximate Quantity Installed on 08/06/01	1175.5 sq. yd.	6066.6 sq. yd.	4500.0 sq. yd.
Approximate Quantity Installed to Date	48,145.6 sq. yd.	45,499.25 sq. yd.	22,000.0 sq. yd.

Signed: Douglas G. Tisdell
QC Manager

Date: 08-09-01

A Washington Company

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc.
21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE

PROJECT: ASARCO

LINER TYPE/QTY: 60mil HDPE

OWNER: ASARCO

LOCATION: E. HELENA

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

Northwest Linings & Geotextile Products, Inc. accepts no responsibility for the composition or character of the soil, nor any underlying conditions present at the site, including, but not limited to, those arising out of improper compaction, use of improper soil or materials, or the presence of underlying harmful objects of any kind. This acceptance is based solely upon a visual inspection of the completed subgrade preparation.

This acceptance is based upon the present condition of the subgrade preparation and Northwest Linings accepts no responsibility for restoration of the subgrade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal or machinery. Neither does Northwest Linings accept responsibility for restoration of the subgrade preparation upon the occurrence of any Act of God, including, but not limited to, rain, wind, hail, snow, flood or earthquake.

Area Being Accepted: Cell 1 in its entirety

NORTHWEST LININGS REPRESENTATIVE:

Date: 08 03 01

Signature:

Name/Title: TROY JAY WOLD SUPERINTENDANT

OWNERS REPRESENTATIVE:

Date: 8-3-01

Company: HYDROMETRICS

Signature:

Name/Title: MARK W. RHODES QA/QC INSPECTOR

406 443-4150
SANTA HOST

TRIAL WELD FORM

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Ward
MATERIAL DESCRIPTION: 60mk HDPE

DATE: 8/02/01

SHEET ____ OF ____.

DATE/ TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS: BARREL TEMP	EXTRUSION WELDS: PREHEAT TEMP	EXTRUSION WELDS: PEEL / TENSILE	FUSION WELDS: WEDGE TEMP	FUSION WELDS: SET SPEED FT / MIN	FUSION WELDS: PEEL / TENSILE	PASS / FAIL	COMMENTS
08/02/01	CW	001	55°	sun	520°	300°	121 129 / 130 121				P	
8/02/01	J.O.H / JOHAN	001	65	" -	530	300	122 128 / 120 152				P	
8/13/01 630	VP	#201						750	85	110 112 / 130 134 129 115	P	177-176
8/14/01	VP	#201						750	80	117 115 / 124 137 122 109	P	176-173
8/13/01	KK	#1			530	300	114 132 / 125				P	156-163
8/14/01	KK	#1			530	300	112 118 / 130				P	162-159
8/15/01	KK	#1			530	300	119 124 / 127				P	164-161
8/15/01	VP	#201						750	85	107 101 / 122 108 109 121	P	163-169
8/15/01	MK	#6	80°	sun				760°	8.5	109 114 110 / 106 108 109	P	162-163
8/16/01	VP	#1			530	300	112-119 / 120				P	169-167
8/16/01	VP	#6								114 122 / 126 112 134 128	P	170-182
/ /												
/ /												
/ /												
/ /												

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
7-28	38-39 / 40		470'	XB	#201	750	Sunny	10-15	75	DT-10	
7-29	40-41		475'	Soup	#108	750	Cloudy	15-20	75	DT-11	
7-29	41-42		475'	XB	#201	750	"	"	"	DT-12	
7-29	42-43		475'	Soup	#108	750	"	"	"	DT-13	
7-29	43/44		475'	XB	#201	"	"	"	"	DT-14	
7-29	44-45		475'	XB	#201	"	"	"	"	DT-15	
8-01	45/46		475'	soup	#108	750°	sun	10-15		DT.16	
8-01	46/47		475'	xB	#201	750°	sun	10-15		DT.17	
8-01	47/48		475	soup	#108	750°	sun	10-15		DT.18	
8-02	48/49		48'	up	#108	750	sun	10-15			
8-02	49/50		36'	up	108	750°	sun	5-10			
8-02	50/51		33'	MK	"	750°	sun	5-10			
8-02	51/52		37'	MK	"	750°	sun	5-10			
8-02	52/53		63'	RJW	"	750°	sun	5-10			
8-02	53/54		64'	RJW	"	750°	sun	5-10			

PAGE 5 OF ____

PANEL SEAMING FORM

PROJECT NAME: PEARCO E. HECENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
8-3	54/55		63'	VP	108	750'	sun	10-15	80°	P	
8-3	55/56		64'	GW	6	750'	sun	10-15	80°	P	
8-3	56/57		64'	VP	108	750'	sun	15-20	80°	P	
8-3	57/58		64'	VP	108	750'	sun	15-20	90°	P	
8-3	58/59		64'	GW	6	750'	sun	15-20	90°	P	
8-3	59/60		64'	GW	6	750'	sun	15-20	90°	P	
8-3	60/61		64'	VP	108	750'	sun	20-25	95°	P	
8-3	61/62		64'	VP	108	750'	sun	20-25	95°	P	
8-3	62/63		64'	GW	6	750'	sun	20-25	90°	P	
8-3	63/64		64'	MK	6	750'	sun	20-25	90°	P	
8-4	64/65		64'	VP	108	750'	sun	5-10	70°	P	
8-4	65/66		64'	VP	108	750'	sun	5-10	70°	P	
8-4	66/67		64'	KC	6	750'	sun	5-10	70°	P	
8-4	67/68		64'	KC	6	750'	sun	5-10	70°	P	
8-4	68/[illegible]		64'	VP	108	750	sun	5-10	70°	P	

PAGE 6 OF ____

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

ATE/ IME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
-4	69/70		37'	MK	108	750°	cldy	S-10	80°	P	
8-4	70/71		38'	MK	108	750°	cldy	S-10	80°	P	
8-4	71/72		40'	MK	108	750°	cldy	S-10	080°	P	
8-4	72/73		48'	VP	6	750°	cldy	S-10	80°	P	
8-4	73/74		48'	VP	6	750	cldy	S-10	80°	P	
8-4	73/48		23'	VP	6	750°	cldy	S-10	80°	P	
8-4	74/47		23'	VP	6	750°	cldy	S-10	80°	P	

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JARVIS
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 08-01

SHEET 5 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8 13 101	R-72	P-45-46	1	KK	1X2' Patch Burn out	08-04	✓
8 13 101	R-73	P-46-47	"	"	1X1' Patch Burn out	08 04	✓
8 13 101	R-74	P-49-52	"	"	1X1' Patch Butt Seam Burn out	08 4	✓
8 13 101	R-75	P 49-50 -51-52	"	"	3X4' Patch Intersection	8-4	✓
8 13 101	R-76	P-45-46	1	VP	2X4' Patch Burn out/Pinhole	8-4	✓
8 13 101	R-77	P-46-47	1	VP	2X4 Patch Burn out/Pin hole	8-4	✓
8 13 101	R 78	P-47-48	1	VP	1X1 Patch Burn out	8-4	✓
8 13 101	R 79	P-47-48	1	VP	1X1 Patch Burn out	8-4	✓
8 14 101	R 80	P-46-47	1	KK	2X4 Patch DT #16	8-4	✓
8 14 101	R 81	P-47-74-46	1	KK	3X5' Patch Butt Seam	8-4	✓
8 14 101	R 82	P-46-74	1	KK	1X1 Patch Burn out	8-4	✓
8 14 101	R 83	P 73-74 47-48	1	KK	1X3' Patch Intersection	8-4	✓
8 14 101	R 84	P 72-73-69 -68-48	1	KK	5X6' Patch Intersection	8-4	✓
8 14 101	R 85	P 69-70-71 72	1	KK	7X5' Patch Intersection	8-4	✓
8 14 101	R 86	P-52-53	1	KK	3X3 Patch Burn out	8-4	✓
8 14 101	R 87	P-49-48-51-53	1	KK	2X5 Patch Intersection	8-4	✓

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Tray Tray Ward
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 08/14/01

SHEET 7 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8 14 101	R-88	P-53-54/48	#1	KK	1X2' Patch Butt Seam	8-4	✓
8 14 101	R 89	P-54-55/48	1	KK	1X1' Patch Butt Seam	8-4	✓
8 14 101	R 90	P-55-56/48	1	KK	1X1 Patch Butt Seam	8-4	✓
8 14 01	R 91	P-56-57/48	1	KK	1X1 Patch Butt Seam	8-4	✓
8 14 101	R 92	P-57-58/48	1	KK	1X1 Patch Butt Seam	8-5	✓
8 15 101	R 93	P-57-58	#1	KK	2X4' Patch Burn out	8-5	✓
8 15 101	R-94	P-54-55	1	KK	2X3 Patch Burn out	8-5	✓
8 15 101	R 95	P-60-59-60A	#1	KK	1X2' Patch Butt Seam	8-5	✓
8 15 101	R 96	P-60-60A-61	1	KK	1X1 Patch Butt Seam	8-5	✓
8 15 01	R 97	P-58-59	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R 98	P-59-60A	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R 99	P-61-60A	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R-100	P-61-62-48	1	"	1X1' Patch Butt Seam	8-5	✓
8 15 101	R 101	P-62-63-48	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R-102	P-62-63-63A	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R-103	P-63-48	1	"	2X4' Patch DT # 18	8-5	✓

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Wold
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 8/10/01

SHEET 3 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/1/01	R-33	P-22T/25T	#1	Soup	1X2' Patch Burn Out / Airtest		
8/1/01	34	P-25T-26T	#1	"	2X4' Patch DT #7		
8/1/01	35	P-26T/27T	#1	"	2X4 Patch DT #8		
8/1/01	36	P-27T/28T	#1	"	2X4 Patch DT #9		
8/1/01	37	P-28T-29T	#1	"	1X2' Patch Burn out		
8/1/01	38	P-28T-29T	#1	"	2X4' Patch DT #10		
8/1/01	39	P-29T-30T	#1	"	2X4' Patch DT #11		
8/1/01	40	P-30T-31T	#1	Soup	2X4' Patch DT #12		
8/2/01	41	P-16T-32-17T	#1	VP	3X2 Patch Butt Seam		
8/2/01	42	P-17T-32T-39T	#1	VP	2X4 Patch Butt Seam		
8/2/01	43	P-39T-32T-33T	#1	VP	1X1 Patch Butt Seam		
8/2/01	44	P-39-33-34T	#1	TJW	1X1 Patch Butt Seam		
8/2/01	45	P-39-34-35T	#1	"	1X1 Patch Butt Seam		
8/2/01	46	P-34-35T	#1	"	1X2 Patch Burn Out		
8/2/01	47	P-34-35T	#1	"	1X2 Patch Burn out		
8/2/01	48	P-39-35-36T	#1	"	1X1 Patch Butt Seam		

REPAIR REPORT

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jaywold
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 08/02/01

SHEET 4 OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/2/01	R-48	P-39-38-36 T	#1	TJW	1X1 Patch Butt Seam		
8/2/01	49	P-38-37-36 T	#1	"	1X1 Patch Butt Seam		
8/2/01	50	P38-37-37 A	#1	VP	7X8 Patches Add Liner		
8/2/01	51	P-39-40 T	#1	VP	1X2 Patch Burn out		
8/2/01	52	P39-40-18 T	#1	VP	1X1 Patch Butt Seam		
8/2/01	53	P-17-18-39 T	#1	VP	1X2 Patch Butt Seam		
8/2/01	54	P-18-19 / P-40-41	#1	VP	2X2 Patch Intersection		
8/2/01	55	P-18-19 T	#1	VP	1X1 Patch Air hole		
8/2/01	56	P-19-21 / P-41-42	#1	KK	2X3 Patch Intersection		
8/2/01	57	P-41-42	#1	"	2X4 Patch DT #13		
8/2/01	58	P-42-43-21	#1	"	1X2 Patch Butt Seam		
8/2/01	59	P-21-24-43	#1	"	1X2 Patch Butt Seam		
8/2/01	60	P-24-25-43	#1	"	2X2 Patch Butt Seam		
8/2/01	61	P-25-43-44	#1	"	1X1 Patch Butt Seam		
8/2/01	62	P-43-44	#1	"	1X1 Patch Seam Burn		
8/2/01	63	P-43-44	#1	"	1X1 Patch Burn out		

REPAIR REPORT

PROJECT NAME:
NWLG PROJECT #
NWLG SUPERINTENDANT:
MATERIAL DESCRIPTION:

T

DATE: / /

SHEET _____ OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8 12 01	R.63	P 25-26 44-45	#1	TJW	1X2 Patch Intersection		
8 12 01	64	P_44-45	#1	"	1X1 Patch Air hole		
8 12 01	65	P_44-45	#1	KK	2X4 Patch DT # 14		
8 12 01	66	P 26-27-45	#1	KK	2X2 Patch Butt Seam		
8 12 01	67	P_27-45-46	#1	"	1X1 Patch Butt Seam		
8 12 01	68	P 27-28 46-47	#1	"	3X4 Patch Intersection		
8 12 01	69	P-46-47	#1	"	2X4 Patch DT # 15		
8 12 01	70	P-47-48	#1	"	1X1 Patch Burn out		
8 12 01	71	P 28-29 47-48	#1	"	2X4 Patch Intersection		
8 12 01	72	P 29-30 48-49	#1	"	2X3 Patch Intersection		
8 12 01	73	P-48-49	#1	"	2X4 Patch DT # 16		
8 12 01	74	P 30-31-49	#1	"	1X1 Patch Butt Seam		
8 12 01	75	P_31-49-50	#1	"	1X1 Patch Butt Seam		
8 12 01	76	P_31-49-50	#1	"	1X1 Patch Butt Seam		
8 16 01	77	P_31-50-51	#1	VP	2X2' Patch Butt Seam		
8 16 01	78	P_31-50	1	VP	1X2' Patch Burn out		

REPAIR REPORT

PROJECT NAME:
NWLG PROJECT #
NWLG SUPERINTENDANT:
MATERIAL DESCRIPTION:

DATE: / /

SHEET _____ OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/16/01	R-79	P-51-52	1	VP	2x4' Patch DT # 17		
8/16/01	80	P-52-53	1	VP	2x7' Patch DT #18 and Burn out		
8/16/01	81	P-54-58-59	1	VP	2x2' Patch Butt Seam		
8/16/01	82	P-58-59-55	1	VP	1x2' Patch Butt Seam		
8/16/01	83	P-58-57-56	1	VP	1x1 Patch Butt Seam		
8/16/01	84	P-57-56-55	1	VP	1x3 Patch Butt Seam		
8/16/01	85	P-59-60-54	1	VP	1x1 Patch Butt Seam		
8/16/01	86	P-54-60-61	1		1x1 Patch Butt Seam		
8/16/01	87	P-53-54-61	1		1x2' Patch Butt Seam		
8/16/01	88	P-60-61	1		1x1 Patch Burn out		
8/16/01	89	P-61-62A-53	1		1x2' Patch Butt Seam		
8/16/01	90	P-61-62-62A	1		1x1 Patch Butt Seam		
8/16/01	91	P-62-62A-63	1		2x2' Patch Butt Seam		
8/16/01	92	P-62A-53-63	1		1x1' Patch Butt Seam		
8/16/01	93	P-63-64-64A	1		1x1 Patch Butt Seam		
8/16/01	94	P-64A-63-53	1		1x1 Patch Butt Seam		

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO ELLENA PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-3	45-46	VP	33	33	0	1140	1145	P	P	
8-3	46-47	VP	34	34	0	1140	1145	P	P	
8-3	47-48	VP	32	30	2	1140	1145	P	P	
8-3	48-49	VP	32	32	0	1140	1145	P	P	
8-3	49-52	VP	35	34	1	1148	1153	P	P	Butt
8-3	49-50	VP	34	34	0	1148	1153	P	P	
8-3	50-51	VP	33	31	2	1148	1153	P	P	Butt
8-3	51-52	VP	35	33	2	1148	1153	P	P	
8-3	45-46	VP	32	31	1	1:05	1:10	P	P	
8-3	45-46	VP	30	30	0	1:05	1:10	P	P	
8-3	46-47	VP	31	31	0	1:05	1:10	P	P	
8-3	46-47	VP	32	32	0	1:10	1:15	P	P	
8-3	47-48	VP	30	30	0	1:10	1:15	P	P	
8-3	47-48	VP	30	30	0	1:10	1:15	P	P	
8-4	46-74	VP	33	32	1	1057	1102	P	P	
8-4	74-73	VP	31	31	0	1055	11:00	P	P	
8-4	74-47	VP	34	33	1	1055	11:00	P	P	Butt
8-4	73-48	VP	30	30	0	1055	11:00	P	P	Butt
8-4	67-68	VP	31	31	0	1105	1110	P	P	
8-4	68-48	VP	35	34	1	1105	1110	P	P	Butt
8-4	67-48	VP	31	31	0	1105	1110	P	P	
8-4	72-73	VP	31	31	0	1112	1117	P	P	
8-4	[illegible]-72	VP	30	30	0	1112	1117	P	P	
8-4	[illegible]-71	VP	30	28	0	1112	1117	P	P	

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-4	69-72	VP	32	32	0	1112	1117	P	P	Butt
8-4	69-70	VP	31	30	1	1112	1117	P	P	
8-4	66-67	VP	32	32	0	1148	1153	P	P	
8-4	66-48	VP	30	30	0	1148	1153	P	P	Butt
8-4	66-65	VP	30	29	1	1148	1153	P	P	
8-4	65-48	VP	30	29	1	1148	1153	P	P	Butt
8-4	64-65	VP	35	34	1	11:55	12:00	P	P	
8-4	64-48	VP	32	32	0	1155	12:00	P	P	Butt
8-4	63-48	VP	31	31	0	1155	12:00	P	P	Butt
8-4	52-53A	VP	31	31	0	1:10	1:15	P	P	
8-4	52-53B	VP	30	30	0	1:10	1:15	P	P	
8-4	53-48	VP	34	34	0	1:10	1:15	P	P	Butt
8-4	53-54	VP	35	35	0	1:20	1:25	P	P	
8-4	54-48	VP	30	30	0	1:55	2:00	P	P	Butt
8-4	54-55	VP	32	32	0	1:55	2:00	P	P	
8-4	55-48	VP	31	30	1	1:55	2:00	P	P	Butt
8-4	55-56	VP	34	32	2	1:56	2:01	P	P	[redacted]
8-4	56-48	VP	32	31	1	1:56	2:01	P	P	Butt
8-4	57-48	VP	31	30	1	1:56	2:01	P	P	Butt
8-4	57-56	VP	30	29	1	2:03	2:08	P	P	
8-4	57-58	VP	35	35	0	2:03	2:08	P	P	
8-4	58-48	VP	33	33	0	2:03	2:08	P	P	Butt
8-4	58-59	VP	34	33	1	2:05	2:10	P	P	
8-4	59-48	VP	32	32	0	2:05	2:10	P	P	Butt

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-4	59-60	VD	31	31	0	2:05	210	P	P	
8-4	60-48	VD	35	35	0	2:13	218	P	P	Butt
8-4	60-48	VD	32	32	0	2:13	218	P	P	Butt
8-4	60-61	VD	34	33	1	2:13	218	P	P	
8-4	60-61	VD	32	32	0	2:13	2:18	P	P	
8-4	61-62	VD	33	30	3	2:13	2:18	P	P	
8-4	62-48	VD	32	32	0	220	223	P	P	Butt
8-4										

NON DESTRUCTIVE TESTING FORM

PAGE 3 OF ___

PROJECT NAME: _____ T PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	+/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-01	23-25	VP	33	32	1	1:10	1:15	P	P	
8-01	22-25	VP	34	34	0	1:10	1:15	P	P	
8-01	22-25	VP	31	30	1	1:12	1:17	P	P	
8-01	22-25	VP	32	32	0	1:12	1:17	P	P	
8-01	28-29	VP	34	32	3	1:13	1:18	P	P	
8-1	29-30	VP	35	35	0	210	215	P	P	
8-1	30-31	VP	33	33	0	210	215	P	P	
8-2	50-49	VP	35	35	0	610	615	P	P	
8-2	49-48	VP	34	34	0	610	615	P	P	
8-2	48-47	VP	35	34	1	610	615	P	P	
8-2	47-46	VP	35	35	0	610	615	P	P	
8-2	46-45	VP	35	35	0	610	615	P	P	
8-2	45-44	VP	30	29	1	628	633	P	P	
8-2	44-43	VP	32	32	0	628	633	P	P	
8-2	42-41	VP	33	33	0	630	635	P	P	
8-2	41-40	VP	30	30	0	630	635	P	P	
8-2	40-39	VP	35	35	0	630	635	P	P	
8-2	44-43	VP	30	30	0	637	642	P	P	
8-2	43-42	VP	35	35	0	637	642	P	P	
8-2	16-32	VP	33	33	0	655	700	P	P	
8-2	17-32	VP	32	32	0	655	700	P	P	Butt
8-2	32-33	VP	34	32	2	655	700	P	P	
8-2	32-33	VP	34	34	0	655	700	P	P	Butt
8-2	33-34	VP	30	30	0	656	701	P	P	

NON DESTRUCTIVE TESTING FORM

PAGE _____ OF ____

PROJECT NAME: _____ (T) PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-2	39-34	VP	32	32	0	656	701	P		Butt
8-2	34-35	VP	32	32	0	656	701	P		
8-2	34-35	VP	30	30	0	710	715	P		
8-2	39-35	VP	35	35	0	710	715	P		Butt
8-2	35-36	VP	30	28	2	710	715	P		
8-2	39-36	VP	30	30	0	710	715	P		Butt
8-2	36-37	VP	30	29	1	711	716	P		
8-2	37-38	VP	30	30	0	711	716	P		Butt
8-2	38-39	VP	30	30	0	711	716	P		
8-2	31-50	VP	30	30	0	812	817	P		Butt
8-2	30-49	VP	32	30	2	812	817	P		"
8-2	29-48	VP	34	34	0	813	818	P		"
8-2	28-47	VP	30	29	1	813	818	P		"
8-2	27-46	VP	33	33	0	814	819	P		"
8-2	26-45	VP	32	32	0	823	828	P		"
8-2	25-44	VP	30	30	0	823	828	P		"
8-2	24-43	VP	32	30	2	824	829	P		"
8-2	21-42	VP	30	30	0	825	830	P		"
8-2	19-41	VP	30	29	1	825	830	P		"
8-2	18-40	VP	34	34	0	835	840	P		Butt
8-2	17-39	VP	33	33	0	835	840	P		Butt
8-6	59-54	VP	35	34	1	7:00	7:05	P		
8-6	59-58	VP	34	34	0	7:00	7:05	P		
8-6	5[illegible]8	VP	32	30	2	7:00	7:05	[illegible]		

NON DESTRUCTIVE TESTING FORM

PAGE _____ OF ____

PROJECT NAME: _____ PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	+/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-6	58-55	VP	30	30	0	7:00	7:05	P		Butt
8-6	57-55	VP	35	35	0	7:01	7:06	P		Butt
8-6	55-56	VP	30	30	0	7:01	7:06	P		
8-6	57-56	VP	32	31	1	7:01	7:06	P		Butt
8-6	54-55	VP	33	33	0	7:01	7:06	P		
8-6	53-54	VP	32	30	2	7:20	725	P		
8-6	53-52	VP	32	32	0	7:20	725	P		
8-6	51-50	VP	33	32	0	7:20	7:25	P		
8-6	50-51	VP	32	30	0	730	7:35	P		
8-6	50-51	VP	31	31	0	730	7:35	P		
8-6	51-52	VP	34	32	2	731	7:36	P		
8-6	52-53	VP	34	~~32~~	2	732	7:37	P		
8-6	59-60	VP	33	33	0	1:30	1:35	P		
8-6	60-61	VP	32	31	1	1:30	1:35	P		
8-6	60-54	VP	32	30	2	1:30	1:35	P		Butt
8-6	54-61	VP	31	30	1	1:30	1:35	P		Butt
8-6	53-61	VP	30	30	1	1:30	1:35	P		Butt
8-6	61-62	VP	35	34	1	1:37	1:42	P		
8-6	53-62	VP	32	30	2	1:37	1:42	P		Butt
8-6	62-63	VP	34	34	0	1:37	1:42	P		
8-6	63-62	VP	34	33	1	1:37	1:42	P		~~Butt~~
8-6	63-53	VP	33	33	0	1:45	150	P		Butt
8-6	63-64	VP	33	33	0	1:45	1:50	P		
8-6	64-53	VP	34	34	0	1:45	1:50	P		Butt

Northwest L ngs & Geotextile Products, Inc.

DESTRU TIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA

NWLG PROJECT # 010404

NWLG SUPERINTENDANT: TROY JAY WOLD

MATERIAL DESCRIPTION: 60 mil HDPE

DATE 08/01/01

SHEET 3 OF ____

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	TENSILE VALUE LBS / IN	PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
7 13001	DT-13	42/43	#3096	VP	1	127	128	P	212	P	
					2	130	147	P	207	P	
					3	143	147	P	211	P	
					4	114	135	P	206	P	
					5	128	132	P	208	P	
7 13081	DT-14	43/44	"	"	1	108	108	P	209	P	
					2	125	110	P	197	P	
					3	109	118	P	203	P	
					4	124	109	P	205	P	
					5	113	118	P	209	P	
7 13081	DT-15	44/45	"	"	1	130	153	P	197	P	
					2	139	157	P	198	P	
					3	134	138	P	202	P	
					4	139	136	P	196	P	
					5	136	137	P	197	P	
8 15 01	DT-16	46/47	3096	"	1	115	126	P	209	P	
					2	114	127	P	211	P	
					3	121	116	P	218	P	
					4	120	112	P	195	P	
					5	112	117	P	206	P	
8 15 01	DT-17	67/68	"	"	1	123	115	P	208	P	
					2	121	126	P	212	P	
					3	123	117	P	199	P	
					4	121	112	P	217	P	
					5	124	104	P	203	P	
8 15 01	DT-18	48/63	"	"	1	127	120	P	191	P	
					2	118	121	P	190	P	
					3	114	127	P	202	P	
					4	131	134	P	189	P	
					5	123	135	P	192	P	

Northwest Linings & Geotextile Products, Inc.

DESTRUCTIVE TEST LOG

T

PROJECT NAME:

NWLG PROJECT #

NWLG SUPERINTENDANT:

MATERIAL DESCRIPTION:

DATE: / /

SHEET ____ OF ____.

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
8 12 01	DT#13T	41T / 42T	#3096	VP	1	126	121	P	180	P	
					2	103	110	P	179	P	
					3	126	136	P	172	P	
					4	117	113	P	167	P	
					5	114	117	P	174	P	
8 12 01	DT#14T	44T / 45T	"	"	1	127	124	P	179	P	
					2	115	120	P	180	P	
					3	110	114	P	183	P	
					4	126	117	P	176	P	
					5	128	112	P	174	P	
8 12 01	DT#15T	46T / 47T	"	"	1	109	127	P	173	P	
					2	118	129	P	169	P	
					3	133	117	P	174	P	
					4	105	116	P	171	P	
					5	124	128	P	178	P	
8 12 01	DT#16T	48T / 49T	"	VP	1	113	126	P	172	P	
					2	114	129	P	177	P	
					3	122	114	P	174	P	
					4	117	133	P	166	P	
					5	124	110	P	181	P	
8 16 01	DT#17T	51T / 52T	3096	VP	1	126	118	P	170	P	
					2	121	128	P	168	P	
					3	126	126	P	168	P	
					4	133	119	P	172	P	
					5	124	119	P	174	P	
8 16 01	DT#18T	52T / 53T	"	VP	1	124	139	P	177	P	
					2	113	121	P	180	P	
					3	126	132	P	169	P	
					4	118	124	P	172	P	
					5	132	121	P	176	P	

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 02 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative: MARK RHODES

I, the undersigned duly authorized representative of: HYDROMETRICS/ENVIROCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions~~: PNLS 1-SOT

Authorized Representative: MARK RHODES

Name	Signature	Title	Date
MARK W. RHODES	[signature]	QA/QC INSPECTOR	8-2-01

Northwest Linings Representative:

Name	Signature	Title	Date
TROY JAYWOLD	[signature]	SUPERINTENDANT	08 02 01

ENVIROCON REPRESENTATIVE

NAME	SIGNATURE	TITLE	DATE
[illegible]	[signature]	QA/QC	08/02/01

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 05 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative: MARK RHODES

I, the undersigned duly authorized representative of: HYDROMETRICS

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions:~~ ENTIRE [illegible] SECONDARY 60 mil LINER

Authorized Representative: MARK RHODES

[illegible] [illegible] [illegible] [illegible] 8-5-01

Name Signature Title Date

Northwest Linings Representative:

TROY THYMAN [signature] SUPERINTENDANT 08-05-01

Name Signature Title Date

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 06 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative:

Authorized Representative: DOUG TISDELL

I, the undersigned duly authorized representative of: ENVIROCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions~~: Panels 1-53 are complete - to install SSY 278 in the near future to complete the cell

Authorized Representative: DOUG TISDELL

Name	Signature	Title	Date
[illegible]	[signature]	OA/QC	08-06-01

Northwest Linings Representative:

Name	Signature	Title	Date
[illegible]	[signature]	SUPERINTENDANT	080601

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655, Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell
SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell

To: Hydrometrics, Inc.

Date: August 16, 2001

Attn: Dale Wells, Mark Rhodes

Phone: (406) 443 - 4150

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS

☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	623	Northwest Linings Daily Submittals

Enclosed Northwest Linings production data for the following dates:

Soil Subgrade Surface Acceptance	08/03/01 – Cell 1 Total Subgrade Acceptance
Panel Layout Diagrams	07/25/01 through 08/15/01
Trial Weld Form	07/25/01 through 08/15/01
Panel Placement Form	07/25/01 through 08/15/01
Panel Seaming Form	07/25/01 through 08/15/01
Repair Report	07/25/01 through 08/15/01
Non Destructive Testing Form	07/25/01 through 08/15/01
Destructive Test Log	07/25/01 through 08/15/01
Certificate of Acceptance	07/25/01 through 08/15/01

Northwest Linings Material Installation Summary

Note: Material summary is based on material inventory, and does not reflect billable yardage.

Material:	60 mil. HDPE Geomembrane	200 mil. Geonet	Geotextile Fabric
Approximate Quantity Installed on 08/15/01	2,300.83 sq. yd.	4,199.94 sq. yd.	5,000.0 sq. yd.
Approximate Quantity Installed to Date	50,446.46 sq. yd.	49,932.62 sq. yd.	28,000.0 sq. yd.

Signed: Douglas G. Tisdell Date:_____

QC Manager

A Washington Company

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc.

21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE

PROJECT: ASARCO

LINER TYPE/QTY: 60mil HDPE

OWNER: ASARCO

LOCATION: E. HELENA

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

Northwest Linings & Geotextile Products, Inc. accepts no responsibility for the composition or character of the soil, nor any underlying conditions present at the site, including, but not limited to, those arising out of improper compaction, use of improper soil or materials, or the presence of underlying harmful objects of any kind. This acceptance is based solely upon a visual inspection of the completed subgrade preparation.

This acceptance is based upon the present condition of the subgrade preparation and Northwest Linings accepts no responsibility for restoration of the subgrade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal or machinery. Neither does Northwest Linings accept responsibility for restoration of the subgrade preparation upon the occurrence of any Act of God, including, but not limited to, rain, wind, hail, snow, flood or earthquake.

Area Being Accepted: Cell 1 in its entirety

NORTHWEST LININGS REPRESENTATIVE:

Date: 08.03.01

Signature:

Name/Title: TROY JAY WOLD Superintendant

OWNERS REPRESENTATIVE:

Date: 8-3-01

Company: HYDROMETRICS

Signature:

Name/Title: MARK W. RHODES QA/QC INSPECTOR

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc.

21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE

PROJECT: ASARCO

LINER TYPE/QTY: 60 MIL HDPE

OWNER: ASARCO

LOCATION: E. HELENA

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

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This acceptance is based upon the present condition of the subgrade preparation and Northwest Linings accepts no responsibility for restoration of the subgrade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal or machinery. Neither does Northwest Linings accept responsibility for restoration of the subgrade preparation upon the occurrence of any Act of God, including, but not limited to, rain, wind, hail, snow, flood or earthquake.

Area Being Accepted: ½ of ENTIRE EAST SIDE of Cell + 96'

NORTHWEST LININGS REPRESENTATIVE:

Date: 07 28 01

Signature: [signature]

Name/Title: Tim Jay Wolf

OWNERS REPRESENTATIVE:

Date: 7-28-01

Company: HYDROMETRICS

Signature: Mark W. Rhodes

Name/Title: MARK W. RHODES QA/QC INSPECTOR

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc.

21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE

PROJECT: ASARCO E. HELENA

LINER TYPE/QTY: 60 MIL HDPE

OWNER: ASARCO

LOCATION: E. HELENA

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

Northwest Linings & Geotextile Products, Inc. accepts no responsibility for the composition or character of the soil, nor any underlying conditions present at the site, including, but not limited to, those arising out of improper compaction, use of improper soil or materials, or the presence of underlying harmful objects of any kind. This acceptance is based solely upon a visual inspection of the completed subgrade preparation.

This acceptance is based upon the present condition of the subgrade preparation and Northwest Linings accepts no responsibility for restoration of the subgrade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal or machinery. Neither does Northwest Linings accept responsibility for restoration of the subgrade preparation upon the occurrence of any Act of God, including, but not limited to, rain, wind, hail, snow, flood or earthquake.

Area Being Accepted: EAST SIDE OUT 157' from TOE of EAST SLOPE NORTH 75' NOT READY. on N SIDE

NORTHWEST LININGS REPRESENTATIVE:

Date: 07-26-01

Signature:

Name/Title: TROY JAYNES SUPERINTENDANT

OWNERS REPRESENTATIVE:

Date: 7-26-01

Company: HYDROMETRICS

Signature: Mark W. Rhodes

Name/Title: MARK W. RHODES QA/QC INSPECTOR

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc.

21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE

PROJECT: ASARCO E. HELENA RCRA LANDFILL CELL 1

LINER TYPE/QTY: 60 MIL HDPE

OWNER: ASARCO

LOCATION: E. HELENA

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

Northwest Linings & Geotextile Products, Inc. accepts no responsibility for the composition or character of the soil, nor any underlying conditions present at the site, including, but not limited to, those arising out of improper compaction, use of improper soil or materials, or the presence of underlying harmful objects of any kind. This acceptance is based solely upon a visual inspection of the completed subgrade preparation.

This acceptance is based upon the present condition of the subgrade preparation and Northwest Linings accepts no responsibility for restoration of the subgrade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal or machinery. Neither does Northwest Linings accept responsibility for restoration of the subgrade preparation upon the occurrence of any Act of God, including, but not limited to, rain, wind, hail, snow, flood or earthquake.

Area Being Accepted: E. SLOPE OUT ~~70~~' 75' OUT from NORTH SLOPE NOT READY panels 1-9

NORTHWEST LININGS REPRESENTATIVE:

Date: 07.25.01

Signature: [signature]

Name/Title: TROY JAY WOLD SUPERINTENDANT

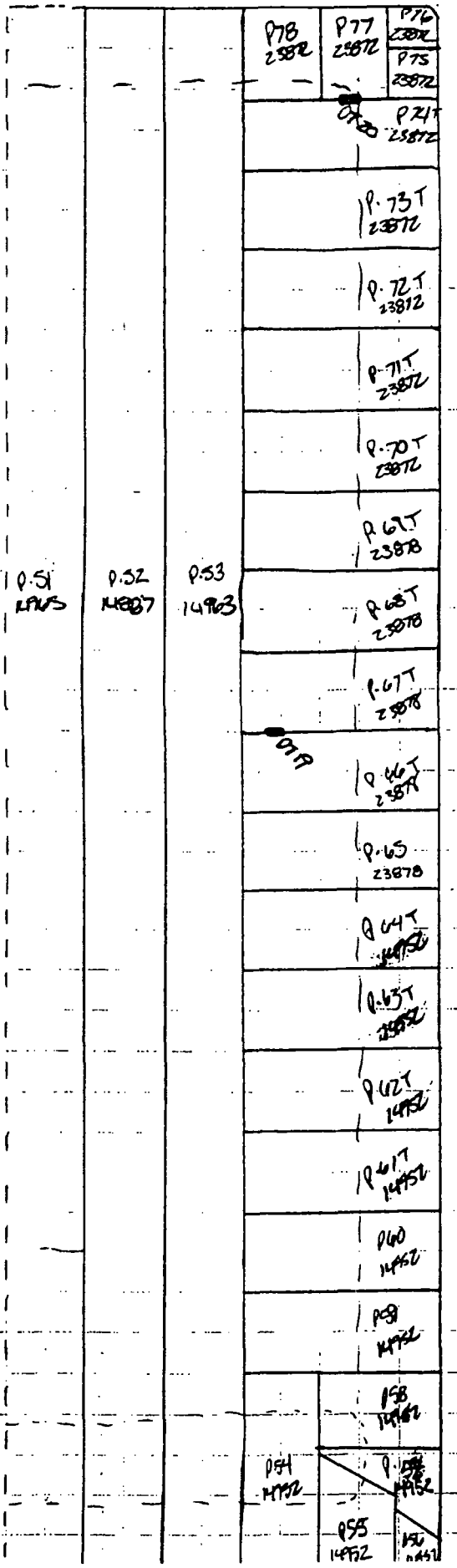
OWNERS REPRESENTATIVE:

Date: 7-25-01

Company: HYDROMETRICS

Signature: Mark W. Rhodes

Name/Title: Mark Rhodes QA/QC Inspector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P74T 23872
P73T 23872
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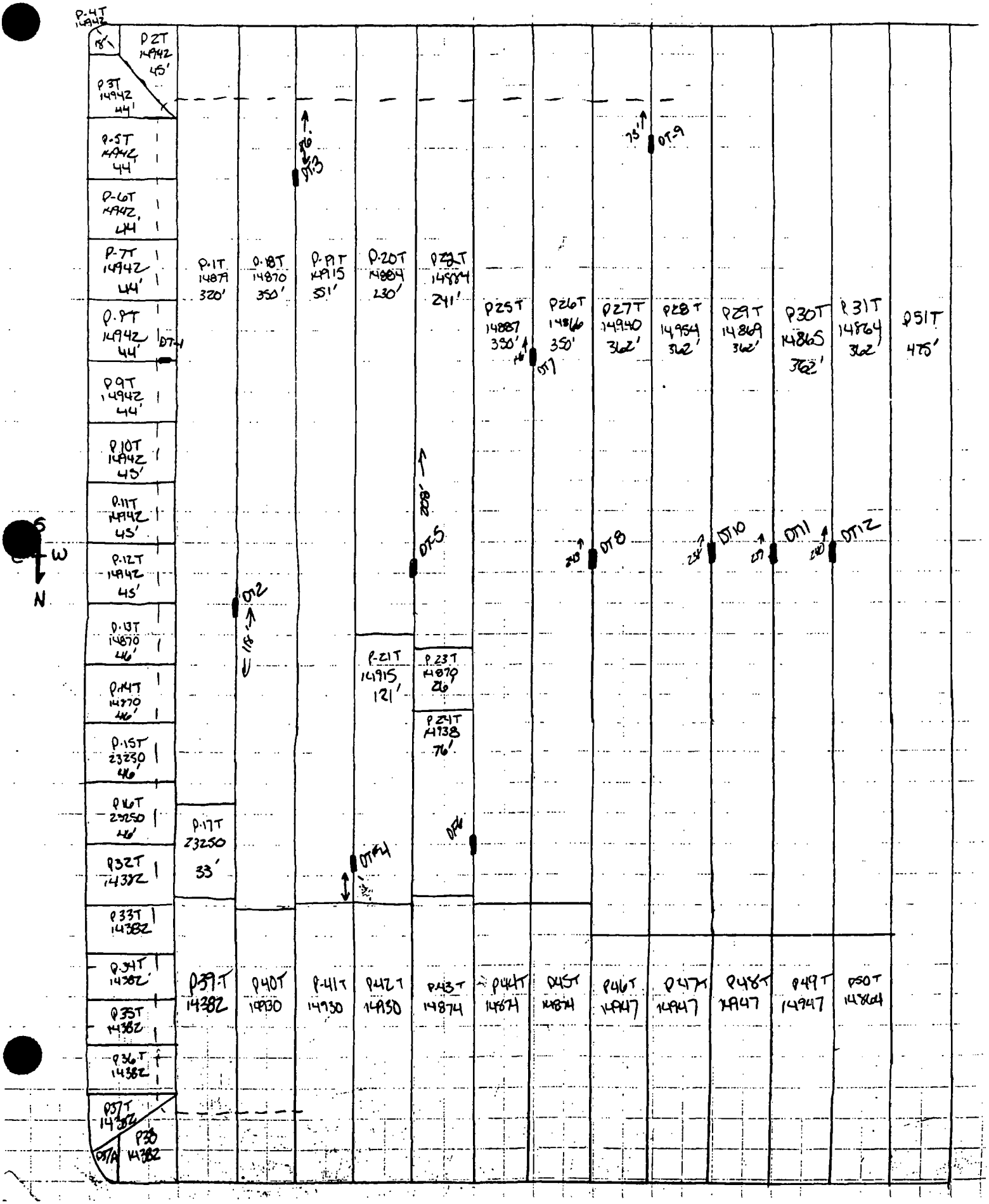
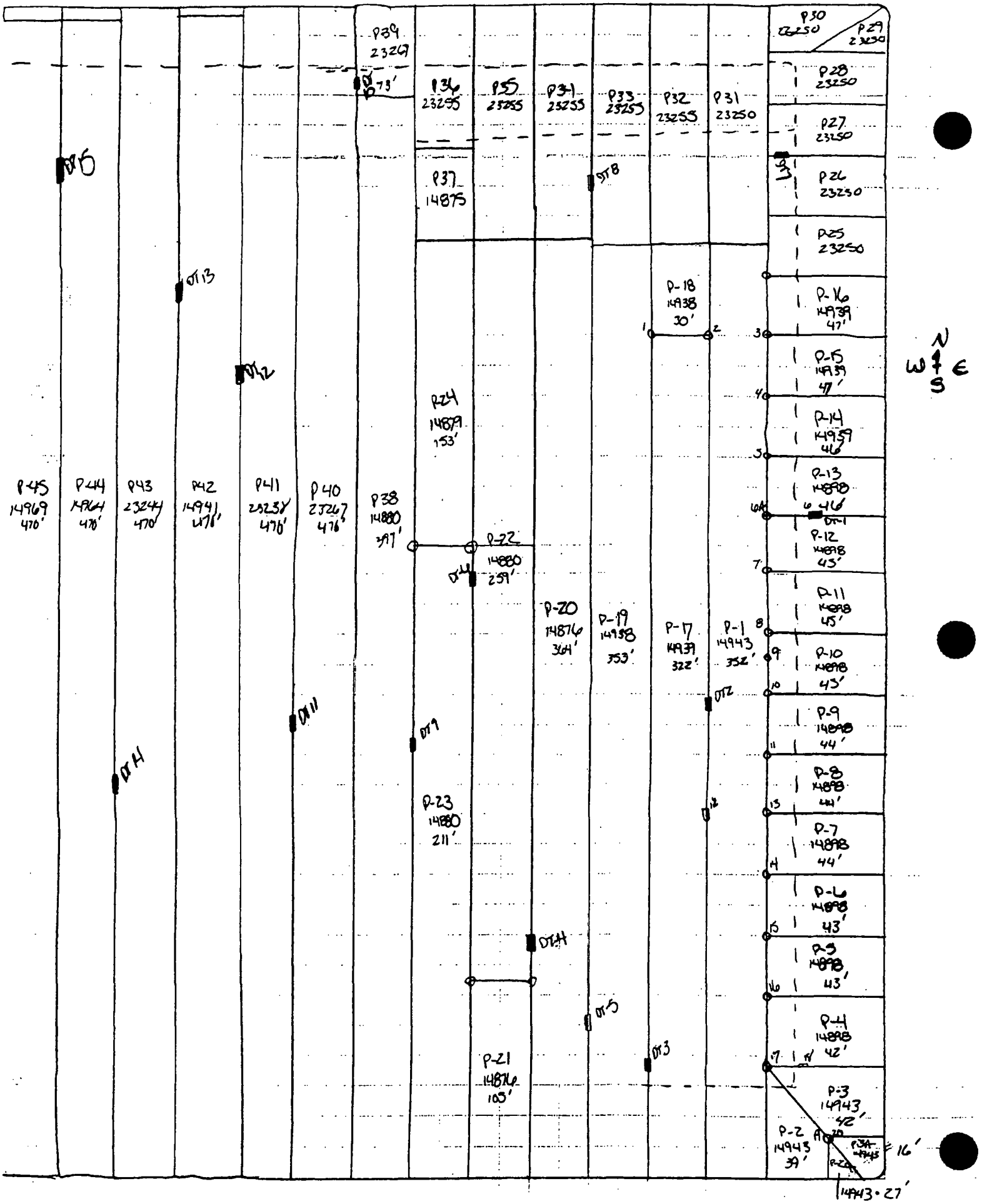
P51 14965
P52 14887
P53 14963

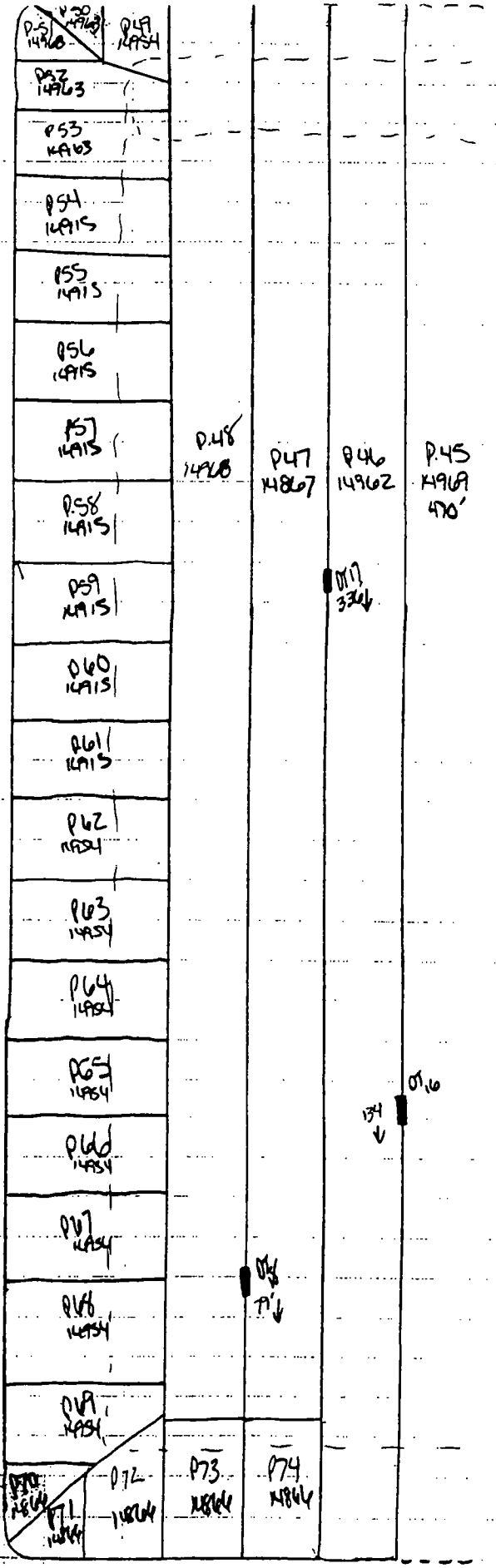


P-4T 14942
18'
P2T 14942 45'
P3T 14942 44'
P-5T 14942 44'
P-6T 14942 44'
P-7T 14942 44'
P-8T 14942 44'
DT-1
P9T 14942 44'
P10T 14942 45'
P-11T 14942 45'
P-12T 14942 45'
P-13T 14870 46'
P-14T 14870 46'
P-15T 23250 46'
P16T 23250 46'
P32T 14382
P33T 14382
P-34T 14382
P35T 14382
P36T 14382
P37T 14382
P38 14382
DT/A
P-1T 14879 320'
P-18T 14870 350'
P-19T 14915 351'
P-20T 14884 230'
P22T 14884 241'
P25T 14887 350'
P26T 14866 350'
P27T 14940 362'
P28T 14954 362'
P29T 14869 362'
P30T 14865 362'
P31T 14864 362'
P51T 475'
P-17T 23250 33'
P-21T 14915 121'
P23T 14879 26'
P24T 14938 76'
P39T 14382
P40T 14930
P-41T 14930
P42T 14930
P43T 14874
P44T 14874
P45T 14874
P46T 14947
P47T 14947
P48T 14947
P49T 14947
P50T 14864
DT-3
DT-9
DT-5
DT-7
DT-8
DT-10
DT-11
DT-12
DT-2
DT-4
DT-6
208'
18'
73'
S
W
N



P30 23250
P29 23250
P28 23250
P27 23250
P26 23250
P25 23250
P-16 14939 47'
P-15 14939 47'
P-14 14939 46'
P-13 14898 46'
P-12 14898 45'
P-11 14898 45'
P-10 14898 45'
P-9 14898 44'
P-8 14898 44'
P-7 14898 44'
P-6 14898 43'
P-5 14898 43'
P-4 14898 42'
P-3 14943 42'
P-2 14943 39'
P-1 14943 352'
P-17 14939 322'
P-18 14938 30'
P-19 14938 353'
P-20 14876 364'
P-21 14876 105'
P-22 14880 259'
P-23 14880 211'
P-24 14879 153'
P-25 14880 397'
P-26 14880 397'
P-27 14880 397'
P-28 14880 397'
P-29 14880 397'
P-30 14880 397'
P-31 23250
P-32 23255
P-33 23255
P-34 23255
P-35 23255
P-36 23255
P-37 14875
P-38 14880 397'
P-39 23267
P-40 23267 476'
P-41 23238 476'
P-42 14941 476'
P-43 23244 470'
P-44 14964 470'
P-45 14969 470'
DT-1
DT-2
DT-3
DT-4
DT-5
DT-6
DT-7
DT-8
DT-9
DT-10
DT-11
DT-12
DT-13
DT-14
DT-15
N
W
E
S
16'
14943 · 27'

ASARCO
E. HELENA



TRIAL WELD FORM

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT #
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 07/25/01

SHEET 1 OF

DATE/ TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS			FUSION WELDS			PASS / FAIL	COMMENTS
					BARREL TEMP	PREHEAT TEMP	PEEL / TENSILE	WEDGE TEMP	SET SPEED FT / MIN	PEEL / TENSILE		
07 25 01 9:45	Soup	#108		SN				750	7.5	118 115 120 120 117 119	P	161-156
07 25 01 9:50	XB	#201		"				750	7.5	125 118 132 129 121 128	P	150-145
07 25 01 12:55	XB	#201		"				"	"	135 129 132 130 123 126	P	165 165
7 25 01 1:00 PM	Soup	#108		"				750	7.5	123 121 121 147 120 139	P	159-160
7 25 01 2:50 PM	Soup	XT#1			520	320	104-113 113				P	172-165
7 26 01 10:45	XB	201						750	7.5	119 118 120 118 117 120	P	152-155
7 26 01 10:50	Soup	#108						750	7.5	129 132 132 132 129 129	P	176-153
7 26 01 1:00	XB	201						750	7.5	135 138 137 138 135	P	150-158
7 26 01 1:20	Kham	XT#1			520	320	117-120 121				P	143-145
7 26 01 1:25	Soup	#108						750	7.5	119 118 120 125 120 119	P	161-170
7 27 01 8:00 AM	XB	#201						750	7.5	128 132 125 136 131 130	P	171-172
7 27 01 8:10 AM	Soup	#108		Sunny				750	7.5	124 107 109 123 116	P	180-189
7 27 01 11:00 AM	Soup	#XT-1		"	520	320	104-107 104				P	145-149
7 27 01 12:55 PM	Soup	#XT=1		"	520	320	106-108 108				P	139-138
/ /												

TRIAL WELD FORM

PROJECT NAME: ASARCO G. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Ray Jay WOLD
MATERIAL DESCRIPTION: 160 MIL HDPE

DATE 7 12801

SHEET ____ OF ____

DATE/ TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS			FUSION WELDS			PASS / FAIL	COMMENTS
					BARREL TEMP	PREHEAT TEMP	PEEL / TENSILE	WEDGE TEMP	SET SPEED FT / MIN	PEEL / TENSILE		
~~7 12801 6:45 AM~~	~~Soup~~	~~#108~~						~~750~~	~~7.5~~			
7 12801 6:45	Soup	108						750	7.5	135 131 136 127 137 136	P	173-171
7 12801 7:00 AM	XB	#201						750	75	140 136 136 135 136 153	P	188-187
7 12801 12:45	XB	# 201						750	75	118 115 120 114 129 108	P	161-163
7 12801 1:00 PM	Khan	Xt ± 1			520	320	114-128 109				P	156-159
7 12901 6:45	Soup	# 1			520	320	113-120 117				P	173-168
7 12901 6:20 AM	Soup	#108						750	7.5	118 131 114 132 124 129	P	176-177
7 12901 6:30	XB	#201						750	75	119 124 125 126 118 136		181-180
7 12901 1:00	Soup	108						750	75	110 109 107 115 112 103	P	160-163
7 12901 1:10 PM	XB	201						750	7.5	114 103 114 125 119 120	P	165-169
8 1 01 6:30 AM	XB	201	Sunny					750	75	136 141 126 132 135 126	P	172-174
8 1 01 9:30 AM	Soup	108	"					750	7.5	139 135 130 131 129 122	P	189-181
1 1 12:30 PM	"	108						750	75	124 126 122 128 128 131		165-165
1 1	XB	201						750	75	130 126 130 131 125 135		172-165
8 1 01 2:00	Soup	# 1			520	320	119-121 114				P	166-163

8/2/001 KHAN # 1 138 140 126 750 176 158 P

406 443-4150
SANTA MOST

TRIAL WELD FORM

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jaywood
MATERIAL DESCRIPTION: 60mk HDPE

DATE: 8/02/01

SHEET ____ OF ____

DATE/ TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS: BARREL TEMP	EXTRUSION WELDS: PREHEAT TEMP	EXTRUSION WELDS: PEEL / TENSILE	FUSION WELDS: WEDGE TEMP	FUSION WELDS: SET SPEED FT / MIN	FUSION WELDS: PEEL / TENSILE	PASS / FAIL	COMMENTS
08102101	BW	001	55°	Sun	520°	300°	121 129 119 / 126 130 127				P	
8102101	1.0H JOHAN	001	65	"	530	300	122 126 / 120 152				P	
8 13 101 630	VP	#201						750	8.5	110 112 / 130 134 129 / 115	P	177-176
8 14 101	VP	#201						750	8.0	117 115 / 124 137 128 / 109	P	176-173
8 13 101	KK	#1			530	300	114 132 / 125				P	156-163
8 14 101	KK	#1			530	300	112 118 / 130				P	162-159
8 15 101	KK	#1			530	300	119 124 / 117				P	164-161
8 15 101	VP	#201						750	8.5	107 101 / 122 108 109 / 121	P	163-169
8 15 101	MK	#6	80°	Sun				760°	8.5	109 114 118 / 106 108 109	P	162-163
8 16 101	VP	#1			530	300	112-119 / 120				P	169-167
8 16 101	VP	#6								111 132 / 126 112 134 / 128	P	170-182
8 115101	XB	6	80°	Sun				780°	8.5	120 127 / 124 120 121 / 129	P	180-183
8 115101	CC	001	90°	Sun	520°	300°	119 / 118 117				P	170-171
/ /												
/ /												

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 07/26 01
SHEET 1 OF 6

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS / PANEL LOCATION
07 /26/01	1T	14879	320'	23'	
07 /26/01	2T	14942	43'	23'	
07 /26/01	3T	14942	42'	23'	
07 /26/01	4T	14942	16'	23'	
07 /26/01	5T	14942	43'	23'	
07 /26/01	6T	14942	43'	23'	
07 /26/01	7T	14942	43'	23'	
07 /26/01	8T	14942	44'	23'	
07 /26/01	9T	14942	44'	23'	
07 /26/01	10T	14942	44'	23'	
07 /26/01	11T	14942	44'	23'	
07 /26/01	12T	14942	45'	23'	
07 /27/01	13T	14870	45'	23'	
07 /27/01	14T	23250	45'	23'	
07/27/01	15T	23250	46'	25'	

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WARD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 07/27/01
SHEET 2 OF 6

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS / PANEL LOCATION
07/27/01	16T	23250	46'	23'	
07/27/01	17T	23250	33'	23'	
07/27/01	18T	14870	350'	23'	
07/27/01	19T	14915	351'	23'	
07/27/01	20T	14884	230'	23'	
07/27/01	21T	14915	121'	23'	
07/27/01	22T	14884	241'	23'	
07/27/01	23T	14870	26'	23'	
07/27/01	24T	14938	76'	23'	
08/01/01	25T	14887	350'	23'	
08/01/01	26T	14866	350'	23'	
08/01/01	27T	14940	362'	23'	
08/01/01	28T	14954	362'	23'	
08/01/01	29T	14869	362'	23'	
08/01/01	30T	14865	362'	23'	

PANEL PLACEMENT FORM

3 of 6

PROJECT NAME: ASARCO E. HELENA (T) PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 MIL HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
08.01.01	31T	14864	362'	23'	
08 01 01	32T	14382	49'	23'	
08 01 01	33T	14382	49'	23'	
08 01 01	34T	14382	49'	23'	
08 01 01	35T	14382	49'	23'	
08 01 01	36T	14382	49'	23'	
08 01 01	37T	14382	49'	23'	
08 01 01	38T	14382	49'	23'	
08 01 01	39T	14382	145'	23'	
08 01 01	40T	14930	115'	23'	
08 01 01	41T	14930	115'	23'	
08 01 01	42T	14930	115'	23'	
08 01 01	43T	14874	115'	23'	

PANEL PLACEMENT FORM

446

PROJECT NAME: ASARCO E. HELENA (T) PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
08 01 01	44 T	14874	115'	23'	
08 01 01	45 T	14874	115'	23'	
08 01 01	46T	14947	115'	23'	
08 01 01	47 T	14947	115'	23'	
08 01 01	48T	14947	115'	23'	
08 01 01	49 T	14947	115'	23'	
08 01 01	50T	14864	115'	23'	
08 04 01	51T	14965	470'	23'	
08 04 01	52 T	14887	470'	23'	
08 04 01	53T	14963	470'	23'	
08 06 01	54	14952	70'	23'	
08 06 01	55	14952	82'	23'	
08 06 01	56	14952	42'	23'	

546

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA (T) PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
08 06 01	57 T	14952	80'	23'	
08 06 01	58 T	14952	80'	23'	
08 06 01	59 T	14952	81'	23'	
08 06 01	60 T	14953	80'	23'	
08 06 01	61 T	14953	81'	23'	
08 06 01	62 T	14953	91'	23'	
08 06 01	63 T	14953	91'	23'	
08 06 01	64 T	14953	92'	23'	
8 15 01	65 T	23878	92'	23'	
8 15 01	66 T	23878	93'	23'	
8 15 01	67 T	23878	93'	23'	
8 15 01	68 T	23878	93'	23'	
8 15 01	69 T	23878	93'	23'	

6 of 6

PANEL PLACEMENT FORM

T

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 MIL HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
8 15 01	70	23872	92'	23'	
8 15 01	71	23872	91'	23'	
8 15 01	72	23872	93'	23'	
8 15 01	73	23872	92'	23'	
8 15 01	74	23872	92'	23'	
8 15 01	75	23872	44'	23'	
8 15 01	76	23872	46'	23'	
8 15 01	77	23872	69'	23'	
8 15 01	78	23872	70'	23'	

146

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E Helena PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
07 25 01	1	14943	352'	23'	
07 25 01	2	14943	39'	23'	
07 25 01	3	14943	42'	23'	
07 25 01	4	14898	42'	23'	
07 25 01	5	14898	43'	23'	
07 25 01	6	14898	43'	23'	
07 25 01	7	14898	44'	23'	
07 25 01	8	14898	44'	23'	
07 25 01	9	14898	44'	23'	
07 25 01	10	14898	45'	23'	
07 25 01	11	14898	45'	23'	
07 25 01	12	14898	45'	23'	
07 25 01	13	14898	46'	23'	

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
07 25 01	14	14939	46'	23'	
07 25 01	15	14939	47'	23'	
07 25 01	16	14939	47'	23'	
07 25 01	17	14939	322'	23'	
07 25 01	18	14938	30'	23'	
07 25 01	19	14938	353'	23'	
07 25 01	2A	14943	27'	23'	
07 25 01	3A	14943	16'	23'	
07 26 01	20	14876	364'	23'	
07 26 01	21	14876	105'	23'	
07 26 01	22	14880	259'	23'	
07 26 01	23	14880	211'	23'	
07 26 01	24	14879	153'	23'	

346

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
072801	25	23250	49'	23'	
072801	26	23250	49'	23'	
072801	27	23250	49'	23'	
072801	28	23250	49'	23'	
072801	29	23250	21'	23'	
072801	30	23250	49'	23'	
072801	31	23250	115'	23'	
072801	32	23255	115'	23'	
072801	33	23255	115'	23'	
072801	34	23255	115'	23'	
072801	35	23255	115'	23'	
072801	36	23255	115'	23'	
072801	37	14875	115'	23'	

416

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
07 28 01	38	14875	397'	23'	
07 28 01	39	23267	73'	23'	
07 29 01	40	23267	476'	23'	
07 29 01	41	23238	470'	23'	
07 29 01	42	14941	470'	23'	
07 29 01	43	23244	470'	23'	
07 29 01	44	14964	470'	23'	
07 29 01	45	14969	470'	23'	
08 03 01	46	14962	470'	23'	
08 03 01	47	14867	465'	23'	
08 03 01	48	14968	469'	23'	
08 03 01	49	14954	50'	23'	
08 03 01	50	14963	50'	23'	

516

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
080301	51	14968	43'	23'	
080301	52	14963	49'	23'	
0803	53	14868	62'	23'	
080301	54	14868	63'	23'	
080301	55	14963	63'	23'	
080301	56	14963	64'	23'	
080301	57	14963	64'	23'	
080301	58	14963	64'	23'	
080301	59	14865	64'	23'	
080301	60	14865	65'	23'	
080301	61	14865	65'	23'	
080301	62	14954	65'	23'	
080301	63	14954	65'	23'	

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PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
08-03-01	64	14954	65'	23'	
08-04-01	65	14954	65'	23'	
08-04-01	66	14954	65'	23'	
08-04-01	67	14954	65'	23'	
08-04-01	68	14954	66'	23'	
08-04-01	69	14954	66'	23'	
08-04-01	70	14864	60'	23'	
08-04-01	71	14864	58'	23'	
08-04-01	72	14864	66'	23'	
08-04-01	73	14864	71'	23'	
08-04-01	74	14864	91'	23'	

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. Helena PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

ATE/ IME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
/25	1/2		41'	BX	#201	750	Sunny	10-15	75		
/25	2/2A		29'	"	"	"	"	"	"		
/25	2A/3A		15'	"	"	"	"	"	"		
/25	3/3A/2A		38'	"	"	"	"	"	"		
/25	3/4		42'	Soup	#108	750	"	"	75		
/25	4/5		42'	BX	#201	750	"	"	"		
/25	5/6		45'	"	"	"	"	"	"		
/25	6/7		45'	"	"	"	"	"	"		
/25	7/8		44'	"	"	"	"	"	"		
/25	8/9		45'	"	"	"	"	"	"		
/25	9/10		44'	"	"	"	"	"	"		
/25	10/11		46'	"	"	"	"	"	"		
/25	11/12		46'	"	"	"	"	"	"		
/25	12/13		44'	Soup	#108	"	"	"	"	DS-1	
/25	13/14		44'	"	"	"	"	"	"		

PANEL SEAMING FORM

PROJECT NAME: BARRO E. HELENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

ATE/ IME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
7-25	14/15		46'	Soup	#108	750	Sunny	10-15	75		
7-25	15/16		47'	"	"	"	"	"	"		
7-25	2-16/1		352'	BX	#201	750	Sunny	10-15	75		
7-25	1/17		322	"	"	"	"	"	"	DS-2	
7-25	1/18		30'	Soup	#108	750	"	"	"		
7-25	17/18		23'	"	"	"	"	"	"		
7-25	19/18		30	"	"	"	"	"	"		
7-25	17/19		322'	Soup	#108	750	"	"	"	DT-3	
7-26	19/20		364'	BX	#201	750	Sunny	5-10	75	DT-5	
7-26	20/22		259'	Soup	#108	750	"	"	"	DT-4	
7-26	20/21		105'	Soup	#108	750	"	"	"		
7-26	22/23+24		259'	BX	#201	750	"	"	"	DT-6	
7-26	21/23		105'	BX	201	750	"	"	"	"	
7-26	21/22		23'	Soup	#108	750	"	"	"	"	
7-26	23		23'	BX	#201	750	"	"	"	"	

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
7-28	16/25		46'	Soup	#108	750	Sunny	10-15	75		
7-28	25/26		46'	XB	#201	750	"	"	"		
7-28	26/27		47'	Soup	108	"	"	"	"	DT-7	
7-28	27/28		47'	XB	201	"	"	"	"		
7-28	28/29		45'	Soup	108	"	"	"	"		
7-28	29/30		28'	XB	201	"	"	"	"		Butt Seam
7-28	25-30/31		119'	XB	201	"	"	"	"		
7-28	31/32		118'	Soup	108	"	"	"	"		
7-28	32/33		116'	Soup	108	"	"	"	"		
7-28	33/34		113'	XB	201	"	"	"	"	DT-8	
7-28	34/35		108'	Soup	108	"	"	"	"		
7-28	36-37/35		108'	Soup	108	"	"	"	"		
7-28	17-18-19-20-22-24/31-32-33-34-35-37		136'	XB	201	"	"	"	"		Butt Seam
7-28	24-36-37/38		470'	Soup	108	"	"	"	"	DT-9	
7/28	38/39		23'	XB	201	"	"	"	"		Butt Seam

PANEL SEAMING FORM

PROJECT NAME: ASARCO G. HELENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
7-28	38-39/40		470'	XB	#201	750	Sunny	10-15	75	DT-10	
7-29	40-41		475'	Soup	#108	750	Cloudy	15-20	75	DT-11	
7-29	41-42		475'	XB	#201	750	"	"	"	DT-12	
7-29	42-43		475'	Soup	#108	750	"	"	"	DT-13	
7-29	43/44		475'	XB	#201	"	"	"	"	DT-14	
7-29	44-45		475'	XB	#201	"	"	"	"	DT-15	
8-01	45/46		475'	soup	#108	750°	sun	10-15		DT.16	
8 01	46/47		475'	XB	#201	750'	sun	10-15		DT.17	
8-01	47/48		475	soup	#108	750°	sun	10-15		DT.18	
8-02	48/49		48'	vp	#108	750	sun	10-15			
8-02	49/50		36'	vp	108	750°	sun	5-10			
8-02	50/51		33'	mk	"	750'	sun	5-10			
8-02	51/52		37'	mk	"	750'	sun	5-10			
8-02	52/53		63'	gw	"	750°	sun	5-10			
8.02	53/		64'	gw	"	750°	sun	5-10			

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. HECENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

ATE/ IME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
8-3	54/55		63'	VP	108	750'	sun	10-15	80°	P	
8-3	55/56		64'	GW	6	750'	sun	10-15	80°	P	
8-3	56/57		64'	VP	108	750'	sun	15-20	80°	P	
8-3	57/58		64'	VP	108	750'	sun	15-20	90°	P	
8-3	58/59		64'	GW	6	750'	sun	15-20	90°	P	
8-3	59/60		64'	GW	6	750'	sun	15-20	90°	P	
8-3	60/61		64'	VP	108	750'	sun	20-25	95°	P	
8-3	61/62		64'	VP	108	750'	sun	20-25	95°	P	
8-3	62/63		64'	GW	6	750'	sun	20-25	90°	P	
8-3	63/64		64'	MK	6	750'	sun	20-25	90°	P	
8-4	64/65		64'	VP	108	750'	sun	5-10	70°	P	
8-4	65/66		64'	VP	108	750'	sun	5-10	70°	P	
8-4	66/67		64'	KC	6	750'	sun	5-10	70°	P	
8-4	67/68		64'	KC	6	750'	sun	5-10	70°	P	
8-4	68/69		64'	VP	108	750	sun	5-10	70°	P	

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

ATE/ IME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
-4	69/70		37'	MK	108	750°	cldy	S-10	80°	P	
5-4	70/71		38'	MK	108	750°	cldy	S-10	80°	P	
5-4	71/72		40'	MK	108	750°	cldy	S-10	080°	P	
5-4	72/73		48'	VP	6	750°	cldy	S-10	80°	P	
5-4	73/74		48'	VP	6	750	cldy	S-10	80°	P	
5-4	73/48		23'	VP	6	750°	cldy	S-10	80°	P	
5-4	74/47		23'	VP	6	750°	cldy	S-10	80°	P	

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 7/26/01
SHEET 1 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
7/26/01	2T-4T		20'	BX	#201	750	Sunny	5-10	7-5	
7/26/01	3T/4T		14'	BX	"	"	"	"	"	
7/26/01	2T/3T		30'	BX	"	"	"	"	"	
7/26/01	1T/2T		42'	BX	"	"	"	"	"	
7/26/01	2T-12T/1T		229	BX	"	"	"	"	"	
7/26/01	3T/5T		41'	Soup	#108	750	"	"	"	
7/26/01	5T/6T		44'	"	"	"	"	"	"	
7/26/01	6T/7T		44'	XB	#201	"	"	"	"	
7/26/01	7T/8T		45'	Soup	#108	"	"	"	"	
7/26/01	8T/9T		44'	XB	#201	"	"	"	"	DT-1
7/26/01	9T/10T		43'	Soup	#108	"	"	"	"	
7/26/01	10T/11T		44'	XB	#201	"	"	"	"	
7/26/01	11T/12T		44'	XB	#201	"	"	"	"	
7/27/01	12T/13T		45'	Soup	#108	750	Sunny	5-10	7-5	
7/27/01	13T/14T		46'	"	"	"	"	"	"	

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. Helena (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Ward
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 07/27/01
SHEET 2 OF 4

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
07/27/01	14T/15T		46'	XB	#201	750	Sunny	5-10	75	
07/27/01	15T/16T		46'	XB	"	"	"	"	"	
07/27/01	1T/17T		23'	Soup	#108	"	"	"	"	
07/27/01	2T-16T/1T		333'	Soup	"	"	"	"	"	
07/27/01	1T/18T		328'	~~XB~~	"	"	"	"	"	DT-2
07/27/01	18T/19T		350'	Soup	"	"	"	"	"	DT-3
07/27/01	19T/20-21T		351'	XB	#201	"	"	"	"	DT-4
07/27/01	20-21T/22-23-24		346'	Soup	#108	"	"	"	"	DT-5
07/27/01	20T/21T		23'	XB	#201	"	"	"	"	
07/27/01	22T/23T		23'	XB	"	"	"	"	"	
07/27/01	23T/24T		23'	XB	"	"	"	"	"	
08/01/01	[illegible]/25		350'	XB	201	750°	Sun	5-10	50°	DT 6
08/01/01	25/26		350'	Soup	108	750°	Sun	5-10	55°	DT7
08/01/01	[illegible]/27		350'	XB	201	750°	Sun	5-10	69°	DT8
08/0[illegible]	27/28		362'	Soup	108	750°	Sun	5-10	73°	DT 9

PANEL SEAMING FORM

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WOOD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 08/01/01
SHEET 3 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
08/01/01	28/29		362'	XB	201	750°	Sun	5-10	70°	
08/01/01	29/30		362'	Soup	108	750°	Sun	5-10	70°	DT 11
08/01/01	30/31		362'	XB	201	750°	Sun	5-10	70°	DT 12
08/01/01	32/16		48'	XB	201	750°	Sun	5-10	80°	
08/01/01	32/33		48'	Soup	108	750°	Sun	5-10	80°	
08/01/01	33/34		48'	Soup	108	750°	Sun	10-15	80°	
08/01/01	34/35		49'	XB	201	750°	Sun	10-15	80°	
08/01/01	35/36		49'	XB	201	750°	Sun	10-15	80°+	
08/01/01	36/37		49'	XB	201	750°	Sun	10-15	80°+	
08/01/01	37/38		47'	Soup	108	750°	Sun	10-15	80°+	
08/01/01	32-38/39		146'	Soup	108	750°	Sun	10-15	80°+	
08/01/01	39/40		115'	XB	201	750°	Sun	10-15	80°	
08/01/01	40/41		115'	Soup	108	750°	Sun	10-15	80°	
08/01/01	41/42		115'	XB	201	750	Sun	10-15	80°	
08/01/01	42/43		115'	Soup	108	750	Sun	10-15	80°	

PANEL SEAMING FORM

1

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Day Wold
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 8/01/01

SHEET 4 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
08/01/01	43/44		115'	XB	201	750°	CLD	5-10	70°	
08/01/01	44/45		115'	SOUP	108	750°	Cld	5-10	65°	
08/01/01	45/46		115'	XB	201	750°	cld	10-15	65°	
08/01/01	46/47		115'	SOUP	108	750°	cld	10-15	65°	
08/01/01	47/48		115'	XB	201	750°	cld	10-15	65°	
08/01/01	48/49		115'	SOUP	108	750°	cld	10-15	65°	
08/01/01	49/50		115'	XB	201	750°	cld	10-15	65°	
8/04/01	50/51		470'	VP	201	750°	cld	8-10	70°	
8/4/01	51/52		470'	VP	201	750°	cld	8-10	70°	
8/4/01	52/53		470'	VP	201	750°	cld	8-10	70°	
8/6/01	53/54-64		470'	MC	208	750	cld	8-10	80°	
08/6/01	54/55		70'	MC	108	750°	cld	8-10	90°	
8/6/01	55/56		46'	MC	108	750°	Sun	8-10	90°	
8/6/01	56/57		38'	VP	201	750°	Sun	8-10	90°	
8/6/01	57/58		49'	VP	201	750°	Sun	8-10	90°	

HDPE PANEL SEAMING FORM

(T)

PROJECT NAME: ASARCO E. HELENA

NWLG PROJECT # 010404

NWLG SUPERINTENDANT: Troy Jay Wold

MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 8/6/01

SHEET 5 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
8/6/01	58/59		90'	VP	201	750'	Sun	0-5	80'+	
8/6/01	59/60		90'	MK	108	750'	Sun	0-5	80+	
8/6/01	60/61		91'	VP	201	750'	Sun	5-10	80+	
8/6/01	61/62		91'	MK	108	750'	Sun	5-10	80+	
8/6/01	62/63		92'	VP	201	750'	Sun	5-10	80+	
8/6/01	63/64		92'	MK	108	750'	Sun	5-10	80+	
8/15/01	64/65		92'	XB	6	750'	Sun	5-10	90'	
8/15/01	65/66		92'	XB	6	750'	Sun	5-10	90+	
8/15/01	66/67		92'	XB	6	750'	Sun	5-10	90'	DT-19
8/15/01	67/68		92'	XB	6	750'	Sun	5-10	90'	
8/15/01	68/69		92'	XB	6	750'	Sun	0-5	90'	
8/15/01	69/70		92'	XB	6	750'	Sun	0-5	90'	
8/15/01	70/71		92'	XB	6	750'	Sun	0-5	90'+	
8/15/01	71/72		92'	XB	6	750'	Sun	0-5	90'	
8/15/01	72/73		92'	XB	6	750'	Sun	0-5	90'	

HDPE PANEL SEAMING FORM

T

PROJECT NAME: ASARCO E. HELENA

NWLG PROJECT # 010404

NWLG SUPERINTENDANT: TRAY JAY WOLD

MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 8/15/01

SHEET 6 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
8/15/01	73/74		92'	XB	4	750°	Sun	0-5	90°	
8/15/01	74/75		42'	XB	4	750°	Sun	0-5	90°	QT 20
8/15/01	75/76		42'	XB	4	750°	Sun	0-5	90°	
8/15/01	76/77		23'	XB	4	750°	Sun	0-5	90°	
8/15/01	77/78		49'	XB	4	750°	Sun	0-5	90°	
8/15/01	78/53		49'	XB	4	750°	Sun	0-5	90°	
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REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY STAYWOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 7/25/01

SHEET 1 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/25/01	R-1	P-17-18-19	#1	Soup	2X3' Patch Butt Seam	7/25	✓
7/25/01	2	P-1-17-18	1	"	2X3' Patch Butt Seam	7/25	✓
7/25/01	3	P-16-15-1	#1	Soup	2X2' Patch Butt Seam	7/25	✓
7/25/01	4	P-15-14-1	#1	"	1X2' Patch Butt Seam	7/25	✓
7/25/01	5	P-14-13-1	#1	"	2X2' Patch Butt Seam	7/25	✓
7/25/01	6	P-12-13	#1	"	2X11 Patch DS-1 Stop of Toe 15'	7/25	✓
7/25/01	7	P-12-11-1	#1	"	1X2 Patch Butt Seam	7/25	✓
7/25/01	8	P-11-10-1	#1	"	1X1' Patch Butt Seam	7/25	✓
7/25/01	9	P-10-1	#1	K.K	1X1 Patch Seam Burn	7/25	✓
7/25/01	10	P-10-9-1	#1	"	1X1 Patch Butt Seam	7/25	✓
7/25/01	11	P-9-8-1	#1	"	2X3 Patch Butt Seam	7/25	✓
7/25/01	12	P-1-17	#1	"	2X3 Patch	7/25	✓
7/25/01	13	P-8-7-1	#1	"	3X5' Patches and Burn Butt Seam	7/25	✓
7/25/01	14	P-7-6-1	#1	"	1X1 Patch Butt Seam	7/25	✓
7/25/01	15	P-6-5-1	#1	"	1X1 Patch Butt Seam	7/25	✓
7/25/01	16	P-5-4-1	#1	KK	1X2 Patch Butt Seam	7/25	✓

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 7/25/01

SHEET 2 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/25/01	R-17	P-4-3-21	#1	SP	3X8 Patches Inter Section	7-25	✓
7/25/01	18	P-3-4	#1	SP	1X1 Patch	7-25	✓
7/25/01	19	P2-2A-3	#1	SP	1X1 Patch Butt Seam	7-25	✓
7/25/01	20	P-3-3A-2A	#1	SP	1X2' Patch Butt Seam	7-25	✓
7/25/01	21	P-17-19	#1	SP	2X4 Patch DS-3 5' of Toe	7-25	✓
7/25/01	22	P-1-17	#1	SP	2X4 Patch DS-2	7-25	✓
7/25/01	6A	P 13-12-1	#1	SP	1X1 PATCH BURNSEAM	7-25	✓
7/26/01	23	P-19-20	#1	SP	2X4' Patch DT-5	7-26	✓
7/26/01	24	P-20-21-22	#1	SP	3X3 Patch Butt Seam	7-26	✓
7/26/01	25	P-20-22	#1	SP	2X4 Patch DS-4	7-26	✓
7/26/01	26	P-21-22-23	#1	SP	1X2 Patch Butt Seam	7-26	✓
7/26/01	27	P-22-23	#1	SP	2X4 Patch DS-6	7-26	✓
7/26/01	28	P-22-23-24	#1	SP	2X2 Patch Butt Seam	7-26	✓
7/28/01	29	P-28-29-30	#1	KK	1X1 Patch Butt Seam	7-28	✓
7/28/01	30	P-28-30-31	#1	KK	1X1 Patch Butt Seam	7-28	✓
7/28/01	31	P-27-28-31	#1	KK	1X1 Patch Butt Seam	7-28	✓

REPAIR REPORT

PROJECT NAME: ASARCO @ HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 07/28/01

SHEET 3 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/28/01	R. 32	P-27-31	#1	KK	2X4' Patch Burn out / Airhole	7-29	✓
7/28/01	33	P-26-27-31	#1	KK	1X1 Patch Butt Seam	7-29	✓
7/28/01	34	P-26-27	#1	KK	2X4 Patch DT #7	7-29	✓
7/28/01	35	P-25-26-31	#1	KK	1X1 Patch Butt Seam	7-29	✓
7/28/01	36	P-25-17-31	#1	KK	1X2' Patch Butt Seam	7-29	✓
7/28/01	37	P-16-25-17	#1	KK	3X4' Patch Butt Seam	7-29	✓
7/28/01	38	P-17-18 / 31-32	#1	SP	1X2' Patch Inter Section	7-29	✓
7/28/01	39	P-18-19 / 32-33	#1	SP	2X2' Patch Inter Section	7-29	✓
7/28/01	40	P-33-34	#1	SP	2X4' Patch DT #8	7-29	✓
7/28/01	41	P-19-20 / 33-34	#1	SP	1X2' Patch Inter Section	7-29	✓
7/28/01	42	P-20-21 / 34-35	#1	SP	3X5' Patches Intersection	7-29	✓
7/28/01	43	P-22-24 / 35-37	#1	SP	1X2' Patch Inter Section	7-29	✓
7/28/01	44	P-24-37 / 38	#1	SP	1X2' Patch Butt Seam	7-29	✓
7/28/01	45	P-36-37 / 55	#1	KK	1X1 Patch Butt Seam	7-29	✓
7/28/01	46	P-36-37 / 38	#1	KK	1X1 Patch Butt Seam	7-29	✓
7/28/01	47	P-38-39 / 36	#1	KK	2X3' Patch Butt Seam	7-29	✓

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 07/28/01

SHEET 4 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7 129 101	R-48	P-38-39/40	#1	KK	1X1' Patch Butt Seam	07 29 01	✓
7 129 101	49	P-29-30-29"	#1	SP	8X9 Patches P-29"	07 29 01	✓
7 129 01	50	P-34-35	#1	KK	1X1 Patch Burn out	07 29	✓
7 129 101	51	P-38-40	#1	KK	2X4' Patch DT # 10	07 29	✓
7 129 101	52	P-24-38	#1	KK	1X1' Patch Burn out	07 29	✓
7 129 101	53	P-24-38	#1	KK	1X1' Patch Burn out	07 29	✓
7 129 101	54	P-38-40	#1	KK	1X1' Patch Burn out	07 29	✓
7 129 101	55	P-23-24-28	#1	KK	1X1' Patch Butt Seam	07 29	✓
7 129 101	56	P-24-38	#1	KK	1X1' Patch Burn out	07 29	✓
7 129 101	57	P-24/38	#1	KK	2X4' Patch DT # 9	07 29	✓
7 129 101	58	P-24-38	#1	KK	1X1' Patch Burn out	07 29	✓
7 129 101	59	P-24-38	#1	KK	1X2' Patch Burn out	07 29	✓
7 129 101	60	P-38-40	#1	KK	1X2' Patch power off	07 29	✓
7 129 101	61	P-41-42	#1	SP	1X2' Patch Burn out	07 29	✓
7 129 101	62	P-43-44	#1	Soup	2X2 Patch Burnout	07 29	✓
7 129 101	63	P-41-42	#1	"	2X2 Patch Add Liner TO Anchor Trench	07 29	✓

REPAIR REPORT

PROJECT NAME: Asarco E. Helena
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Wold
MATERIAL DESCRIPTION: 40 mil HDPE

DATE: 07/29/01

SHEET 5 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7 29 01	R-64	P-42-43	#1	Soup	2X3' Patch Add Linner To Anchor Trench	7 29 01	✓
7 29 01	65	P-43-44	#1	Soup	1X2' Patch Add Linner To Anchor Trench	7 29	✓
7 29 01	66	P-44-45	#1	"	2X2' Patch Add Linner To Anchor Trench	7 29	✓
7 29 01	67	P-40-41	#1	"	2X4' Patch DT # 11	7 29	✓
7 29 01	68	P-41-42	#1	"	2X4' Patch DT # 12	7 29	✓
7 29 01	69	P-42-43	#1	"	2X4' Patch DT # 13	7 29	✓
7 29 01	70	P-43-44	#1	"	2X4 Patch DT # 14	7 29	✓
7 29 01	71	P-44-45	#1	Soup	2X4' Patch DT # 15		
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REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAYWOOD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 08-05-01

SHEET 5 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8 13 101	R-72	P-45-46	#1	KK	1X2' Patch Burn out	08-04	✓
8 13 101	R-73	P-46-47	"	"	1X1' Patch Burn out	08 04	✓
8 13 101	R-74	P-49-52	"	"	1X1' Patch Butt Seam Burn out	08 4	✓
8 13 101	R-75	P 49-50 -51-52	"	"	3X4' Patch Intersection	8-4	✓
8 13 101	R-76	P-45-46	#1	VP	2X4' Patch Burn out/Air hole	8-4	✓
8 13 101	R-77	P-46-47	1	VP	2X4 Patch Burn out/Air hole	8-4	✓
8 13 101	R 78	P-47-48	1	VP	1X1 Patch Burn out	8-4	✓
8 13 101	R 79	P-47-48	1	VP	1X1 Patch Burn out	8-4	✓
8 14 101	R 80	P-46-47	#1	KK	2X4 Patch DT #16	8-4	✓
8 14 101	R 81	P-47-74-46	1	KK	3X5' Patch Butt Seam	8-4	✓
8 14 101	R 82	P-46-74	1	KK	1X1 Patch Burn out	8-4	✓
8 14 101	R 83	P 73-74 47-48	1	KK	1X2' Patch Intersection	8-4	✓
8 14 101	R 84	P 72-73-69 -68-48	1	KK	5X6' Patch Intersection	8-4	✓
8 14 101	R 85	P 69-70-71 72	1	KK	7X5' Patch Intersection	8-4	✓
8 14 101	R 86	P-52-53	1	KK	3X3 Patch Burn out	8-4	✓
8 14 101	R 87	P 49-48-51-53	1	KK	2X5 Patch Intersection	8-4	✓

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Tray Jray Ward
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 08/14/01

SHEET 7 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8 14 101	R-88	P-53-56/48	#1	KK	1X2' Patch Butt Seam	8-4	✓
8 14 101	R 89	P-54-55/48	1	KK	1X1' Patch Butt Seam	8-4	✓
8 14 101	R 90	P-55-56/48	1	KK	1X1 Patch Butt Seam	8-4	✓
8 14 101	R 91	P 56-57/48	1	KK	1X1 Patch Butt Seam	8-4	✓
8 14 101	R 92	P-57-58/48	1	KK	1X1 Patch Butt Seam	8-5	✓
8 15 101	R-93	P-57-58	#1	KK	2X4' Patch Burn out	8-5	✓
8 15 101	R-94	P-54-55	1	KK	2X3 Patch Burn out	8-5	✓
8 15 101	R 95	P-60-59-60A	#1	KK	1X2' Patch Butt Seam	8-5	✓
8 15 101	R 96	P-60-60A-61	1	KK	1X1 Patch Butt Seam	8-5	✓
8 15 101	R 97	P-58-59	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R 98	P-59-60A	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R 99	P-61-60A	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R-100	P-61-62-48	1	"	1X1' Patch Butt Seam	8-5	✓
8 15 101	R-101	P-62-63-48	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R-102	P-62-63-63A	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R-103	P-63-48	1	"	2X4' Patch DT # 18	8-5	✓

REPAIR REPORT

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 7/27/01

SHEET 1 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/27/01	R-1	P-2-4-3	#1	K-K	2x3' Patch Butt Seam TOP of Slop	7.27	✓
7/27/01	2	P-1-2-3	1	"	1x2' Patch Butt Seam	7.27	✓
7/27/01	3	P-1-3-5	1	"	1x1 Patch Butt Seam	7.27	✓
7/27/01	4	P-1-5-6	1	"	2x4' Patch Butt Seam	7.27	✓
7/27/01	5	P-1-6-7	1	"	2x4' Patch Butt Seam	7.27	✓
7/27/01	6	P-7-8	1	SP	2x4 Patch Butt Seam	7.27	✓
7/27/01	7	P-1-8-9	1	"	2x3 Patch Butt Seam	7.27	✓
7/27/01	8	P-8-9	1	"	2x4 Patch DT#1 of Toe	7.27	✓
7/27/01	9	P-1-9-10	1	"	1x1 Patch Butt Seam	7.27	✓
7/27/01	10	P-1-10-11	1	"	1x2' Patch Butt Seam	7.27	✓
7/27/01	11	P-1-11-12	1	"	1x2 Patch Butt Seam	7.27	✓
7/27/01	12	P-1-12-13	1	"	4x4' Patch Butt Seam	7.27	✓
7/27/01	13	P-1-13-14	1	"	2x3' Patch Butt Seam	7.27	✓
7/27/01	14	P-1-14-15	1	"	1x1 Patch Butt Seam	7.27	✓
7/27/01	15	P-1-15-16	1	"	1x1 Patch Butt Seam	7.27	✓
7/27/01	16	P-1-17-16	1	"	1x2' Patch Butt Seam	7.27	✓

REPAIR REPORT

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WELD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 7/27/01

SHEET 2 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/27/01	R-17	P-1T-17T-18T	#1	SP	3x4' Patch Butt Seam	7-27	✓
7/27/01	18	P-1T-18T	#1	"	2x4' Patch DT #2	7.27	✓
7/27/01	19	P-1T-18T	#1	"	1x1 Patch Seam Burn S/OP	7.27	✓
7/27/01	20	P-18T-19T	#1	KK	2x4 Patch DT #3	7.27	✓
7/27/01	21	P-19T-20T-21T	#1	"	1x1 Patch Butt Seam	7.27	✓
7/27/01	22	P-19T/21T	#1	"	2x4 Patch DT #4	7.28	✓
7/27/01	23	P19T-21T	#	"	2x3 Patch Seam Burn/ Air hole	7.28	✓
7/27/01	24	P-21T-23T-24T	#1	"	1x1 Patch Butt Seam	7.28	✓
7/27/01	25	P-21T-23T-22T	#1	"	1x1 Patch Butt Seam	7.28	✓
7/27/01	26	P-20T-22T-23T	#1	"	2x3 Patch Butt Seam	7.28	✓
7/27/01	27	P-20T-21T	#	"	1x1 Patch Seam Burn	7.28	✓
7/27/01	28	P-20T-22T	#1	"	2x4' Patch DT #5	7.28	✓
8/01/01	29	P-24T/25T	#1	SOUP	2x4' Patch DT #6	8-1	
8/01/01	30	P-23T-24T-25T	#1	"	1x1 Patch Butt Seam		
8/01/01	31	P-22T-23T-25T	#1	"	1x1 Patch Butt Seam		
8/01/01	32	P-22T-25T	#1	"	1x1 Patch Burn Out		

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Tray Jay wald
MATERIAL DESCRIPTION: 60 MIL HDPE

T

DATE 8/10/01

SHEET 3 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8 11 101	R-33	P-22T/25T	#1	Soup	1X2' Patch Burn Out / Airlock		
8 11 101	34	P-25T-26T	#1	"	2X4' Patch DT # 7		
8 11 101	35	P-26T/27T	#1	"	2X4 Patch DT # 8		
8 11 101	36	P-27T/28T	#1	"	2X4 Patch DT #9		
8 11 101	37	P-28T-29T	#1	"	1X2' Patch Burn out		
8 11 101	38	P-28T-29T	#1	"	2X4' Patch DT # 10		
8 11 101	39	P-29T-30T	#1	"	2X4' Patch DT # 11		
8 11 101	40	P-30T-31T	#1	Soup	2X4' Patch DT #12		
8 12 101	41	P-16T-32-17T	#1	VP	3X3 Patch Butt Seam		
8 12 101	42	P-17T-32T-39T	#1	VP	2X4 Patch Butt Seam		
8 12 101	43	P-39T-32T-33T	#1	VP	1X1 Patch Butt Seam		
8 12 101	44	P-39-33-34T	#1	TJW	1X1 Patch Butt Seam		
8 12 101	45	P-39-34-35T	#1	"	1X1 Patch Butt Seam		
8 12 101	46	P-34-35T	#1	"	1X2 Patch Burn out		
8 12 101	47	P-34-35T	#1	"	1X2 Patch Burn out		
8 12 101	48	P-39-35-36T	#1	"	1X1 Patch Butt Seam		

REPAIR REPORT

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Wold
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 8/10/01

SHEET 4 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/12/01	R-48	P-39-38-36 T	#1	TJW	1X1 Patch Butt Seam		
8/12/01	49	P-38-37-36 T	#1	"	1X1 Patch Butt Seam		
8/12/01	50	P38-37-37 T	#1	VP	7X8 Patches Add Liner		
8/12/01	51	P-39-40 T	#1	VP	1X2 Patch Burn out		
8/12/01	52	P39-40-18 T	#1	VP	1X1 Patch Butt Seam		
8/12/01	53	P-17-18-39 T	#1	VP	1X2 Patch Butt Seam		
8/12/01	54	P-18-19 / P-40-41	#1	VP	2X2 Patch Intersection		
8/12/01	55	P-18-19 T	#1	VP	1X1 Patch Air hole		
8/12/01	56	P-19-21 / P-41-42	#1	KK	2X3 Patch Intersection		
8/12/01	57	P-41-42	#1	"	2X4 Patch DT #13		
8/12/01	58	P-42-43-21	#1	"	1X2 Patch Butt Seam		
8/12/01	59	P-21-24-43	#1	"	1X2 Patch Butt Seam		
8/12/01	60	P-24-25-43	#1	"	2X2 Patch Butt Seam		
8/12/01	61	P-25-43-44	#1	"	1X1 Patch Butt Seam		
8/12/01	62	P-43-44	#1	"	1X1 Patch Seam Burn		
8/12/01	63	P-43-44	#1	"	1X1 Patch Burn out		

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jaywold
MATERIAL DESCRIPTION: 60 mil HDPE

T

DATE: 8/2/01

SHEET 4 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/2/01	R.63	P 25-26 44-45	#1	TJW	1X2 Patch Intersection		
8/2/01	64	P-44-45	#1	"	1X1 Patch Air hole		
8/2/01	65	P-44-45	#1	KK	2X4 Patch DT #14		
8/2/01	66	P-26-27-45	#1	KK	2X2 Patch Butt Seam		
8/2/01	67	P-27-45-46	#1	"	1X1 Patch Butt Seam		
8/2/01	68	P 27-28 46-47	#1	"	3X4 Patch Intersection		
8/2/01	69	P-46-47	#1	"	2X4 Patch DT # 15		
8/2/01	70	P-47-48	#1	"	1X1 Patch Burn out		
8/2/01	71	P 28-29 47-48	#1	"	2X4 Patch Intersection		
8/2/01	72	P 29-30 48-49	#1	"	2X3 Patch Intersection		
8/2/01	73	P-48-49	#1	"	2X4 Patch DT # 16		
8/2/01	74	P 30-31-49	#1	"	1X1 Patch Butt Seam		
8/2/01	75	P-31-49-50	#1	"	1X1 Patch Butt Seam		
8/2/01	76	P-31-49-50	#1	"	1X1 Patch Butt Seam		
8/2/01	77	P-31-50-51	#1	VP	2X2' Patch Butt Seam		
8/2/01	78	P-31-51	1	VP	1X2' Patch Burn out		

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010464
NWLG SUPERINTENDANT: Thay Jay Wald
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 8/6/01

SHEET 5 OF

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/6/01	R-79	P-51-52	1	VP	2x4' Patch DT #17	8-6	✓
8/6/01	80	P-52-53	1	VP	2x7' Patch DT #18 and Burn out	8-6	✓
8/6/01	81	P-54-58-59	1	VP	2x2' Patch Butt Seam	8-6	✓
8/6/01	82	P-58-59-55	1	VP	1x2' Patch Butt Seam	8-6	✓
8/6/01	83	P-58-57-56	1	VP	1x1 Patch Butt Seam	8-6	✓
8/6/01	84	P-57-56-55	1	VP	1x3 Patch Butt Seam	8-6	✓
8/6/01	85	P-59-60-54	1	VP	1x1 Patch Butt Seam	8-6	✓
8/6/01	86	P-54-60-61	1	KC	1x1 Patch Butt Seam	8-6	✓
8/6/01	87	P-53-54-61	1	KC	1x2' Patch Butt Seam	8-6	✓
8/6/01	88	P-60-61	1	KC	1x1 Patch Burn out	8-6	✓
8/6/01	89	P-61-62A-53	1	KC	1x2' Patch Butt Seam	8-6	✓
8/6/01	90	P-61-62-62A	1	[illegible]	1x1 Patch Butt Seam	8-6	✓
8/6/01	91	P-62-62A-63	1	[illegible]	2x2' Patch Butt Seam	8-6	✓
8/6/01	92	P-62A-53-63	1	[illegible]	1x1' Patch Butt Seam	8-6	✓
8/6/01	93	P-63-64-64A	1	[illegible]	1x1 Patch Butt Seam	8-6	✓
8/6/01	94	P-64A-63-53	1	[illegible]	1x1 Patch Butt Seam	8-6	✓

REPAIR REPORT

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 020404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 8/15/01

SHEET _____ OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/15/01	95	64/65/64A	001	KC	2x2' Patch Butt	8/15	✓
8/15/01	96	P-64A/53/65	001	KC	2x2' Patch Butt	8/15	✓
8/15/01	97	P-53-65-66	001	KC	2x2' Patch Butt	8/15	✓
8/15/01	98	P-66/67	001	KC	2x4' Patch DT - 19'	8/15	✓
8/15/01	99	P-53-66-67	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	100	P53-67-68	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	101	P53-68-69	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	102	P-53-69-70	001	KC	1x1' Patch Butt	8/15	✓
8/15/01	103	P-53-70-71	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	104	P-53-71-72	001	KC	1x2' Patch Butt	8/15	✓
8/15/01	105	P-53-72-73	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	106	P-53-73-74	001	KC	1x1' Patch Butt	8/15	✓
8/15/01	107	P53-73-74	001	KC	1x1' Patch Butt	8/15	✓
8/15/01	108	P-73-74	001	KC	2x3' Patch Butt	8/15	✓
8/15/01	109	P-74-77	001	KC	2x4' Patch DT - 20'	8/15	✓
8/15/01	110	P-74-75-77	001	KC	1x1 Patch Butt	8/15	✓

REPAIR REPORT

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Rod Sanwald
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 8/15/01

SHEET _____ OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/15/01	111	P-75-76-77	001	KC	1X1 Patch Butt	8/15	✓
8/15/01	112	P-53-78	001	KC	1X1 Patch Seam Burn	8/15	✓
8/15/01	113	P-76-77	001	KC	1X1 Patch Burn out	8/15	✓
8/15/01	114	77	001	KC	Bead	8/15	✓
8/15/01	115	75	001	KC	Bead	8/15	✓
8/15/01	116	68	001	KC	Bead	8/15	✓
8/15/01	117	67	001	KC	Bead	8/15	✓
8/15/01	118	67	001	KC	Bead	8/15	✓
8/15/01	119	65	001	KC	Bead	8/15	✓
8/15/01	120	59	001	KC	Bead	8/15	✓
8/15/01	121	65	001	KC	Bead	8/15	✓
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/ /							

NON DESTRUCTIVE TESTING FORM

(T)

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 610404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7/26	2T/4T	VP	37	35	2	306	311	P	P	
7/26	4T/3T	VP	35	35	0	306	311	P	P	
7/26	2T/3T	VP	31	31	0	306	311	P	P	Butt
7/26	3T/5T	VP	33	32	1	305	310	P	P	
7/26	5T/6T	VP	32	32	0	252	257	P	P	
7/26	6T/7T	VP	32	30	2	252	257	P	P	
7/26	7T/8T	VP	32	31	1	252	257	P	P	
7/26	8T/9T	VP	34	33	1	252	257	P	P	
7/26	9T/10T	VP	30	29	1	257	256	P	P	
7/26	10T/11T	VP	33	31	2	301	306	P	P	
7/26	11T/12T	VP	34	33	1	301	306	P	P	
7/27	12T/1T	VP	31	31	0	1015	1020	P	P	Butt
7/27	1T/11T	VP	32	32	0	1015	1020	P	P	"
7/27	1T/10T	VP	35	33	2	1015	1020	P	P	"
7/27	1T/9T	VP	35	35	0	1015	1020	P	P	"
7/27	1T/8T	VP	31	31	0	1016	1021	P	P	"
7/27	1T/7T	VP	35	33	2	1016	1021	P	P	"
7/27	1T/6T	VP	34	34	0	1030	1035	P	P	"
7/27	1T/5T	VP	30	29	1	1030	1035	P	P	"
7/27	1T/2T	VP	32	32	0	1030	1035	P	P	"
7/27	1T/3T	VP	30	30	0	1030	1035	P	P	Butt
7/27	12/13	VP	33	33	0	1055	11:00	P	P	
7/27	1-13	VP	31	30	1	1055	11:00	P	P	Butt
7/27	[illegible]4	VP	33	31	2	1055	11:00	[illegible]	P	

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA (T) PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7/27	1-14	VP	35	33	2	1055	11:00	P	P	Butt
7/27	14-15	VP	33	31	2	1056	11:01	P	P	
7/27	15-16	VP	32	31	1	1056	11:01	P	P	
7/27	1-15	VP	30	29	1	1056	11:01	P	P	Butt
7/27	1-16	VP	35	34	1	1105	1110	P	P	"
7/27	1-17	VP	32	32	0	1105	1110	P	P	"
7/27	16-17	VP	30	30	0	1105	1110	P	P	Butt
7/27	17-18	VP	34	33	1	1112	1117	P	P	
7/27	1-18	VP	34	33	1	1112	1117	P	P	
7/27	18-19	VP	35	35	0	1120	1125	P	P	
7/27	19-20	VP	35	35	0	1125	1130	P	P	
7/27	20-21	VP	30	29	1	1125	1130	P	P	Butt Seam
7/27	19-21	VP	35	34	1	1125	1130	P	P	
7/27	21-24	VP	34	33	1	1145	1150	P	P	
7/27	23-24	VP	30	29	1	1145	1150	P	P	Butt
7/27	21-23	VP	34	34	0	1145	1150	P	P	
7/27	22-23	VP	33	33	0	1145	1150	P	P	Butt
7/27	22-21	VP	35	35	0	1145	1150	P	P	
7/27	20-22	VP	33	33	0	1150	1155	P	P	
8.01	24/25	VP	34	33	1	1255	1:00	P		
8.01	25-26	VP	34	34	0	1256	1:01	P		
8.01	26-27	VP	34	32	2	1257	1:02	P		
8.01	27-28	VP	33	33	0	1258	1:03	P		
8.01	28-29	VP	35	35	0	1259	1:04	P		

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HECENA (T) PROJECT NUMBER:

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-01	23-25	VP	33	32	1	1:10	1:15	P	P	
8-01	22-25	VP	34	34	0	1:10	1:15	P	P	
8-01	22-25	VP	31	30	1	1:12	1:17	P	P	
8-01	22-25	VP	32	32	0	1:12	1:17	P	P	
8-01	28-29	VP	34	32	3	1:13	1:18	P	P	
8-1	29-30	VP	35	35	0	210	215	P	P	
8-1	30-31	VP	33	33	0	210	215	P	P	
8-2	50-49	VP	35	35	0	610	615	P	P	
8-2	49-48	VP	34	34	0	610	615	P	P	
8-2	48-47	VP	35	34	1	610	615	P	P	
8-2	47-46	VP	35	35	0	610	615	P	P	
8-2	46-45	VP	35	35	0	610	615	P	P	
8-2	45-44	VP	30	29	1	628	633	P	P	
8-2	44-43	VP	32	32	0	628	633	P	P	
8-2	42-41	VP	33	33	0	630	635	P	P	
8-2	41-40	VP	30	30	0	630	635	P	P	
8-2	40-39	VP	35	35	0	630	635	P	P	
8-2	44-43	VP	30	30	0	637	642	P	P	
8-2	43-42	VP	35	35	0	637	642	P	P	
8-2	16-32	VP	33	33	0	655	7:00	P	P	
8-2	17-32	VP	32	32	0	655	7:00	P	P	Butt
8-2	32-33	VP	34	32	2	655	700	P	P	
8-2	39-33	VP	34	34	0	655	700	P	P	Butt
8-2	[illegible]-41	VP	30	30	0	656	701	[illegible]	P	

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: Asarco E. Helena (T) PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-2	39-34	VP	32	32	0	656	701	P		Butt
8-2	34-35	VP	32	32	0	656	701	P		
8-2	34-35	VP	30	30	0	710	715	P		
8-2	39-35	VP	35	35	0	710	715	P		Butt
8-2	35-36	VP	30	28	2	710	715	P		
8-2	39-36	VP	30	30	0	710	715	P		Butt
8-2	36-37	VP	30	29	1	711	716	P		
8-2	37-38	VP	30	30	0	711	716	P		Butt
8-2	38-39	VP	30	30	0	711	716	P		
8-2	31-50	VP	30	30	0	812	817	P		Butt
8-2	30-49	VP	32	30	2	812	817	P		"
8-2	29-48	VP	34	34	0	813	818	P		"
8-2	28-47	VP	30	29	1	813	818	P		"
8-2	27-46	VP	33	33	0	814	819	P		"
8-2	26-45	VP	32	32	0	823	828	P		"
8-2	25-44	VP	30	30	0	823	828	P		"
8-2	24-43	VP	32	30	2	824	829	P		"
8-2	21-42	VP	30	30	0	825	830	P		"
8-2	19-41	VP	30	29	1	825	830	P		"
8-2	18-40	VP	34	34	0	835	840	P		Butt
8-2	17-39	VP	33	33	0	835	840	P		Butt
8-6	59-54	VP	35	34	1	7:00	7:05	P		
8-6	59-58	VP	34	34	0	7:00	7:05	P		
8-6	57-58	VP	32	30	2	7:00	7:05	P		

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: PSARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-6	58-55	VP	30	30	0	7:00	7:05	P	P	Butt
8-6	57-55	VP	35	35	0	7:01	7:06	P	P	Butt
8-6	55-56	VP	30	30	0	7:01	7:06	P	P	
8-6	57-56	VP	32	31	1	7:01	7:06	P	P	Butt
8-6	54-55	VP	33	33	0	7:01	7:06	P	P	
8-6	53-54	VP	32	30	2	7:20	725	P	P	
8-6	53-52	VP	32	32	0	7:20	725	P	P	
8-6	51-50	VP	33	33	0	7:20	7:25	P	P	
8-6	50-51	VP	32	30	0	730	7:35	P	P	
8-6	50-51	VP	31	31	0	730	7:35	P	P	
8-6	51-52	VP	34	32	2	731	7:36	P	P	
8-6	52-53	VP	34	32	2	732	7:37	P	P	
8-6	59-60	VP	33	33	0	1:30	1:35	P	P	
8-6	60-61	VP	32	31	1	1:30	1:35	P	P	
8-6	60-54	VP	32	30	2	1:30	1:35	P	P	Butt
8-6	54-61	VP	31	30	1	1:30	1:35	P	P	Butt
8-6	53-61	VP	30	30	1	1:30	1:35	P	P	Butt
8-6	61-62	VP	35	34	1	1:37	1:42	P	P	
8-6	53-62A	VP	32	30	2	1:37	1:42	P	P	Butt
8-6	62-63	VP	34	34	0	1:37	1:42	P	P	
8-6	63-62A	VP	34	33	1	1:37	1:42	P	P	~~Butt~~
8-6	63-53	VP	33	33	0	1:45	150	P	P	Butt
8-6	63-64	VP	33	33	0	1:45	1:50	P	P	
8-6	6[illegible]3	VP	34	34	0	1:45	1:50	[illegible]	P	Butt

NON DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HECENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

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DATE 8/15/01

SHEET 16 OF 7

DATE/ TIME	SEAM #	TESTER INITIALS	AIR PRESSURE TESTING START PRESSURE/ TIME	ENDING PRESSURE/ TIME	PRESSURE LOSS	PASS/ FAIL	VACUUM BOX PASS / FAIL	COMMENTS / LOCATION
8 1/5 101	64/65	VP	34 920	32 925	2	P	P	
8 1/5 101	65/66	VP	31 920	29 925	2	P	P	
8 1/5 101	66/67	VP	30 921	29 926	1	P	P	
8 1/5 101	67/68	VP	34 921	34 926	0	P	P	
8 1/5 101	68/69	VP	32 922	32 927	0	P	P	
8 1/5 101	69/70	VP	34 933	33 938	1	P	P	
8 1/5 101	70/71	VP	34 1040	34 1045	0	P	P	
8 1/5 101	71/72	VP	35 1040	33 1045	2	P	P	
8 1/5 101	72/73	VP	32 1033	32 1038	0	P	P	
8 1/5 101	73/74	VP	34 1033	33 1038	1	P	P	
8 1/5 101	74/75	VP	33 12:55	33 1:00	0	P	P	
8 1/5 101	75/76	VP	32 1255	32 1:00	0	P	P	
8 1/5 101	76/77	VP	33 1255	33 1:00	0	P	P	
8 1/5 101	77/78	VP	33 12:35	32 12:40	1	P	P	
8 1/5 101	78/53	VP	34 12:35	34 12:40	0	P	P	
8 1/5 101	65/53	VP	31 11:30	31 11:35	0	P	P	Butt
8 1/5 101	66/53	VP	33 11:30	33 1:35	0	P	P	Butt

NON DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO ELHELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Thay Jaywood
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 8/15/01

SHEET 7 OF 7

DATE/ TIME	SEAM #	TESTER INITIALS	AIR PRESSURE TESTING START PRESSURE/ TIME	AIR PRESSURE TESTING ENDING PRESSURE/ TIME	AIR PRESSURE TESTING PRESSURE LOSS	AIR PRESSURE TESTING PASS/ FAIL	VACUUM BOX PASS / FAIL	COMMENTS / LOCATION
8/15/01	67/53	VP	34 11:38	34 11:43	0	P	P	Butt
8/15/01	68/53	VP	33 11:38	32 11:43	1	P	P	"
8/15/01	69/53	VP	33 11:45	33 11:50	0	P	P	"
8/15/01	70/53	VP	31 11:45	31 11:50	0	P	P	"
8/15/01	71/53	VP	31 11:52	31 11:57	0	P	P	"
8/15/01	72/53	VP	31 11:52	31 11:57	0	P	P	"
8/15/01	73/53	VP	32 11:59	30 12:04	2	P	P	"
8/15/01	74/53	VP	31 11:59	31 12:04	0	P	P	Butt
8/15/01	75/74	VP	32 12:47	32 12:52	0	P	P	Butt
8/15/01	77/74	VP	35 12:47	34 12:52	1	P	P	"
8/15/01	78/74	VP	33 12:47	33 12:52	0	P	P	Butt
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NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-25-01	16/15	VP	35	33	2	1144	1149	P	P	
7/25	15/14	VP	35	33	2	1144	1149	P	P	
7/25	14/13	VP	35	34	1	1144	1149	P	P	
7/25	13/12	VP	34	34	0	1238	1243	P	P	
7-25	12/11	VP	32	30	2	1156	1201	P	P	
7-25	11/10	VP	32	30	2	1157	1202	P	P	
7-25	10/9	VP	34	34	0	1245	1250	P	P	
7-25	9/8	VP	32	31	1	1255	1:00	P	P	
7-25	8/7	VP	30	29	1	1255	1:00	P	P	
7-25	7/6	VP	31	30	1	1255	1:02	P	P	
7-25	6/5	VP	33	31	2	1255	1:00	P	P	
7-25	5/4	VP	30	30	0	1:02	1:07	P	P	
7-25	3/3A	VP	35	35	0	1:02	1:07	P	P	
7-25	3A/2A	VP	35	33	2	1:02	1:07	P	P	
7-25	2A/3	VP	32	32	0	1:02	1007	P	P	Butt Seam
7-25	2/2A	VP	34	34	0	1:20	1:25	P	P	
7-25	16/1	VP	31	30	1	145	150	P	P	Butt
7-25	15/1	VP	31	31	0	145	150	P	P	Butt
7-25	17/18	VP	34	33	1	1:58	2:03	P	P	Butt Seam
7-25	18/1	VP	33	31	2	1:50	200	P	P	
7-25	18/19	VP	32	32	0	147	152	P	P	
7-25	14/1	VP	30	30	0	203	208	P	P	Butt
7-25	13/1	VP	33	33	0	203	208	P	P	"
7/25	12/1	VP	32	30	2	204	209	P	P	"

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-25-01	11/1	VP	30	29	1	204	209	P	P	Butt Seam
7-25-01	10/1	VP	30	30	0	210	215	P	P	"
7-25-01	9/1	VP	30	30	0	210	215	P	P	"
7-25-01	8/1	VP	34	34	0	211	216	P	P	"
7-25-01	7/1	VP	33	30	1	211	216	P	P	"
7-25-01	6/1	VP	33	31	2	220	225	P	P	"
7-25-01	5/1	VP	32	32	0	220	225	P	P	"
7-25-01	4/1	VP	34	34	0	221	226	P	P	Butt
7-25-01	2/1	VP	35	33	2	221	226	P	P	
7-25-01	[illegible]/17	VP	32	32	0	230	235	P	P	[redacted]
7-25-01	1/17	VP	32	32	0	230	235	P	P	
7-25-01	17/19	VP	34	32	2	231	236	P	P	
7-26-01	19/20	VP	34	34	0	1250	1255	P	P	
7-26-01	20/22	VP	35	34	1	1251	1256	P	P	
7-26-01	20/21	VP	33	32	1	1204	1209	P	P	
7-26-01	21/22	VP	32	32	0	233	238	P	P	Butt
7/26	21/23	VP	30	30	0	233	238	P	P	
7/26	22/23	VP	30	30	0	233	238	P	P	
7/26	23/24	VP	32	30	2	240	245	P	P	Butt
7/26	22/24	VP	32	31	1	240	245	P	P	
7-28	16/25	VP	33	33	0	913	918	P	P	
7-28	25-26	VP	32	32	0	913	918	P	P	
7-28	25-31	VP	31	30	1	913	918	P	P	Butt
7-28	[illegible]31	VP	32	31	1	913	918	[illegible]	P	Butt

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-28	26/27	VP	31	29	2	914	919	P	P	
7-28	27/31	VP	31	31	0	914	919	P	P	Butt Seam
7-28	27/31	VP	30	30	0	926	931	P	P	Butt Seam
7-28	27/28	VP	33	33	0	935	940	P	P	
7-28	28/31	VP	30	30	0	935	940	P	P	Butt
7-28	28/29	VP	33	33	0	935	940	P	P	
7-28	29/30	VP	30	30	0	935	940	P	P	Butt
7-28	30/31	VP	31	30	1	935	940	P	P	
7-28	30/28	VP	32	31	1	935	940	P	P	Butt
7-28	32/33	VP	35	35	0	955	1000	P	P	
7-28	19/33	VP	32	31	1	955	1000	P	P	Butt
7-28	33/34	VP	35	35	0	955	1000	P	P	
7-28	20/34	VP	32	32	0	955	1000	P	P	Butt
7-28	34/35	VP	33	33	0	956	1001	P	P	
7-28	24/35	VP	33	32	1	956	1001	P	P	Butt
7-28	24/37	VP	34	34	0	1005	1010	P	P	Butt
7-28	35/37	VP	34	33	1	1005	1010	P	P	
7-28	35/36	VP	33	33	0	1005	1010	P	P	
7-28	36/37	VP	35	35	0	1005	1010	P	P	Butt
7-28	31/32	VP	35	35	0	1020	1025	P	P	
7-28	18/32	VP	35	33	2	1020	1025	P	P	Butt
7-28	17/31	VP	35	34	1	1020	1025	P	P	Butt
7-28	25/17	VP	35	35	0	1020	1025	P	P	Butt
7-28	36/39	VP	35	35	0	1240	1245	P	P	

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-28	38-39	VP	30	29	1	1240	1245	P	P	Butt
7-28	36-38	VP	30	30	0	1240	1245	P	P	
7-28	37-38	VP	31	30	1	1240	1245	P	P	
7-28	39-40	VP	35	35	0	1240	1245	P	P	
7-28	38-40	VP	34	34	0	1240	1245	P	P	
7-28	24-38	VP	30	29	1	1247	1252	P	P	Burn out
7-28	24-38	VP	35	35	0	1247	1252	P	P	"
7-28	24-38	VP	30	30	0	1247	1252	P	P	"
7-28	24-38	VP	33	33	0	1:00	1:05	P	P	"
7-28	24-38	VP	34	34	0	1:00	1:05	P	P	"
7-28	24-38	VP	35	35	0	1:00	1:05	P	P	"
7-28	38-24	VP	35	34	1	1:00	1:05	P	P	Burn out
7-28	38-40	VP	35	35	0	1:07	1:12	P	P	Power off
7-28	38-40	VP	35	35	0	1:07	1:12	P	P	Burn out
7-29	40-41	VP	35	35	0	1:05	1:10	P	P	
7-29	41-42	VP	35	34	1	1:06	1:11	P	P	
7-29	41-42	VP	32	32	0	1:06	1:11	P	P	
7-29	42-43	VP	35	35	0	1:07	1:12	P	P	
7-29	43-44	VP	35	34	1	1:08	1:13	P	P	
7-29	43-44	VP	35	34	1	1:20	1:25	P	P	
7-29	44-45	VP	35	35	0	1:45	1:50	P	P	

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO EL PASO PROJECT NUMBER:

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	+/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-3	45-46	VP	33	33	0	1140	1145	P	P	
8-3	46-47	VP	34	34	0	1140	1145	P	P	
8-3	47-48	VP	32	30	2	1140	1145	P	P	
8-3	48-49	VP	32	32	0	1140	1145	P	P	
8-3	49-52	VP	35	34	1	1148	1153	P	P	Butt
8-3	49-50	VP	34	34	0	1148	1153	P	P	
8-3	50-51	VP	33	31	2	1148	1153	P	P	Butt
8-3	51-52	VP	35	33	2	1148	1153	P	P	
8-3	45-46	VP	32	31	1	1:05	1:10	P	P	
8-3	45-46	VP	30	30	0	1:05	1:10	P	P	
8-3	46-47	VP	31	31	0	1:05	1:10	P	P	
8-3	46-47	VP	32	32	0	1:10	1:15	P	P	
8-3	47-48	VP	30	30	0	1:10	1:15	P	P	
8-3	47-48	VP	30	30	0	1:10	1:15	P	P	
8-4	46-74	VP	33	32	1	1057	1102	P	P	
8-4	74-73	VP	31	31	0	1055	11:00	P	P	
8-4	74-47	VP	34	33	1	1055	11:00	P	P	Butt
8-4	73-48	VP	30	30	0	1055	11:00	P	P	Butt
8-4	67-68	VP	31	31	0	1105	1110	P	P	
8-4	68-48	VP	35	34	1	1105	1110	P	P	Butt
8-4	67-48	VP	31	31	0	1105	1110	P	P	
8-4	72-73	VP	31	31	0	1112	1117	P	P	
8-4	71-72	VP	30	30	0	1112	1117	P	P	
8-4	70-71	VP	30	28	0	1112	1117	P	P	

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-4	69-72	VP	32	32	0	1112	1117	P	P	Butt
8-4	69-70	VP	31	30	1	1112	1117	P	P	
8-4	66-67	VP	32	32	0	1148	1153	P	P	
8-4	66-48	VP	30	30	0	1148	1153	P	P	Butt
8-4	66-65	VP	30	29	1	1148	1153	P	P	
8-4	65-48	VP	30	29	1	1148	1153	P	P	Butt
8-4	64-65	VP	35	34	1	11:55	12:00	P	P	
8-4	64-48	VP	32	32	0	1155	12:00	P	P	Butt
8-4	63-48	VP	31	31	0	1155	12:00	P	P	Butt
8-4	52-53#	VP	31	31	0	1:10	1:15	P	P	
8-4	52-53#	VP	30	30	0	1:10	1:15	P	P	
8-4	53-48	VP	34	34	0	1:10	1:15	P	P	Butt
8-4	53-54	VP	35	35	0	1:20	1:25	P	P	
8-4	54-48	VP	30	30	0	1:55	2:00	P	P	Butt
8-4	54-55	VP	32	32	0	1:55	2:00	P	P	
8-4	55-48	VP	31	30	1	1:55	2:00	P	P	Butt
8-4	55-56	VP	34	32	2	1:56	2:01	P	P	[redacted]
8-4	56-48	VP	32	31	1	1:56	2:01	P	P	Butt
8-4	57-48	VP	31	30	1	156	2:01	P	P	Butt
8-4	57-56	VP	30	29	1	2:03	2:08	P	P	
8-4	57-58	VP	35	35	0	2:03	2:08	P	P	
8-4	58-48	VP	33	33	0	2:03	2:08	P	P	Butt
8-4	58-59	VP	34	33	1	2:05	2:10	P	P	
8-4	[redacted]-48	VP	32	32	0	2:05	2:10	[redacted]	P	Butt

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-4	59-60	VA	31	31	0	2:05	210	P	P	
8-4	60-48	VA	35	35	0	2:13	218	P	P	Butt
8-4	60-48	VA	32	32	0	2:13	218	P	P	Butt
8-4	60-61	VA	34	33	1	2:13	218	P	P	
8-4	60-61	VA	32	32	0	2:13	2:18	P	P	
8-4	61-62	VA	33	30	3	2:13	2:18	P	P	
8-4	62-48	VA	32	32	0	220	223	P	P	Butt
8-4										

Northwest Linings & Geotextile Products, Inc.

DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAYJAY WARD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 7/25/01

SHEET 1 OF 3

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
7 25/01	DS-3	17/19	3096	VP	1	106	126	P	172	P	
					2	108	122	P	173	P	
					3	103	113	P	169	P	
					4	100	116	P	169	P	
					5	103	122	P	168	P	
7 25/01	DS-2	1/17	"	"	1	126	140	P	174	P	
					2	100	138	P	176	P	
					3	129	109	P	170	P	
					4	117	130	P	172	P	
					5	120	131	P	168	P	
07/25/01	DS-1	12/13	"	"	1	110	112	P	179	P	
					2	111	124	P	174	P	
					3	122	148	P	177	P	
					4	132	130	P	182	P	
					5	123	120	P	180	P	
07/26/01	DT-4	22/20	3096	VP	1	108	106	P	145	P	
					2	98	101	P	141	P	
					3	109	100	P	142	P	
					4	111	97	P	144	P	
					5	100	106	P	145	P	
07/26/01	DT 5	19/20	3096	VP	1	116	112	P	178	P	
					2	120	137	P	188	P	
					3	113	129	P	192	P	
					4	118	122	P	187	P	
					5	131	130	P	198	P	
07/26/01	DT-6	22/23	3096	VP	1	131	122	P	183	P	
					2	126	136	P	194	P	
					3	117	119	P	189	P	
					4	130	124	P	192	P	
					5	142	137	P	195	P	

Northwest L[illegible]ngs & Geotextile Products, Inc.

DESTRU[illegible]TIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010484
NWLG SUPERINTENDANT: Troy Jay WORD
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 07/29/01

SHEET 2 OF 3

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN			TENSILE VALUE		LAB PASS / FAIL PEEL / TENSILE
						INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	LBS / IN	PASS / FAIL	
7 129 101	DT-7	26/27	#3096	VP	1	123	118	P	208	P	
					2	126	129	P	207	P	
					3	114	108	P	217	P	
					4	123	106	P	205	P	
					5	124	121	P	212	P	
7 129 101	DT-8	33/34	"	"	1	139	131	P	205	P	
					2	123	136	P	213	P	
					3	128	118	P	215	P	
					4	125	133	P	209	P	
					5	114	124	P	214	P	
7 29 101	DT-9	24/38	"	"	1	110	127	P	209	P	
					2	116	120	P	206	P	
					3	114	117	P	210	P	
					4	123	126	P	213	P	
					5	115	106	P	199	P	
7 29 101	DT-10	38/40	"	"	1	128	121	P	214	P	
					2	127	133	P	206	P	
					3	113	114	P	217	P	
					4	122	128	P	202	P	
					5	114	117	P	214	P	
7 29 01	DT-11	40/41	"	"	1	110	124	P	171	P	
					2	133	103	P	179	P	
					3	133	103	P	152	P	
					4	123	104	P	177	P	
					5	104	123	P	175	P	
7 29 101	DT-12	41/42			1	130	125	P	181	P	
					2	108	132	P	180	P	
					3	104	136	P	180	P	
					4	106	136	P	177	P	
					5	127	109	P	171	P	

Northwest L ngs & Geotextile Products, Inc.

DESTRU TIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA

NWLG PROJECT # 010404

NWLG SUPERINTENDANT: TROY JAY WOLD

MATERIAL DESCRIPTION: 60 mil HDPE

DATE 08/01/01

SHEET 3 OF 3

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	TENSILE VALUE LBS / IN	PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
7 13001	DT-13	42/43	#3096	VP	1	127	128	P	212	P	
					2	130	147	P	207	P	
					3	143	147	P	211	P	
					4	114	135	P	206	P	
					5	128	132	P	208	P	
7 13081	DT-14	43/44	"	"	1	108	108	P	209	P	
					2	125	110	P	197	P	
					3	109	118	P	203	P	
					4	124	109	P	205	P	
					5	113	118	P	209	P	
7 13081	DT-15	44/45	"	"	1	130	153	P	197	P	
					2	139	157	P	198	P	
					3	134	138	P	202	P	
					4	139	136	P	196	P	
					5	136	137	P	197	P	
8 15 01	DT-16	46/47	3096	"	1	115	126	P	209	P	
					2	114	127	P	211	P	
					3	121	116	P	218	P	
					4	120	112	P	195	P	
					5	112	117	P	206	P	
8 15 01	DT-17	67/68	"	"	1	123	115	P	208	P	
					2	121	126	P	212	P	
					3	123	117	P	199	P	
					4	121	112	P	217	P	
					5	124	104	P	203	P	
8 15 01	DT-18	48/63	"	"	1	127	120	P	191	P	
					2	118	121	P	190	P	
					3	114	127	P	202	P	
					4	131	134	P	189	P	
					5	123	135	P	192	P	

Northwest Linings & Geotextile Products, Inc.

DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Tray Jay Wold
MATERIAL DESCRIPTION: 60mx HDPE

DATE: 7/21/01

SHEET 1 OF 4

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	TENSILE VALUE LBS / IN	PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
07/27/01	1T	8T/9T	3096	VP	1	102	122	P	148	P	
					2	112	97	P	150	P	
					3	98	102	P	141	P	
					4	110	119	P	149	P	
					5	113	110	P	152	P	
07/27/01	2T	1T/18T	3096	"	1	114	115	P	142	P	
					2	125	129	P	148	P	
					3	107	108	P	139	P	
					4	107	103	P	141	P	
					5	113	117	P	144	P	
07/27/01	3T	18T/19T	3096	"	1	118	111	P	137	P	
					2	122	119	P	139	P	
					3	126	129	P	145	P	
					4	107	126	P	147	P	
					5	133	126	P	147	P	
07/27/01	4T	19T/21T	3096	"	1	106	122	P	152	P	
					2	122	129	P	150	P	
					3	128	107	P	147	P	
					4	134	115	P	147	P	
					5	129	113	P	149	P	
07/27/01	5T	20T/22T	3096	"	1	136	122	P	144	P	
					2	129	128	P	138	P	
					3	126	108	P	147	P	
					4	104	118	P	153	P	
					5	132	120	P	154	P	
8/01/01	6T	24T/25T	3096	VP	1	123	112	P	162	P	
					2	106	104	P	170	P	
					3	115	117	P	164	P	
					4	121	100	P	169	P	
					5	116	114	P	166	P	

Northwest L[illegible]ngs & Geotextile Products, Inc.

DESTRU TIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA

NWLG PROJECT # 010404

NWLG SUPERINTENDANT: TRAY JAY WOLD

MATERIAL DESCRIPTION: 60 MIL HDPE

(T)

DATE 08T01/01

SHEET 2 OF 4

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	TENSILE VALUE LBS / IN	PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
8/1/01	DT-7 (T)	25T/26T	3096	VP	1	135	109	P	161	P	
					2	135	97	P	163	P	
					3	138	98	P	160	P	
					4	144	117	P	166	P	
					5	134	124	P	167	P	
8/1/01	D-8 (T)	26T/27T	"	"	1	138	135	P	161	P	
					2	143	136	P	159	P	
					3	144	135	P	152	P	
					4	138	141	P	160	P	
					5	140	141	P	161	P	
8/1/01	D-9 (T)	27T/28T	"	"	1	122	134	P	167	P	
					2	100	111	P	164	P	
					3	117	109	P	163	P	
					4	110	116	P	166	P	
					5	112	125	P	159	P	
8/1/01	DT-10 (T)	28T/29T	"	"	1	136	124	P	171	P	
					2	121	116	P	162	P	
					3	124	134	P	158	P	
					4	114	117	P	169	P	
					5	130	119	P	161	P	
8/1/01	DT-11 (T)	29T/30T	"	"	1	122	108	P	157	P	
					2	114	122	P	162	P	
					3	132	97	P	159	P	
					4	142	137	P	164	P	
					5	141	135	P	163	P	
8/1/01	DT-12 (T)	30T/31T	3096	VP	1	106	105	P	165	P	
					2	119	142	P	164	P	
					3	146	129	P	160	P	
					4	127	143	P	157	P	
					5	108	129	P	162	P	

Northwest Linings & Geotextile Products, Inc.

DESTRUCTIVE TEST LOG

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Thay Jay Wold
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 8/12/01

SHEET 3 OF 4

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	TENSILE VALUE LBS / IN	PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
8/12/01	DT#13T	41T / 42T	#3096	VP	1	126	121	P	180	P	
					2	103	110	P	179	P	
					3	126	136	P	172	P	
					4	117	113	P	167	P	
					5	114	117	P	174	P	
8/12/01	DT#14T	44T / 45T	"	"	1	127	124	P	179	P	
					2	115	120	P	180	P	
					3	110	114	P	183	P	
					4	126	117	P	176	P	
					5	128	112	P	174	P	
8/12/01	DT#15T	46T / 47T	"	"	1	109	127	P	173	P	
					2	118	129	P	169	P	
					3	133	117	P	174	P	
					4	105	116	P	171	P	
					5	124	128	P	178	P	
8/12/01	DT#16T	48T / 49T	"	VP	1	113	126	P	172	P	
					2	114	129	P	177	P	
					3	122	114	P	174	P	
					4	117	133	P	166	P	
					5	124	110	P	181	P	
8/16/01	DT#17T	51T / 52T	3096	VP	1	126	118	P	170	P	
					2	121	128	P	168	P	
					3	126	126	P	168	P	
					4	133	119	P	172	P	
					5	124	119	P	174	P	
8/16/01	DT#18T	52T / 53T	"	VP	1	124	139	P	177	P	
					2	113	121	P	180	P	
					3	126	132	P	169	P	
					4	118	124	P	172	P	
					5	132	121	P	176	P	

HDPE DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WALD
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 8/15/01

T

SHEET 4 OF 4

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
8/15/01	DT-19T	66T/67T	#3096	VP	1	124	138	P	171	P	
					2	110	106	P	166	P	
					3	138	122	P	164	P	
					4	112	114	P	173	P	
					5	112	124	P	168	P	
8/15/01	DT-20T	74T/77T Butt	"	"	1	107	102	P	129	P	
					2	104	115	P	131	P	
					3	107	104	P	131	P	
					4	103	102	P	134	P	
					5	103	106	P	131	P	
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CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 07 26 01

Project Location: E. HELENA MT.

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: Doug TISDELL

Owner's Representative: MARK RHODES

Authorized Representative:

I, the undersigned duly authorized representative of: HYDROMETRICS

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

Exceptions: Panels 1-19 60 MIL HDPE PRIME.

Authorized Representative: MARK RHODES

Name	Signature	Title	Date
MARK RHODES	[illegible]	[illegible]	7-26-01

Northwest Linings Representative:

Name	Signature	Title	Date
TRAY JAYWOLD	[signature]	SUPERINTENDENT	07 26 01

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 07 26 01

Project Location: E. HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: _____

Owner's Representative: MARK RHODES

Authorized Representative: MARK RHODES

I, the undersigned duly authorized representative of: HYDROMETRICS

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

Exceptions: Panels 1-24 Bottom 60 mil HDPE

Authorized Representative: MARK RHODES

MARK W. RHODES [illegible] INSPECTOR 7-26-01

Name Signature Title Date

Northwest Linings Representati[illegible]

TROY SAYWOLD [illegible] SUPERINTENDENT 07-26-01

Name Signature Title Date

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 07 29 01

Project Location: E. HELENA

Owner: ASARCO

General Contractor: ENVIRECON

Contractor's Representative:

Owner's Representative:

Authorized Representative: MARK RHODES

I, the undersigned duly authorized representative of: HYDROMETRICS

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions~~: BOTTOM LAYER of 60mil
JNLS 1-45

Authorized Representative: MARK RHODES

[illegible] — [illegible] 7-29-01

Name Signature Title Date

Northwest Linings Representative:

TIM TAYLOR SUPERINTENDENT 07 29 01

Name Signature Title Date

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08·01·01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative:

I, the undersigned duly authorized representative of: HYDROMETRICS / ENVIROCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

Exceptions: PNLS 1-24T

OWNERS ~~Authorized~~ Representative:

MARK W RHODES [illegible] 8-01-01

Name Signature Title Date

ENVIROCON ~~Northwest Linings~~ Representative:

[illegible] 08-01-01

Name Signature Title Date

NORTHWEST LININGS REPRESENTATIVE

TODAY JULY WAS [illegible] SUPERINTENDANT 08 01 01

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 02 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative: MARK RHODES

I, the undersigned duly authorized representative of: HYDROMETRICS/ENVIROCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions~~: PNLS 1-50T

Authorized Representative: MARK RHODES

Name	Signature	Title	Date
MARK W RHODES	[signature]	[illegible]	8-2-01

Northwest Linings Representative:

Name	Signature	Title	Date
TROY TAYWORD	[signature]	SUPERINTENDANT	08 02 01

ENVIROCON REPRESENTATIVE

NAME	SIGNATURE	TITLE	DATE
[illegible]	[signature]	GA/QC	08/02/01

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 05 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative: MARK RHODES

I, the undersigned duly authorized representative of: HYDROMETRICS

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions:~~ ENTIRE [illegible] SECONDARY 60 MIL LINER

Authorized Representative: MARK RHODES

[illegible] 8-5-01

Name Signature Title Date

Northwest Linings Representative:

TRAY THYWAD [signature] SUPERINTENDANT 08-05-01

Name Signature Title Date

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 06 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative:

Authorized Representative: DOUG TISDELL

I, the undersigned duly authorized representative of: ENVIROCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions~~: PANELS 1-53 ARE COMPLETE - TO INSTALL 85 & 278 IN THE NEAR FUTURE TO COMPLETE THE CELL

Authorized Representative: DOUG TISDELL

Name	Signature	Title	Date
[signature]	[signature]	QA/QC	08-06-01

Northwest Linings Representative:

Name	Signature	Title	Date
Troy Jaynard	[signature]	Superintendant	08 06 01

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 15 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIRCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative: MARK RHODES

I, the undersigned duly authorized representative of: HYDROKINETICS/ENVIRCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions~~: PNLS 64-78 Primary OK no install NET/FABRIC

Authorized Representative: MARK RHODES

[illegible] 8-15-01

Name Signature Title Date

Northwest Linings Representative:

[illegible] Superintendent 8.15.01

Name Signature Title Date

ENVIRCON Representative

[illegible]

NAME Sig TITLE DATE

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 15 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative: DOUG TISDELL

I, the undersigned duly authorized representative of: ENVIROCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions:~~ Cell 1 Complete Excluding Fabric 85 x 50'

* CONTRACTOR TO PICK UP MISC TRASH

Authorized Representative: DOUG TISDELL

Name	Signature	Title	Date
Douglas E. Tisdell		OWNER	08-15-01

Northwest Linings Representative:

Name	Signature	Title	Date
Troy Jaynes		SUPERINTENDANT	08 15 01

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655, Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell
SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell
To: ASARCO, Inc.

Date: August 22, 2001
Attn: Darrell Shew
Phone: (406) 227 - 7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS
☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	623	Northwest Linings Daily Submittals

Enclosed Northwest Linings production data for the following dates:

Panel Layout / Destructive Test Locations	07/25/01 through 08/15/01
Trial Weld Form	08/15/01
Panel Placement Form	08/03/01 through 08/15/01
Panel Seaming Form	08/06/01 through 08/15/01
Repair Report	08/15/01
Non Destructive Testing Form	08/15/01
Destructive Test Log	08/15/01
Certificate of Acceptance	08/15/01

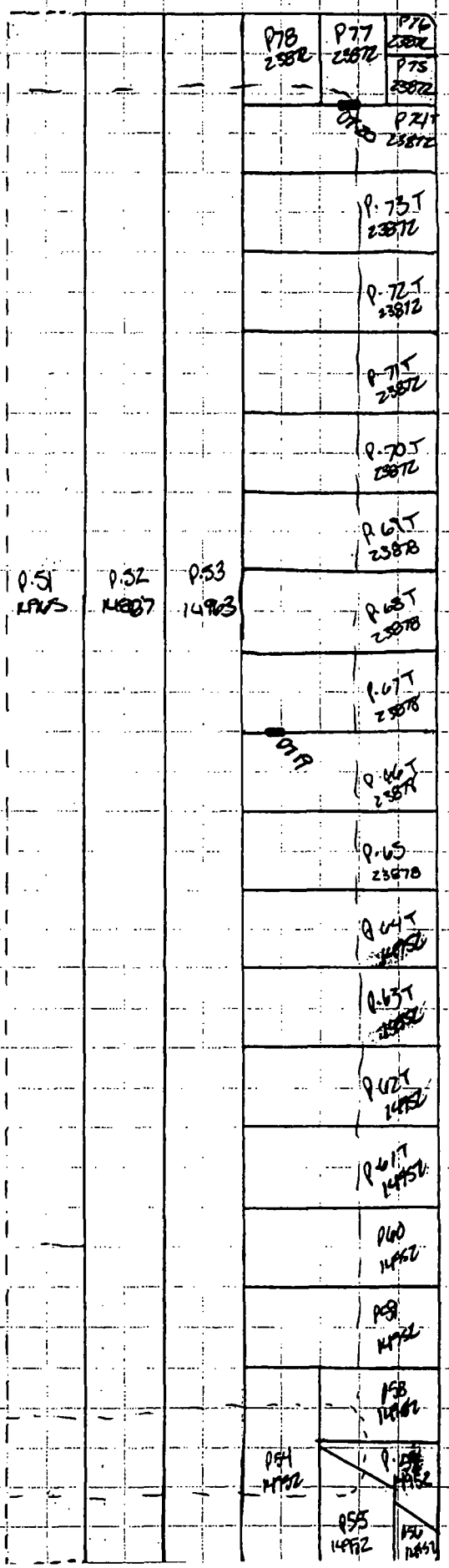
Northwest Linings Material Installation Summary

Note: Material summary is based on material inventory, and does not account for material overlap, scrap waste during installation, and does not reflect billable yardage. A shipment of Geotextile is in transport, and will be installed by Envirocon to complete installation of primary layer in entirety.

Material:	60 mil. HDPE Geomembrane	200 mil. Geonet	Geotextile Fabric
Approximate Quantity Installed on 08/15/01	2,300.83 sq. yd.	4,199.94 sq. yd.	5,000.0 sq. yd.
Approximate Quantity Installed to Date	50,446.46 sq. yd.	49,932.62 sq. yd.	28,000.0 sq. yd.

Signed: Douglas G. Tisdell Date: 08-22-01
QC Manager

A Washington Company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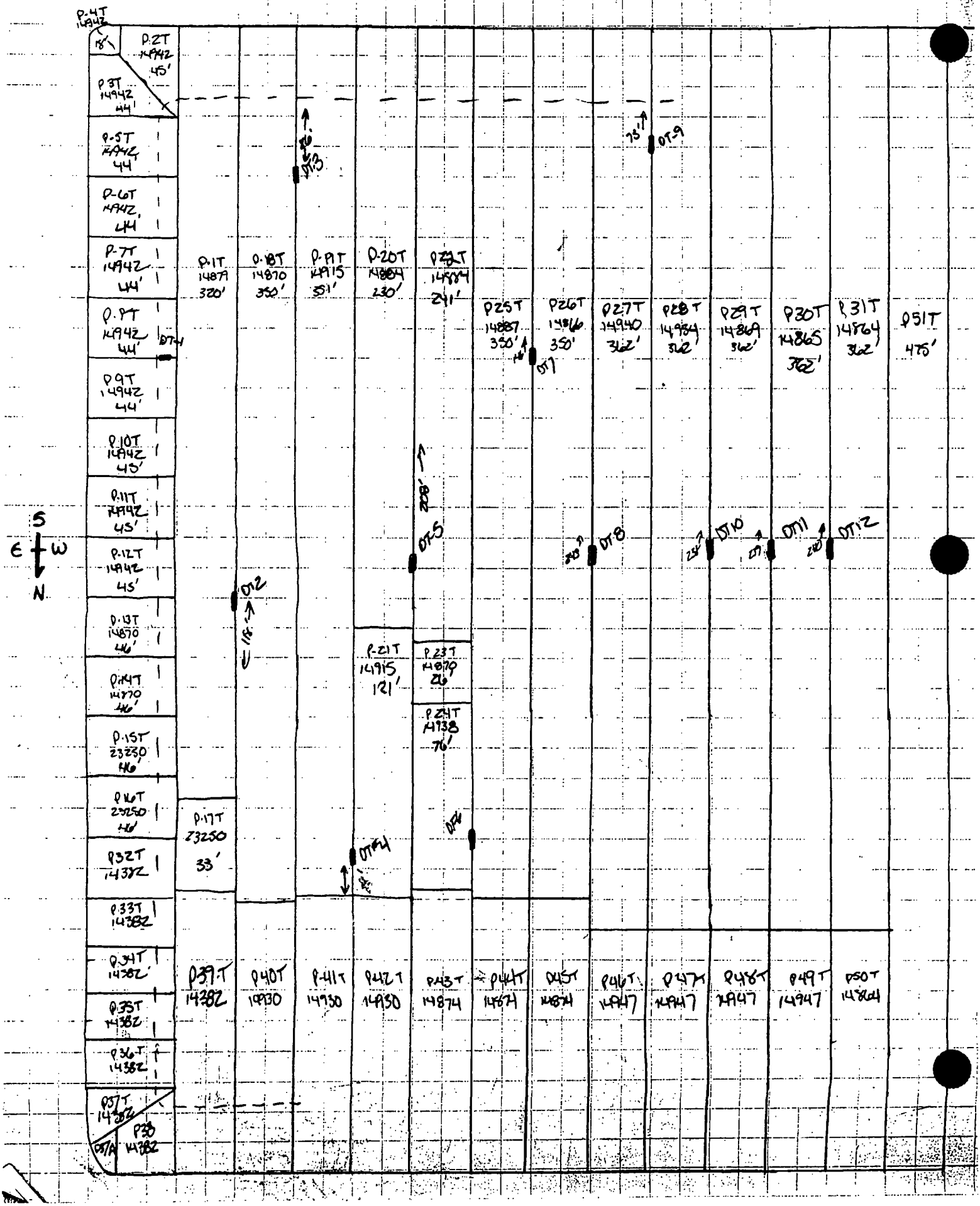

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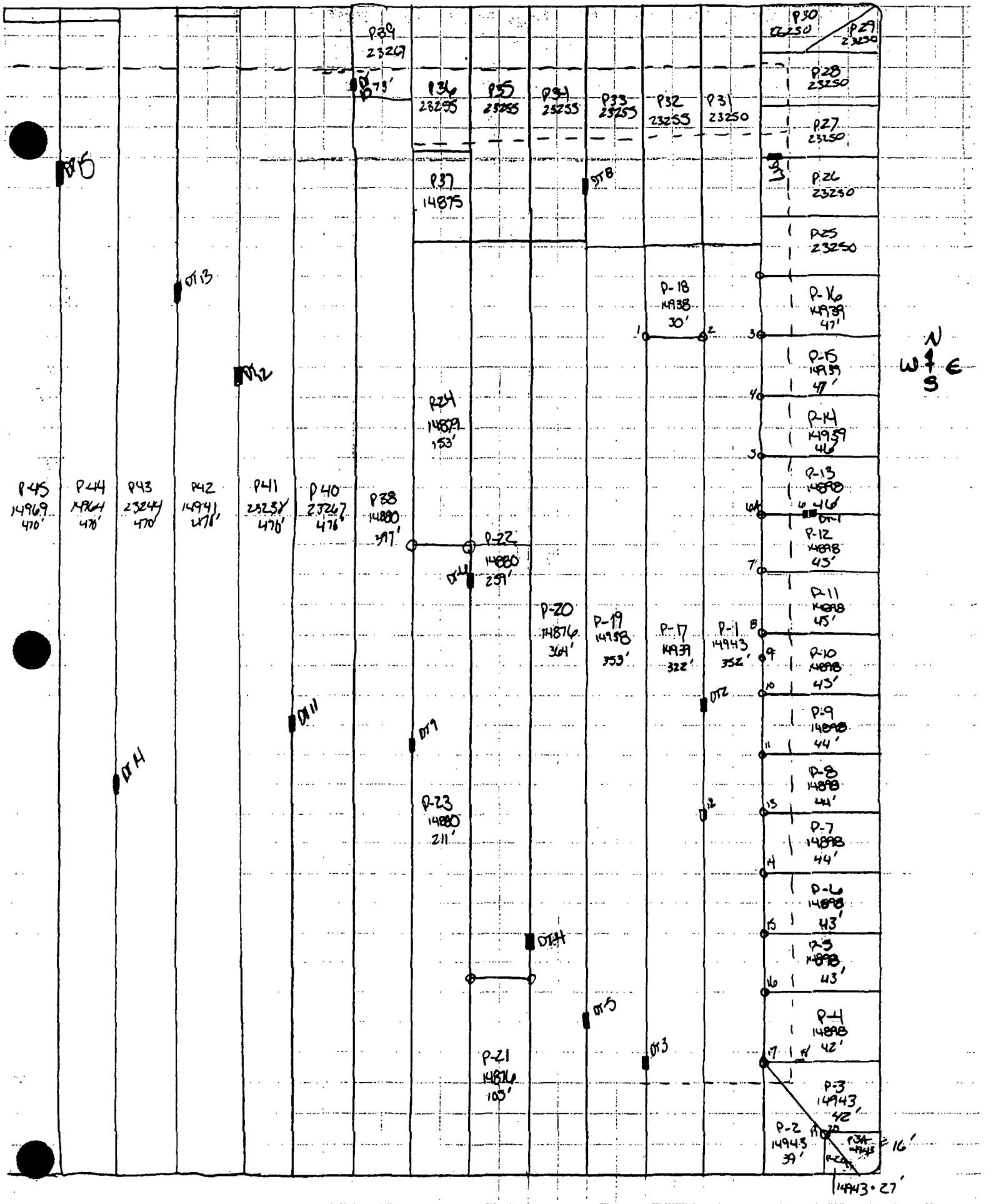
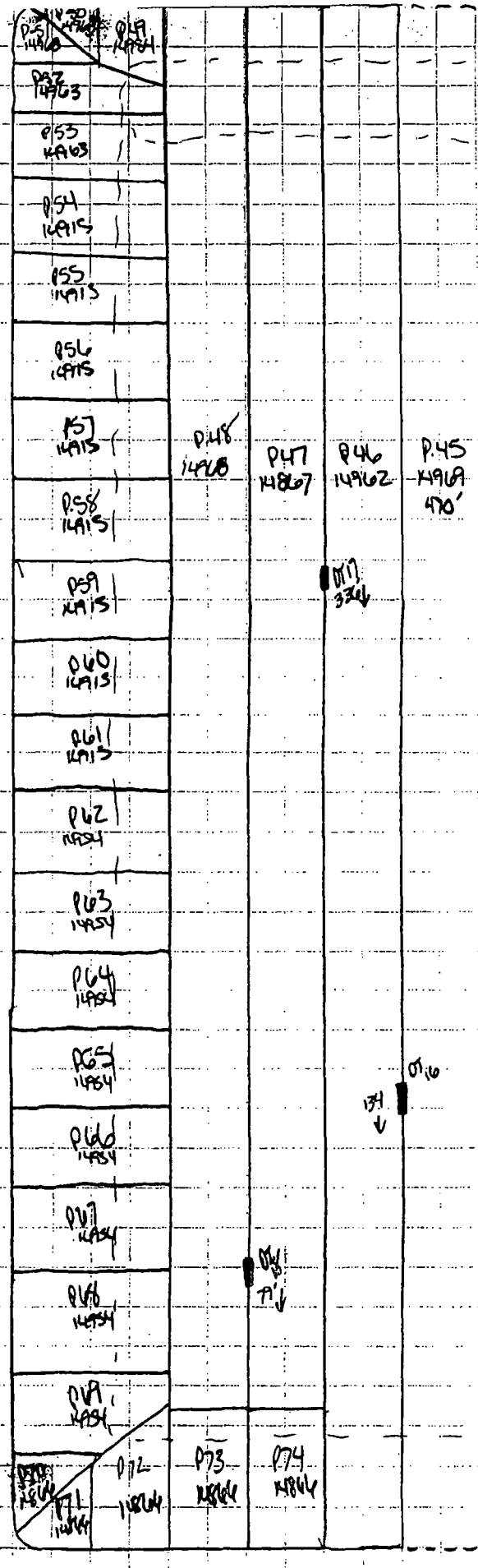
P-10T 14942 45'
P-11T 14942 45'
P-12T 14942 45'
P-13T 14870 46'
P-14T 14870 46'
P-15T 23250 46'
P-16T 23250 46'
P-32T 14382
P-33T 14382
P-34T 14382
P-35T 14382
P-36T 14382
P-37T 14382
P-38 14382
P-1T 14879 320'
P-18T 14870 350'
P-19T 14915 351'
P-20T 14884 230'
P-22T 14884 241'
P-25T 14887 350'
P-26T 14866 350'
P-27T 14940 362'
P-28T 14954 362'
P-29T 14869 362'
P-30T 14865 362'
P-31T 14864 362'
P-51T 475'
P-17T 23250 33'
P-21T 14915 121'
P-23T 14879 26'
P-24T 14938 76'
P-39T 14382
P-40T 14930
P-41T 14930
P-42T 14930
P-43T 14874
P-44T 14874
P-45T 14874
P-46T 14947
P-47T 14947
P-48T 14947
P-49T 14947
P-50T 14864
DT-1
DT-2
DT-3
DT-4
DT-5
DT-6
DT-7
DT-8
DT-9
DT-10
DT-11
DT-12
S
E
W
N



P30 23250
P29 23250
P28 23250
P27 23250
P26 23250
P25 23250
P-16 14939 47'
P-15 14939 47'
P-14 14939 46'
P-13 14898 46'
P-12 14898 43'
P-11 14898 45'
P-10 14898 43'
P-9 14898 44'
P-8 14898 44'
P-7 14898 44'
P-6 14898 43'
P-5 14898 43'
P-4 14898 42'
P-3 14943 42'
P-2 14943 39'
P-1 14943 352'
P-17 14939 322'
P-19 14938 353'
P-20 14876 364'
P-21 14876 105'
P-22 14880 259'
P-23 14880 211'
P-24 14879 153'
P-18 14938 30'
P-37 14875
P-36 23255
P-35 23255
P-34 23255
P-33 23255
P-32 23255
P-31 23250
P-39 23267
P-38 14880 397'
P-40 23267 476'
P-41 23238 476'
P-42 14941 476'
P-43 23244 470'
P-44 14964 470'
P-45 14969 470'
DT-1
DT-2
DT-3
DT-4
DT-5
DT-6
DT-7
DT-8
DT-9
DT-11
DT-12
DT-13
DT-14
DT-15
N
W
E
S
16'
14943 · 27'

ASARCO

E. HELENA



406 443-4150
SANTA HOST

TRIAL WELD FORM

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Tray Jay Ward
MATERIAL DESCRIPTION: 60mk HDPE

DATE: 8/02/01

SHEET ____ OF ____

DATE/ TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS			FUSION WELDS			PASS / FAIL	COMMENTS
					BARREL TEMP	PREHEAT TEMP	PEEL / TENSILE	WEDGE TEMP	SET SPEED FT / MIN	PEEL / TENSILE		
08/02/01	CW	001	55°	Sun	520°	300°	121 129 / 120 121				P	
8/02/01	J.OH / JOHAN	001	65	"	530	300	122 126 / 130 152				P	
8/13/01 630	VP	#201						750	8.5	110 112 / 130 134 129 115	P	172-176
8/14/01	VP	#201						750	8.0	117 115 / 124 137 123 109	P	176-173
8/15/01	KK	#1			530	300	114 132 / 125				P	156-163
8/14/01	KK	#1			530	300	112 118 / 130				P	162-159
8/15/01	KK	#1			530	300	119 124 / 117				P	164-161
8/15/01	VP	#201						750	8.5	102 101 / 122 108 102 124	P	163-169
8/15/01	MK	#6	80°	Sun				760°	8.5	109 110 / 109	P	162-163
8/16/01	VP	#1			530	300	112-119 / 120				P	169-167
8/16/01	VP	#6								111 132 / 126 112 134 128	P	170-182
8/15/01	XB	6	80°	Sun				750°	8.5	120 127 / 124 120	P	180-183
8/15/01	CC	001	90°	Sun	520°	300°	113 / 115 117				P	170-171
/ /												
/ /												

PANEL PLACEMENT FORM

446

PROJECT NAME: ASARCO E. HELENA (T) PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
08 01 01	44 T	14874	115'	23'	
08 01 01	45 T	14874	115'	23'	
08 01 01	46T	14947	115'	23'	
08 01 01	47 T	14947	115'	23'	
08 01 01	48T	14947	115'	23'	
08 01 01	49 T	14947	115'	23'	
08 01 01	50T	14864	115'	23'	
08 04 01	51T	14965	470'	23'	
08 04 01	52 T	14887	470'	23'	
08 04 01	53T	14963	470'	23'	
08 06 01	54	14952	70'	23'	
08 04 01	55	14952	82'	23'	
08 04 01	56	14952	42'	23'	

546

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA (T) PROJECT NUMBER: 00404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
08 06 01	57 T	14952	80'	23'	
08 06 01	58 T	14952	80'	23'	
08 06 01	59 T	14952	81'	23'	
08 06 01	60 T	14953	88'	23'	
08 06 01	61 T	14953	87'	23'	
08 06 01	62 T	14953	91'	23'	
08 06 01	63 T	14953	91'	23'	
08 06 01	64 T	14953	92'	23'	
8 15 01	65 T	23878	92'	23'	
8 15 01	66 T	23878	93'	23'	
8 15 01	67 T	23878	93'	23'	
8 15 01	68 T	23878	93'	23'	
8 15 01	69 T	23878	93'	23'	

646

PANEL PLACEMENT FORM

T

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 MIL HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
8 15 01	70	23872	92'	23'	
8 15 01	71	23872	91'	23'	
8 15 01	72	23872	93'	23'	
8 15 01	73	23872	92'	23'	
8 15 01	74	23872	92'	23'	
8 15 01	75	23872	44'	23'	
8 15 01	76	23872	46'	23'	
8 15 01	77	23872	69'	23'	
8 15 01	78	23872	70'	23'	

446

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
07 28 01	38	14875	397'	23'	
07 28 01	39	23267	73'	23'	
07 29 01	40	23267	476'	23'	
07 29 01	41	23238	470'	23'	
07 29 01	42	14941	470'	23'	
07 29 01	43	23244	470'	23'	
07 29 01	44	14964	470'	23'	
07 29 01	45	14969	470'	23'	
08 03 01	46	14962	470'	23'	
08 03 01	47	14867	465'	23'	
08 03 01	48	14968	469'	23'	
08 03 01	49	14954	50'	23'	
08 03 01	50	14963	50'	23'	

516

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
080301	51	14968	43'	23'	
080301	52	14963	49'	23'	
0803	53	14868	62'	23'	
080301	54	14868	63'	23'	
080301	55	14963	43'	23'	
080301	56	14963	64'	23'	
080301	57	14963	64'	23'	
080301	58	14963	64'	23'	
080301	59	14865	64'	23'	
080301	60	14865	65'	23'	
080301	61	14865	65'	23'	
080301	62	14864	65'	23'	
080301	63	14854	65'	23'	

6 of 6

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
08-03-01	64	14954	65'	23'	
08-04-01	65	14954	65'	23'	
08-04-01	66	14954	65'	23'	
08-04-01	67	14954	65'	23'	
08-04-01	68	14954	66'	23'	
08-04-01	69	14954	66'	23'	
08-04-01	70	14864	60'	23'	
08-04-01	71	14864	58'	23'	
08-04-01	72	14864	66'	23'	
08-04-01	73	14864	71'	23'	
08-04-01	74	14864	91'	23'	

PANEL SEAMING FORM

1

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Wold
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 8/01/01

SHEET 4 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
08/01/01	43/44		115'	XB	201	750°	CLD	5-10	70°	
08/01/01	44/45		115'	SOP	108	750°	cld	5-10	65°	
08/01/01	45/46		115'	XB	201	750°	cld	10-15	65°	
08/01/01	46/47		115'	SOP	108	750°	cld	10-15	65°	
08/01/01	47/48		115'	XB	201	750°	cld	10-15	65°	
08/01/01	48/49		115'	SOP	108	750°	cld	10-15	65°	
08/01/01	49/50		115'	XB	201	750°	cld	10-15	65°	
8/04/01	50/51		470'	VP	201	750°	cld	5-10	70°	
8/4/01	51/52		470'	VP	201	750°	cld	5-10	70°	
8/4/01	52/53		470'	VP	201	750°	cld	5-10	70°	
8/6/01	53/54-64		470'	MC	208	750	cld	5-10	80°	
08/6/01	54/55		70'	MC	108	750°	cld	5-10	90°	
8/6/01	55/56		46'	MC	108	750°	Sun	5-10	90°	
8/6/01	56/57		38'	VP	201	750°	Sun	5-10	90°	
8/6/01	57/58		49'	VP	201	750°	Sun	5-10	90°	

HDPE PANEL SEAMING FORM

(T)

PROJECT NAME: ASARCO E. HELENA

NWLG PROJECT # 010404

NWLG SUPERINTENDANT: Troy Jay Wold

MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 8/6/01

SHEET 5 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
8/6/01	58/59		90'	VP	201	750'	Sun	0-5	80'+	
8/6/01	59/60		90'	MK	108	750'	Sun	0-5	80+	
8/6/01	60/61		91'	VP	201	750'	Sun	5-10	80+	
8/6/01	61/62		91'	MK	108	750'	Sun	5-10	80+	
8/6/01	62/63		92'	VP	201	750'	Sun	5-10	80+	
8/6/01	63/64		92'	MK	108	750'	Sun	5-10	80+	
8/15/01	64/65		92'	XB	6	750'	Sun	5-10	90'	
8/15/01	65/66		92'	XB	6	750'	Sun	5-10	90+	
8/15/01	66/67		92'	XB	6	750'	Sun	5-10	90'	DT-19
8/15/01	67/68		92'	XB	6	750'	Sun	5-10	90'	
8/15/01	68/69		92'	XB	6	750'	Sun	0-5	90'	
8/15/01	69/70		92'	XB	6	750'	Sun	0-5	90'	
8/15/01	70/71		92'	XB	6	750'	Sun	0-5	90'+	
8/15/01	71/72		92'	XB	6	750'	Sun	0-5	90'	
8/15/01	72/73		92'	XB	6	750'	Sun	0-5	90'	

HDPE PANEL SEAMING FORM

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 8/15/01

SHEET 6 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
8/15/01	73/74		92'	XB	4	750°	Sun	0-5	90°	
8/15/01	74/75		42'	XB	4	750°	Sun	0-5	90°	OT 20
8/15/01	75/76		42'	XB	4	750°	Sun	0-5	90°	
8/15/01	76/77		23'	XB	4	750°	Sun	0-5	90°	
8/15/01	77/78		49'	XB	4	750°	Sun	0-5	90°	
8/15/01	78/53		49'	XB	4	750°	Sun	0-5	90°	
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REPAIR REPORT

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 020404
NWLG SUPERINTENDANT: Ray Jay Wold
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 8/15/01

SHEET _____ OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/15/01	95	64/65/64"	001	KC	2x2' Patch Butt	8/15	✓
8/15/01	96	P-64A/53/65	001	KC	2x2' Patch Butt	8/15	✓
8/15/01	97	P-53-65-66	001	KC	2x2' Patch Butt	8/15	✓
8/15/01	98	P-66/67	001	KC	2x4' Patch DT-19'	8/15	✓
8/15/01	99	P-53-66-67	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	100	P53-67-68	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	101	P53-68-69	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	102	P-53-69-70	001	KC	1x1' Patch Butt	8/15	✓
8/15/01	103	P-53-70-71	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	104	P-53-71-72	001	KC	1x2' Patch Butt	8/15	✓
8/15/01	105	P-53-72-73	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	106	P-53-73-74	001	KC	1x1' Patch Butt	8/15	✓
8/15/01	107	P-53-76-74	001	KC	1x1' Patch Butt	8/15	✓
8/15/01	108	P-77-78-74	001	KC	2x3' Patch Butt	8/15	✓
8/15/01	109	P-74-77	001	KC	2x4' Patch DT-20'	8/15	✓
8/15/01	110	P-74-75-77	001	KC	1x1 Patch Butt	8/15	✓

REPAIR REPORT

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Sayworld
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 8/15/01

SHEET _____ OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/15/01	111	P-75-76-77	001	KC	1X1 Patch Butt	8/15	✓
8/15/01	112	P-53-78	001	KC	1X1 Patch Seam Burn	8/15	✓
8/15/01	113	P-76-77	001	KC	1X1 Patch Burn out	8/15	✓
8/15/01	114	77	001	KC	Bead	8/15	✓
8/15/01	115	75	001	KC	Bead	8/15	✓
8/15/01	116	68	001	KC	Bead	8/15	✓
8/15/01	117	67	001	KC	Bead	8/15	✓
8/15/01	118	67	001	KC	Bead	8/15	✓
8/15/01	119	65	001	KC	Bead	8/15	✓
8/15/01	120	59	001	KC	Bead	8/15	✓
8/15/01	121	65	001	KC	Bead	8/15	✓
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NON DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: THOMAS WOLD
MATERIAL DESCRIPTION: 10 MIL HDPE

DATE 8/15/01

SHEET 7 OF 7

DATE/ TIME	SEAM #	TESTER INITIALS	AIR PRESSURE TESTING START PRESSURE/ TIME	AIR PRESSURE TESTING ENDING PRESSURE/ TIME	AIR PRESSURE TESTING PRESSURE LOSS	AIR PRESSURE TESTING PASS/ FAIL	VACUUM BOX PASS / FAIL	COMMENTS / LOCATION
8/15/01	64/65	VP	34 920	32 925	2	P	P	
8/15/01	65/66	VP	31 920	29 925	2	P	P	
8/15/01	66/67	VP	30 921	29 926	1	P	P	
8/15/01	67/68	VP	34 921	34 926	0	P	P	
8/15/01	68/69	VP	32 922	32 927	0	P	P	
8/15/01	69/70	VP	34 933	33 938	1	P	P	
8/15/01	70/71	VP	34 1040	34 1045	0	P	P	
8/15/01	71/72	VP	35 1040	33 1045	2	P	P	
8/15/01	72/73	VP	32 1033	32 1038	0	P	P	
8/15/01	73/74	VP	34 1033	33 1038	1	P	P	
8/15/01	74/75	VP	33 12:55	33 1:00	0	P	P	
8/15/01	75/76	VP	32 12:55	32 1:00	0	P	P	
8/15/01	76/77	VP	33 12:55	33 1:00	0	P	P	
8/15/01	77/78	VP	33 12:35	32 12:40	1	P	P	
8/15/01	78/53	VP	34 12:35	34 12:40	0	P	P	
8/15/01	65/53	VP	31 11:30	31 11:35	0	P	P	Butt
8/15/01	66/53	VP	33 11:30	33 1:35	0	P	P	Butt

NON DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Taylor
MATERIAL DESCRIPTION: 60 mil HDPE

7

DATE: 8/15/01

SHEET 7 OF 7

DATE/ TIME	SEAM #	TESTER INITIALS	AIR PRESSURE TESTING START PRESSURE/ TIME	AIR PRESSURE TESTING ENDING PRESSURE/ TIME	AIR PRESSURE TESTING PRESSURE LOSS	AIR PRESSURE TESTING PASS/ FAIL	VACUUM BOX PASS / FAIL	COMMENTS / LOCATION
8/15/01	67/53	VP	34 / 11:38	34 / 11:43	0	P	P	Butt
8/15/01	68/53	VP	33 / 11:38	32 / 11:43	1	P	P	"
8/15/01	69/53	VP	33 / 11:45	33 / 11:50	0	P	P	"
8/15/01	70/53	VP	31 / 11:45	31 / 11:50	0	P	P	"
8/15/01	71/53	VP	31 / 11:52	31 / 11:57	0	P	P	"
8/15/01	72/53	VP	31 / 11:52	31 / 11:57	0	P	P	"
8/15/01	73/53	VP	32 / 11:59	30 / 12:04	2	P	P	"
8/15/01	74/53	VP	31 / 11:59	31 / 12:04	0	P	P	Butt
8/15/01	75/74	VP	32 / 12:47	32 / 12:52	0	P	P	Butt
8/15/01	77/74	VP	35 / 12:47	34 / 12:52	1	P	P	"
8/15/01	78/74	VP	33 / 12:47	33 / 12:52	0	P	P	Butt
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HDPE DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WALD
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 8/15/01

SHEET 4 OF 4

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS	PEEL VALUES LBS/IN			TENSILE VALUE		LAB PASS / FAIL PEEL / TENSILE
					INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	LBS / IN	PASS / FAIL	
8/15/01	DT-19T	66T/67T	#3096	VP	124	138	P	171	P	
					110	106	P	166	P	
					138	122	P	164	P	
					112	114	P	173	P	
					112	124	P	168	P	
8/15/01	DT-20T	74T/77T Butt	"	"	107	102	P	129	P	
					104	115	P	131	P	
					107	104	P	131	P	
					103	102	P	134	P	
					103	106	P	131	P	
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CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 15 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative: DOUG TISDELL

I, the undersigned duly authorized representative of: ENVIROCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions:~~ Cell 1 Complete Excluding Fabric 75 x 50'

* CONTRACTOR TO PICK UP MISC TRASH

Authorized Representative: DOUG TISDELL

Name	Signature	Title	Date
Douglas G. Tisdell		GM/SC	08-15-01

Northwest Linings Representative:

Name	Signature	Title	Date
TROY JAYWALD		SUPERINTENDANT	08 15 01

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655, Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell
SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell

To: ASARCO, Inc.

Date: August 24, 2001

[redacted]w

Phone: (406) 227 - 7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS
☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	623	Geomembrane, Geonet, and Geotextile Manufacturers Certification of Compliance for materials installed in Cell 1 on August 15, 2001.

Northwest Linings Material Installation Summary

Note: Material summary is based on material inventory, and does not account for material overlap, scrap waste during installation, and does not reflect billable yardage.

Material:	60 mil. HDPE Geomembrane	200 mil. Geonet	Geotextile Fabric
Approximate Quantity Installed on 08/23/01	0.00 sq. yd.	0.00 sq. yd.	500.0 sq. yd.
Approximate Quantity Installed to Date	50,446.46 sq. yd.	49,932.62 sq. yd.	28,500.0 sq. yd.

Signed: Douglas G. Tisdell Date: August 24, 2001
QC Manager

A Washington Company

BILL OF LADING–SHORT FORM–NOT NEGOTIABLE

Carrier	CPF	Trailer No.	Date	Shipment No.	Bill of Lading No.
CIRCLE P FARMS		01	08/08/2001	6084	6074

RECIEVED, subject to the classifications and lawfully allowed tariffs in effect on the date of issue of this Bill of Lading.

The property described below in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below which said carrier (the word carrier being understood throughout this contract as any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutally is agreed as to each carrier of all or any said property over all or any portion of said route to destination, and as to each party at any time interested in all or any said property, that every service to be made hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classification in effect on the date hereof, if this is a rail or a rail-water shipment, in the applicable motor carrier classification or tariff if this is a motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

From:
Shipper (Origin)
EVERGREEN TECHNOLOGIES, INC.
200 MILLER SELLERS DRIVE
EVERGREEN, AL 36401

To:
Cosignee
NORTHWEST LININGS
ENVIROCON - C/O ASARCO
200 SMELTER AVENUE
EAST HELENA, MI 59635

ETI Order Number: **0003224-00** Customer Purchase Order: **C-868** Job Number:

TES/TET#: 3055 **TMP#:** **Freight Terms:** PPD

Order Comments TES-3055 / TMP # 39569
CONTACT AT SITE - TJ - 406-544-4824.

Bill of Lading Comments

No. Pkgs		Kind of Package, Description of Articles, Special Marks and Exceptions	Weight
4	NS1400168300	NS1400 14x300 4,200ft2	3,240
3	TG650180300N8N	TG650 15x300 500y2	703

7 **Total Pkgs** **Total Weight** 3,942 lbs

Cosignee Signature			Delivery Date
REMIT C.O.D. TO:	C.O.D. Amt$	C.O.D Fee:	☐ Prepaid ☐ Collect $

Subject to Section 7 of conditions, if this shipment is to be delivered to the cosignee without recourse on the cosignor, the cosignor shall sign the following statement:
the carrier shall not make delivery of the shipment without payment of freight and all other lawful charges.

_____ (Signature of Cosignor)

Freight charges are PREPAID unless marked collect. **Check box if charges are Collect.** ☐

This is to certify that the above named materials are properly classified, described, packaged, marked and labled, and are in proper condition for transportation, according to the applicable regulations of the Department of Transportation.

EVERGREEN TECHNOLOGIES, INC.
200 MILLER SELLERS DRIVE - EVERGREEN, AL 36401
Permanent post office address of shipper

Shipper, Per _____ Agent, Per _____

Packing List

8-Aug-01 **12:15:28**

Order Number 0003224-00 **PO Number:** C-868

Shipment Number: 6084

Customer NOR300

Ship To: NORTHWEST LININGS
ENVIROCON - C/O ASARCO
200 SMELTER AVENUE
EAST HELENA, MI 59635

Line	Roll Number	Lot Number	Product Code
1	1302291	13060	NS1400168300
2	1302328	13058	NS1400168300
3	1302329	13058	NS1400168300
4	1302330	13058	NS1400168300
5	200104279	10049	TG650180300N8N
6	200104280	10049	TG650180300N8N
7	200104281	10049	TG650180300N8N

EVERGREEN
TECHNOLOGIES, INC.

August 12, 2001

Northwest Linings &
Geotextile Products
21000 77TH Avenue South
Kent, WA 98032
Attn: Mark Wells

Subj.: TG650 Nonwoven Geotextile Certificate of Compliance

Customer Order # 3224-00, PO# C-868, Project: Asarco Smelter
TES # 3055, Shipment # 6084, B/L # 6074

Dear Mr. Wells:

The roll list, lot 10049, shows the roll numbers with the nine digits, which have been converted from rolls listed in the slit roll column and original roll column.

Respectfully,

Donna Womack

Donna Womack
Certification Coordinator

5883 Glenridge Drive / Suite 200 / Atlanta, Georgia 30328
Tel. 800-984-9784 / Fax 404-705-9650

200 Miller Sellers Drive / Evergreen, Alabama 36401
Tel. 334-578-9003 • Fax 334-578-6141

EVERGREEN
TECHNOLOGIES, INC.

August 12, 2001

Northwest Linings &
Geotextile Products
21000 77TH Avenue South
Kent, WA 98032
Attn: Mark Wells

Subj.: TG650 Nonwoven Geotextile Certificate of Compliance

Customer Order # 3224-00, PO# C-868, Project: Asarco Smelter
TES # 3055, Shipment # 6084, B/L # 6074

Dear Mr. Wells:

This letter certifies that TG650 is a metal-free Nonwoven polypropylene Geotextile, shipped from Evergreen, Alabama, manufactured by Evergreen Technologies Inc. (ETI), meets or exceeds the minimum requirements listed below and was shipped from Lot # 10049.

PROPERTY	TEST PROCEDURE	VALUE(1)	
Grab Strength	ASTM D 4632	180	lbs
Grab Elongation	ASTM D 4632	50	%
Puncture Resistance	ASTM D 4833	75	lbs
Tear Strength	ASTM D 4533	75	lbs
A.O.S. (2)	ASTM D 4751	40	* US Std Sieve (max)
U.V. Resistance (150 Hours)	ASTM D 4355	70	%

(1) Values in weaker principle direction. Unless noted otherwise, these values represent minimum average roll values (i.e. test results from any sampled roll in a lot, tested in accordance with ASTM D 4759-88 will meet or exceed the minimum values listed with a 97.7% level of confidence).

(2) Smaller sieve size number represents the maximum average roll value.

* Determined at the time of manufacturing, storage and handling conditions, which differ from those, found in ASTM D 4873-88 may influence these properties.

Unless noted otherwise, this certification is based on testing conducted by Evergreen Technologies Quality Assurance & Quality Control testing laboratories at the time of manufacturing. Evergreen Technologies issues this letter of certification to indicate our commitment to providing our customers with a quality product which will meet or exceed the minimum average roll values in accordance with the applicable American Society for Testing and Materials (ASTM) test method.

Respectfully,

Jonathan McCulley
QA / QC Supervisor

5883 Glenridge Drive / Suite 200 / Atlanta, Georgia 30328
Tel. 800-984-9784 / Fax 404-705-9650

200 Miller Sellers Drive / Evergreen, Alabama 36401
Tel. 334-578-9003 • Fax 334-578-6141

Report Date. 12/2001 Time: 08:34:34
Product Type: NS1400 BLACK
Lot Number: 13060
Dimension: 14 ft 0 in X 300 ft

Evergreen Te[illegible]logies Inc.
Quality Control Lab
Evergreen, Alabama

Net Product Report

Reviewed By:
QA [illegible]
Engineer

Roll No.	Test Date	Strip Tensile ASTM D 5035 MD Tensile (lbs/in)	Strip Tensile ASTM D 5035 CD Tensile (lbs/in)	Mass/Area ASTM D5199 (lbs/ft2)	Thickness ASTM D5199 (mils)	Carbon Black Content ASTM D 4218 (%)	+ Transmissivity ASTM D4716 (m2/s) 10-3	10-4	10-5	Density ASTM D1505 (g/cc)
1302288	07/31/2001	63.8	18.6	0.1917	225.90	2.58	1.0895	10.895	108.95	0.9440
1302290	07/31/2001	56.5	22.1	0.1944	230.10	2.77				0.9460
1302292	07/31/2001	65.8	22.4	0.2038	232.10	2.63				0.9470
1302295	08/01/2001	71.6	23.2	0.1955	246.00	2.61	1.0503	10.503	105.03	0.9490
1302297	08/01/2001	75.9	24.6	0.2109	240.20	2.82				0.9480
1302299	08/01/2001	62.1	19.8	0.2003	227.30	2.67				0.9510
1302301	08/01/2001	57.8	20.5	0.1909	225.50	2.77				0.9480
1302303	08/01/2001	75.1	22.3	0.1943	230.50	2.72	1.0295	10.295	102.95	0.9420
1302305	08/01/2001	76.5	21.8	0.1979	230.40	2.75				0.9520
1302307	08/01/2001	62.1	20.3	0.1932	227.60	2.83				0.9520
1302309	08/02/2001	63.6	21.1	0.1898	231.20	2.68				0.9510
1302311	08/02/2001	62.9	22.2	0.1910	232.50	2.72	1.0046	10.046	100.46	0.9530
1302312	08/02/2001			0.1869	224.60					
1302313	08/02/2001	65.8	20.9	0.1822	222.30	2.89				0.9450
130[illegible]	[illegible]/02/2001	65.3	18.1	0.1807	221.10	2.61				0.9510
13023[illegible]	[illegible]					2.52				
Average		66.1	21.3	0.1936	229.82	2.69	1.0435	10.435	104.35	0.9485
Standard Deviation =		[illegible]4	1.8	0.0078	6.49		0.0359	0.359	3.59	0.0034

Transmissivity tested at 4,00[illegible] 1 0, configuration = p/sample/p 8.0 x 10-4 m2/sec, 15 minutes seating time.

Report Date: /2/2001 Time: 08:34:04
Product Type: NS1400 BLACK
Lot Number: 13058
Dimension: 14 ft 0 in X 300 ft

Evergreen Te[illegible]logies Inc.
Quality Co[illegible]ol Lab
Evergreen, Alabama

Reviewed By:
QA
Engineer

Net Product Report

Roll No.	Test Date	Strip Tensile ASTM D 5035 MD Tensile (lbs/in)	Strip Tensile ASTM D 5035 CD Tensile (lbs/in)	Mass/Area ASTM D5199 (lbs/ft2)	Thickness ASTM D5199 (mils)	Carbon Black Content ASTM D 4218 (%)	+ Transmissivity ASTM D4716 (m2/s) 10-3	10-4	10-5	Density ASTM D1505 (g/cc)
1302327	08/02/2001	56.3	21.4	0.1956	230.60	2.38	1.0047	10.047	100.47	0.9510
1302331	08/10/2001	63.0	28.7	0.1869	235.00	2.71	1.0458	10.458	104.58	0.9480
1302332	08/03/2001	62.2	23.4	0.2070	239.90	2.34	1.0096	10.096	100.96	0.9420
1302333	08/03/2001	71.4	27.1	0.2111	236.00	2.42				0.9420
Average =		63.3	25.1	0.2001	235.38	2.46	1.0200	10.200	102.00	0.9458
Standard Deviation =		6.2	3.3	0.0110	3.82		0.0224	0.224	2.24	0.0045

Transmissivity tested at 4,000 psf, gradient = 1.0, configuration = p/sample/p 5.0 x 10-4 m2/sec, 15 minutes seating time.

EVERGREEN
TECHNOLOGIES, INC.

August 12, 2001

Northwest Linings &
Geotextile Products
21000 77TH Avenue South
Kent, WA 98032
Attn: Mark Wells

Subj.: NS1400 Geonet Certificate of Compliance

Customer Order # 3224-00, PO# C-868, Project: Asarco Smelter
TES # 3055, Shipment # 6084, B/L # 6074

Dear Mr. Wells:

This letter certifies that NS1400, a 200 mil polyethylene geonet shipped from Evergreen, Alabama, manufactured by Evergreen Technologies, Inc. (ETI), meets or exceeds the minimum requirements listed below and was shipped from Lot #s 13058 and 13060.

PROPERTY	TEST PROCEDURE	VALUE(1)	
Transmissivity (2)	ASTM D 4716	5.0	$x10^{-4}$ m^2/sec
Thickness	ASTM D 5199	200	Mil
Compressive Strength	ASTM D 1621	100	ppi

Resin Information

A minimum 97% virgin polyethylene is used to produce NS1400. Railcar Numbers NCIX-1706 and NCIX-1097, HDPE.

(1) Unless noted otherwise, these values represent minimum average roll values (i.e. test results from any sampled roll in a lot, tested in accordance with ASTM D 4759-88 will meet or exceed the minimum values listed with a 97.7 % level of confidence).

(2) Transmissivity test parameters were set at gradient of 1.0, pressure load of 4,000 pounds per square foot (psf), with a configuration of metal plate / sample / metal plate, 15 minutes seating time.

This certification is based on testing conducted by ETI Quality Assurance & Quality Control testing laboratory at the time of manufacturing. ETI issues this letter of certification to indicate our commitment to providing our customers with a quality product which will meet or exceed the minimum average roll values in accordance with the applicable American Society for Testing and Materials (ASTM) test method.

Respectfully,

Jonathan McCulley
QA / QC Supervisor

5883 Glenridge Drive / Suite 200 / Atlanta, Georgia 30328
Tel. 800-984-9784 / Fax 404-705-9650

200 Miller Sellers Drive / Evergreen, Alabama 36401
Tel. 334-578 9003 • Fax 334-578-6141

EVERGREEN
TECHNOLOGIES, INC.

Quality Control Laboratory

REVIEWED BY:
QA
ENGINEER

Melt Flow Index
ASTM D 1238
PROCEDURE B AUTOMATIC
Conditions: Test Temp 190 C / 2.16 kg (formerly Condition E)

Polyethylene

Geonet Lot No.	Railcar No.	Melt FlowIndex g/10 min ASTM D1238	Density g/cc ASTM D 1505
13058	NCIX 1706	.500	.950
13060	NCIX 1097	.700	.940

ETI

5883 Glenridge Drive / Suite 200 / Atlanta, Georgia 30328
Tel. 800-984-9784 / Fax 404-705-9650

200 Miller Sellers Drive / Evergreen, Alabama 36401
Tel. 334-578-9003 • Fax 334-578-6141

Evergreen Technologies - Roll Listing

Date: 08-12-2001 *Time:* 08:43:09

	Roll Number	Product Code	Description	Lot Number	Production Date	Shift	Stg Area	Status	On BL	Job Number	Slit From Roll	Original Roll	Linear Ft.	Sq Ft./Yds
001	200104279	TG650180300N8N	TG650 15x300 500y2	10049	04/27/2001	D	0402	I	N		1009122		300	500.00 SQY
002	200104280	TG650180300N8N	TG650 15x300 500y2	10049	04/27/2001	D	0402	I	N		1009122		300	500.00 SQY
003	200104281	TG650180300N8N	TG650 15x300 500y2	10049	04/27/2001	D	0402	I	N		1009122		300	500.00 SQY
												Totals	900	1,500.

13-Aug-2001

Product Grade: TG600

Lot Number: 10049

Color: BLACK

Roll Dimensions: 15ft x 300ft

Evergreen Technologies Inc.
QA/QC Laboratory
Evergreen, Alabama

Nonwoven Test
Rolls
Lot Summary

Reviewed By:

QA: DMBV

Engineer: _____

Roll No.	Test Date	Weight ASTM D5261 (oz/yd2)	Grab Tensile/Elongation ASTM D4632 M.D. Tens. (lbs)	M.D. Elong (%)	C.D. Tens. (lbs)	C.D. Elong (%)	M. Burst ASTM D3786 (psi)	Puncture Resistance ASTM D4833 (lbs)	Trap.Tear ASTM D4533 MD (lbs)	Trap.Tear CD (lbs)	Thickness ASTM D5199 (mils)	Hydraulic Tests ASTM D4491 Permit. (sec-1)	Perm.(Kv) (cm/sec)	Water Flow (gpm/ft2)	A.O.S. ASTM D4751 (mm)
1009122	04/27/2001	6.4	212.3	171.3	221.9	79.8	300.0	95.0	115.3	103.8	74	2.14	0.458	160.0	0.221
Average =		6.4	212.3	171.3	221.9	79.8	300.0	95.0	115.3	103.8	73.9	2.14	0.458	160.0	0.221
Standard Deviation =		.0	.0	.0	.0	.0	.0	.0	.0	.0	.0	.00	0.000	.0	0.000

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

BILL OF LADING - NON NEGOTIABLE

☒ Manufacturing Division
☐ Construction Division

Date AUG. 10, 2001
Shippers No C01428
Project No 125-01-21

Received at the point of origin on the date specified, from the consignor mentioned herein, the property herin described, in apparent good order, except as noted (contents and conditions of package unknown) marked, consigned and destined as indicated below, which the carrier agrees to carry and to deliver to the consignee at the said destination, if on its own authorized route or otherwise to cause to be carried by another carrier on the route to said destination, subject to the rates and classification in effect on the date of shipment. It is mutually agreed, as to each carrier of all or any of the goods over all or any portion of the route to destination, and as to each party of any time interested in all or any of the goods, that every service to be performed here under shall be subject to all the conditions not prohibited by law, whether printed or written, including conditions set aside by the standard bill of lading, in power at the date of issuing, which are hereby agreed by consignor and accepted for himself and his assigns.
The Contract for the carriage of the goods listed in this bill of lading is governed by regulation in force in the jurisdiction at the time and place of shipment and is subject to the conditions set out in such regulations.

CONSIGNEE	(Please do not abbreviate the consignee's Name) NORTHWEST LININGS & GEOTEXTILE	CONSIGNEE'S P.O. NO. 22433 / 9227 / C-867
COMPLETE DELIVERY ADDRESS	(Street and Number, help us deliver your shipment) C/O ASARCO SMELTER / ENVIROCON INC. 200 SMELTER AVE	
DESTINATION	(City) EAST HELENA / (Province/State) MT	(Postal Code/Zip Code) 59635
CARRIER / ROUTE	CONTACT: TJ @ 406-544-4824; DRIVER TO CONTACT SITE 24 HRS PRIOR TO DELIVERY	

PIECES	PROPER SHIPPING NAME AND SPECIAL MARKS	WEIGHT
3	ROLLS OF HD600 GEOMEMBRANE LINER	10,840 LBS
	CORES	135 LBS
	6 NYLON SLINGS - DO NOT REMOVE FROM ROLLS	
-	SEAL NUMBER(S)	
TOTAL 3	Dimension of Shipment	TOTAL WEIGHT 10,975 LBS

FREIGHT CHARGES (Please mark one)
☐ Collect
☒ Prepaid
☒ 3rd Party Billed to GSA Shpt #11514
☐ Customer Pick Up

Declared Valuation $

Maximum liability $4.41 per kilogram computed on the total weight of the shipment unless declared valuation states otherwise.

Special agreement between shipper and carrier, advise here: ETA: 8/13/2001

NOTICE OF CLAIM
(a) No carrier is liable for loss, damage or delay to any goods under the Bill of Lading unless notice there of setting out particulars of the origin, destination and date of shipment of the goods and the estimated amount claimed in respect of such loss, damage or delay is given in writing to the originating carrier or the delivering carrier within sixty (60) days after the delivery of the goods, or, in the case of failure to make delivery, within nine (9) months from the date of shipment.
(b) The final statement of the claim must be filed within nine (9) months from the date of shipment together with a copy of the paid freight bill.

COLUMBIA GEOSYSTEMS	CARRIER BITTERROOT INT'L	CONSIGNEE
PER	PER	PER
	UNIT NO.	

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

ate : 10/08/01 **Shipping / Packing List** Page : 1

USTOMER: 125-01-21 Bill of Lading: C01428

ESTINATION: EAST HELENA, MT

	Roll Number	Weight (LBS)	Square Feet	Dimensions (FT)	QC
1 PS	060 400 23872B ✓	3,614	11,960.00	23.00 x 520.00	✓
2 PS	060 400 23878B ✓	3,624	11,960.00	23.00 x 520.00	✓
3 PS	060 400 24312B ✓	3,602	11,960.00	23.00 x 520.00	✓
	TOTAL	10,840	35,880.00		

COLUMBIA GEOSYSTEMS
Adolf Vor
Aug 10/01
Q.C. DEPARTMENT

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

POLYETHYLENE CERTIFICATE OF ANALYSIS

Project : 125-01-21
Customer : NORTHWEST LININGS & GEOTEXTILE TYPE:PHILLIPS

Project Name : ASARCO SMELTER / ENVIROCON INC., MT

Columbia Ref : 125-01-21
We hereby certify that the polyethylene resin for the above identified shipment, meets or exceeds Columbia Geosystem's specifications, below. Testing was performed on each resin blend.

Melt flow index was determined according to ASTM D 1238. Density was determined according to ASTM D 792/1505. Where appropriate, carbon content was determined according to ASTM D 4218. The average test results are listed in the table below.

RESIN SPECIFICATIONS

Melt flow index 1.0 g/10 minutes Maximum
Density - HDPE 0.930 g/cc Minimum
Density - LLDPE 0.926 g/cc Maximum

Lot Number	Columbia Batch #	Melt Flow Index g/10	Density g/cc	Carbon Content %	OIT Min.
3210199	777	0.072	0.938	N/A	N/A
3210338	783	0.100	0.936	N/A	N/A

Adolf Nar
Q.C. TECHNICIAN

Aug 14/2001
DATE

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

March 26, 2001

PSN# 7516-01

FAX: 403-235-6864

Columbia Geosystems
1415 28th Street N.E.
Calgary AB, Canada T2A 2P6

Greg Sharrun

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-400G
Lot Number:	8210199
P.O. Number:	7266
Date Shipped:	03/26/01
Package:	PSPX 2310
Quantity:	187100 LBS.
HLMI Flow Rate,ASTM D1238:	10.6 G/10 MIN
Density, ASTM D1505:	.938 G/CC
Melt Index, ASTM D1238:	.070 G/10 MIN
Production Date:	02/19/01

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

CGL BATCH # 777

A/L

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

April 02, 2001

PSN# 8082-01

FAX: 403-235-6864

Columbia Geosystems
1415 28th Street N.E.
Calgary AB, Canada T2A 2P6

Greg Sharrun

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-400G
Lot Number:	8210338
P.O. Number:	7272
Date Shipped:	04/02/01
Package:	PSPX 8118
Quantity:	184650 LBS.
HLMI Flow Rate,ASTM D1238:	13.1 G/10 MIN
Density, ASTM D1505:	.938 G/CC
Melt Index, ASTM D1238:	.110 G/10 MIN
Production Date:	03/17/01

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

CSL BATCH # 783

A/L

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE CERTIFICATE OF ANALYSIS

Customer : NORTHWEST LININGS & GEOTEXTILE

Project Name : ASARCO SMELTER / ENVIROCON INC., MT

Columbia Ref # : 125-01-21

We hereby certify that the polyethylene geomembrane for the above-identified shipment meets or exceeds Columbia Geosystems' specifications below. Testing was performed at the indicated frequency.

Columbia Geosystems' manufacturing lines are equipped with spark testers for pinhole detection. The raw polymeric material is first quality polyethylene resin.

HD600 SMOOTH GEOMEMBRANE SPECIFICATIONS

Property	Test Method	Test Value	Test Frequency
Thickness (ave)	ASTM D5199	60 mil	Per Roll
Thickness (min)		54 mil	
•Lowest individual of 25 values			
Tensile Properties	ASTM D638 Type IV		47,840 ft²
•Yield Strength	(2 ipm)	2100 psi(126 lb/in)	
•Break Strength		3800 psi(228 lb/in)	
•Yield Elongation	(1.3" GL)	12 %	
•Break Elongation	(2.0" GL)	700 %	
Tear Resistance	ASTM D1004	700 ppi (42 lb)	47,840 ft²
Puncture Resistance	ASTM D4833	1800 ppi(108 lb)	47,840 ft²
Carbon Dispersion	ASTM D5596/3015	CAT 1 or 2	47,840 ft²
Carbon Content	ASTM D4218/1603	2 - 3 %	47,840 ft²
Dimensional Stab.	ASTM D1204	+/- 2.0 %	Resin Batch
Density	ASTM D792/1505	0.940 g/cc	Resin Batch
NTCL, single point	ASTM D5397 (App)	200 hours	Resin Batch

Adolf Vaz
Quality Control Supervisor

August 14/2001
Date

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-21

Roll Number	Thick Min mil	Thick Ave mil	Carbon Cont. %	Carbon Disp	Stress Yield MD psi	Stress Yield TD psi	Stress Break MD psi
777B01-23872B	58.0	60.5	2.36	CAT 1	2727	2839	4886
777A01-23880B	57.0	60.5	2.51	CAT 1	2653	2813	4946
783C01-24312B	58.0	60.3	2.65	CAT 1	2673	2764	4993

Page 1.1 Cont...

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-21

Roll Number	Stress Break TD psi	Strain Yield MD %	Strain Yield TD %	Strain Break MD %	Strain Break TD %	Tear Resist MD ppi	Tear Resist TD ppi
777B01-23872B	5098	16.9	15.8	799	864	886	848
777A01-23880B	5365	17.4	16.2	810	924	892	844
783C01-24312B	5216	18.0	15.6	815	893	847	795

Page 1.2 Cont...

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-21

Roll Number	Punct Resist ASTM ppi	Density g/cc	Dimen Stabili MD %	Dimen Stabili TD %
777B01-23872B	2279			
777A01-23880B	2330	0.946		
783C01-24312B	2171	0.948	-0.15	0.10

Adolf Ray
Q.C. TECHNICIAN

August 14/2001
DATE

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-21

Roll Number	Punct Resist ASTM ppi	Density g/cc	Dimen Stabili MD %	Dimen Stabili TD %
777B01-23872B	2279			
777A01-23880B	2330	0.946		
783C01-24312B	2171	0.948	-0.15	0.10

Adolf Ray
Q.C. TECHNICIAN

August 14/2001
DATE

Precision Geosynthetic Laboratories

ISO 9002

October 10, 2001

Sanna M. Yost, P.E.
HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Dear Yost: RE: Asarco East Helena CAMU / Proj# 1237.50.300

Thank you for consulting Precision Geosynthetic Laboratories for your material testing needs.

It should be noted that the test specimen and test sample used for this report was believed to be representative of the material produced under the designation herein stated. However, these results are indicative of only the specimens that were actually tested. The testing herein is based upon accepted industry practice as well as the test method listed. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the final use and purpose of the material.

By accepting the data and results represented on this report, 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 test(s) represented in this report, and Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liability in excess of the aforementioned limit.

The test data and all associated project information shall be held in confidence and disclosed to other parties only with the authorization of Client or Precision Geosynthetic Laboratories.

It is a company policy to keep the physical records of each job for 2 years since the receipt of the samples and keep the electronic file for 7 years. ***Failed seam samples are kept for 7 years; good seam samples are disposed after 2 weeks and conformance samples are disposed after 1 month.*** Should you need us to keep them longer, please advise us in writing.

If you have any questions or if we may be of further service, please do not hesitate to call at 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

Enclosure: (Job No. J010658)

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

Precision Geosynthetic Laboratories

ISO 9002

CLIENT: HYDROMETRICS, INC.
PROJECT: Asarco East Helena CAMU / Proj# 1237.50.300

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. J010658)

MATERIAL DESCRIPTION: 40 mil HDPE seam

DATE RECEIVED: October 10, 2001 **DATE REPORTED:** October 10, 2001

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
DT-1	64639
DT-2	64640
DT-3	64641
DT-4 P25/26	64642
DT-5	64643

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D4437	Seam Peel Adhesion
ASTM D4437	Bonded Seam Strength

TEST CONDITIONS: The samples were conditioned for a minimum 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. The units in which the data are reported are included on the tables.

PRECISION GEOSYNTHETIC LABORATORIES

Initials: 013
Date: 10/10/01

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

TABLE
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.** MATERIAL: **40 Mil HDPE** QC'd By: [illegible]
PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300** SEAM TYPE: **Heat Fusion Weld** TEST METHOD: **ASTM D4437**
DATE REC'D: **10-Oct-01** PGL JOB #: **J010658** DATE REPORT: **10-Oct-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DT-1	**64639**	119	>200		1 Outside	100	<10	SE1	
		108	>200		2 Outside	98	<10	SE1	
		112	>200		3 Outside	100	<10	SE1	
		119	>200		4 Outside	98	<10	SE1	
		119	>200		5 Outside	100	<10	SE1	
					AVG:	**99**			*50*
					STD. DEV.	**1**			
					1 Inside	87	<10	SE1	
					2 Inside	86	<10	SE1	
					3 Inside	82	<10	SE1	
					4 Inside	77	<10	SE1	
					5 Inside	82	<10	SE1	
	AVG.	**115**		*60*	***AVG:***	**83**			*50*
	STD. DEV.	**5**			*STD. DEV.*	**4**			
DT-2	**64640**	119	>200		1 Outside	84	<10	SE1	
		115	>200		2 Outside	87	<10	SE1	
		114	>200		3 Outside	85	<10	SE1	
		120	>200		4 Outside	86	<10	SE1	
		123	>200		5 Outside	88	<10	SE1	
					AVG:	**86**			*50*
					STD. DEV.	**2**			
					1 Inside	103	<10	SE1	
					2 Inside	105	<10	SE1	
					3 Inside	100	<10	SE1	
					4 Inside	86	<10	SE1	
					5 Inside	87	<10	SE1	
	AVG:	**118**		*60*	***AVG:***	**96**			*50*
	STD. DEV.	**4**			*STD. DEV.*	**9**			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM THROUGH BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

TABLE 2
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.** MATERIAL: **40 Mil HDPE** QC'd By: SJM
PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300** SEAM TYPE: **Heat Fusion Weld** TEST METHOD: **ASTM D4437**
DATE REC'D: **10-Oct-01** PGL JOB #: **J010658** DATE REPORT: **10-Oct-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DT-3	64641	116	>200		1 Outside	87	<10	SE1	
		113	>200		2 Outside	89	<10	SE1	
		110	>200		3 Outside	83	<10	SE1	
		119	>200		4 Outside	82	<10	SE1	
		123	>200		5 Outside	82	<10	SE1	
					AVG:	85			50
					STD. DEV.	3			
					1 Inside	97	<10	SE1	
					2 Inside	93	<10	SE1	
					3 Inside	88	<10	SE1	
					4 Inside	91	<10	SE1	
					5 Inside	91	<10	SE1	
	AVG.	116		60	AVG:	92			50
	STD. DEV.	5			STD. DEV.	3			
DT-4 P25/26	64642	131	>200		1 Outside	89	<10	SE1	
		126	>200		2 Outside	91	<10	SE1	
		127	>200		3 Outside	90	<10	SE1	
		133	>200		4 Outside	87	<10	SE1	
		137	>200		5 Outside	96	<10	SE1	
					AVG:	91			50
					STD. DEV.	3			
					1 Inside	95	<10	SE1	
					2 Inside	97	<10	SE1	
					3 Inside	99	<10	SE1	
					4 Inside	100	<10	SE1	
					5 Inside	101	<10	SE1	
	AVG:	131		60	AVG:	98			50
	STD. DEV.	4			STD. DEV.	2			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM [illegible] BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SOM[illegible] ON FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

TABLE [illegible]
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.**
PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300**
DATE REC'D: **10-Oct-01**

MATERIAL: **40 Mil HDPE**
SEAM TYPE: **Heat Fusion Weld**
PGL JOB #: **J010658**

QC'd By: [signature]
TEST METHOD: **ASTM D4437**
DATE REPORT: **10-Oct-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DT-5	**64643**	129	>200		1 Outside	98	<10	SE1	
		124	>200		2 Outside	98	<10	SE1	
		127	>200		3 Outside	92	<10	SE1	
		132	>200		4 Outside	83	<10	SE1	
		135	>200		5 Outside	97	<10	SE1	
					AVG:	**94**			50
					STD. DEV.	**6**			
					1 Inside	101	<10	SE1	
					2 Inside	106	<10	SE1	
					3 Inside	104	<10	SE1	
					4 Inside	101	<10	SE1	
					5 Inside	101	<10	SE1	
	AVG.	**129**		60	**AVG:**	**103**			50
	STD. DEV.	**4**			STD. DEV.	**2**			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM [illegible]H BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SOM[illegible]ON FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

Precision Geosynthetic Laboratories

ISO 9002

October 11, 2001

Sanna M. Yost, P.E.
HYDROMETRICS, INC.
2727 Airport Road
Helena, MT 59601

Dear Yost: RE: Asarco East Helena CAMU / Proj# 1237.50.300

Thank you for consulting Precision Geosynthetic Laboratories for your material testing needs.

It should be noted that the test specimen and test sample used for this report was believed to be representative of the material produced under the designation herein stated. However, these results are indicative of only the specimens that were actually tested. The testing herein is based upon accepted industry practice as well as the test method listed. Precision Geosynthetic Laboratories neither accepts responsibility for nor makes claims to the final use and purpose of the material.

By accepting the data and results represented on this report, 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 test(s) represented in this report, and Client agrees to indemnify and hold harmless Precision Geosynthetic Laboratories from and against all liability in excess of the aforementioned limit.

The test data and all associated project information shall be held in confidence and disclosed to other parties only with the authorization of Client or Precision Geosynthetic Laboratories.

It is a company policy to keep the physical records of each job for 2 years since the receipt of the samples and keep the electronic file for 7 years. ***Failed seam samples are kept for 7 years; good seam samples are disposed after 2 weeks and conformance samples are disposed after 1 month.*** Should you need us to keep them longer, please advise us in writing.

If you have any questions or if we may be of further service, please do not hesitate to call at 800-522-4599.

Sincerely,

PRECISION GEOSYNTHETIC LABORATORIES

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

Enclosure: (Job No. J010665)

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

Precision Geosynthetic Laboratories

ISO 9002

CLIENT: HYDROMETRICS, INC.
PROJECT: Asarco East Helena CAMU / Proj# 1237.50.300

VERIFICATION OF MATERIAL PROPERTIES
(PGL Job No. J010665)

MATERIAL DESCRIPTION: 40 mil HDPE seam

DATE RECEIVED: October 11, 2001 **DATE REPORTED:** October 11, 2001

SAMPLE IDENTIFICATIONS:

SAMPLE ID	PRECISION CONTROL NUMBER
DT-7 P28/29	64682
DT-8	64683
DT-9	64684
DT-10 P37/38	64685
DT-11 P38/40	64686
DT-12 P39/40	64687

TESTS REQUIRED:

TEST METHOD	DESCRIPTION
ASTM D4437	Seam Peel Adhesion
ASTM D4437	Bonded Seam Strength

TEST CONDITIONS: The samples were conditioned for a minimum 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. The units in which the data are reported are included on the tables.

PRECISION GEOSYNTHETIC LABORATORIES

Initials: #: 013
Date: 10/

Edith Pintor
Quality Assurance

Cora B. Queja
Vice President

1160 North Gilbert Street, Anaheim, CA 92801, Tel # 714-520-9631, Fax # 714-520-9637

TABLE
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.** MATERIAL: **40 Mil HDPE** QC'd By: [illegible]
PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300** SEAM TYPE: **Heat Fusion Weld** TEST METHOD: **ASTM D4437**
DATE REC'D: **11-Oct-01** PGL JOB #: **J010665** DATE REPORT: **11-Oct-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DT-7 P28/29	**64682**	131	>200		1 Outside	94	<10	SE1	
		129	>200		2 Outside	99	<10	SE1	
		127	>200		3 Outside	90	<10	SE1	
		133	>200		4 Outside	86	<10	SE1	
		138	>200		5 Outside	87	<10	SE1	
					AVG:	**91**			*50*
					STD. DEV.	**5**			
					1 Inside	102	<10	SE1	
					2 Inside	104	<10	SE1	
					3 Inside	102	<10	SE1	
					4 Inside	98	<10	SE1	
					5 Inside	98	<10	SE1	
	AVG.	**132**		*60*	***AVG:***	**101**			*50*
	STD. DEV.	**4**			*STD. DEV.*	**3**			
DT-8	**64683**	129	>200		1 Outside	87	<10	SE1	
		124	>200		2 Outside	90	<10	SE1	
		125	>200		3 Outside	85	<10	SE1	
		129	>200		4 Outside	82	<10	SE1	
		135	>200		5 Outside	89	<10	SE1	
					AVG:	**87**			*50*
					STD. DEV.	**3**			
					1 Inside	110	<10	SE1	
					2 Inside	109	<10	SE1	
					3 Inside	102	<10	SE1	
					4 Inside	98	<10	SE1	
					5 Inside	101	<10	SE1	
	AVG:	**128**		*60*	***AVG:***	**104**			*50*
	STD. DEV.	**4**			*STD. DEV.*	**5**			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM THROUGH BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

TABLE
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.**
PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300**
DATE REC'D: **11-Oct-01**

MATERIAL: **40 Mil HDPE**
SEAM TYPE: **Heat Fusion Weld**
PGL JOB #: **J010665**

QC'd By: [illegible]
TEST METHOD: **ASTM D4437**
DATE REPORT: **11-Oct-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DT-9	**64684**	129	>200		1 Outside	104	<10	SE1	
		126	>200		2 Outside	***74***	***100%***	***AD***	
		124	>200		3 Outside	98	<10	SE1	
		130	>200		4 Outside	95	<10	SE1	
		134	>200		5 Outside	99	<10	SE1	
					AVG:	**94**			*50*
					STD. DEV.	**12**			
					1 Inside	111	<10	SE1	
					2 Inside	115	<10	SE1	
					3 Inside	111	<10	SE1	
					4 Inside	105	<10	SE1	
					5 Inside	109	<10	SE1	
	AVG.	**129**		*60*	***AVG:***	**110**			*50*
	STD. DEV.	**4**			*STD. DEV.*	**4**			
DT-10 P37/38	**64685**	116	>200		1 Outside	88	<10	SE1	
		121	>200		2 Outside	93	<10	SE1	
		117	>200		3 Outside	86	<10	SE1	
		127	>200		4 Outside	87	<10	SE1	
		133	>200		5 Outside	91	<10	SE1	
					AVG:	**89**			*50*
					STD. DEV.	**3**			
					1 Inside	102	<10	SE1	
					2 Inside	105	<10	SE1	
					3 Inside	100	<10	SE1	
					4 Inside	94	<10	SE1	
					5 Inside	99	<10	SE1	
	AVG:	**123**		*60*	***AVG:***	**100**			*50*
	STD. DEV.	**7**			*STD. DEV.*	**4**			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM [illegible]H BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SO[illegible] [illegible]ION FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

TABLE
SEAM PEEL AND SHEAR TEST RESULTS

CLIENT: **HYDROMETRICS, INC.** MATERIAL: **40 Mil HDPE** QC'd By: [illegible]
PROJECT: **Asarco East Helena CAMU / Proj# 1237.50.300** SEAM TYPE: **Heat Fusion Weld** TEST METHOD: **ASTM D4437**
DATE REC'D: **11-Oct-01** PGL JOB #: **J010665** DATE REPORT: **11-Oct-01**

		SHEAR EVALUATION			PEEL EVALUATION				
SAMPLE ID	PGL CONTROL #	MAXIMUM STRENGTH (lb/in)	ELONGATION @ BREAK (%)	PROJECT SPEC. (lb/in)	SPECIMEN NUMBER	MAXIMUM STRENGTH (lb/in)	% PEEL (%)	LOCUS OF FAILURE	PROJECT SPEC. (lb/in)
DT-11 P38/40	**64686**	128	>200		1 Outside	98	<10	SE1	
		124	>200		2 Outside	97	<10	SE1	
		120	>200		3 Outside	87	<10	SE1	
		129	>200		4 Outside	81	<10	SE1	
		134	>200		5 Outside	88	<10	SE1	
					AVG:	**90**			*50*
					STD. DEV.	**7**			
					1 Inside	102	<10	SE1	
					2 Inside	102	<10	SE1	
					3 Inside	94	<10	SE1	
					4 Inside	94	<10	SE1	
					5 Inside	97	<10	SE1	
	AVG.	**127**		*60*	***AVG:***	**98**			*50*
	STD. DEV.	**5**			*STD. DEV.*	**4**			
DT-12 P39/40	**64687**	127	>200		1 Outside	90	<10	SE1	
		125	>200		2 Outside	79	<10	SE1	
		119	>200		3 Outside	87	<10	SE1	
		129	>200		4 Outside	83	<10	SE1	
		134	>200		5 Outside	89	<10	SE1	
					AVG:	**86**			*50*
					STD. DEV.	**5**			
					1 Inside	98	<10	SE1	
					2 Inside	99	<10	SE1	
					3 Inside	97	<10	SE1	
					4 Inside	99	<10	SE1	
					5 Inside	99	<10	SE1	
	AVG:	**127**		*60*	***AVG:***	**98**			*50*
	STD. DEV.	**5**			*STD. DEV.*	**1**			

BREAK DESCRIPTION (NSF 54, 1993):

AD	ADHESION FAILURE.
BRK	BREAK IN SHEETING.
SE1	BREAK AT OUTER EDGE OF SEAM.
SE2	BREAK AT INNER EDGE OF SEAM THROUGH BOTH SHEETS.
AD-BRK	BREAK IN FIRST SEAM AFTER SOME ADHESION FAILURE.
FTB	FILM-TEAR BOND.

Precision Geosynthetic Laboratories

ISO 9002

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655, Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell
SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell

To: ASARCO, Inc.

Date: October 11, 2001

Attn: Darrell Shew

Phone: (406) 227 – 7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS

☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	623.03	Northwest Lining Geomembrane Installation Data ASARCO CAMU Cell I

Remarks: These submittals have been reviewed by the QC Manager to ensure that they comply with the Project Specifications. Any variances are noted below:

Variances: None

Signed: Douglas G. Tisdell Date: 10-11-01

QC Manager

A Washington Company

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc.

21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE

PROJECT: ASARCO

LINER TYPE/QTY: 60mil HDPE

OWNER: ASARCO

LOCATION: E. HELENA

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

Northwest Linings & Geotextile Products, Inc. accepts no responsibility for the composition or character of the soil, nor any underlying conditions present at the site, including, but not limited to, those arising out of improper compaction, use of improper soil or materials, or the presence of underlying harmful objects of any kind. This acceptance is based solely upon a visual inspection of the completed subgrade preparation.

This acceptance is based upon the present condition of the subgrade preparation and Northwest Linings accepts no responsibility for restoration of the subgrade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal or machinery. Neither does Northwest Linings accept responsibility for restoration of the subgrade preparation upon the occurrence of any Act of God, including, but not limited to, rain, wind, hail, snow, flood or earthquake.

Area Being Accepted: Cell 1 in its entirety

NORTHWEST LININGS REPRESENTATIVE:

Date: 08 03 01

Signature:

Name/Title: TROY JAY WOLD SUPERINTENDANT

OWNERS REPRESENTATIVE:

Date: 8-3-01

Company: HYDROMETRICS

Signature:

Name/Title: MARK W. RHODES QA/QC INSPECTOR

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc.
21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF GCL SUBGRADE SURFACE

PROJECT: ASARCO - CAMU CELL I

LINER TYPE/QTY: 40 mil HDPE

OWNER: ASARCO, INC.

LOCATION: EAST HELENA, MT

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the GCL subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

Northwest Linings & Geotextile Products, Inc. accepts no responsibility for the composition or character of the GCL nor any underlying conditions present at the site, including, but not limited to, those arising out of improper compaction, use of improper soil or materials, or the presence of underlying harmful objects of any kind. This acceptance is based solely upon a visual inspection of the completed subgrade preparation.

This acceptance is based upon the present condition of the subgrade preparation and Northwest Linings accepts no responsibility for restoration of the subgrade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal or machinery. Neither does Northwest Linings accept responsibility for restoration of the subgrade preparation upon the occurrence of any Act of God, including, but not limited to, rain, wind, hail, snow, flood or earthquake.

Area Being Accepted: Entire Surface of ASARCO CAMU, CELL I

NORTHWEST LININGS REPRESENTATIVE:

Date: 10/11/01

Signature: Larry Murray

Name/Title: Larry Murray NWL Super.

OWNERS REPRESENTATIVE:

Date: 10-11-01

Company: Envirocon, Inc.

Signature: Douglas G. Tisdell

Name/Title: DOUGLAS G. TISDELL, QA/QC MANAGER

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc.

21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE

PROJECT: ASARCO

LINER TYPE/QTY: 60 MIL HDPE

OWNER: ASARCO

LOCATION: E. HELENA

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

Northwest Linings & Geotextile Products, Inc. accepts no responsibility for the composition or character of the soil, nor any underlying conditions present at the site, including, but not limited to, those arising out of improper compaction, use of improper soil or materials, or the presence of underlying harmful objects of any kind. This acceptance is based solely upon a visual inspection of the completed subgrade preparation.

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Area Being Accepted: ½ of ENTIRE EAST SIDE of Cell + 96'

NORTHWEST LININGS REPRESENTATIVE:

Date: 07 28 01

Signature: [signature]

Name/Title: Troy Jay Wolf

OWNERS REPRESENTATIVE:

Date: 7-28-01

Company: HYDROMETRICS

Signature: Mark W. Rhodes

Name/Title: MARK W. RHODES QA/QC INSPECTOR

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, Inc.

21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE:

PROJECT: ASARCO E. HELENA RCRA LANDFILL CELL 1

LINER TYPE/QTY: 60 MIL HDPE

OWNER: ASARCO

LOCATION: E. HELENA

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

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This acceptance is based upon the present condition of the subgrade preparation and Northwest Linings accepts no responsibility for restoration of the subgrade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal or machinery. Neither does Northwest Linings accept responsibility for restoration of the subgrade preparation upon the occurrence of any Act of God, including, but not limited to, rain, wind, hail, snow, flood or earthquake.

Area Being Accepted: E. SLOPE OUT ~~70~~' 75' OUT from NORTH SLOPE NOT READY panels 1-9

NORTHWEST LININGS REPRESENTATIVE:

Date: 07-25-01

Signature:

Name/Title: TROY JAY WOLD SUPERINTENDANT

OWNERS REPRESENTATIVE:

Date: 7-25-01

Company: HYDROMETRICS

Signature: Mark W. Rhodes

Name/Title: Mark Rhodes QA/QC Inspector

NORTHWEST LININGS &
GEOTEXTILE PRODUCTS, Inc.
21000 77th AVE. SOUTH
KENT, WA 98032
253-872-0244
FAX 253-872-0245

CERTIFICATE OF ACCEPTANCE OF SOIL SUBGRADE SURFACE

PROJECT: ASARCO E. HELENA

LINER TYPE/QTY: 60 MIL HDPE

OWNER: ASARCO

LOCATION: E. HELENA

I, the undersigned, a duly appointed representative of Northwest Linings & Geotextile Products Inc., have visually observed the soil subgrade surface described below, and found it to be an acceptable surface on which to install geomembrane.

Northwest Linings & Geotextile Products, Inc. accepts no responsibility for the composition or character of the soil, nor any underlying conditions present at the site, including, but not limited to, those arising out of improper compaction, use of improper soil or materials, or the presence of underlying harmful objects of any kind. This acceptance is based solely upon a visual inspection of the completed subgrade preparation.

This acceptance is based upon the present condition of the subgrade preparation and Northwest Linings accepts no responsibility for restoration of the subgrade preparation, upon physical harm or change, including, but not limited to, that caused by man, animal or machinery. Neither does Northwest Linings accept responsibility for restoration of the subgrade preparation upon the occurrence of any Act of God, including, but not limited to, rain, wind, hail, snow, flood or earthquake.

Area Being Accepted: EAST SIDE OUT 137' from TOE of EAST SLOPE NORTH 75' NOT READY. on N SIDE

NORTHWEST LININGS REPRESENTATIVE:

Date: 07-26-01

Signature: [signature]

Name/Title: TROY JAYWOLD SUPERINTENDANT

OWNERS REPRESENTATIVE:

Date: 7-26-01

Company: HYDROMETRICS

Signature: Mark W. Rhodes

Name/Title: MARK W. RHODES QA/QC INSPECTOR

TRIAL WELD FORM

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT #
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 07/25/01

SHEET 1 OF ____

DATE/ TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS: BARREL TEMP	EXTRUSION WELDS: PREHEAT TEMP	EXTRUSION WELDS: PEEL / TENSILE	FUSION WELDS: WEDGE TEMP	FUSION WELDS: SET SPEED FT / MIN	FUSION WELDS: PEEL / TENSILE	PASS / FAIL	COMMENTS
07 RS 101 9:45	Soup	#108		SN				750	7.5	118 115 125 126 117 119	P	161-156
07125101 9:50	XB	#201		"				750	7.5	125 118 122 129 121 128	P	150-145
07125101 12:55	XB	#201		"				"	"	135 128 132 130 123 126	P	165 165
7 125101 1:00 PM	Soup	#108		"				750	7.5	123 131 117 120 121 139	P	159-160
7 125101 2:50 PM	Soup	XT#1			520	320	104-113 113				P	152-165
7 126101 10:45	XB	201						750	7.5	119 117 120 118 117 120	P	152-155
7 126101 10:50	Soup	#108						750	7.5	129 122 132 132 129 121	P	176-153
7 126101 1:00	XB	#201						750	7.5	135 130 137 135 135 136	P	150-158
7 126101 1:20	Kham	XT#1			520	320	117-120 121				P	143-145
7 126101 1:25	Soup	#108						750	7.5	119 118 120 125 120 119	P	161-170
7 127101 8:00 AM	XB	#201						750	7.5	128 132 129 136 137 130	P	171-172
7 127101 8:10 AM	Soup	#108		Sunny				750	7.5	124 107 109 123 109 115	P	180-189
7 127101 11:00 AM	Soup	#XT-1		"	520	320	104-107 104				P	145-149
7 127101 12:55 PM	Soup	#XT=1		"	520	320	106-108 98				P	139-138
/ /												

TRIAL WELD FORM

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 7 128 01

SHEET ____ OF ____

DATE/ TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS: BARREL TEMP	EXTRUSION WELDS: PREHEAT TEMP	EXTRUSION WELDS: PEEL / TENSILE	FUSION WELDS: WEDGE TEMP	FUSION WELDS: SET SPEED FT / MIN	FUSION WELDS: PEEL / TENSILE	PASS / FAIL	COMMENTS
~~7 128 01 6:45 AM~~	~~Soup~~	~~#108~~						~~750~~	~~7.5~~			
7 128 01 6:45	Soup	108						750	7.5	135 131 136 127 137 136	P	173-171
7 128 01 7:00 AM	XB	#201						750	75	140 156 135 130 150 153	P	188-187
7 128 01 12:45	XB	#201						750	75	118 115 120 114 129 108	P	161-163
7 128 01 1:00 PM	Khaw	Xt #1			520	320	114-128 109				P	156-159
7 129 01 6:45	Soup	#1			520	320	113-120 117				P	173-168
7 129 01 7:20 AM	Soup	#108						750	7.5	118 131 114 137 124 129	P	176-177
7 129 01 6:30	XB	#201						750	75	119 124 123 126 118 136		189-180
7 129 01 1:00	Soup	108						750	75	110 109 107 115 112 103	P	160-163
7 129 01 1:10 PM	XB	201						750	7.5	116 103 114 125 119 120	P	165-169
8 11 01 6:30 AM	XB	201		Summer				750	75	136 141 120 132 138 126	P	172-174
8 11 01 9:50 AM	Soup	108		"				750	7.5	139 135 130 131 129 122	P	189-181
1 1 12:30 PM	"	108						750	75	124 130 128 128 130 131		165-168
1 1	XB	201						750	75	130 126 130 131 125 135		172-165
8 11 01 2:00	Soup	#1			520	320	119-121 114				P	166-163
8/2/00	HDM	#1					138 140 136	750		176 158	P	

406 443-4150
SANTA HOST

TRIAL WELD FORM

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Tray Jay Ward
MATERIAL DESCRIPTION: 60mk HDPE

DATE: 8/02/01

SHEET ____ OF ____

DATE/ TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS			FUSION WELDS			PASS / FAIL	COMMENTS
					BARREL TEMP	PREHEAT TEMP	PEEL / TENSILE	WEDGE TEMP	SET SPEED FT / MIN	PEEL / TENSILE		
08/02/01	JW	001	55°	sun	520°	300°	121 120 ~~120~~ ~~120~~ 121				P	
8/02/01	I.JH JHAM	001	65	"	530	300	122 120 ~~120~~ ~~152~~				P	
8/13/01 630	VP	#201						750	8.5	110 112 ~~120~~ ~~134~~ 129 ~~115~~	P	177-176
8/14/01	VP	#201						750	8.0	117 ~~124~~ 115 ~~137~~ 121 ~~109~~	P	176-173
8/15/01	KK	#1			530	300	114 125 132 ~~[illegible]~~				P	156-163
8/15/01	KK	#1			530	300	112 130 118 ~~[illegible]~~				P	162-159
8/15/01	KK	#1			530	300	119 117 ~~124~~				P	164-161
8/15/01	VP	#201						750	8.5	107 ~~122~~ 101 ~~108~~ 109 ~~121~~	P	163-169
8/15/01	MK	#6	80°	sun				760°	8.5	109 ~~106~~ 114 ~~108~~ 109	P	162-163
8/16/01	VP	#1			530	300	112-117 120				P	169-167
8/16/01	VP	#6								111 ~~126~~ 132 112 134 ~~128~~	P	170-182
8/15/01	XB	6	80°	Sun				750°	8.5	120 ~~124~~ 127 ~~120~~ 121 ~~129~~	P	180-183
8/15/01	LC	001	90°	Sun	520°	300°	117 115 117				P	170-171
/ /												
/ /												

HDPE TRIAL WELD FORM

PROJECT NAME: E Helena
NWLG PROJECT #
NWLG SUPERINTENDANT: Murray
MATERIAL DESCRIPTION: 40 MILL HD Smooth

DATE: 10/4/01

SHEET 1 OF

DATE/ TIME	SEAMER INITIALS	MACHINE NUMBER	AMBIENT TEMP	WEATHER	EXTRUSION WELDS			FUSION WELDS			PASS / FAIL	COMMENTS
					BARREL TEMP	PREHEAT TEMP	PEEL / TENSILE	WEDGE TEMP	SET SPEED FT / MIN	PEEL / TENSILE		
10/4/1 9:00 AM	XB	2	30	Over cast				750	15	104 113 116 111 110 104	P	133/134
10/4/1 1:00	XB	2	50	clear				750	15	114 111 129 116 118 116	P	143/147
10/5/01 10:00	XB	2	33	clear				750	15	93 110 117 118 117 116	P	150/151
10/5/01 1:00	XB	2	60	clear				750	15	110 111 115 115 117 117	P	131/145
10/6/01 8:00	XB	2	34	clear				750	15	106 98 110 110 111 112	P	170/178
10/6/01 1:00	XB	2	35	clear				750	15	106 99 108 114 117 118	P	145/150
10/7/01 8:00	XB	2	38	clear				750	15	106 98 108 114 116 105	P	143/145
10/7/01 1:00	XB	2	50	Over cast				750	15	114 117 118 113 115 116	P	140/146
10/8/01 1:00	XB	2	35	Over cast				750	15	98 99 98 111 110 114	P	135/140
10/9/01 AM	XB	1	40	over cast	500	300	118 117 111 110 116 117					
10/9/01 PM	XB	1	60	over cast	500	300	115 100 101 116 117 118					
10/10/01 AM	KAM	2	50	over cast	500	300	117 116 108 100 101 110					
10/10/01 PM	KAM	2	40	over cast	500	300	116 119 110 111 112 113					
10/10/01 PM	XB	1	50	over cast	500	30	116 117 111 99 101 118					
/ /												

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 07/26 01
SHEET 1 OF 6

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS / PANEL LOCATION
07/26/01	1T	14879	320'	23'	
07/26/01	2T	14942	43'	23'	
07/26/01	3T	14942	42'	23'	
07/26/01	4T	14942	16'	23'	
07/26/01	5T	14942	43'	23'	
07/26/01	6T	14942	43'	23'	
07/26/01	7T	14942	43'	23'	
07/26/01	8T	14942	44'	23'	
07/26/01	9T	14942	44'	23'	
07/26/01	10T	14942	44'	23'	
07/26/01	11T	14942	44'	23'	
07/26/01	12T	14942	45'	23'	
07/27/01	13T	14870	45'	23'	
07/27/01	14T	23250	45'	23'	
07/27/01	15T	23250	46'	25'	

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Tray Jay Wood
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 07/27/01
SHEET 2 OF 6

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS / PANEL LOCATION
07/27/01	16T	23250	46'	23'	
07/27/01	17T	23250	33'	23'	
07/27/01	18T	14870	350'	23'	
07/27/01	19T	14915	351'	23'	
07/27/01	20T	14884	230'	23'	
07/27/01	21T	14915	121'	23'	
07/27/01	22T	14884	241'	23'	
07/27/01	23T	14870	26'	23'	
07/27/01	24T	14938	76'	23'	
08/01/01	25T	14887	350'	23'	
08/01/01	26T	14866	350'	23'	
08/01/01	27T	14940	362'	23'	
08/01/01	28T	14954	362'	23'	
08/01/01	29T	14869	362'	23'	
08/01/01	30T	14865	362'	23'	

PANEL PLACEMENT FORM

T

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 MIL HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
08.01.01	31T	14864	362'	23'	
08 01 01	32T	14382	49'	23'	
08 01 01	33T	14382	49'	23'	
08 01 01	34T	14382	49'	23'	
08 01 01	35T	14382	49'	23'	
08 01 01	36T	14382	49'	23'	
08 01 01	37T	14382	49'	23'	
08 01 01	38T	14382	49'	23'	
08 01 01	39T	14382	145'	23'	
08 01 01	40T	14930	115'	23'	
08 01 01	41T	14930	115'	23'	
08 01 01	42T	14930	115'	23'	
08 01 01	43T	14874	115'	23'	

PANEL PLACEMENT FORM

446

PROJECT NAME: ASARCO E. HELENA (T) PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
08 01 01	44 T	14874	115'	23'	
08 01 01	45 T	14874	115'	23'	
08 01 01	46T	14947	115'	23'	
08 01 01	47 T	14947	115'	23'	
08 01 01	48T	14947	115'	23'	
08 01 01	49 T	14947	115'	23'	
08 01 01	50T	14864	115'	23'	
08 04 01	51T	14965	470'	23'	
08 04 01	52 T	14887	470'	23'	
08 04 01	53T	14963	470'	23'	
08 04 01	54	14952	70'	23'	
08 04 01	55	14952	82'	23'	
08 04 01	56	14952	42'	23'	

546

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA (T) PROJECT NUMBER: 00404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
08 06 01	57 T	14952	80'	23'	
08 06 01	58 T	14952	80'	23'	
08 06 01	59 T	14952	81'	23'	
08 06 01	60 T	14953	80'	23'	
08 06 01	61 T	14953	87'	23'	
08 06 01	62 T	14953	91'	23'	
08 06 01	63 T	14953	91'	23'	
08 06 01	64 T	14953	92'	23'	
8 15 01	65 T	23878	92'	23'	
8 15 01	66 T	23878	93'	23'	
8 15 01	67 T	23878	93'	23'	
8 15 01	68 T	23878	93'	23'	
8 15 01	69 T	23878	93'	23'	

646

PANEL PLACEMENT FORM

T

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 MIL HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
8 15 01	70	23872	92'	23'	
8 15 01	71	23872	91'	23'	
8 15 01	72	23872	93'	23'	
8 15 01	73	23872	92'	23'	
8 15 01	74	23872	92'	23'	
8 15 01	75	23872	44'	23'	
8 15 01	76	23872	46'	23'	
8 15 01	77	23872	69'	23'	
8 15 01	78	23872	70'	23'	

146

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E Helena PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
07 25 01	1	14943	352'	23'	
07 25 01	2	14943	39'	23'	
07 25 01	3	14943	42'	23'	
07 25 01	4	14898	42'	23'	
07 25 01	5	14898	43'	23'	
07 25 01	6	14898	43'	23'	
07 25 01	7	14898	44'	23'	
07 25 01	8	14898	44'	23'	
07 25 01	9	14898	44'	23'	
07 25 01	10	14898	45'	23'	
07 25 01	11	14898	45'	23'	
07 25 01	12	14898	45'	23'	
07 25 01	13	14898	46'	23'	

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
07 25 01	14	14939	46'	23'	
07 25 01	15	14939	47'	23'	
07 25 01	16	14939	47'	23'	
07 25 01	17	14939	322'	23'	
07 25 01	18	14938	30'	23'	
07 25 01	19	14938	353'	23'	
07 25 01	2A	14943	27'	23'	
07 25 01	3A	14943	16'	23'	
07 26 01	20	14876	364'	23'	
07 26 01	21	14876	105'	23'	
07 26 01	22	14880	259'	23'	
07 26 01	23	14880	211'	23'	
07 26 01	24	14879	153'	23'	

346

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
072801	25	23250	49'	23'	
072801	26	23250	49'	23'	
072801	27	23250	49'	23'	
072801	28	23250	49'	23'	
072801	29	23250	21'	23'	
072801	30	23250	49'	23'	
072801	31	23250	115'	23'	
072801	32	23255	115'	23'	
072801	33	23255	115'	23'	
072801	34	23255	115'	23'	
072801	35	23255	115'	23'	
072801	36	23255	115'	23'	
072801	37	14875	115'	23'	

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
07 28 01	38	14875	397'	23'	
07 28 01	39	23267	73'	23'	
07 29 01	40	23267	476'	23'	
07 29 01	41	23238	470'	23'	
07 29 01	42	14941	470'	23'	
07 29 01	43	23244	470'	23'	
07 29 01	44	14964	470'	23'	
07 29 01	45	14969	470'	23'	
08 03 01	46	14962	470'	23'	
08 03 01	47	14867	469'	23'	
08 03 01	48	14968	469'	23'	
08 03 01	49	14954	468'	23'	
08 03 01	50	14963	468'	23'	

516

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
080301	51	14968	43'	23'	
080301	52	14963	49'	23'	
0803	53	14868	62'	23'	
080301	54	14868	63'	23'	
080301	55	14963	63'	23'	
080301	56	14963	64'	23'	
080301	57	14963	64'	23'	
080301	58	14963	64'	23'	
080301	59	14865	64'	23'	
080301	60	14865	65'	23'	
080301	61	14865	65'	23'	
080301	62	14864	65'	23'	
080301	63	14854	65'	23'	

6 of 6

PANEL PLACEMENT FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
08-03-01	64	14954	65'	23'	
08-04-01	65	14954	65'	23'	
08-04-01	66	14954	65'	23'	
08-04-01	67	14954	65'	23'	
08-04-01	68	14954	66'	23'	
08-04-01	69	14954	66'	23'	
08-04-01	70	14864	60'	23'	
08-04-01	71	14864	58'	23'	
08-04-01	72	14864	66'	23'	
08-04-01	73	14864	71'	23'	
08-04-01	74	14864	91'	23'	

PANEL PLACEMENT FORM

PROJECT NAME: EAST Helena PROJECT NUMBER: _____

MATERIAL DESCRIPTION: 40 Mil HD Smooth

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
10/4/01	1	0234	68'	23	NW Corner Side slopes 1564
	2	0234	67'	23	North END 1541
	3	0234	65'	23	North END 1495
	4	0234	65'	23	North END 1495
	5	0234	63	23	North END 1449
	6	0234	62	23	North END 1426
	7	0234	61	23	North END 1403
	8	0234	62	23	North END 1426
	9	0234	62	23	North END 1426
	10	0234	60	23	North END 635 1380
	11	0201	67	23	North END 1541
	12	0201	66	23	North END 1518
	13	0201	64	23	North END 1472

19136

PANEL PLACEMENT FORM

PROJECT NAME: EAST Helena PROJECT NUMBER: _____

MATERIAL DESCRIPTION: 40 Mil HD Smooth

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
10/4/01	14	0201	62'	23	North END 1426
	15	0201	62'	23	North END 1426
	16	0201	63'	23	North END 1449
	17	0201	63'	23	EAST Corner 1449
	18	0201	40'	23	EAST Corner 920
	19	0201	45'	23	EAST Corner 1035
	20	0201	45	23	West Corner 577 1035
	21	0491	35'	23	West Corner 805
10/4/01	22	0491	55'	23	West Corner 1265
10/4	23	0491	480	23	West END TO EAST TOP Panel 520 11040
10/4	24	0201	45'	23	EAST END 622 1035
10/4	25	0485	477'	23	West END TO EAST TOP Panel 477 10971 = 10/4/01 52992

PANEL PLACEMENT FORM

PROJECT NAME: EAST Helena PROJECT NUMBER:

MATERIAL DESCRIPTION: 40 Mil ND

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
10/5	26	0495	475'	23	TOP E-W 10925
10/5	27	0514	480'	23	TOP E-W 11040
10/5	28	0499	485'	23	741 11155
10/5	29	0499	256'	23	5888
10/5	30	0495	225'	23	700 5175
10/5	31	0493	474	23	10902
10/5	32	0493	263'	23	6049 737
10/5	33	0514	213	23	4899 - 66033 693

PANEL PLACEMENT FORM

PROJECT NAME: EAST Helena PROJECT NUMBER:

MATERIAL DESCRIPTION: 40 Mill HD

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
10/6	34	0497	470	23	E-W TOP 10810
10/6	35	0497	270	23	E-W TOP 6210 740
10/6	36	0510	210	23	E-W TOP 4830 Butt seam
10/6	37	0510	480	23	E-W TOP 11040 690
10/6	38	0498	480	23	EW TOP 11040
10/6	39	0498	252	23	EW TOP 5796 Butt seam 732
10/6	40	0485	228	23	EW TOP 5244 54970

PANEL PLACEMENT FORM

PROJECT NAME: East Nelson PROJECT NUMBER:

MATERIAL DESCRIPTION: 40 MILL HD Smooth

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
10/7	41	0502	485'	23	E-W top
	42	0502	76'	23	E W top
	43	0502	71'	23	E W top 632
	44	0502	88'	23	North slope 720
	45	0161	60'	23	N W Corner.
	46	0161	46'	23	N W Corner
	47	0161	45'	23	N W Corner
	48	0161	20'	23	N W Corner
	49	0161	88'	23	North Slope
	50	0161	89'	23	North Slope
	51	0161	90	23	North Slope
	52	0161	88	23	North Slope
	53	0161	85	23	North Slope
	54	0161	84	23	North Slope 894

PANEL PLACEMENT FORM

PROJECT NAME: East Helena PROJECT NUMBER: _____

MATERIAL DESCRIPTION: 40 Mil

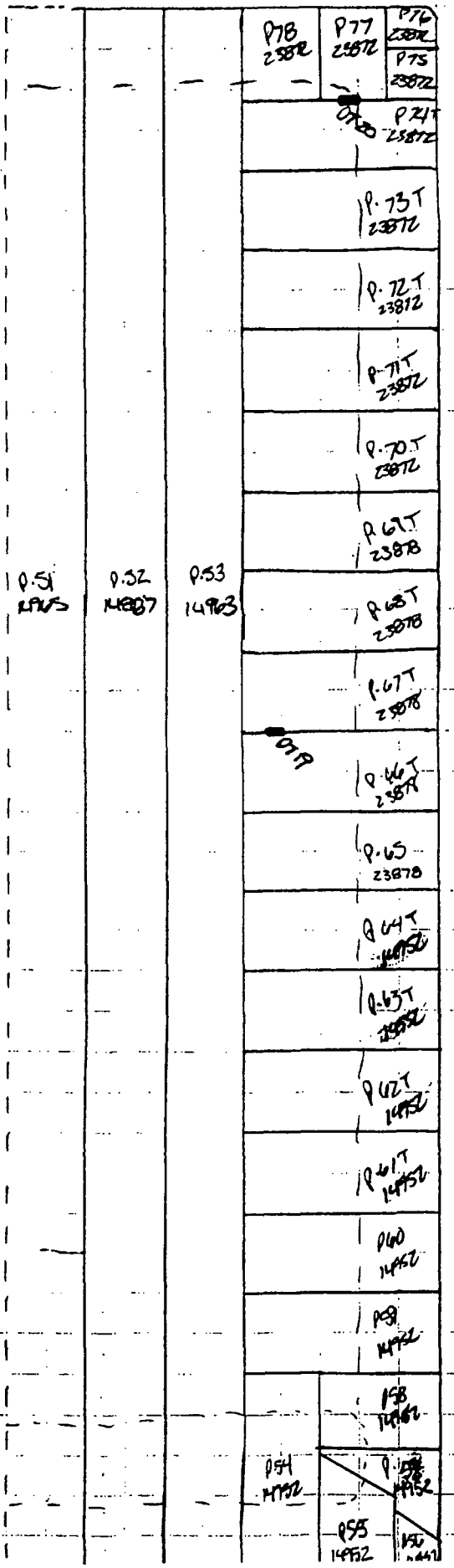
DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
10/8	55	0494	87'	23'	South Slope
	56	0494	85'	—	South Slope
	57	0494	84'		South Slope
	58	0494	87'		South Slope
	59	0494	86'		South slope
	60	0494	85'		South slope
	61	0494	83'		South slope
	62	0494	84'		South slope
	63	0494	50'		South slope 731
	64	0671	71'		SE Corner
	65	0671	43		SE Corner
	66	0671	43		SE Corner 157
			TO 20,924		

PANEL PLACEMENT FORM

PROJECT NAME: E Nelena PROJECT NUMBER: _____

MATERIAL DESCRIPTION: 68 MILL

DATE/ TIME	PANEL NUMBER	ROLL NUMBER	PANEL LENGTH	PANEL WIDTH	COMMENTS/ PANEL LOCATION
10/8	68	24312	191	23	E to W top
10/8	69	24312	114	23	E to W top and E slope
10/8	70	24312	113	23	EAST slope
10/8	67	24312	99'	23	E to W top 517
			11891		
			32,315		


P78
23872
P77
23872
P76
23872
P75
23872
P74T
23872
P73T
23872
P72T
23872
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23872
P70T
23872
P69T
23878
P68T
23878
P67T
23878
P66T
23878
P65
23878
P64T
14952
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P62T
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P61T
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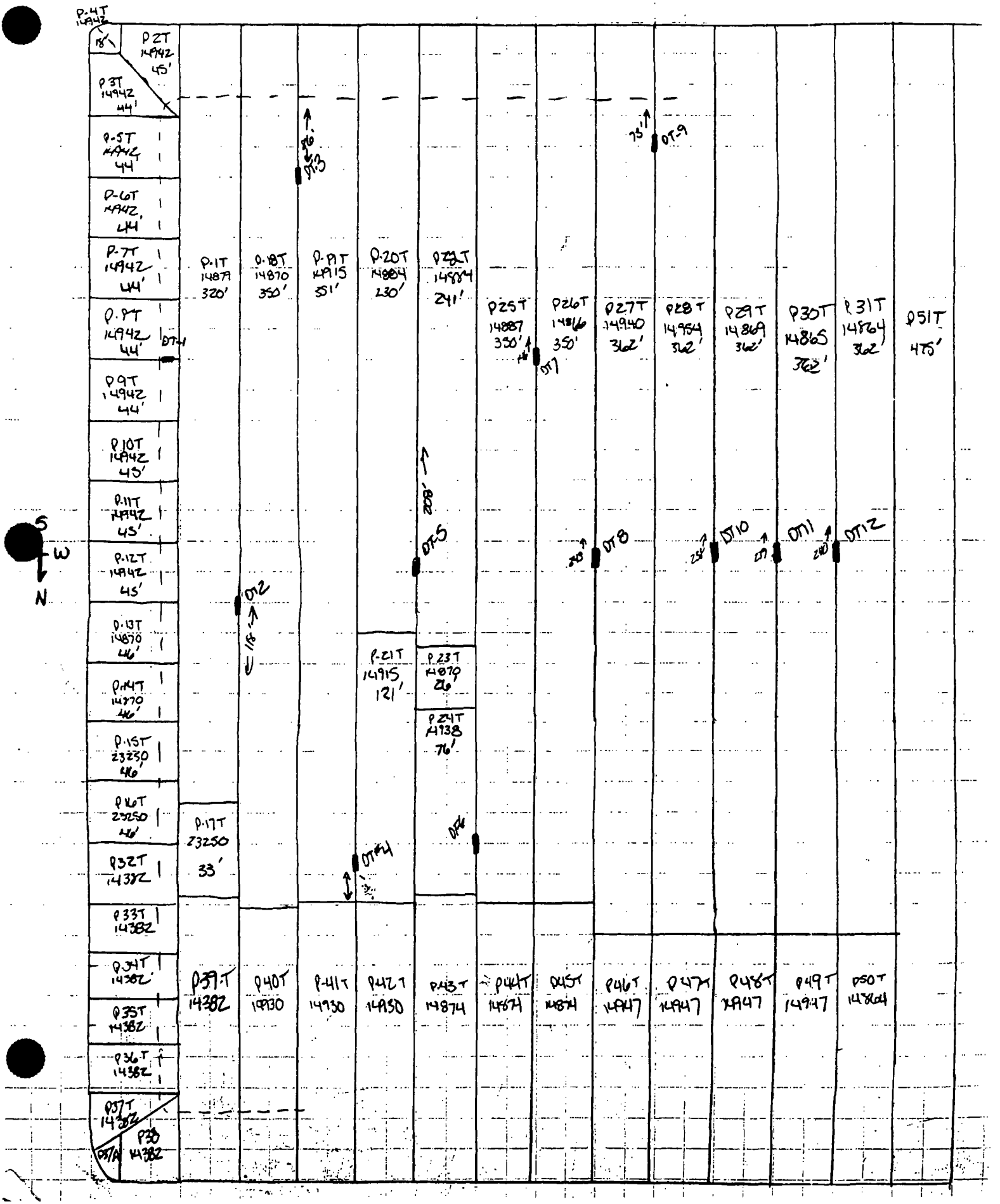
14955
P52
14957
P53
14963



P-4T 14942
18'
P2T 14942 45'
P3T 14942 44'
P-5T 14942 44
P-6T 14942 44'
P-7T 14942 44'
P-8T 14942 44'
DT-1
P9T 14942 44'
P10T 14942 45'
P-11T 14942 45'
P-12T 14942 45'
P-13T 14870 46'
P-14T 14870 46'
P-15T 23250 46'
P16T 23250 46'
P32T 14382
P33T 14382
P34T 14382
P35T 14382
P36T 14382
P37T 14382
P38 14382
P37A
P-1T 14879 320'
P-17T 23250 33'
P-18T 14870 350'
P-19T 14915 351'
P-20T 14884 230'
P-21T 14915 121'
P22T 14884 241'
P23T 14879 26'
P24T 14938 76'
P25T 14887 350'
P26T 14866 350'
P27T 14940 362'
P28T 14954 362'
P29T 14869 362'
P30T 14865 362'
P31T 14864 362'
P51T 475'
DT-3
DT-9
DT-5
DT-8
DT-10
DT-11
DT-12
DT-2
DT-4
DT-6
DT-7
P39T 14382
P40T 14930
P-41T 14930
P42T 14930
P43T 14874
P44T 14874
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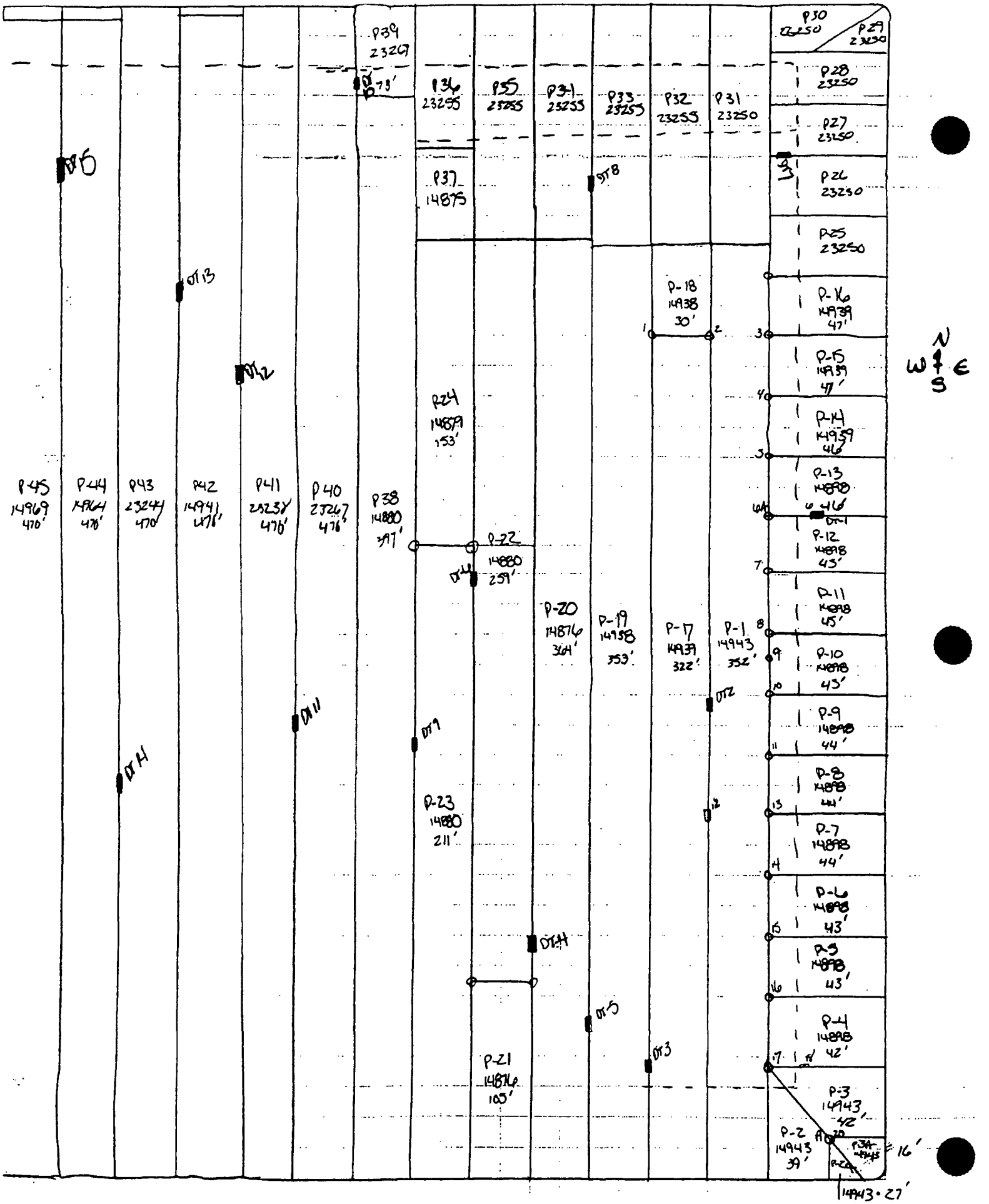
P46T 14947
P47T 14947
P48T 14947
P49T 14947
P50T 14864
S
W
N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P39 23267
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P35 23255
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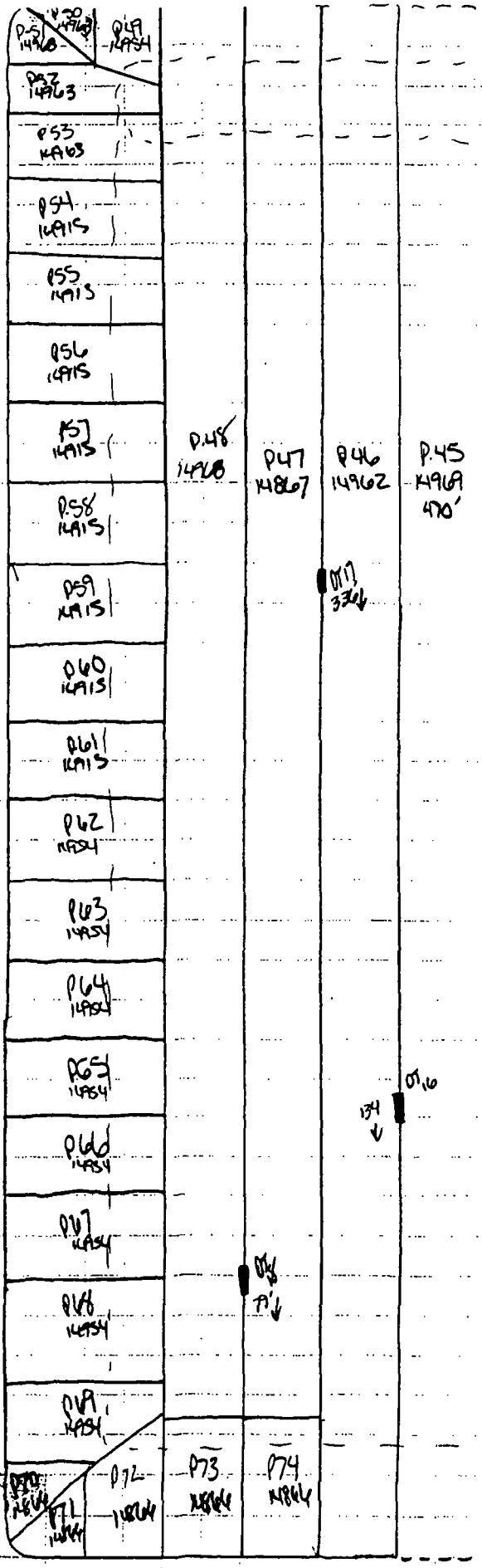
P33 23255
P32 23255
P31 23250
P37 14875
P45 14969 470'
P44 14964 470'
P43 23244 470'
P42 14941 470'
P41 23238 470'
P40 23267 470'
P38 14880 397'
P24 14879 153'
P-18 14938 30'
P-16 14939 47'
P-15 14939 47'
P-14 14959 46'
P-13 14880 46'
P-12 14878 43'
P-11 14878 45'
P-10 14878 43'
P-9 14878 44'
P-8 14878 44'
P-7 14878 44'
P-6 14878 43'
P-5 14878 43'
P-4 14878 42'
P-3 14943 42'
P-2 14943 39'
P-22 14880 259'
P-20 14876 364'
P-19 14958 353'
P-17 14939 322'
P-1 14943 352'
P-23 14880 211'
P-21 14876 105'
N
W
E
S
16'
14943.27'

ASARCO

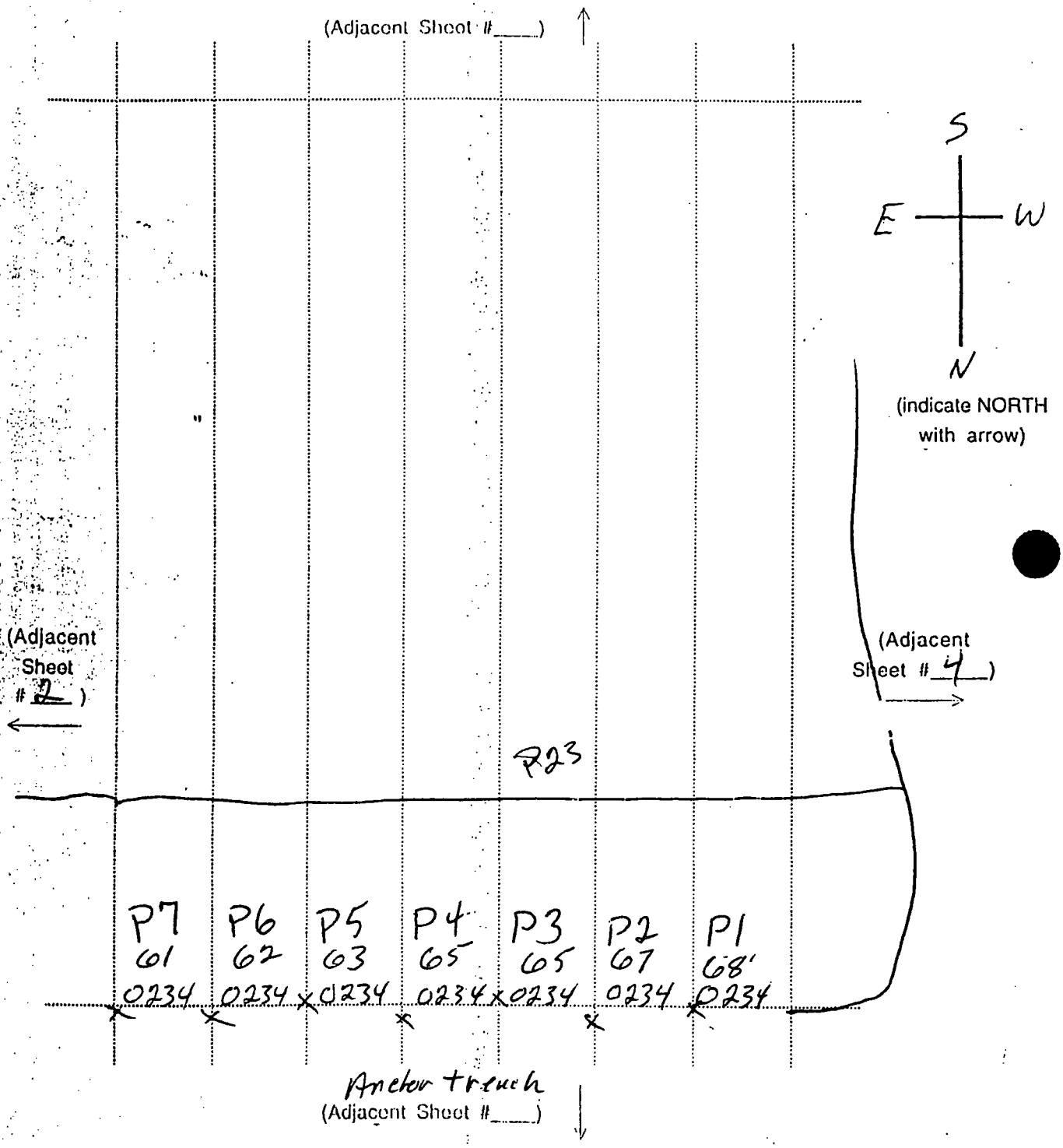
E. HELENA



Northwest Linings & Geotextile Products, Inc.
Tel: 800-729-6954
Fax: 253-872-0245

DAILY PANEL LAYOUT

Project Name: East Helena Project No.: Date Installed: 10/4/01
Sheet No.: 1 of 8



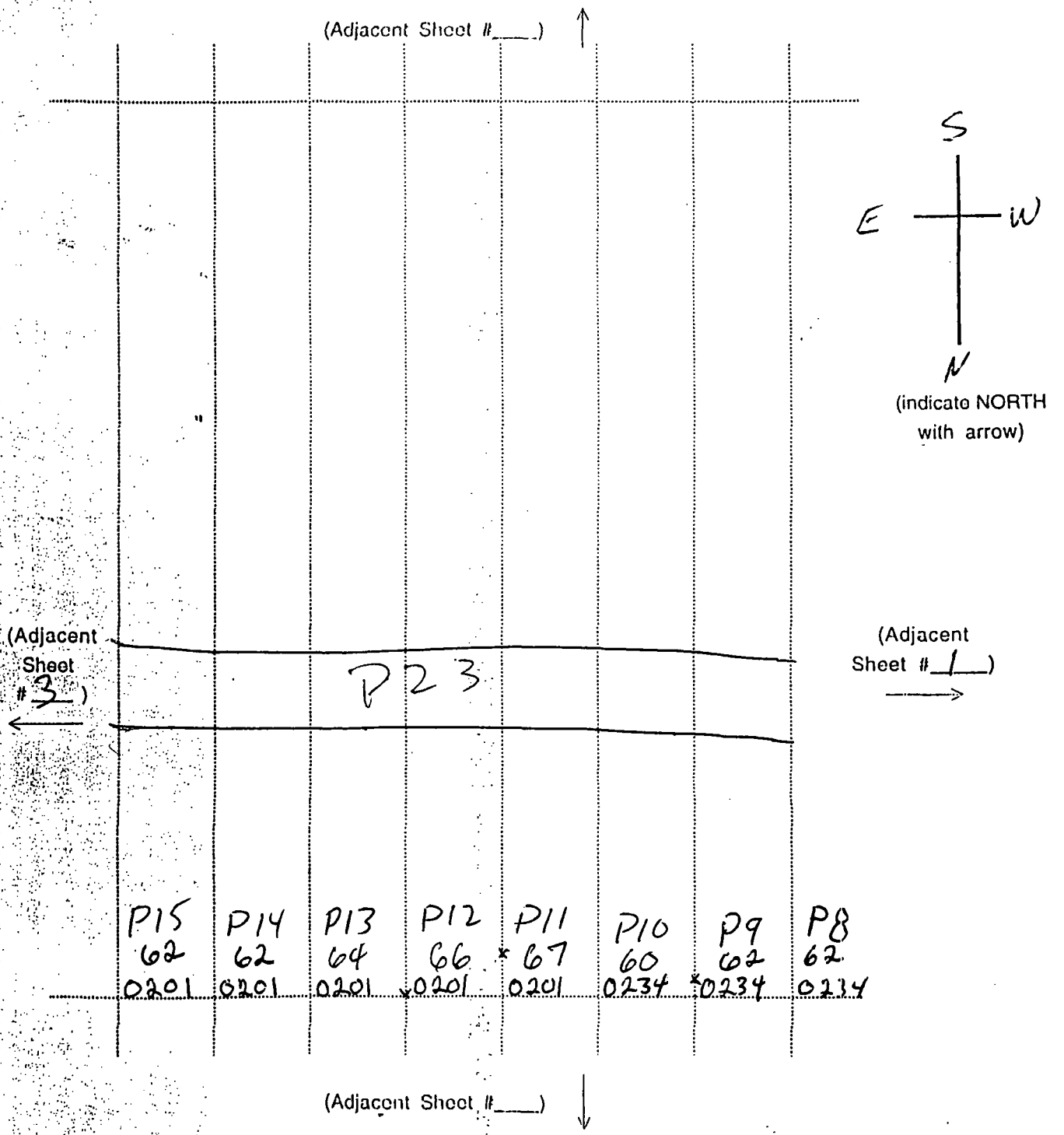
X - REPAIRS
0 - PATCH
DESTRUCT
BOOT
R - ROLL NO.
P - PANEL NO.

Northwest Linings & Geotextile Products, Inc.
Tel: 800-729-6954
Fax: 253-872-0245

DAILY PANEL LAYOUT

Date Installed: 10/4/01

Project Name: EAST Helena Project No.: Sheet No.: 2 088



X - REPAIRS
0 - PATCH
DESTRUCT
BOOT
R - ROLL NO.
P - PANEL NO.

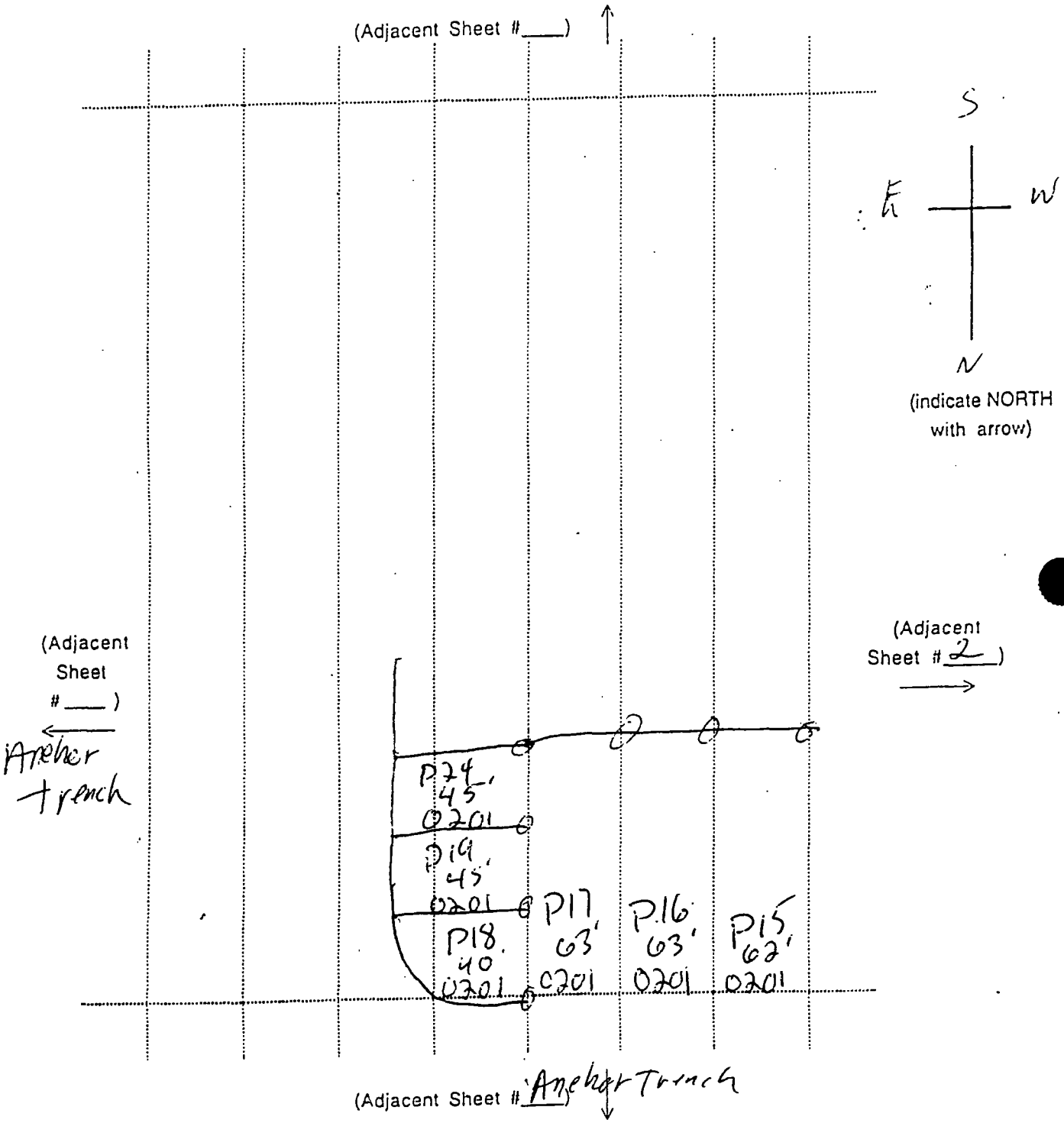
6/13/96

NORTHWEST LININGS &
GEOTEXTILE PRODUCTS, INC.
21000 77th AVE. SO.
KENT, WA 98032
(253) 872-0244

DAILY PANEL LAYOUT

Date Installed: 10/4/01

Project Name: East Helena Project No.:_____ Sheet No.: 3088



X - REPAIRS ☐ - DESTRUCT R - ROLL NO.
0 - PATCH ⊙ - BOOT P - PANEL NO.

5/1/96

Northwest Linings & Geotextile Products, Inc.
[illegible]
Fax: 253-872-0245

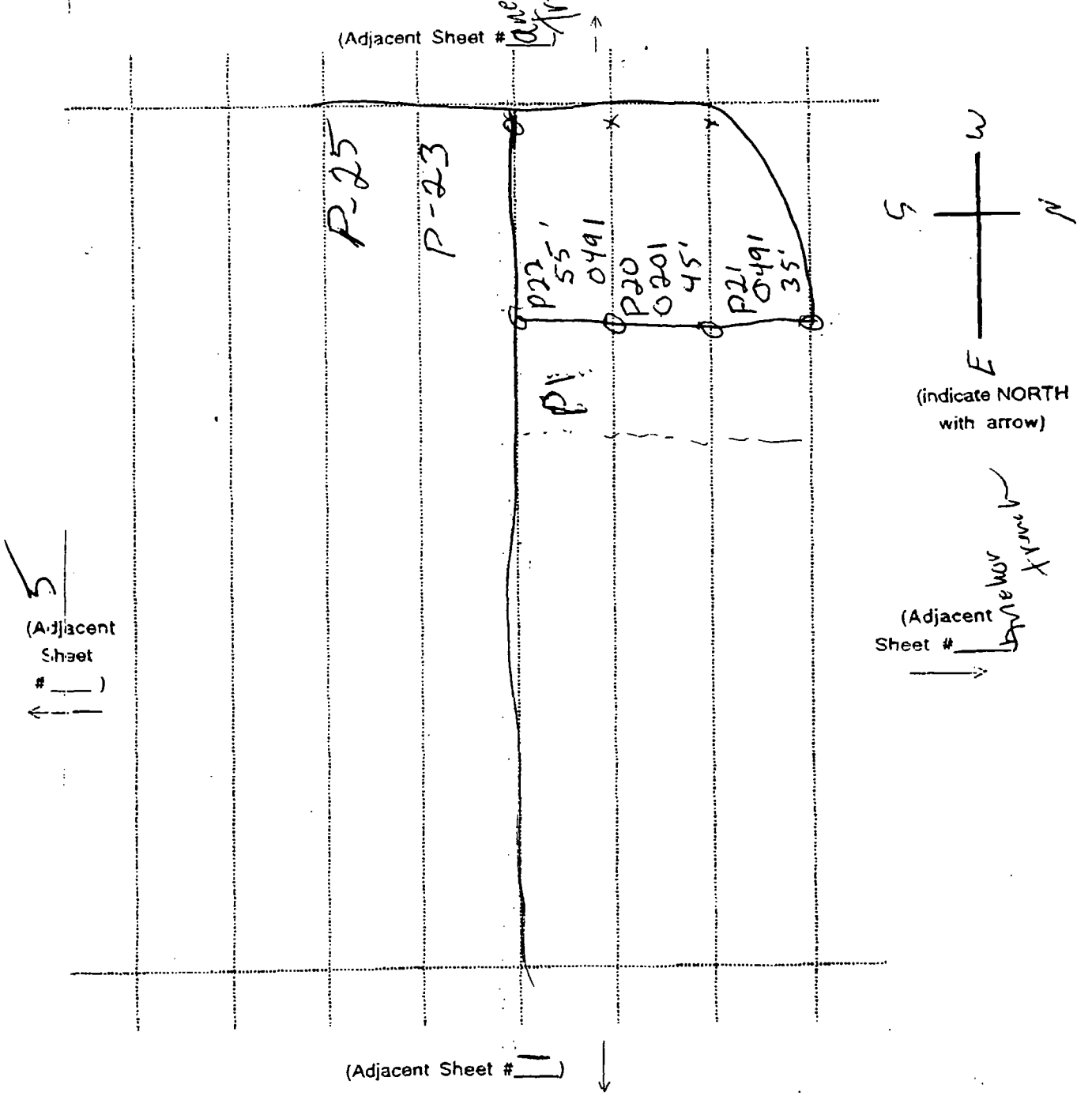
DAILY PANEL LAYOUT

Date Installed: 10/4/01

Project Name: E Hudson

Project No.:

Sheet No.: 4 of 8



X - REPAIRS
0 - PATCH
DESTRUCT
BOOT
R - ROLL NO.
P - PANEL NO.

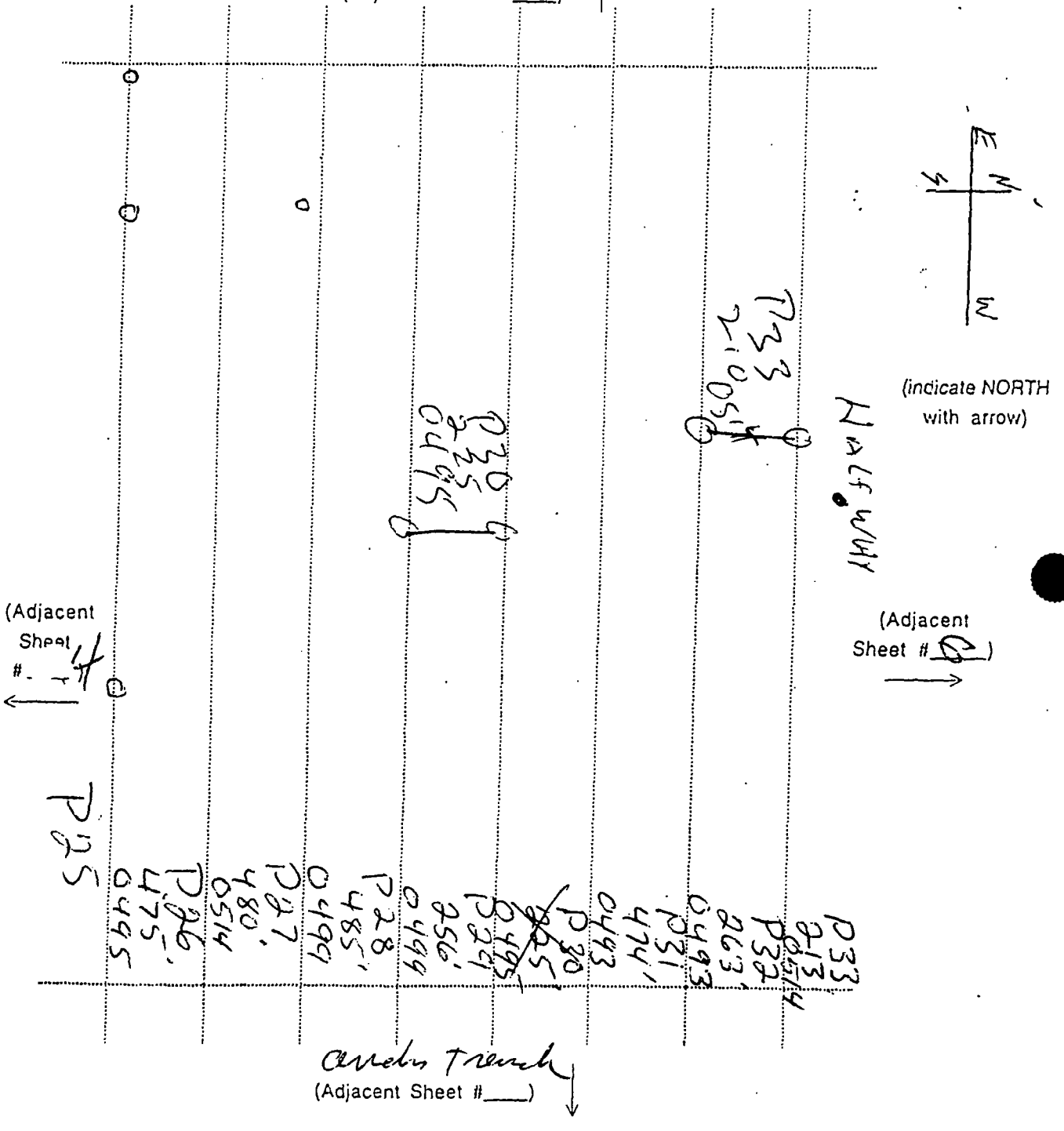
NORTHWEST LININGS &
GEOTEXTILE PRODUCTS, INC.
21000 77th AVE. SO.
KENT, WA 98032
(253) 872-0244

DAILY PANEL LAYOUT

Date Installed: 10/5/01

Project Name: EAST Helena Project No.:_____ Sheet No.: 5 of 8

Anchor trench
(Adjacent Sheet #____)



Anchor Trench
(Adjacent Sheet #____)

X - REPAIRS ☐ - DESTRUCT R - ROLL NO.
0 - PATCH ⊙ - BOOT P - PANEL NO.

5/1/96

NORTHWEST LININGS &
GEOTEXTILE PRODUCTS, INC.
21000 77th AVE. SO.
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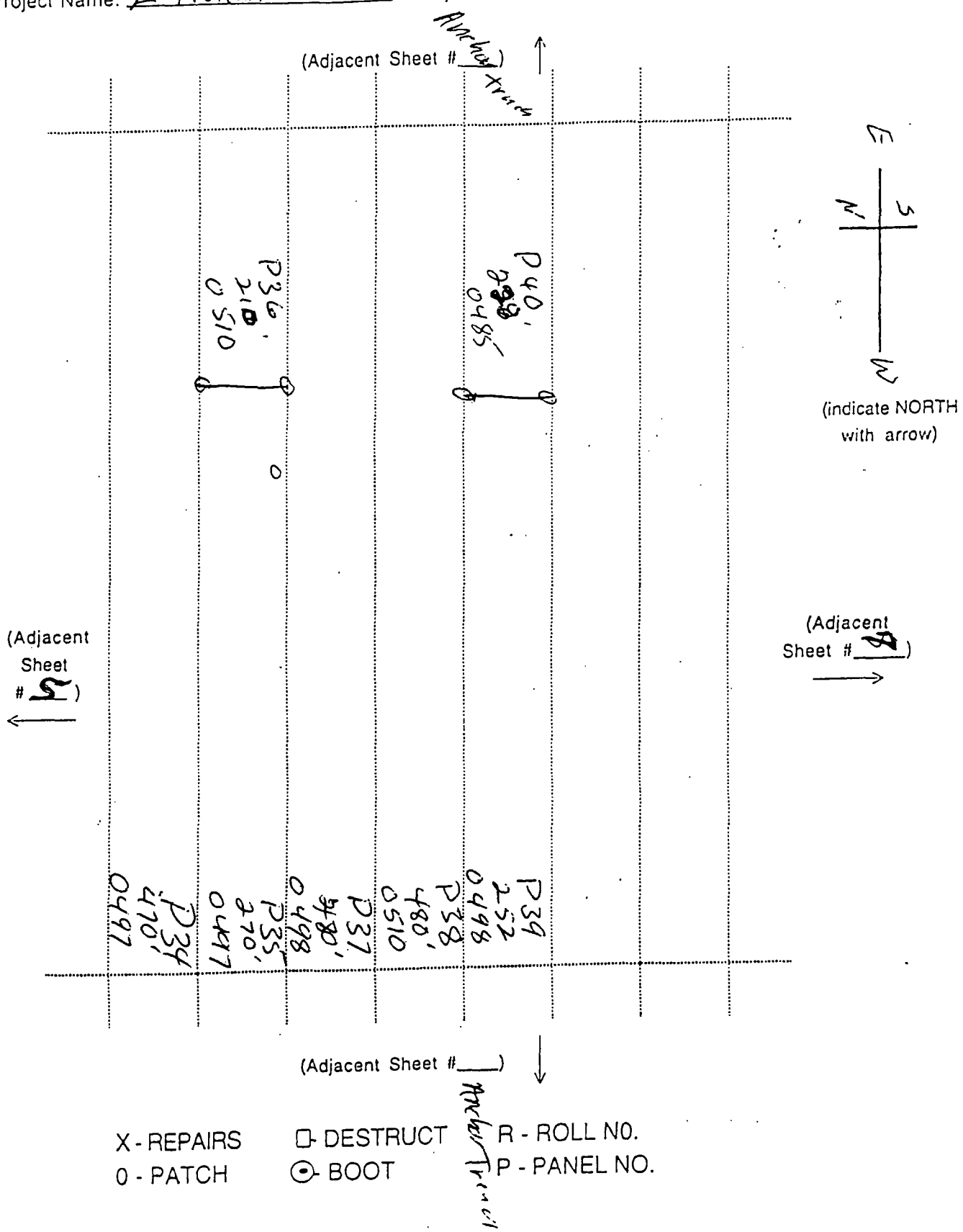
(253) 872-0244

DAILY PANEL LAYOUT

Date Installed: 10/6

Project Name: E Helena Project No.: Sheet No.: 6 of 8



5/1/96

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21000 77th AVE. SO.
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(253) 872-0244

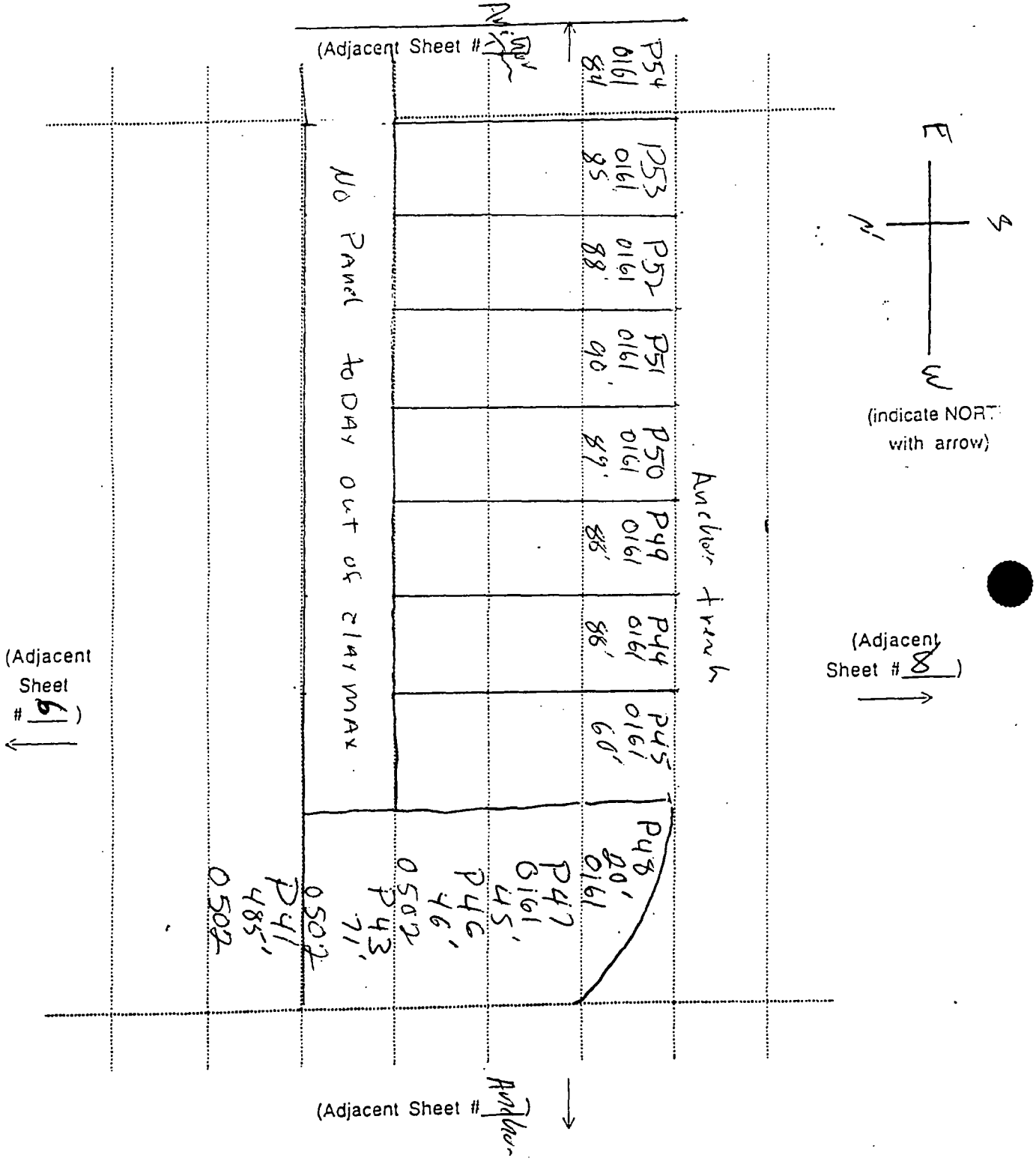
DAILY PANEL LAYOUT

Date Installed: 9/7/01

Project Name: East Helena

Project No.:

Sheet No.: 7



X - REPAIRS
0 - PATCH
DESTRUCT
BOOT
R - ROLL NO.
P - PANEL NO.

5/1/96

NORTHWEST LININGS &
GEOTEXTILE PRODUCTS, INC.
21000 77th AVE. SO.
KENT, WA 98032
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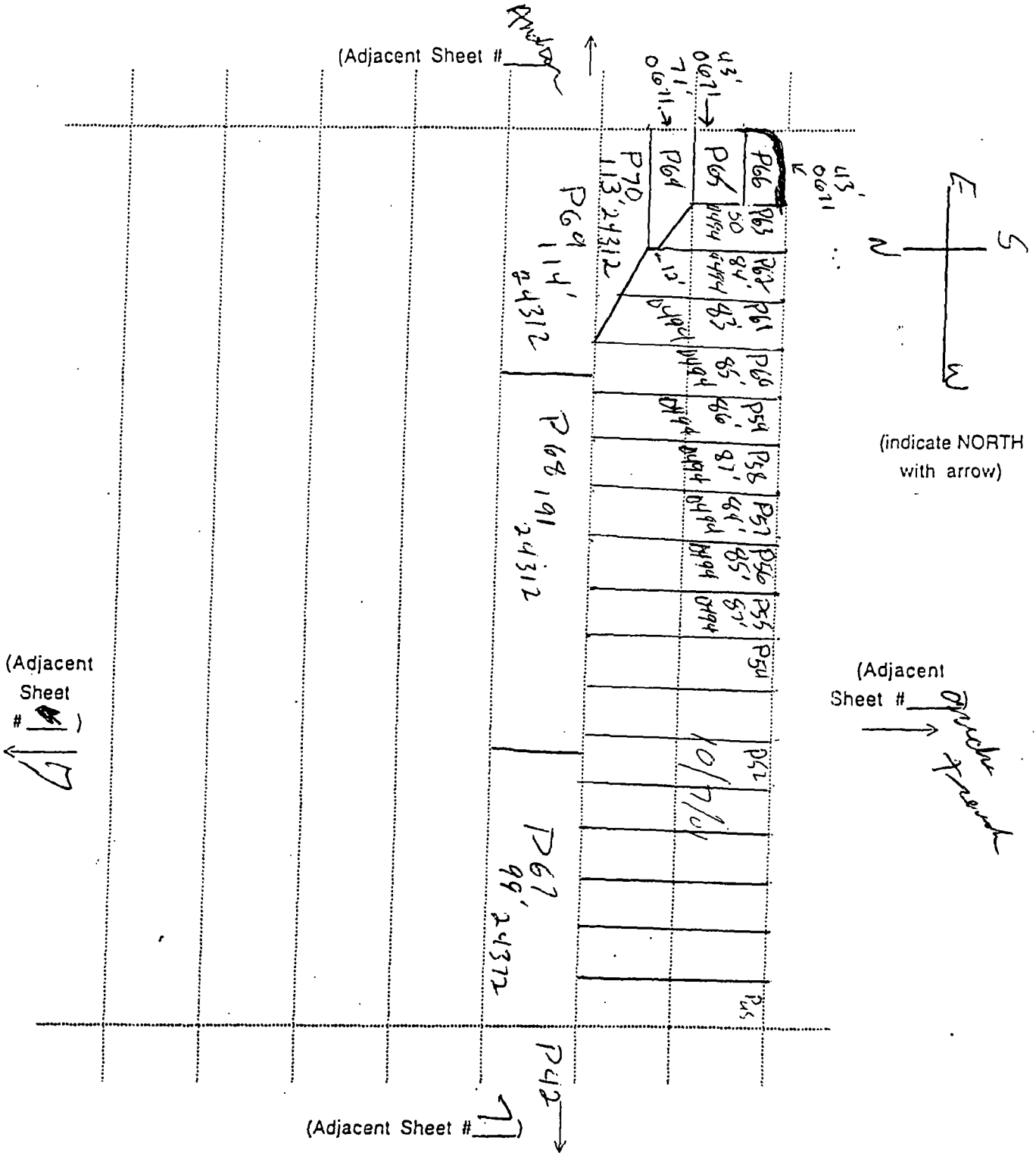
DAILY PANEL LAYOUT

Date Installed: 10/8/01

Project Name: East Nelson Project No.: _____ Sheet No.: 8 of 8



X - REPAIRS ⊡ DESTRUCT R - ROLL NO.
0 - PATCH ⊙ BOOT P - PANEL NO.

5/1/96

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. Helena PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 MIL HDPE

ATE/ IME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
/25	1/2		41'	BX	#201	750	Sunny	10-15	75		
/25	2/2A		29'	"	"	"	"	"	"		
/25	2A/3A		15'	"	"	"	"	"	"		
/25	3/3A/2A		38'	"	"	"	"	"	"		
/25	3/4		42'	Soup	#108	750	"	"	75		
/25	4/5		42'	BX	#201	750	"	"	"		
/25	5/6		45'	"	"	"	"	"	"		
/25	6/7		45'	"	"	"	"	"	"		
/25	7/8		44'	"	"	"	"	"	"		
/25	8/9		45'	"	"	"	"	"	"		
/25	9/10		44'	"	"	"	"	"	"		
/25	10/11		46'	"	"	"	"	"	"		
/25	11/12		46'	"	"	"	"	"	"		
/25	12/13		44'	Soup	#108	"	"	"	"	DS-1	
/25	13/[illegible]		44'	"	"	"	"	"	"		

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
7-25	14/15		46'	Soup	#108	750	Sunny	10-15	75		
7-25	15/16		47'	"	"	"	"	"	"		
7-25	2-16/1		352'	BX	#201	750	Sunny	10-15	75		
7-25	1/17		322	"	"	"	"	"	"	DS-2	
7-25	1/18		30'	Soup	#108	750	"	"	"		
7-25	17/18		23'	"	"	"	"	"	"		
7-25	19/18		30	"	"	"	"	"	"		
7-25	17/19		322'	Soup	#108	750	"	"	"	DT-3	
7-26	19/20		364'	BX	#201	750	Sunny	5-10	75	DT-5	
7-26	20/22		259'	Soup	#108	750	"	"	"	DT-4	
7-26	20/21		105'	Soup	#108	750	"	"	"		
7-26	22/23+24		259'	BX	#201	750	"	"	"	DT-6	
7-26	21/23		105'	BX	201	750	"	"	"	"	
7-26	21/22		23'	Soup	#108	750	"	"	"	"	
7-26	23/24		23'	BX	#201	750	"	"	"	"	

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 90404 MATERIAL DESCRIPTION: 60 mil HDPE

ATE/ IME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
7-28	16/25		46'	Soup	#108	750	Sunny	10-15	75		
7-28	25/26		46'	XB	#201	750	"	"	"		
7-28	26/27		47'	Soup	108	"	"	"	"	DT-7	
7-28	27/28		47'	XB	201	"	"	"	"		
7-28	28/29		45'	Soup	108	"	"	"	"		
7-28	29/30		28'	XB	201	"	"	"	"		Butt Seam
7-28	25-30/31		119'	XB	201	"	"	"	"		
7-28	31/32		118'	Soup	108	"	"	"	"		
7-28	32/33		116'	Soup	108	"	"	"	"		
7-28	33/34		113'	XB	201	"	"	"	"	DT-8	
7-28	34/35		108'	Soup	108	"	"	"	"		
7-28	36-37/35		108'	Soup	108	"	"	"	"		
-28	17-18-19-20-22-24/31-32-33-34-35-37		136'	XB	201	"	"	"	"		Butt Seam
-28	24-36-37/38		470'	Soup	108	"	"	"	"	DT-9	
7/28	38/[illegible]		23'	XB	201	"	[illegible]	"	"		Butt Se[illegible]

PANEL SEAMING FORM

PROJECT NAME: ASARCO G. HELENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
7-28	38-39 / 40		470'	XB	#201	750	Sunny	10-15	7-5	DT-10	
7-29	40-41		475'	Soup	#108	750	Cloudy	15-20	7.5	DT-11	
7-29	41-42		475'	XB	#201	750	"	"	"	DT-12	
7-29	42-43		475'	Soup	#108	750	"	"	"	DT-13	
7-29	43/44		475'	XB	#201	"	"	"	"	DT-14	
7-29	44-45		475'	XB	#201	"	"	"	"	DT-15	
8-01	45/46		475'	soup	#108	750°	sun	10-15		DT.16	
8 01	46/47		475'	xB	#201	750'	sun	10-15		DT.17	
8-01	47/48		475	soup	#108	750°	sun	10-15		DT.18	
8-02	48/49		48'	vp	#108	750	sun	10-15			
8-02	49/50		36'	vp	108	750°	sun	5-10			
8-02	50/51		33'	mk	"	750°	sun	5-10			
8-02	51/52		37'	mk	"	750°	sun	5-10			
8-02	52/53		63'	RW	"	750°	sun	5-10			
8.02	53/54		64'	RW	"	750°	sun	5-10			

PANEL SEAMING FORM

PROJECT NAME: PEMEX E. HECENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

ATE/ IME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
8-3	54/55		63'	VP	108	750°	sun	10-15	80°	P	
8-3	55/56		64'	CJW	6	750°	sun	10-15	80°	P	
8.3	56/57		64'	VP	108	750°	sun	15-20	80°	P	
8.3	57/58		64'	VP	108	750°	sun	15-20	90°	P	
8.3	58/59		64'	CJW	6	750°	sun	15-20	90°	P	
8.3	59/60		64'	CJW	6	750°	sun	15-20	90°	P	
8.3	60/61		64'	VP	108	750°	sun	20-25	95°	P	
8.3	61/62		64'	VP	108	750°	sun	20-25	95°	P	
8.3	62/63		64'	CJW	4	750°	sun	20-25	90°	P	
8-3	63/64		64'	MK	6	750°	sun	20-25	90°	P	
8-4	64/65		64'	VP	108	750°	sun	5-10	70°	P	
8-4	65/66		64'	VP	108	750°	sun	5-10	70°	P	
8-4	66/67		64'	KC	6	750°	sun	5-10	70°	P	
8-4	67/68		64'	KC	6	750°	sun	5-10	70°	P	
8-4	68/[illegible]		64'	VP	108	750	[illegible]	5-10	70°	P	

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404 MATERIAL DESCRIPTION: 60 mil HDPE

ATE/ IME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
-4	69/70		37'	MK	108	750°	cldy	S-10	80°	P	
-4	70/71		38'	MK	108	750°	cldy	S-10	80°	P	
-4	71/72		40'	MK	108	750°	cldy	S-10	080°	P	
-4	72/73		48'	VP	6	750°	cldy	S-10	80°	P	
-4	73/74		48'	VP	6	750	cldy	S-10	80°	P	
-4	73/48		23'	VP	6	750°	cldy	S-10	80°	P	
-4	74/47		23'	VP	6	750°	cldy	S-10	80°	P	

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 7/26/01
SHEET 1 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
7/26/01	2T-4T		28'	BX	#201	750	Sunny	5-10	75	
7/26/01	3T/4T		14'	BX	"	"	"	"	"	
7/26/01	2T/3T		30'	BX	"	"	"	"	"	
7/26/01	1T/2T		42'	BX	"	"	"	"	"	
7/26/01	2T/12T/11T		229	BX	"	"	"	"	"	
7/26/01	3T/5T		41'	Soup	#108	750	"	"	"	
7/26/01	5T/6T		44'	"	"	"	"	"	"	
7/26/01	6T/7T		44'	XB	#201	"	"	"	"	
7/26/01	7T/8T		45'	Soup	#108	"	"	"	"	
7/26/01	8T/9T		44'	XB	#201	"	"	"	"	DT-1
7/26/01	9T/10T		43'	Soup	#108	"	"	"	"	
7/26/01	10T/11T		44'	XB	#201	"	"	"	"	
7/26/01	11T/12T		44'	XB	#201	"	"	"	"	
7/27/01	12T/13T		45'	Soup	#108	750	Sunny	5-10	75	
7/27/01	13T/14T		46'	"	"	"	"	"	"	

PANEL SEAMING FORM

PROJECT NAME: ASARCO E. Helena (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Ward
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 07/27/01
SHEET 2 OF 4

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
07/27/01	14T/15T		46'	XB	#201	750	Sunny	5-10	75	
07/27/01	15T/16T		46'	XB	"	"	"	"	"	
07/27/01	1T/17T		23'	Soup	#108	"	"	"	"	
07/27/01	2T-16T/1T		333'	Soup	"	"	"	"	"	
07/27/01	1T/18T		320'	~~XB~~ Soup	"	"	"	"	"	DT-2
07/27/01	18T/19T		350'	Soup	"	"	"	"	"	DT-3
07/27/01	19T/20-21T		351'	XB	#201	"	"	"	"	DT-4
07/27/01	20-21T/22-23-24		346'	Soup	#108	"	"	"	"	DT-5
07/27/01	20T/21T		23'	XB	#201	"	"	"	"	
07/27/01	22T/23T		23'	XB	"	"	"	"	"	
07/27/01	23T/24T		23'	XB	"	"	"	"	"	
08/01/01	[illegible]/25		350'	XB	201	750°	Sun	5-10	50°	DT 6
08/01/01	25/26		350'	Soup	108	750°	Sun	5-10	55°	DT7
08/01/01	26/27		350'	XB	201	750°	Sun	5-10	69°	DT8
08/01/01	27/28		362'	Soup	108	750°	Sun	5-10	75°	DT9

PANEL SEAMING FORM

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 08/01/01
SHEET 3 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
08/01/01	28/29		362'	XB	201	750°	Sun	5-10	70°	
08/01/01	29/30		362'	SOUP	108	750°	Sun	5-10	70°	DT 11
08/01/01	30/31		362'	XB	201	750°	Sun	5-10	70°	DT 12
08/01/01	32/16		48'	XB	201	750°	Sun	5-10	80°	
08/01/01	32/33		48'	SOUP	108	750°	Sun	5-10	80°	
08/01/01	33/34		48'	SOUP	108	750°	Sun	10-15	80°	
08/01/01	34/35		49'	XB	201	750°	Sun	10-15	80°	
08/01/01	35/36		49'	XB	201	750°	Sun	10-15	80°+	
08/01/01	36/37		49'	XB	201	750°	Sun	10-15	80°+	
08/01/01	37/38		47'	SOUP	108	750°	Sun	10-15	80°+	
08/01/01	32-38/39		146'	SOUP	108	750°	Sun	10-15	80°	
08/01/01	39/40		115'	XB	201	750°	Sun	10-15	80°	
08/01/01	40/41		115'	SOUP	108	750°	Sun	10-15	80°	
08/01/01	41/42		115'	XB	201	750	Sun	10-15	80°	
08/01/01	42/43		115'	SOUP	108	750	Sun	10-15	80°	

PANEL SEAMING FORM

1

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Day Wold
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 8/01/01

SHEET 4 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
08/01/01	43/44		115'	XB	201	750°	CLD	5-10	70°	
08/01/01	44/45		115'	SOP	108	750°	Cld	5-10	65°	
08/01/01	45/46		115'	XB	201	750°	Cld	10-15	65°	
08/01/01	46/47		115'	SOP	108	750°	Cld	10-15	65°	
08/01/01	47/48		115'	XB	201	750°	Cld	10-15	65°	
08/01/01	48/49		115'	SOP	108	750°	Cld	10-15	65°	
08/01/01	49/50		115'	XB	201	750°	Cld	10-15	65°	
8/04/01	50/51		470'	VP	201	750°	Cld	5-10	70°	
8/4/01	51/52		470'	VP	201	750°	Cld	5-10	70°	
8/4/01	52/53		470'	VP	201	750°	Cld	5-10	70°	
8/6/01	53/54-64		470'	MC	208	750	Cld	5-10	80°	
08/6/01	54/55		70'	MC	108	750°	Cld	5-10	90°	
8/6/01	55/56		46'	MC	108	750°	Sun	5-10	90°	
8/6/01	56/57		38'	VP	201	750°	Sun	5-10	90°	
8/6/01	57/58		49'	VP	201	750°	Sun	5-10	90°	

HDPE PANEL SEAMING FORM

(T)

PROJECT NAME: ASARCO E. HELENA

NWLG PROJECT # 010404

NWLG SUPERINTENDANT: Troy Jay Wold

MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 8/6/01

SHEET 5 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
8/6/01	58/59		90'	VP	201	750'	Sun	0-5	80'+	
8/6/01	59/60		90'	MK	108	750'	Sun	0-5	80+	
8/6/01	60/61		91'	VP	201	750'	Sun	5-10	80+	
8/6/01	61/62		91'	MK	108	750'	Sun	5-10	80+	
8/6/01	62/63		92'	VP	201	750'	Sun	5-10	80+	
8/6/01	63/64		92'	MK	108	750'	Sun	5-10	80+	
8/15/01	64/65		92'	XB	6	750'	Sun	5-10	90'	
8/15/01	65/66		92'	XB	6	750'	Sun	5-10	90+	
8/15/01	66/67		92'	XB	6	750'	Sun	5-10	90'	DT-19
8/15/01	67/68		92'	XB	6	750'	Sun	5-10	90'	
8/15/01	68/69		92'	XB	6	750'	Sun	0-5	90'	
8/15/01	69/70		92'	XB	6	750'	Sun	0-5	90'	
8/15/01	70/71		92'	XB	6	750'	Sun	0-5	90'+	
8/15/01	71/72		92'	XB	6	750'	Sun	0-5	90'	
8/15/01	72/73		92'	XB	6	750'	Sun	0-5	90'	

HDPE PANEL SEAMING FORM

T

PROJECT NAME: ASARCO E. HELENA

NWLG PROJECT # 010404

NWLG SUPERINTENDANT: TRAY JAY WOLD

MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 8/15/01

SHEET 6 OF 6

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
8/15/01	73/74		92'	XB	4	750°	Sun	0-5	90°	
8/15/01	74/75		42'	XB	4	750°	Sun	0-5	90°	QT 20
8/15/01	75/76		42'	XB	4	750°	Sun	0-5	90°	
8/15/01	76/77		23'	XB	4	750°	Sun	0-5	90°	
8/15/01	77/78		49'	XB	4	750°	Sun	0-5	90°	
8/15/01	78/53		49'	XB	4	750°	Sun	0-5	90°	
/ /										
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HDPE PANEL SEAMING FORM

PROJECT NAME: Helena
NWLG PROJECT #
NWLG SUPERINTENDANT: L Murray
MATERIAL DESCRIPTION: 40 Mil HD Smooth

DATE/10/4/01

SHEET 1 OF 5

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
10/4/01		1 2	68'	XB	2	750	overcast	20	33	
10/4/01		2 3	66'	✓	✓	✓	✓	✓	33	
10/4/01		3 4	65'						33	
10/4/01		4 5	62						34	
10/4/01		5 6	62						34	
10/4/01		6 7	62						34	
10/4/01		7 8	62						34	
10/4/01 10/4		8 9	62						36	
10/4/01		9 10	61						36	
10/4/01		10 11	66						36	
10/4/01		11 12	66						36	
10/4/01		12 13	65						36	
10/4/01		14 15	62						36	
10/4/01		15 16	62						36	
10/4/01		16 17	63						36	

HDPE PANEL SEAMING FORM

PROJECT NAME: EAST Helena
NWLG PROJECT #
NWLG SUPERINTENDANT: Murray
MATERIAL DESCRIPTION: 40 Mil HD Smooth

DATE: 10/5/01
SHEET 2 OF 5

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WIND MPH	AMBIENT TEMP	COMMENTS
10/4/1		18/19	43	XB	2	750/15	overcast	25	35	
10/4/1		19/24	44	XB		750/15			45	
10/4/1		18-19-24/17	63	XB					45	Butt Seam
10/4/1		21/20	40						45	
10/4/1		20/22	49						45	
10/4/1		1/22-20-21	68						45	Butt Seam
10/4/1		23/24	45						50	
10/4/1		25/26	475						50	
10/5/1		23/1-24	480						50	Butt Seam
10/5/1		26/27	480						50	
10/5/1		27/28	485						50	
10/5/1		28/29	256						50	
10/5/1		28/30	225						50	
10/5/1		29/31	256						50	
10/5/1		30/31	225						50	

PANEL SEAMING FORM

PROJECT NAME: E Helena PROJECT NUMBER: _____ MATERIAL DESCRIPTION: 40 mil

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
10/6		31/32	263	XB	2	750	clear	20	60		
10/6		31/33	210	XB	2	750	clear	20	60		
10/6		33/34	470	XB	2	750	clear	20	60		
10/6		34/35	270	XB	2	750	clear	20	60		
10/6		34/36	210	XB	2	750	clear	20	60		
10/6		35/37	270	XB	2	750	clear	20	60		
10/6		36/37	210	XB	2	750	clear	20	60		
10/6		37/38	480	XB	2	750	clear	20	60		
10/6		38/40	228	XB	2	750	clear	20	60		
10/6		38/39	252	XB	2	750	clear	20	60		
10/6		40/39	228	XB	2	750	clear	20	60		

PANEL SEAMING FORM

PROJECT NAME: E Helena PROJECT NUMBER: MATERIAL DESCRIPTION: 40mil

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
9/7	41/39	41/39	252	XB	#2	750	clear	20+	35		
		40/41	228	XB	#2	750	over cast	25+	40		
		41/43	71'	XB	#2	750		25+			
		43/46	46'					25+			
		46/45	45'								
		45/48	20'								
		45/47 46 48	80'								Butt seam
		45/44	88'								
		44/49	88'								
		49/50	89'								
		51/50	89'								
		51/52	88'								
		52/53	86'								
		53/54	85'								
9/7											

PANEL SEAMING FORM

PROJECT NAME: East Helena PROJECT NUMBER: _____ MATERIAL DESCRIPTION: 40 Mil 60 Mil

DATE/ TIME	SEAM NUMBER	PANEL NUMBERS	SEAM LENGTH	SEAMER INITIALS	MACHINE NUMBER	TEMP SETTING	WEATHER	WINDS	AMBIENT TEMP	DES TEST P/F	COMMENTS
10/8	2	55/56	86	XB	2	750	Overcast	20	45		
		56/57	85	XB	2	750	o/c	28	45		
		57/58	86	XB	2	750	o/c	25	45		
		58/59	87	XB	2	750	o/c	25	45		
		59/60	86	XB	2	750	o/c	25	45		
		61/62	84	XB	2	750	o/c	25	45		
		62/63	84	XB	2	750	o/c	25	50		
		63/66 65 64	85	XB	2	750	o/c	25	50		Butt seam
		66/65	43	XB	2	750	o/c	25	50		
		65/64	43	XB	2	750	o/c	25	50		
		64/70	71	XB	2	750	o/c	25	50		
		70/69	113	XB	2	750	o/c	25	50		
		70/62 61	45'	X-B	2	750	o/c	25	50		Butt seam
		68 66 65 54 60 59 58 57	191	XB	2	750	o/c	35	35		Butt seam
		67/51 52 45 44 80	99	XB	2	750	o/c	35	35		Butt seam

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY STAYWOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 7/25/01

SHEET 1 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/25/01	R-1	P-17-18-19	#1	Soup	2X3' Patch Butt Seam	7/25	✓
7/25/01	2	P-1-17-18	1	"	2X3' Patch Butt Seam	7/25	✓
7/25/01	3	P-16-15-1	#1	Soup	2X2' Patch Butt Seam	7/25	✓
7/25/01	4	P-15-14-1	#1	"	1X2' Patch Butt Seam	7/25	✓
7/25/01	5	P-14-13-1	#1	"	2X2' Patch Butt Seam	7/25	✓
7/25/01	6	P-12-13	#1	"	2X11 Patch DS-1 Stop of Toe 15'	7/25	✓
7/25/01	7	P-12-11-1	#1	"	1X2 Patch Butt Seam	7/25	✓
7/25/01	8	P-11-10-1	#1	"	1X1' Patch Butt Seam	7/25	✓
7/25/01	9	P-10-1	#1	K.K	1X1 Patch Seam Burn	7/25	✓
7/25/01	10	P-10-9-1	#1	"	1X1 Patch Butt Seam	7/25	✓
7/25/01	11	P-9-8-1	#1	"	2X3 Patch Butt Seam	7/25	✓
7/25/01	12	P-1-17	#1	"	2X3 Patch	7/25	✓
7/25/01	13	P-8-7-1	#1	"	3X5' Patches and Burn Butt Seam	7/25	✓
7/25/01	14	P-7-6-1	#1	"	1X1 Patch Butt Seam	7/25	✓
7/25/01	15	P-6-5-1	#1	"	1X1 Patch Butt Seam	7/25	✓
7/25/01	16	P-5-4-1	#1	KK	1X2 Patch Butt Seam	7/25	✓

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 7/25/01

SHEET 2 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/25/01	R-17	P-4-3-21	#1	SP	3X8 Patches Inter Section	7-25	✓
7/25/01	18	P-3-4	#1	SP	1X1 Patch	7-25	✓
7/25/01	19	P2-2A-3	#1	SP	1X1 Patch Butt Seam	7-25	✓
7/25/01	20	P-3-3A-2A	#1	SP	1X2' Patch Butt Seam	7-25	✓
7/25/01	21	P-17-19	#1	SP	2X4 Patch DS-3 5' of Toe	7-25	✓
7/25/01	22	P-1-17	#1	SP	2X4 Patch DS-2	7-25	✓
7/25/01	6A	P 13-12-1	#1	SP	1X1 PATCH Burnseam	7-25	✓
7/26/01	23	P-19-20	#1	SP	2X4' Patch DT-5	7-26	✓
7/26/01	24	P 20-21-22	#1	SP	3X3 Patch Butt Seam	7-26	✓
7/26/01	25	P-20-22	#1	SP	2X4 Patch DS-4	7-26	✓
7/26/01	26	P 21-22-23	#1	SP	1X2 Patch Butt Seam	7-26	✓
7/26/01	27	P-22-23	#1	SP	2X4 Patch DS-6	7-26	✓
7/26/01	28	P-22-23-24	#1	SP	2X2 Patch Butt Seam	7-26	✓
7/28/01	29	P-28-29-30	#1	KK	1X1 Patch Butt Seam	7-28	✓
7/28/01	30	P-28-30-31	#1	KK	1X1 Patch Butt Seam	7-28	✓
7/28/01	31	P-27-28-31	#1	KK	1X1 Patch Butt Seam	7-28	✓

REPAIR REPORT

PROJECT NAME: PORCO @ HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 07/28/01

SHEET 3 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/28/01	R. 32	P-27-31	#1	KK	2X4' Patch Burn out / Airhole	7-29	✓
7/28/01	33	P-26-27-31	#1	KK	1X1 Patch Butt Seam	7-29	✓
7/28/01	34	P-26-27	#1	KK	2X4 Patch DT #7	7-29	✓
7/28/01	35	P-25-26-31	#1	KK	1X1 Patch Butt Seam	7-29	✓
7/28/01	36	P-25-17-31	#1	KK	1X2' Patch Butt Seam	7-29	✓
7/28/01	37	P-16-25-17	#1	KK	3X4' Patch Butt Seam	7-29	✓
7/28/01	38	P-17-18 / 31-32	#1	SP	1X2' Patch Inter Section	7-29	✓
7/28/01	39	P-18-19 / 32-33	#1	SP	2X2' Patch Inter Section	7-29	✓
7/28/01	40	P-33-34	#1	SP	2X4' Patch DT #8	7-29	✓
7/28/01	41	P-19-20 / 33-34	#1	SP	1X2' Patch Inter Section	7-29	✓
7/28/01	42	P-20-21 / 34-35	#1	SP	3X5' Patches Intersection	7-29	✓
7/28/01	43	P-22-24 / 35-37	#1	SP	1X2' Patch Inter Section	7-29	✓
7/28/01	44	P-24-37 / 38	#1	SP	1X2' Patch Butt Seam	7-29	✓
7/28/01	45	P-36-37 / 55	#1	KK	1X1 Patch Butt Seam	7-29	✓
7/28/01	46	P-36-37 / 38	#1	KK	1X1 Patch Butt Seam	7-29	✓
7/28/01	47	P-38-39 / 36	#1	KK	2X3' Patch Butt Seam	7-29	✓

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAYWOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 07/28/01

SHEET 4 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7 129 101	R-48	P-38-39/40	#1	KK	1X1' Patch Butt Seam	07 29 01	✓
7 129 101	49	P-29-30-29A	#1	SP	8X9 Patches P-29A	07 29 01	✓
7 129 01	50	P-34-35	#1	KK	1X1 Patch Burn out	07 29	✓
7 129 101	51	P-38-40	#1	KK	2X4' Patch DT # 10	07 29	✓
7 129 101	52	P-24-38	#1	KK	1X1' Patch Burn out	07 29	✓
7 129 101	53	P-24-38	#1	KK	1X1' Patch Burn out	07 29	✓
7 129 101	54	P-38-40	#1	KK	1X1' Patch Burn out	07 29	✓
7 129 101	55	P-23-24-28	#1	KK	1X1' Patch Butt Seam	07 29	✓
7 129 101	56	P-24-38	#1	KK	1X1' Patch Burn out	07 29	✓
7 129 101	57	P-24/38	#1	KK	2X4' Patch DT # 9	07 29	✓
7 129 101	58	P-24-38	#1	KK	1X1' Patch Burn out	07 29	✓
7 129 101	59	P-24-38	#1	KK	1X2' Patch Burn out	07 29	✓
7 129 101	60	P-38-40	#1	KK	1X2' Patch power off	07 29	✓
7 129 101	61	P-41-42	#1	SP	1X2' Patch Burn out	07 29	✓
7 129 101	62	P-43-44	#1	Soup	2X2 Patch Burnout	07 29	✓
7 129 101	63	P-41-42	#1	"	2X2 Patch Add Liner TO Anchor Trench	07 29	✓

REPAIR REPORT

PROJECT NAME: ASARCO E. Helena
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Ward
MATERIAL DESCRIPTION: 40 mil HDPE

DATE: 07/29/01

SHEET 5 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7 29 01	R-64	P-42-43	#1	Soup	2X3' Patch Add Linner To Anchor Trench	7 29 01	✓
7 29 01	65	P-43-44	#1	Soup	1X2' Patch Add Linner To Anchor Trench	7 29	✓
7 29 01	66	P-44-45	#1	"	2X2' Patch Add Linner To Anchor Trench	7 29	✓
7 29 01	67	P-40-41	#1	"	2X4' Patch DT # 11	7 29	✓
7 29 01	68	P-41-42	#1	"	2X4' Patch DT # 12	7 29	✓
7 29 01	69	P-42-43	#1	"	2X4' Patch DT # 13	7 29	✓
7 29 01	70	P-43-44	#1	"	2X4 Patch DT # 14	7 29	✓
7 29 01	71	P-44-45	#1	Soup	2X4' Patch DT # 15		
/ /							
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REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAYWARD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 08-04

SHEET 5 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8 13 101	R-72	P-45-46	#1	KK	1X2' Patch Burn out	08-04	✓
8 13 101	R-73	P-46-47	"	"	1X1' Patch Burn out	08 04	✓
8 13 101	R-74	P-49-52	"	"	1X1' Patch Butt Seam Burn out	08 4	✓
8 13 101	R-75	P 49-50 -51-52	"	"	3X4' Patch Intersection	8-4	✓
8 13 101	R-76	P-45-46	#1	VP	2X4' Patch Burn out/Air hole	8-4	✓
8 13 101	R-77	P-46-47	1	VP	2X4 Patch Burn out/Air hole	8-4	✓
8 13 101	R 78	P-47-48	1	VP	1X1 Patch Burn out	8-4	✓
8 13 101	R 79	P-47-48	1	VP	1X1 Patch Burn out	8-4	✓
8 14 101	R 80	P-46-47	#1	KK	2X4 Patch DT #16	8-4	✓
8 14 101	R 81	P-47-74-46	1	KK	3X5' Patch Butt Seam	8-4	✓
8 14 101	R 82	P-46-74	1	KK	1X1 Patch Burn out	8-4	✓
8 14 101	R 83	P 73-74 47-48	1	KK	1X2' Patch Intersection	8-4	✓
8 14 101	R 84	P 72-73-69 -68-48	1	KK	5X6' Patch Intersection	8-4	✓
8 14 101	R 85	P 69-70-71 72	1	KK	7X5' Patch Intersection	8-4	✓
8 14 101	R 86	P-52-53	1	KK	3X3 Patch Burn out	8-4	✓
8 14 101	R 87	P 49-48-51-53	1	KK	2X5 Patch Intersection	8-4	✓

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Tray Tray Ward
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 08/14/01

SHEET 7 OF 7

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8 14 101	R-88	P-53-56/48	#1	KK	1X2' Patch Butt Seam	8-4	✓
8 14 101	R 89	P-54-55/48	1	KK	1X1' Patch Butt Seam	8-4	✓
8 14 101	R 90	P-55-56/48	1	KK	1X1 Patch Butt Seam	8-4	✓
8 14 01	R 91	P 56-57/48	1	KK	1X1 Patch Butt Seam	8-4	✓
8 14 101	R 92	P-57-58/48	1	KK	1X1 Patch Butt Seam	8-5	✓
8 15 101	R 93	P-57-58	#1	KK	2X4' Patch Burn out	8-5	✓
8 15 101	R-94	P-54-55	1	KK	2X3 Patch Burn out	8-5	✓
8 15 101	R 95	P-60-59-60A	#1	KK	1X2' Patch Butt Seam	8-5	✓
8 15 101	R 96	P-60-60A-61	1	KK	1X1 Patch Butt Seam	8-5	✓
8 15 101	R 97	P-58-59	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R 98	P-59-60A	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R 99	P-61-60A	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R-100	P-61-62-48	1	"	1X1' Patch Butt Seam	8-5	✓
8 15 101	R-101	P-62-63-48	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R-102	P-62-63-63A	1	"	1X1 Patch Butt Seam	8-5	✓
8 15 101	R-103	P-63-48	1	"	2X4' Patch DT # 18	8-5	✓

REPAIR REPORT

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 7/27/01

SHEET 1 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/27/01	R-1	P-2-4-3	#1	K-K	2x3' Patch Butt Seam Top of Slop	7.27	✓
7/27/01	2	P-1-2-3	1	"	1x2' Patch Butt Seam	7.27	✓
7/27/01	3	P-1-3-5	1	"	1x1 Patch Butt Seam	7.27	✓
7/27/01	4	P-1-5-6	1	"	2x4' Patch Butt Seam	7.27	✓
7/27/01	5	P-1-6-7	1	"	2x4' Patch Butt Seam	7.27	✓
7/27/01	6	P-7-8	1	SP	2x4 Patch Butt Seam	7.27	✓
7/27/01	7	P-1-8-9	1	"	2x3 Patch Butt Seam	7.27	✓
7/27/01	8	P-8-9	1	"	2x4 Patch DT#1 of Toe	7.27	✓
7/27/01	9	P-1-9-10	1	"	1x1 Patch Butt Seam	7.27	✓
7/27/01	10	P-1-10-11	1	"	1x2' Patch Butt Seam	7.27	✓
7/27/01	11	P-1-11-12	1	"	1x2 Patch Butt Seam	7.27	✓
7/27/01	12	P-1-12-13	1	"	4x4 Patch Butt Seam	7.27	✓
7/27/01	13	P-1-13-14	1	"	2x3' Patch Butt Seam	7.27	✓
7/27/01	14	P-1-14-15	1	"	1x1 Patch Butt Seam	7.27	✓
7/27/01	15	P-1-15-16	1	"	1x1 Patch Butt Seam	7.27	✓
7/27/01	16	P-1-17-16	1	"	1x2' Patch Butt Seam	7.27	✓

REPAIR REPORT

(T)

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TROY JAY WOLD
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 7/27/01

SHEET 2 OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
7/27/01	R-17	P-1T-17T-18T	#1	SP	3X4' Patch Butt Seam	7-27	✓
7/27/01	18	P-1T-18T	#1	"	2X4' Patch DT #2	7.27	✓
7/27/01	19	P-1T-18T	#1	"	1X1 Patch Seam Burn Stop	7.27	✓
7/27/01	20	P-18T-19T	#1	KK	2X4 Patch DT #3	7.27	✓
7/27/01	21	P-19T-20T-21T	#1	"	1X1 Patch Butt Seam	7.27	✓
7/27/01	22	P-19T/21T	#1	"	2X4 Patch DT #4	7.28	✓
7/27/01	23	P19T-21T	#	"	2X3 Patch Seam Burn/ Air hole	7.28	✓
7/27/01	24	P-21T-23T-24T	#1	"	1X1 Patch Butt Seam	7.28	✓
7/27/01	25	P-21T-23T-22T	#1	"	1X1 Patch Butt Seam	7.28	✓
7/27/01	26	P-20T-22T-23T	#1	"	2X3' Patch Butt Seam	7.28	✓
7/27/01	27	P-20T-21T	#	"	1X1 Patch Seam Burn	7.28	✓
7/27/01	28	P-20T-22T	#1	"	2X4' Patch DT #5	7.28	✓
8/01/01	29	P-24T/25T	#1	Soup	2X4' Patch DT #6	8-1	
8/01/01	30	P-23T-24T-25T	#1	"	1X1 Patch Butt Seam		
8/01/01	31	P-22T-23T-25T	#1	"	1X1 Patch Butt Seam		
8/01/01	32	P-22T-25T	#1	"	1X1 Patch Burn Out		

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Tray Jay wald
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 8/10/01

SHEET 3 OF

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/1/01	R-33	P-22T/25T	#1	Soup	1x2' Patch Burn Out / Airlock		
8/1/01	34	P-25T-26T	#1	"	2x4' Patch DT # 7		
8/1/01	35	P-26T/27T	#1	"	2x4 Patch DT # 8		
8/1/01	36	P-27T/28T	#1	"	2x4 Patch DT #9		
8/1/01	37	P-28T-29T	#1	"	1x2' Patch Burn out		
8/1/01	38	P-28T-29T	#1	"	2x4' Patch DT # 10		
8/1/01	39	P-29T-30T	#1	"	2x4' Patch DT # 11		
8/1/01	40	P-30T-31T	#1	Soup	2x4' Patch DT #12		
8/2/01	41	P-16T-32-17T	#1	VP	3x2 Patch Butt Seam		
8/2/01	42	P-17T-32T-39T	#1	VP	2x4 Patch Butt Seam		
8/2/01	43	P-39T-32T-33T	#1	VP	1x1 Patch Butt Seam		
8/2/01	44	P-39-33-34T	#1	TJW	1x1 Patch Butt Seam		
8/2/01	45	P-39-34-35T	#1	"	1x1 Patch Butt Seam		
8/2/01	46	P-34-35T	#1	"	1x2 Patch Burn out		
8/2/01	47	P-34-35T	#1	"	1x2 Patch Burn out		
8/2/01	48	P-39-35-36T	#1	"	1x1 Patch Butt Seam		

REPAIR REPORT

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Wold
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE: 8/10/01

SHEET 4 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/12/01	R-48	P-39-38-36 T	#1	TJW	1X1 Patch Butt Seam		
8/12/01	49	P-38-37-36 T	#1	"	1X1 Patch Butt Seam		
8/12/01	50	P38-37-37 A	#1	VP	7X8 Patches Add Liner		
8/12/01	51	P-39-40 T	#1	VP	1X2 Patch Burn out		
8/12/01	52	P39-40-18 T	#1	VP	1X1 Patch Butt Seam		
8/12/01	53	P-17-18-39 T	#1	VP	1X2 Patch Butt Seam		
8/12/01	54	P 18-19 / P-40-41	#1	VP	2X2 Patch Intersection		
8/12/01	55	P-18-19 T	#1	VP	1X1 Patch Air hole		
8/12/01	56	P 19-21 / P-41-42	#1	KK	2X3 Patch Intersection		
8/12/01	57	P-41-42	#1	"	2X4 Patch DT #13		
8/12/01	58	P-42-43-21	#1	"	1X2 Patch Butt Seam		
8/12/01	59	P-21-24-43	#1	"	1X2 Patch Butt Seam		
8/12/01	60	P-24-25-43	#1	"	2X2 Patch Butt Seam		
8/12/01	61	P-25-43-44	#1	"	1X1 Patch Butt Seam		
8/12/01	62	P-43-44	#1	"	1X1 Patch Seam Burn		
8/12/01	63	P-43-44	#1	"	1X1 Patch Burn out		

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Trey Sayward
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 8/12/01

SHEET 4 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/12/01	R.63	P 25-26 P-44-45	#1	TJW	1X2 Patch Intersection		
8/12/01	64	P-44-45	#1	"	1X1 Patch Air hole		
8/12/01	65	P-44-45	#1	KK	2X4 Patch DT # 14		
8/12/01	66	P-26-27-45	#1	KK	2X2 Patch Butt Seam		
8/12/01	67	P-27-45-46	#1	"	1X1 Patch Butt Seam		
8/12/01	68	P 27-28 46-47	#1	"	3X4 Patch Intersection		
8/12/01	69	P-46-47	#1	"	2X4 Patch DT # 15		
8/12/01	70	P-47-48	#1	"	1X1 Patch Burn out		
8/12/01	71	P 28-29 P-47-48	#1	"	2X4 Patch Intersection		
8/12/01	72	P 29-30 P-48-49	#1	"	2X3 Patch Intersection		
8/12/01	73	P-48-49	#1	"	2X4 Patch DT # 16		
8/12/01	74	P 30-31-49	#1	"	1X1 Patch Butt Seam		
8/12/01	75	P-31-49-50	#1	"	1X1 Patch Butt Seam		
8/12/01	76	P-31-49-50	#1	"	1X1 Patch Butt Seam		
8/12/01	77	P-31-50-51	#1	VP	2X2' Patch Butt Seam		
8/12/01	78	P-31-50	1	VP	1X2' Patch Burn out		

REPAIR REPORT

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010464
NWLG SUPERINTENDANT: Tracy Jay Wood
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 8/16/01

SHEET 5 OF ____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/16/01	R-79	P-51-52	1	VP	2X4' Patch DT #17	8-6	✓
8/16/01	80	P-52-53	1	VP	2X7' Patch DT #18 and Burn out	8-6	✓
8/16/01	81	P-54-58-59	1	VP	2X2' Patch Butt Seam	8-6	✓
8/16/01	82	P-58-59-55	1	VP	1X2' Patch Butt Seam	8-6	✓
8/16/01	83	P-58-57-55	1	VP	1X1 Patch Butt Seam	8-6	✓
8/16/01	84	P-57-56-55	1	VP	1X3 Patch Butt Seam	8-6	✓
8/16/01	85	P-59-60-54	1	VP	1X1 Patch Butt Seam	8-6	✓
8/16/01	86	P-54-60-61	#1	KC	1X1 Patch Butt Seam	8-6	✓
8/16/01	87	P-53-54-61	1	KC	1X2' Patch Butt Seam	8-6	✓
8/16/01	88	P-60-61	1	KC	1X1 Patch Burn out	8-6	✓
8/16/01	89	P-61-62A-53	1	KC	1X2' Patch Butt Seam	8-6	✓
8/16/01	90	P-61-62-62A	1	[illegible]	1X1 Patch Butt Seam	8-6	✓
8/16/01	91	P-62-62A-63	1	[illegible]	2X2' Patch Butt Seam	8-6	✓
8/16/01	92	P-62A-53-63	1	[illegible]	1X1' Patch Butt Seam	8-6	✓
8/16/01	93	P-63-64-64A	1	[illegible]	1X1 Patch Butt Seam	8-6	✓
8/16/01	94	P-64A-63-53	1	[illegible]	1X1 Patch Butt Seam	8-6	✓

REPAIR REPORT

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 020404
NWLG SUPERINTENDANT: Ray Jay Wood
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 8/15/01

SHEET _____ OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/15/01	95	64/65/64A	001	KC	2x2' Patch Butt	8/15	✓
8/15/01	96	P-64A/53/65	001	KC	2x2' Patch Butt	8/15	✓
8/15/01	97	P-53-65-66	001	KC	2x2' Patch Butt	8/15	✓
8/15/01	98	P-66/67	001	KC	2x4' Patch DT-19'	8/15	✓
8/15/01	99	P-53-66-67	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	100	P53-67-68	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	101	P53-68-69	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	102	P-53-69-70	001	KC	1x1' Patch Butt	8/15	✓
8/15/01	103	P-53-70-71	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	104	P-53-71-72	001	KC	1x2' Patch Butt	8/15	✓
8/15/01	105	P-53-72-73	001	KC	1x1 Patch Butt	8/15	✓
8/15/01	106	P-53-73-74	001	KC	1x1' Patch Butt	8/15	✓
8/15/01	107	P53-78-74	001	KC	1x1' Patch Butt	8/15	✓
8/15/01	108	P-77-78-74	001	KC	2x3' Patch Butt	8/15	✓
8/15/01	109	P-74-77	001	KC	2x4' Patch DT-20'	8/15	✓
8/15/01	110	P-74-75-77	001	KC	1x1 Patch Butt	8/15	✓

REPAIR REPORT

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Paul Sandwold
MATERIAL DESCRIPTION: 60 mil HDPE

DATE: 8/15/01

SHEET _____ OF _____

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
8/15/01	111	P-75-76-77	001	KC	1X1 Patch Butt	8/15	✓
8/15/01	112	P-53-78	001	KC	1X1 Patch Seam Burn	8/15	✓
8/15/01	113	P-76-77	001	KC	1X1 Patch Burn out	8/15	✓
8/15/01	114	77	001	KC	Bead	8/15	✓
8/15/01	115	75	001	KC	Bead	8/15	✓
8/15/01	116	68	001	KC	Bead	8/15	✓
8/15/01	117	67	001	KC	Bead	8/15	✓
8/15/01	118	67	001	KC	Bead	8/15	✓
8/15/01	119	65	001	KC	Bead	8/15	✓
8/15/01	120	59	001	KC	Bead	8/15	✓
8/15/01	121	65	001	KC	Bead	8/15	✓
/ /							
/ /							
/ /							
/ /							
/ /							

HDPE REPAIR REPORT

(1)

DATE: 10-9-01

PROJECT NAME: EAST Helena
NWLG PROJECT #
NWLG SUPERINTENDANT:
MATERIAL DESCRIPTION:

SHEET 1 OF 6

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
10 19 01	1	P25/26	# 1	Khan	1X1 Burn out	10/9/01	10/9/01
10 19 01	2	25/26	# 1	Kh	2 X 5 1/2 DT# 4		
/ /	3	26/27	#1	Kh	1 X 1 Burn out		
/ /	4	26/27	# 1	Kh	1/2 X 2 # Burn out		
/ /	5	26/27	# 1	Kh	1 X 1 Path Burn out		
/ /	6	26/27	# 1	Kh	1/2 X 2 Path Burn out		
/ /	7	26/27	# 1	Kh	2 X 5 1/2 DT# 5		
/ /	8	27/28	# 1	Kh	2 X 5 DT# 6		
/ /	9	28/29	# 1	Kh	2 X 5 1/2 DT # 7		
/ /	10	29/30	# 1	Kh	1 X 2 Path Cross Seam		
/ /	11	29/30	# 1	Kh	1 X 2 1/2 Path Cross Seam		
/ /	12	29/31	#1	Kh	2 X 5 DT# 8		
/ /	13	32/33	#1	Kh	2 X 3 Path Cross Seam		
/ /	14	32/33	# 1	Kh	2 X 3 Path Cross Seam		
/ /	15	P. 33	# 1	Kh	1 X 2 Path Hole		
/ /	16	33/34	# 1	Kh	2 X 3 1/2 Path Cross Seam		

HDPE REPAIR REPORT

(2)

10/10-01

DATE: / /

PROJECT NAME:
NWLG PROJECT #
NWLG SUPERINTENDANT:
MATERIAL DESCRIPTION:

SHEET 2 OF 6

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
10/10/01	17	33/34	#1	KH	1X2 Path Cross Seam	10/10/01	10/10/01
/ /	18	35/36	#1	KH	1X3 Path Cross Seam		
/ /	19	35/36	#1	KH	1X2½ Path Cross Seam		
/ /	20	35/37	#1	KH	1½ X 4 Path Burn out		
/ /	21	37/38	#1	KH	1½ X 2 Path Cross Seam		
/ /	22	37/38	#1	KH	1½ X 2 Path Cross Seam		
/ /	23	37/38	#1	KH	2X5 DT #10		
/ /	24	P39	#1	KH	1X1½ Path Cut EX #1 Long 29 F		
/ /	25	39/40	#1	KH	2 X 5½ Cross Seam		
/ /	26	39/40	#1	KH	2 X 3 Cross Seam		
/ /	27	38/40	#1	KH	2 X 5½ DT #11		
/ /	28	38/40	#1	KH	2 X 4 Path Burn out		
/ /	30	39/41	#1	KH	2 X 5½ DT #12		
/ /	31	39/41	#2	Van	2 X 3 Path Burn out		
/ /	32	39/41	#2	Van	2½ X 4½ Big Hole		
/ /	33	68/69	#2	Soup	2 X 3 Cross Seam		

HDPE REPAIR REPORT

(3)

DATE: 10-10-01

PROJECT NAME:
NWLG PROJECT #
NWLG SUPERINTENDANT:
MATERIAL DESCRIPTION:

SHEET 2 OF 6

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
10/1/01	34	68/69	#2	Soup	2X2 Cross Seam	10/10/01	10/10/01
/ /	35	41/68	#2	Soup	2X5½ DT #13		
/ /	36	67/68	#2	Soup	2X2 Path Cross Seam		
/ /	37	41/67	#2	Soup	2X3 Path Burn out		
/ /	38	42/67	#2	Soup	2X2 Cross Seam		
/ /	39	42/67	#2	Soup	2½ 5½ Cross Seam		
/ /	40	43/46	#1	Kh	2X3 Cross Seam		
/ /	41	43/46	#1	Kh	3X6 Cross Seam		
/ /	42	45/48	#1	Kh	4X5 Cross Seam		
/ /	43	44/49	#2	Soup	1X1 Path Burn out		
/ /	43	49/67	#2	Soup	1X1 Cross Seam		
/ /	44	49/67	#2	Soup	1X2 Cross Seam		
/ /	45	50/67	#2	Soup	1X2 Cross Seam		
/ /	46	50/51	#1	Kh	2X3 Burn out		
/ /	47	50 51/67	#2	Soup	2X2 Cross Seam		
/ /	48	51-52/67	#2	Soup	2X2½ Cross Seam		

HDPE REPAIR REPORT

(4)

DATE: / / 10-01

PROJECT NAME:
NWLG PROJECT #
NWLG SUPERINTENDANT:
MATERIAL DESCRIPTION:

SHEET 2 OF 6

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
10/10/01	49	52-53/67	#2	Soup	2 x 4 Cross Seam	10/10/01	10/10/01
/ /	50	51 52-53/67	# 2	Soup	9 X 53 add Liner		
/ /	51	53/54	# 1	Kh	2 x 5½ DT #15		
/ /	52	53-54/68	# 2	Soup	2 X 2 Cross Seam		
/ /	53	54/55	# 2	Soup	1 X 1 Path Burn out		
/ /	54	54-55/68	# 2	Soup	2 X 6 Cross Seam		
/ /	55	P 55	# 2	Soup	1 X 1 Path Hole		
/ /	56	P 55	# 2	Soup	1 X 1 Path Hole		
/ /	57	55/56	# 2	Soup	1 X 1½ Path Burn out		
/ /	58	55-56/68	# 2	Soup	1 X 1 Cross Seam		
/ /	59	56-57/68	# 2	Soup	1 X 2 Cross Seam		
/ /	60	57-58/68	# 2	Soup	1 X 2 Cross Seam		
/ /	61	58-59/68	# 2	Soup	1 X 1 Cross Seam		
/ /	62	59/60/68	# 2	Soup	1 X 1 Cross Seam		
/ /	63	60/61	# 1	Kh	3 X 17 add Liner		
/ /	64	60/61	# 1	Kh	2 X 5½ DT # 14		

HDPE REPAIR REPORT

(5)

DATE: 10-10-01

PROJECT NAME:
NWLG PROJECT #
NWLG SUPERINTENDANT:
MATERIAL DESCRIPTION:

SHEET 2 OF 8

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
10/10/01	65	61/62/70	#1	Kh	1X1 Cross Seam	10/10/01	10/10/01
/ /	66	61/70	#1	Kh	1X2 Path Burn out		
/ /	67	62 63/64	#1	Kh	1X2 Cross Seam		
/ /	68	63/66	#1	Kh	2X2 Cross Seam		
/ /	69	63/65	#1	Kh	1X1 Path Burn out		
/ /	70	63 65/64	#1	Khan	2X4 Path Cross Seam		
/ /	71	64/70	#1	Khan	3X4 Cross Seam		
/ /	72	62/70	#1	Kh	3X5 Boot		
/ /	73	8-34	#1	Kh	3X5 Boot		
/ /	78	34/35	#1	KM	DT #9		
/ /							
/ /							
/ /							
/ /							
/ /							
/ /							

REPAIR REPORT

PROJECT NAME:
NWLG PROJECT #
NWLG SUPERINTENDANT:
MATERIAL DESCRIPTION:

DATE: 10/9/01

SHEET 2 OF 6

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
10/9/01	79	1/22	#1	KM	Cross Seam Butt	10/9/01	10/9/01
/ /	80	1/20	—	—	Cross Seam Butt		
/ /	81	1/21			Cross Seam Butt		
/ /	82	1/2			Cross Seam Butt		
/ /	83	2/3			Cross Seam Butt		
/ /	84	3/4			Cross Seam Butt		
/ /	85	4/5			Cross Seam Butt		
/ /	86	5/6			Cross Seam Butt		
/ /	87	6/7			Cross Seam Butt		
/ /	88	7/8			Cross Seam Butt		
/ /	89	8/9			Cross Seam Butt		
/ /	90	9/10			Cross Seam Butt		
/ /	91	10/11			Cross Seam Butt		
/ /	92	11/12			Cross Seam Butt		
/ /	93	12/13			Cross Seam Butt		
/ /	94				Cross Seam Butt		

REPAIR REPORT

6

PROJECT NAME:
NWLG PROJECT #
NWLG SUPERINTENDANT:
MATERIAL DESCRIPTION:

DATE 10 / 9 /

SHEET 2 OF 6

REPAIR DATE/ TIME	REPAIR ID # locate ID # on as built	PANEL / SEAM #	EXTRUDER #	OPERATOR	TYPE OF REPAIR / DETAILS / LOCATION ie. DT patch, rock hole, burn out, failed seam etc.	REPAIR VBOX DATE	REPAIR PASSED VBOX
10 19 10	95	1/2	1	XB	DT #1	10/9	10/9
/ /	96	9/8	✓	KM	DT #2	✓	✓
/ /	97	15/16			DT #3		
/ /	98	14/15			Butt Seam -		
/ /	99	15/16			Cross Seam		
/ /	100	16/17			Cross Seam		
/ /	101	17/24			Cross Seam		
/ /	102	17/19			Cross Seam		
/ /	103	17/18			Cross Seam		
/ /	104	Seam 24			25" Seam extruded -		
/ /	105	23			Patch -		
/ /							
/ /							
/ /							
/ /							
/ /							

NON DESTRUCTIVE TESTING FORM

PAGE 17 OF 7

(T)

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: G10404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7/26	2T/4T	VP	37	35	2	306	311	P	P	
7/26	4T/3T	VP	35	35	0	306	311	P	P	
7/26	2T/3T	VP	31	31	0	306	311	P	P	Butt
7/26	3T/5T	VP	33	32	1	305	310	P	P	
7/26	5T/6T	VP	32	32	0	252	257	P	P	
7/26	6T/7T	VP	32	30	2	252	257	P	P	
7/26	7T/8T	VP	32	31	1	252	257	P	P	
7/26	8T/9T	VP	34	33	1	252	257	P	P	
7/26	9T/10T	VP	30	29	1	257	256	P	P	
7/26	10T/11T	VP	33	31	2	301	306	P	P	
7/26	11T/12T	VP	34	33	1	301	306	P	P	
7/27	12T/1T	VP	31	31	0	1015	1020	P	P	Butt
7/27	1T/11T	VP	32	32	0	1015	1020	P	P	"
7/27	1T/10T	VP	35	33	2	1015	1020	P	P	"
7/27	1T/9T	VP	35	35	0	1015	1020	P	P	"
7/27	1T/8T	VP	31	31	0	1016	1021	P	P	"
7/27	1T/7T	VP	35	33	2	1016	1021	P	P	"
7/27	1T/6T	VP	34	34	0	1030	1035	P	P	"
7/27	1T/5T	VP	30	29	1	1030	1035	P	P	"
7/27	1T/2T	VP	32	32	0	1030	1035	P	P	"
7/27	1T/3T	VP	30	30	0	1030	1035	P	P	Butt
7/27	12/13	VP	33	33	0	1055	11:00	P	P	
7/27	1-13	VP	31	30	1	1055	11:00	P	P	Butt
7/27	13-14	VP	33	31	2	1055	11:00	P	P	

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA (T) PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7/27	1-14	VP	35	33	2	1055	11:10	P	P	Butt
7/27	14-15	VP	33	31	2	1056	11:01	P	P	
7/27	15-16	VP	32	31	1	1056	11:01	P	P	
7/27	1-15	VP	30	29	1	1056	11:01	P	P	Butt
7/27	1-16	VP	35	34	1	1105	1110	P	P	"
7/27	1-17	VP	32	32	0	1105	1110	P	P	"
7/27	16-17	VP	30	30	0	1105	1110	P	P	Butt
7/27	17-18	VP	34	33	1	1112	1117	P	P	
7/27	1-18	VP	34	33	1	1112	1117	P	P	
7/27	18-19	VP	35	35	0	1120	1125	P	P	
7/27	19-20	VP	35	35	0	1125	1130	P	P	
7/27	20-21	VP	30	29	[illegible]	1125	1130	P	P	Butt Seam
7/27	19-21	VP	35	34	1	1125	1130	P	P	
7/27	21-24	VP	34	33	1	1145	1150	P	P	
7/27	23-24	VP	30	29	1	1145	1150	P	P	Butt
7/27	24-23	VP	34	34	0	1145	1150	P	P	
7/27	22-23	VP	33	33	0	1145	1150	P	P	Butt
7/27	22-21	VP	35	35	0	1145	1150	P	P	
7/27	20-22	VP	33	33	0	1150	1155	P	P	
8.01	24/25	VP	34	33	1	1255	1:00	P		
8.01	25-26	VP	34	34	0	1256	1:01	P		
8.01	26-27	VP	34	32	2	1257	1:02	P		
8.01	27-28	VP	33	33	0	1258	1:03	P		
8.01	[illegible]	VP	35	35	0	1259	1:04	[illegible]		

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HECENA (T) PROJECT NUMBER:

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	+/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-01	23-25	VP	33	32	1	1:10	1:15	P	P	
8-01	22-25	VP	34	34	0	1:10	1:15	P	P	
8-01	22-25	VP	31	30	1	1:12	1:17	P	P	
8-01	22-25	VP	32	32	0	1:12	1:17	P	P	
8-01	28-29	VP	34	32	3	1:13	1:18	P	P	
8-1	29-30	VP	35	35	0	210	215	P	P	
8-1	30-31	VP	33	33	0	210	215	P	P	
8-2	50-49	VP	35	35	0	610	615	P	P	
8-2	49-48	VP	34	34	0	610	615	P	P	
8-2	48-47	VP	35	34	1	610	615	P	P	
8-2	47-46	VP	35	35	0	610	615	P	P	
8-2	46-45	VP	35	35	0	610	615	P	P	
8-2	45-44	VP	30	29	1	628	633	P	P	
8-2	44-43	VP	32	32	0	628	633	P	P	
8-2	42-41	VP	33	33	0	630	635	P	P	
8-2	41-40	VP	30	30	0	630	635	P	P	
8-2	40-39	VP	35	35	0	630	635	P	P	
8-2	44-43	VP	30	30	0	637	642	P	P	
8-2	43-42	VP	35	35	0	637	642	P	P	
8-2	16-32	VP	33	33	0	655	7:00	P	P	
8-2	17-32	VP	32	32	0	655	7:00	P	P	Butt
8-2	32-33	VP	34	32	2	655	700	P	P	
8-2	39-33	VP	34	34	0	655	700	P	P	Butt
8-2	33-34	VP	30	30	0	656	701	P	P	

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA (T) PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-2	39-34	VP	32	32	0	656	701	P		Butt
8-2	34-35	VP	32	32	0	656	701	P		
8-2	34-35	VP	30	30	0	710	715	P		
8-2	39-35	VP	35	35	0	710	715	P		Butt
8-2	35-36	VP	30	28	2	710	715	P		
8-2	39-36	VP	30	30	0	710	715	P		Butt
8-2	36-37	VP	30	29	1	711	716	P		
8-2	37-38	VP	30	30	0	711	716	P		Butt
8-2	38-39	VP	30	30	0	711	716	P		
8-2	31-50	VP	30	30	0	812	817	P		Butt
8-2	30-49	VP	32	30	2	812	817	P		"
8-2	29-48	VP	34	34	0	813	818	P		"
8-2	28-47	VP	30	29	1	813	818	P		"
8-2	27-46	VP	33	33	0	814	819	P		"
8-2	26-45	VP	32	32	0	823	828	P		"
8-2	25-44	VP	30	30	0	823	828	P		"
8-2	24-43	VP	32	30	2	824	829	P		"
8-2	21-42	VP	30	30	0	825	830	P		"
8-2	19-41	VP	30	29	1	825	830	P		"
8-2	18-40	VP	34	34	0	835	840	P		Butt
8-2	17-39	VP	33	33	0	835	840	P		Butt
8-6	59-54	VP	35	34	1	7:00	7:05	P		
8-6	59-58	VP	34	34	0	7:00	7:05	P		
8-6	[illegible]8	VP	32	30	2	7:00	7:05	[illegible]		

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: PSARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	+/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-6	58-55	VP	30	30	0	7:00	7:05	P	P	Butt
8-6	57-55	VP	35	35	0	7:01	7:06	P	P	Butt
8-6	55-56	VP	30	30	0	7:01	7:06	P	P	
8-6	57-56	VP	32	31	1	7:01	7:06	P	P	Butt
8-6	54-55	VP	33	33	0	7:01	7:06	P	P	
8-6	53-54	VP	32	30	2	7:20	725	P	P	
8-6	53-52	VP	32	32	0	7:20	725	P	P	
8-6	51-50	VP	33	33	0	7:20	7:25	P	P	
8-6	50-51	VP	32	30	0	730	7:35	P	P	
8-6	50-51	VP	31	31	0	730	7:35	P	P	
8-6	51-52	VP	34	32	2	731	7:36	P	P	
8-6	52-53	VP	34	32	2	732	7:37	P	P	
8-6	59-60	VP	33	33	0	1:30	1:35	P	P	
8-6	60-61	VP	32	31	1	1:30	1:35	P	P	
8-6	60-54	VP	32	30	2	1:30	1:35	P	P	Butt
8-6	54-61	VP	31	30	1	1:30	1:35	P	P	Butt
8-6	53-61	VP	30	30	1	1:30	1:35	P	P	Butt
8-6	61-62	VP	35	34	1	1:37	1:42	P	P	
8-6	53-62A	VP	32	30	2	1:37	1:42	P	P	Butt
8-6	62-63	VP	34	34	0	1:37	1:42	P	P	
8-6	63-62A	VP	34	33	1	1:37	1:42	P	P	~~Butt~~
8-6	63-53	VP	33	33	0	1:45	150	P	P	Butt
8-6	63-64	VP	33	33	0	1:45	1:50	P	P	
8-6	64-53	VP	34	34	0	1:45	1:50	P	P	Butt

NON DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: THOMSON WOLD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 8/15/01

SHEET 7 OF 7

DATE/ TIME	SEAM #	TESTER INITIALS	AIR PRESSURE TESTING START PRESSURE/ TIME	AIR PRESSURE TESTING ENDING PRESSURE/ TIME	PRESSURE LOSS	PASS/ FAIL	VACUUM BOX PASS / FAIL	COMMENTS / LOCATION
8/15/01	64/65	VP	34 920	32 925	2	P	P	
8/15/01	65/66	VP	31 920	29 925	2	P	P	
8/15/01	66/67	VP	30 921	29 926	1	P	P	
8/15/01	67/68	VP	34 921	34 926	0	P	P	
8/15/01	68/69	VP	32 922	32 927	0	P	P	
8/15/01	69/70	VP	34 933	33 938	1	P	P	
8/15/01	70/71	VP	34 1040	34 1045	0	P	P	
8/15/01	71/72	VP	35 1040	33 1045	2	P	P	
8/15/01	72/73	VP	32 1033	32 1038	0	P	P	
8/15/01	73/74	VP	34 1033	33 1038	1	P	P	
8/15/01	74/75	VP	33 12:55	33 1:00	0	P	P	
8/15/01	75/76	VP	32 1255	32 1:00	0	P	P	
8/15/01	76/77	VP	33 1255	33 1:00	0	P	P	
8/15/01	77/78	VP	33 12:35	32 12:40	1	P	P	
8/15/01	78/53	VP	34 12:35	34 12:40	0	P	P	
8/15/01	65/53	VP	31 11:30	31 11:35	0	P	P	Butt
8/15/01	66/53	VP	33 11:30	33 1:35	0	P	P	Butt

NON DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Tray Jaywald
MATERIAL DESCRIPTION: 60 mil HDPE

T

DATE: 8/15/01

SHEET 7 OF 7

DATE/ TIME	SEAM #	TESTER INITIALS	AIR PRESSURE TESTING START PRESSURE/ TIME	AIR PRESSURE TESTING ENDING PRESSURE/ TIME	AIR PRESSURE TESTING PRESSURE LOSS	AIR PRESSURE TESTING PASS/ FAIL	VACUUM BOX PASS / FAIL	COMMENTS / LOCATION
8/15/01	67/53	VP	34 11:38	34 11:43	0	P	P	Butt
8/15/01	68/53	VP	33 11:38	32 11:43	1	P	P	"
8/15/01	69/53	VP	33 11:45	33 11:50	0	P	P	"
8/15/01	70/53	VP	31 11:45	31 11:50	0	P	P	"
8/15/01	71/53	VP	31 11:52	31 11:57	0	P	P	"
8/15/01	72/53	VP	31 11:52	31 11:57	0	P	P	"
8/15/01	73/53	VP	32 11:59	30 12:04	2	P	P	"
8/15/01	74/53	VP	31 11:59	31 12:04	0	P	P	Butt
8/15/01	75/74	VP	32 12:47	32 12:52	0	P	P	Butt
8/15/01	77/74	VP	35 12:47	34 12:52	1	P	P	"
8/15/01	78/74	VP	33 12:47	33 12:52	0	P	P	Butt
/ /								
/ /								
/ /								
/ /								
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/ /								

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-25-01	16/15	VP	35	33	2	1144	1149	P	P	
7/25	15/14	VP	35	33	2	1144	1149	P	P	
7/25	14/13	VP	35	34	1	1144	1149	P	P	
7/25	13/12	VP	34	34	0	1238	1243	P	P	
7-25	12/11	VP	32	30	2	1156	1201	P	P	
7-25	11/10	VP	32	30	2	1157	1202	P	P	
7-25	10/9	VP	34	34	0	1245	1250	P	P	
7-25	9/8	VP	32	31	1	1255	1:00	P	P	
7-25	8/7	VP	30	29	1	1255	1:00	P	P	
7-25	7/6	VP	31	30	1	1255	1:02	P	P	
7-25	6/5	VP	33	31	2	1255	1:00	P	P	
7-25	5/4	VP	30	30	0	1:02	1:07	P	P	
7-25	3/3A	VP	35	35	0	1:02	1:07	P	P	
7-25	3/2A	VP	35	33	2	1:02	1:07	P	P	
7-25	2A/3	VP	32	32	0	1:02	1007	P	P	Butt Seam
7-25	2/2A	VP	34	34	0	1:20	1:25	P	P	
7-25	16/1	VP	31	30	1	145	150	P	P	Butt
7-25	15/1	VP	31	31	0	145	150	P	P	Butt
7-25	17/18	VP	34	33	1	1:58	2:03	P	P	Butt Seam
7-25	18/1	VP	33	31	2	1:50	200	P	P	
7-25	18/19	VP	32	32	0	147	152	P	P	
7-25	14/1	VP	30	30	0	203	208	P	P	Butt
7-25	13/1	VP	33	33	0	203	208	P	P	"
7/25	[illegible]	VP	32	30	2	204	209	[illegible]	P	"

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-25-01	11/1	VP	30	29	1	204	209	P	P	Butt Seam
7-25-01	10/1	VP	30	30	0	210	215	P	P	"
7-25-01	9/1	VP	30	30	0	210	215	P	P	"
7-25-01	8/1	VP	34	34	0	211	216	P	P	"
7-25-01	7/1	VP	33	30	1	211	216	P	P	"
7-25-01	6/1	VP	33	31	2	220	225	P	P	"
7-25-01	5/1	VP	32	32	0	220	225	P	P	"
7-25-01	4/1	VP	34	34	0	221	226	P	P	Butt
7-25-01	2/1	VP	35	33	2	221	226	P	P	
7-25-01	1/17	VP	32	32	0	230	235	P	P	~~Butt~~
7-25-01	1/17	VP	32	32	0	230	235	P	P	
7-25-01	17/19	VP	34	32	2	231	236	P	P	
7-26-01	19/20	VP	34	34	0	1250	1255	P	P	
7-26-01	20/22	VP	35	34	1	1251	1256	P	P	
7-26-01	20/21	VP	33	32	1	1204	1209	P	P	
7-26-01	21/22	VP	32	32	0	233	238	P	P	Butt
7/26	21/23	VP	30	30	0	233	238	P	P	
7/26	22/23	VP	30	30	0	233	238	P	P	
7/26	23/24	VP	32	30	2	240	245	P	P	Butt
7/26	22/24	VP	32	31	1	240	245	P	P	
7-28	16/25	VP	33	33	0	913	918	P	P	
7-28	25-26	VP	32	32	0	913	918	P	P	
7-28	25-31	VP	31	30	1	913	918	P	P	Butt
7-28	26-31	VP	32	31	1	913	918	P	P	Butt

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-28	26/27	VP	31	29	2	914	919	P	P	
7-28	27/31	VP	31	31	0	914	919	P	P	Butt Seam
7-28	27/31	VP	30	30	0	926	931	P	P	Butt Seam
7-28	27/28	VP	33	33	0	935	940	P	P	
7-28	28/31	VP	30	30	0	935	940	P	P	Butt
7-28	28/29	VP	33	33	0	935	940	P	P	
7-28	29/30	VP	30	30	0	935	940	P	P	Butt
7-28	30/31	VP	31	30	1	935	940	P	P	
7-28	30/28	VP	32	31	1	935	940	P	P	Butt
7-28	32/33	VP	35	35	0	955	1000	P	P	
7-28	19/33	VP	32	31	1	955	1000	P	P	Butt
7-28	33/34	VP	35	35	0	955	1000	P	P	
7-28	20/34	VP	32	32	0	955	1000	P	P	Butt
7-28	34/35	VP	33	33	0	956	1001	P	P	
7-28	24/35	VP	33	32	1	956	1001	P	P	Butt
7-28	24/37	VP	34	34	0	1005	1010	P	P	Butt
7-28	35/37	VP	34	33	1	1005	1010	P	P	
7-28	35/36	VP	33	33	0	1005	1010	P	P	
7-28	36/37	VP	35	35	0	1005	1010	P	P	Butt
7-28	31/32	VP	35	35	0	1020	1025	P	P	
7-28	18/32	VP	35	33	2	1020	1025	P	P	Butt
7-28	17/31	VP	35	34	1	1020	1025	P	P	Butt
7-28	25/17	VP	35	35	0	1020	1025	P	P	Butt
7-28	3[illegible]9	VP	35	35	0	1240	1245	[illegible]	P	

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: 010404

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
7-28	38-39	VP	30	29	1	1240	1245	P	P	Butt
7-28	36-38	VP	30	30	0	1240	1245	P	P	
7-28	37-38	VP	31	30	1	1240	1245	P	P	
7-28	39-40	VP	35	35	0	1240	1245	P	P	
7-28	38-40	VP	34	34	0	1240	1245	P	P	
7-28	24-38	VP	30	29	1	1247	1252	P	P	Burn out
7-28	24-38	VP	35	35	0	1247	1252	P	P	"
7-28	24-38	VP	30	30	0	1247	1252	P	P	"
7-28	24-38	VP	33	33	0	1:00	1:05	P	P	"
7-28	24-38	VP	34	34	0	1:00	1:05	P	P	"
7-28	24-38	VP	35	35	0	1:00	1:05	P	P	"
7-28	38-24	VP	35	34	1	1:00	1:05	P	P	Burn out
7-28	38-40	VP	35	35	0	1:07	1:12	P	P	Power off
7-28	38-40	VP	35	35	0	1:07	1:12	P	P	Burn out
7-29	40-41	VP	35	35	0	1:05	1:10	P	P	
7-29	41-42	VP	35	34	1	1:06	1:11	P	P	
7-29	41-42	VP	32	32	0	1:06	1:11	P	P	
7-29	42-43	VP	35	35	0	1:07	1:12	P	P	
7-29	43-44	VP	35	34	1	1:08	1:13	P	P	
7-29	43-44	VP	35	34	1	1:20	1:25	P	P	
7-29	44-45	VP	35	35	0	1:45	1:50	P	P	

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-3	45-46	VP	33	33	0	1140	1145	P	P	
8-3	46-47	VP	34	34	0	1140	1145	P	P	
8-3	47-48	VP	32	30	2	1140	1145	P	P	
8-3	48-49	VP	32	32	0	1140	1145	P	P	
8-3	49-52	VP	35	34	1	1148	1153	P	P	Butt
8-3	49-50	VP	34	34	0	1148	1153	P	P	
8-3	50-51	VP	33	31	2	1148	1153	P	P	Butt
8-3	51-52	VP	35	33	2	1148	1153	P	P	
8-3	45-46	VP	32	31	1	1:05	1:10	P	P	
8-3	45-46	VP	30	30	0	1:05	1:10	P	P	
8-3	46-47	VP	31	31	0	1:05	1:10	P	P	
8-3	46-47	VP	32	32	0	1:10	1:15	P	P	
8-3	47-48	VP	30	30	0	1:10	1:15	P	P	
8-3	47-48	VP	30	30	0	1:10	1:15	P	P	
8-4	46-74	VP	33	32	1	1057	1102	P	P	
8-4	74-73	VP	31	31	0	1055	11:00	P	P	
8-4	74-47	VP	34	33	1	1055	11:00	P	P	Butt
8-4	73-48	VP	30	30	0	1055	11:00	P	P	Butt
8-4	67-68	VP	31	31	0	1105	1110	P	P	
8-4	68-48	VP	35	34	1	1105	1110	P	P	Butt
8-4	67-48	VP	31	31	0	1105	1110	P	P	
8-4	72-73	VP	31	31	0	1112	1117	P	P	
8-4	71-72	VP	30	30	0	1112	1117	P	P	
8-4	[illegible]-71	VP	30	28	0	1112	1117	[illegible]	P	

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-4	69-72	VP	32	32	0	1112	1117	P	P	Butt
8-4	69-70	VP	31	30	1	1112	1117	P	P	
8-4	66-67	VP	32	32	0	1148	1153	P	P	
8-4	66-68	VP	30	30	0	1148	1153	P	P	Butt
8-4	66-65	VP	30	29	1	1148	1153	P	P	
8-4	65-48	VP	30	29	1	1148	1153	P	P	Butt
8-4	64-65	VP	35	34	1	11:55	12:00	P	P	
8-4	64-48	VP	32	32	0	1155	12:00	P	P	Butt
8-4	63-48	VP	31	31	0	1155	12:00	P	P	Butt
8-4	52-53	VP	31	31	0	1:10	1:15	P	P	
8-4	52-53	VP	30	30	0	1:10	1:15	P	P	
8-4	53-48	VP	34	34	0	1:10	1:15	P	P	Butt
8-4	53-54	VP	35	35	0	1:20	1:25	P	P	
8-4	54-48	VP	30	30	0	1:55	2:00	P	P	Butt
8-4	54-55	VP	32	32	0	1:55	2:00	P	P	
8-4	55-48	VP	31	30	1	1:55	2:00	P	P	Butt
8-4	55-56	VP	34	32	2	1:56	2:01	P	P	[redacted]
8-4	56-48	VP	32	31	1	1:56	2:01	P	P	Butt
8-4	57-48	VP	31	30	1	156	2:01	P	P	Butt
8-4	57-58	VP	30	29	1	2:03	2:08	P	P	
8-4	57-58	VP	35	35	0	2:03	2:08	P	P	
8-4	58-48	VP	33	33	0	2:03	2:08	P	P	Butt
8-4	58-59	VP	34	33	1	2:05	2:10	P	P	
8-4	59-48	VP	32	32	0	2:05	2:10	P	P	Butt

NON DESTRUCTIVE TESTING FORM

PROJECT NAME: ASARCO E. HELENA PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
8-4	59-60	VA	31	31	0	2:05	210	P	P	
8-4	60-48	VA	35	35	0	2:13	218	P	P	Butt
8-4	60-48	VA	32	32	0	2:13	218	P	P	Butt
8-4	60-61	VA	34	33	1	2:13	218	P	P	
8-4	60-61	VA	32	32	0	2:13	2:18	P	P	
8-4	61-62	VA	33	30	3	2:13	2:18	P	P	
8-4	62-48	VA	32	32	0	220	223	P	P	Butt
8-4										

NON DESTRUCTIVE TESTING FORM

PAGE 1 OF 2

PROJECT NAME: EAST Helum

PROJECT NUMBER:

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
10/5	17/16	KC	33	0		1025	1030	F		
	16/15	KC	30	28	-2	1034	1039	P		
	15/14	KC	28	26	-2	1044	1049	P		
	14/13	KC	29	27	-2	1005	1010	P		
	13/12	KC	33	33	0	1115	1120	P		
	12/11	CK	30	28	-2	1145	1150	P		
	11/10	CK	28	26	-2	1253	1158	P		
	10/9	CK	30	28	-2	1105	1110	P		
	9/8	CK	30	29	-1	1114	1119	P		
	8/7	CK	30	28	-2	1145	1150	P		
	7/6	CK	32	30	-2	133	138	P		
	6/5	CK	30	28	-2	150	155	P		
	5/4	CK	30	28	-2	211	216	P		
	4/3	CK	32	31	-1	220	225	P		
	3/2	CK	33	31	-2	227	232	P		
	2/1	CK	30	28	-2	300	305	P		
	1/22	CK	30	28	-2	317	323	P		Butt
	22/20	CK	31	29	-2	327	335	P		
	20/23	CK	32	30	2	320	325	P		Butt
	23/1	CK	33	32	-1	320	325	P		Butt
	23/2	CK	32	30	2	310	315	P		Butt
	23/3	CK	30	28	2	255	300	P		Butt
	23/3A	CK	35	33	2	215	220	P		Butt
	23/3B	CK	31	29	2	240	245	P		Butt
10/7	[illegible]	CK	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

NON DESTRUCTIVE TESTING FORM

PAGE 2 OF ___

PROJECT NAME: East Helena

PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
10/7	1/21	CK	32	30	2	854	859	P		BUTT
10/7	20/21	CK	33	32	-1	854	904	P		
10/5	4/23	CK	33	30	2	216	221	P		BUTT
"	5/23	CK	30	28	2	210	215	P		BUTT
"	7/23	CK	30	28	2	125	130	P		"
"	6/23	CK	30	28	2	145	150	P		"
"	8/23	CK	30	28	2	121	126	P		"
"	9/23	CK	33	31	2	109	114	P		"
"	12/23	CK	30	28	2	1120	1125	P		"
"	13/23	CK	32	30	2	1110	1115	P		"
"	A-14/23	CK	30	28	2	1000	1005	P		"
"	B-14/23	CK	25	23	2	1025	1030	P		"
"	15/23	CK	34	32	2	1043	1048	P		"
"	16/23	CK	30	29	1	1033	1038	P		"
"	18/17	CK	29	27	2	953	958	P		"
"	18/19	CK	30	28	2	935	940	P		
"	24/19	CK	X	X	X	X	"	F		
"	23/24	CK	31	29		826	831	P		
"	23/25	CK	30	28	2	400	405	P		
"	23/25A	CK	29	27	2	350	355	P		
"	25/26	CK	32	30	2	422	427	P		
	27/22	CK	30	28	2	440	445	P		
	26/27	CK	30	29	1	410	415	P		
	[illegible]/22	CK	30	29	1	410	415	P		

NON DESTRUCTIVE TESTING FORM

PAGE 3 OF ___

PROJECT NAME: EAST Holcomb PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	+/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
10/5	28/30	CK	33	32	-1	500	505	P		
"	28/29	CK	33	31	-2	450	455	P		
"	29/30	CK	32	30	-2	455	500	P		BUTT
10/6	29/31	CK	33	32	-1	902	907	P		
10/6	31/30	CK	33	31	-2	850	855	P		
"	32/31	CK	33	33	0	904	909	P		
"	33/31	CK	35	34	-1	843	848	P		
10/7	32/33	CK	35	34	1	940	945	P		BUTT
"	33/34	CK	33	33	0	941	946	P		
"	32/34	CK	30	30	0	941	946	P		
"	34/36	CK	30	29	1	945	950	P		
"	34/35	CK	32	31	1	948	953	P		
"	35/36	CK	33	32	1	949	954	P		BUTT
"	35/37	CK	30	28	2	955	1000	P		
" A	36/37	CK	33	32	1	956	1001	P		
" B	35/37	CK	33	31	1	957	1002	P		
"	38/39	CK	33	32	1	1010	1015	P		
"	38/40	CK	32	30	2	1010	1015	P		
10/8	42/43	CK	34	33	1	1030	1035	P		
"	41/42	CK	33	31	.2	1035	1040	P		
"	43/46	CK						F		POP UP
"	45/46	CK	32	30	-2	1048	1053	P		Butt
"	45/43	CK	32	30	-1	1040	1045	P		Butt
"	46/47	CK	35	33	-2	1100	1105	P		
"	47	CK	33	[illegible]	1	[illegible]	[illegible]	[illegible]		[illegible]

NON DESTRUCTIVE TESTING FORM

PAGE _____ OF ___

PROJECT NAME: EAST Helena

PROJECT NUMBER: _____

DATE/ TIME	SEAM NO.	TESTER INITIAL	AIR TESTING PRESSURE START	PRESSURE END	PRESSURE +/-	TIME START	TIME END	P/F	VBOX P/F	LOCATION / COMMENTS
10/8	47/48	CK	33	32	-1	1106	1113	P		
"	44/45	CK	34	33	-1	1115	1120	P		
"	44/49	CK	32	30	-2	1123	1128	P		
"	49/50	CK	34	32	-2	1130	1135	P		
"	50/51	CK	34	32	-2	1139	1144	P		
"	51/52	CK	33	33	0	1145	1150	P		
"	52/53	CK	31	29	-2	1150	1155	P		
"	53/54	CK	33	31	-2	1156	1201	P		
"	54/55	CK	34	32	-2	1235	1240	P		
"	55/56	CK	33	31	-2	1241	1246	P		
"	56/57	CK	32	30	-2	1246	1251	P		
"	57/58	CK	34	32	-2	1252	1257	P		
"	58/59	CK	30	30	0	1254	104	P		
"	59/60	CK	35	33	-2	1254	1259	P		
"	60/61	CK	33	32	-2	1254	1259	P		
"	61/62	CK	30	28	-2	106	111	P		
"	62/64	CK	34	32	-2	112	117	P		BUH
"	62/63	CK	35	33	-2	120	125	P		
"	63/64	CK	33	32	-1	126	131	P		BU #
"	63/65	CK	35	33	-2	132	137	P		BU #
	65/66	CK	31	30	-1	134	139	P		BU #
	65/66	CK	31	29	-2	135	140	P		
	64/65	CK	33	31	-2	135	140	P		

Northwest Linings & Geotextile Products, Inc.

DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WAD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 7/25/01

SHEET 1 OF 3

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
7 25/01	DS-3	17/19	3096	VP	1	106	126	P	172	P	
					2	108	122	P	173	P	
					3	103	113	P	169	P	
					4	100	116	P	169	P	
					5	103	122	P	168	P	
7 25/01	DS-2	1/17	"	"	1	126	140	P	174	P	
					2	100	138	P	176	P	
					3	129	109	P	170	P	
					4	117	130	P	172	P	
					5	120	131	P	168	P	
07/25/01	DS-1	12/13	"	"	1	110	112	P	179	P	
					2	111	124	P	174	P	
					3	122	148	P	177	P	
					4	132	130	P	182	P	
					5	123	120	P	180	P	
07/26/01	DT-4	22/20	3096	VP	1	108	106	P	145	P	
					2	98	101	P	141	P	
					3	109	100	P	142	P	
					4	111	97	P	144	P	
					5	100	106	P	145	P	
07/26/01	DT 5	19/20	3096	VP	1	116	112	P	178	P	
					2	120	137	P	188	P	
					3	113	129	P	192	P	
					4	118	122	P	187	P	
					5	131	130	P	198	P	
07/26/01	DT-6	22/23	3096	VP	1	131	122	P	183	P	
					2	126	136	P	194	P	
					3	117	119	P	189	P	
					4	130	124	P	192	P	
					5	142	137	P	195	P	

Northwest L[illegible]ngs & Geotextile Products, Inc.

DESTRU[illegible]TIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA

NWLG PROJECT # 010484

NWLG SUPERINTENDANT: Troy Jay Ward

MATERIAL DESCRIPTION: 60 mil. HDPE

DATE: 07/29/01

SHEET 2 OF 3

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
7 129 01	DT-7	26/27	#3096	VP	1	123	118	P	208	P	
					2	126	129	P	207	P	
					3	114	108	P	217	P	
					4	123	106	P	205	P	
					5	124	121	P	212	P	
7 129 01	DT-8	33/34	"	"	1	139	131	P	205	P	
					2	123	136	P	213	P	
					3	128	118	P	215	P	
					4	125	133	P	209	P	
					5	114	124	P	214	P	
7 129 01	DT-9	24/38	"	"	1	110	127	P	209	P	
					2	116	120	P	206	P	
					3	114	117	P	210	P	
					4	123	126	P	213	P	
					5	115	106	P	199	P	
7 129 01	DT-10	38/40	"	"	1	128	121	P	214	P	
					2	127	133	P	206	P	
					3	113	114	P	217	P	
					4	122	128	P	202	P	
					5	114	117	P	214	P	
7 129 01	DT-11	40/41	"	"	1	110	124	P	171	P	
					2	133	103	P	179	P	
					3	133	103	P	152	P	
					4	123	104	P	177	P	
					5	104	123	P	175	P	
7 129 01	DT-12	41/42			1	130	125	P	181	P	
					2	108	132	P	180	P	
					3	104	136	P	180	P	
					4	106	136	P	177	P	
					5	127	109	P	171	P	

Northwest L[illegible]ngs & Geotextile Products, Inc.

DESTRU[illegible]TIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA

NWLG PROJECT # 010404

NWLG SUPERINTENDANT: TRAY JAY WOLD

MATERIAL DESCRIPTION: 60 mil HDPE

DATE 08/01/01

SHEET 3 OF 3

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	TENSILE VALUE LBS / IN	PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
7 13001	DT-13	42/43	#3096	VP	1	127	128	P	212	P	
					2	130	147	P	207	P	
					3	143	147	P	211	P	
					4	114	135	P	206	P	
					5	128	132	P	208	P	
7 13081	DT-14	43/44	"	"	1	108	108	P	209	P	
					2	125	110	P	197	P	
					3	109	118	P	203	P	
					4	124	109	P	205	P	
					5	113	118	P	209	P	
7 13081	DT-15	44/45	"	"	1	130	153	P	197	P	
					2	139	157	P	198	P	
					3	134	138	P	202	P	
					4	139	136	P	196	P	
					5	136	137	P	197	P	
8 15 01	DT-16	46/47	3096	"	1	115	126	P	209	P	
					2	114	127	P	211	P	
					3	121	116	P	218	P	
					4	120	112	P	195	P	
					5	112	117	P	206	P	
8 15 01	DT-17	67/68	"	"	1	123	115	P	208	P	
					2	121	126	P	212	P	
					3	123	117	P	199	P	
					4	121	112	P	217	P	
					5	124	104	P	203	P	
8 15 01	DT-18	48/63	"	"	1	127	120	P	191	P	
					2	118	121	P	190	P	
					3	114	127	P	202	P	
					4	131	134	P	189	P	
					5	123	135	P	192	P	

Northwest Linings & Geotextile Products, Inc.

DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA (T)
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WOLD
MATERIAL DESCRIPTION: 60mx HDPE

DATE: 7/27/01

SHEET 1 OF 4

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
07/27/01	1T	8T/9T	3096	VP	1	102	122	P	148	P	
					2	112	97	P	150	P	
					3	98	102	P	141	P	
					4	110	119	P	149	P	
					5	113	110	P	152	P	
07/27/01	2T	17T/18T	3096	"	1	114	115	P	142	P	
					2	125	129	P	148	P	
					3	107	108	P	139	P	
					4	107	103	P	141	P	
					5	113	117	P	149	P	
07/27/01	3T	18T/19T	3096	"	1	118	111	P	137	P	
					2	122	119	P	139	P	
					3	126	129	P	145	P	
					4	107	126	P	147	P	
					5	133	126	P	147	P	
07/27/01	4T	19T/21T	3096	"	1	106	122	P	152	P	
					2	122	129	P	150	P	
					3	128	107	P	147	P	
					4	134	115	P	147	P	
					5	129	113	P	149	P	
07/27/01	5T	20T/22T	3096	"	1	136	122	P	144	P	
					2	129	128	P	138	P	
					3	126	108	P	147	P	
					4	164	118	P	153	P	
					5	132	120	P	154	P	
8/01/01	6T	24T/25T	3096	VP	1	123	112	P	162	P	
					2	106	104	P	170	P	
					3	115	117	P	164	P	
					4	121	100	P	169	P	
					5	116	114	P	166	P	

Northwest Lining & Geotextile Products, Inc.

DESTRUCTIVE TEST LOG

(T)

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Troy Jay Ward
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 08/01/01

SHEET 2 OF 4

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
8/1/01	DT-7 (T)	25T/26T	3096	VP	1	135	109	P	161	P	
					2	135	97	P	163	P	
					3	138	98	P	160	P	
					4	144	117	P	166	P	
					5	134	124	P	167	P	
8/1/01	D-8 (T)	26T/27T	"	"	1	138	135	P	161	P	
					2	143	136	P	159	P	
					3	144	135	P	152	P	
					4	138	141	P	160	P	
					5	140	141	P	161	P	
8/1/01	D-9 (T)	27T/28T	"	"	1	122	134	P	167	P	
					2	100	111	P	164	P	
					3	117	109	P	163	P	
					4	110	116	P	166	P	
					5	112	125	P	159	P	
8/1/01	DT-10 (T)	28T/29T	"	"	1	136	124	P	171	P	
					2	121	116	P	162	P	
					3	124	134	P	158	P	
					4	114	117	P	169	P	
					5	130	119	P	161	P	
8/1/01	DT-11 (T)	29T/30T	"	"	1	122	108	P	157	P	
					2	114	122	P	162	P	
					3	132	97	P	159	P	
					4	142	137	P	164	P	
					5	141	135	P	163	P	
8/1/01	DT-12 (T)	30T/31T	3096	VP	1	106	105	P	165	P	
					2	119	142	P	164	P	
					3	146	129	P	160	P	
					4	127	143	P	157	P	
					5	108	129	P	162	P	

Northwest Linings & Geotextile Products, Inc.

DESTRUCTIVE TEST LOG

T

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: Thay Jay Lowd
MATERIAL DESCRIPTION: 60 mil HDPE

DATE 8/12/01

SHEET 3 OF 4

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
8/12/01	DT#13T	41T / 42T	#3096	VP	1	126	121	P	180	P	
					2	103	110	P	179	P	
					3	126	136	P	172	P	
					4	117	113	P	167	P	
					5	114	117	P	174	P	
8/12/01	DT#14T	44T / 45T	"	"	1	127	124	P	179	P	
					2	115	120	P	180	P	
					3	110	114	P	183	P	
					4	126	117	P	176	P	
					5	128	112	P	174	P	
8/12/01	DT#15T	46T / 47T	"	"	1	109	127	P	173	P	
					2	118	129	P	169	P	
					3	133	117	P	174	P	
					4	105	116	P	171	P	
					5	124	128	P	178	P	
8/12/01	DT#16T	48T / 49T	"	VP	1	113	126	P	172	P	
					2	114	129	P	177	P	
					3	122	114	P	174	P	
					4	117	133	P	166	P	
					5	124	110	P	181	P	
8/16/01	DT#17T	51T / 52T	3096	VP	1	126	118	P	170	P	
					2	121	128	P	168	P	
					3	126	126	P	168	P	
					4	133	119	P	172	P	
					5	124	119	P	174	P	
8/16/01	DT#18T	52T / 53T	"	VP	1	124	139	P	177	P	
					2	113	121	P	180	P	
					3	126	132	P	169	P	
					4	118	124	P	172	P	
					5	132	121	P	176	P	

HDPE DESTRUCTIVE TEST LOG

PROJECT NAME: ASARCO E. HELENA
NWLG PROJECT # 010404
NWLG SUPERINTENDANT: TRAY JAY WALD
MATERIAL DESCRIPTION: 60 MIL HDPE

DATE 8/15/01

SHEET 4 OF 4

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
8 15 01	DT-19T	66T/67T	#3096	VP	1	124	138	P	171	P	
					2	110	106	P	166	P	
					3	138	122	P	164	P	
					4	112	114	P	173	P	
					5	112	124	P	168	P	
8 15 01	DT-20T	74T/77T Butt	"	"	1	107	102	P	129	P	
					2	104	115	P	131	P	
					3	107	104	P	131	P	
					4	103	102	P	134	P	
					5	103	106	P	131	P	
/ /					1						
					2						
					3						
					4						
					5						
/ /					1						
					2						
					3						
					4						
					5						
/ /					1						
					2						
					3						
					4						
					5						
/ /					1						
					2						
					3						
					4						
					5						

Northwest L ngs & Geotextile Products, Inc.

DESTRL TIVE TEST LOG

PROJECT NAME: East Helena

NWLG PROJECT #

NWLG SUPERINTENDANT: Murray

MATERIAL DESCRIPTION: 40 Mil

DATE: / /

SHEET 1 OF 2

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	TENSILE VALUE LBS / IN	PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
10/9/01	DT-1C	1/2	3096	XB.	1	95	103	P	128	P	
					2	84	104	P	128	P	
					3	89	102	P	131	P	
					4	82	100	P	125	P	
					5	87	95	P	129	P	
10/9/01	DT-2C	10/9	"	XB.	1	89	83	P	133	"	
					2	89	94	"	131	"	
					3	83	94	"	125	"	
					4	89	95	"	130	"	
					5	85	90	"	127	"	
10/9/01	DT-3C	15/16	"	"	1	89	91	"	131	"	
					2	92	95	"	134	"	
					3	85	91	"	129	"	
					4	86	91	"	130	"	
					5	85	89	"	132	"	
10/9/01	DT-4C	25/26	"	"	1	89	91	"	129	"	
					2	85	89	"	126	"	
					3	87	90	"	132	"	
					4	85	91	"	128	"	
					5	84	89	"	130	"	
10/9/01	DT-5C	26/27	"	"	1	88	92	"	136	"	
					2	83	102	"	132	"	
					3	85	98	"	140	"	
					4	95	105	"	138	"	
					5	89	91	"	142	"	
10/10/01	DT-6C	27/28	"	"	1	85	94		137		
					2	86	111		130		
					3	83	87		131		
					4	82	86		134		
					5	85	88		133		

Northwest[illegible]ngs & Geotextile Products, Inc.

DESTRU[illegible]TIVE TEST LOG

PROJECT NAME: [illegible]

NWLG PROJECT #

NWLG SUPERINTENDANT: Murray

MATERIAL DESCRIPTION: 40 Mil

DATE: / /

SHEET 2 OF 3

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	PEEL VALUES LBS/IN OUTSIDE TRACK	PEEL VALUES LBS/IN PASS / FAIL	TENSILE VALUE LBS / IN	TENSILE VALUE PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
10/10/01	DT-7C	28/29	~~3096~~	XA-	1	92	94	P	125	P.	
					2	79	87	"	128	"	
					3	86	92.	"	130	"	
					4	83	89	"	128	"	
					5	83	91	"	126	"	
10/10/01	DT-8C	29/31	3096	"	1	79	97	"	136	"	
					2	83	91	"	130	"	
					3	79	95	"	128	"	
					4	83	93	"	130	"	
					5	90	107	"	126	"	
10/10/01	DT-9C.	34/35	"	"	1	89	119	"	126	"	
					2	95	114	"	119	"	
					3	96	98	"	119	"	
					4	93	97	"	123	"	
					5	89	98	"	124	"	
10/10/01	DT-10	37/38	"	"	1	105	95	"	127	"	
					2	92	105	"	122	"	
					3	84	92.	"	127	"	
					4	79	88	"	120	"	
					5	87	91	"	122	"	
10/10/01	DT 11C	38/40	"	"	1	87	86	"	120	"	
					2	87	98	"	125	"	
					3	88	90	"	125	"	
					4	79	91	"	130	"	
					5	86	89	"	127	"	
10/10/01	DT-12C	~~39~~/41	"	"	1	79	94	"	124	"	
					2	83.	90	"	127	"	
					3	83	92	"	123	"	
					4	86	97	"	127	"	
					5	82	94	"	124	"	

Northwest L ıgs & Geotextile Products, Inc.

DESTRU TIVE TEST LOG

PROJECT NAME: EAST Helena

NWLG PROJECT #

NWLG SUPERINTENDANT: Murray

MATERIAL DESCRIPTION: 40 Mill

DATE: / /

SHEET 3 OF 3

DATE/ TIME	SAMPLE I.D. SHOW I.D. ON AS BUILT	SEAM #	TEST MACHINE I.D.	TESTER INITIALS		PEEL VALUES LBS/IN INSIDE TRACK	OUTSIDE TRACK	PASS / FAIL	TENSILE VALUE LBS / IN	PASS / FAIL	LAB PASS / FAIL PEEL / TENSILE
10/10/01	DT-13C 60 mil 40	41/68	3096	XB. Billy	1	88	85	"	131	"	
					2	83	80	"	137	"	
					3	82	79	"	126	"	
					4	80	78	"	131	"	
					5	79	76	"	131	"	
10/10/01	DT-15C	53/54	"	"	1	79	95	"	120	"	
					2	85	90	"	121	"	
					3	78	100	"	126	"	
					4	81	95	"	128	"	
					5	79	88	"	122	"	
10/10/01	DT-14C	60/61	"	"	1	99	105	"	133	"	
					2	98	104	"	128	"	
					3	96	105	"	142	"	
					4	97	104	"	143	"	
					5	89	103	"	138	"	
/ /					1			"			
					2						
					3						
					4						
					5						
/ /					1						
					2						
					3						
					4						
					5						
/ /					1						
					2						
					3						
					4						
					5						

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 07 26 01

Project Location: E. HELENA MT.

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: Doug TISDELL

Owner's Representative: MARK RHODES

Authorized Representative:

I, the undersigned duly authorized representative of: HYDROMETRICS

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

Exceptions: Panels 1-19 60 mil HDPE PRIME.

Authorized Representative: MARK RHODES

Name	Signature	Title	Date
MARK RHODES	[illegible]	[illegible]	7-26-01

Northwest Linings Representative:

Name	Signature	Title	Date
TRAY JAYWALD	[signature]	SUPERINTENDENT	07 26 01

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 07 26 01

Project Location: E. HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative:

Owner's Representative: MARK RHODES

Authorized Representative: MARK RHODES

I, the undersigned duly authorized representative of: HYDROMETRICS

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

Exceptions: Panels 1-24 Bottom 60 mil HDPE

Authorized Representative: MARK RHODES

Name	Signature	Title	Date
MARK W. RHODES	[illegible]	[illegible]	7-26-01

Northwest Linings Representative:

Name	Signature	Title	Date
TRAY TAYLOR	[illegible]	SUPERINTENDENT	07-26-01

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 07 29 01

Project Location: E. HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: _____

Owner's Representative: _____

Authorized Representative: MARK RHODES

I, the undersigned duly authorized representative of: HYDROMETRICS

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions~~: BOTTOM LAYER of 60 MIL
PNLS 1-45

Authorized Representative: MARK RHODES

Name	Signature	Title	Date
[illegible]	[illegible]	[illegible]	7-29-01

Northwest Linings Representative:

Name	Signature	Title	Date
TROY JAYWOLD	[illegible]	SUPER. ATTENDANT	07 29 01

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08·01·01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative: _____

I, the undersigned duly authorized representative of: HYDROMETRICS / ENVIROCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

Exceptions: PNLS 1-24T

OWNERS ~~Authorized~~ Representative: _____

[illegible] 8-01-01

Name Signature Title Date

ENVIROCON ~~Northwest Linings~~ Representative:

[illegible] 08-01-01

Name Signature Title Date

NORTHWEST LININGS REPRESENTATIVE

TRAY JAY WALD [signature] SUPERINTENDANT 08 01 01

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 02 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative: MARK RHODES

I, the undersigned duly authorized representative of: HYDROMETRICS/ENVIROCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions~~: PNLS 1-50T

Authorized Representative: MARK RHODES

Name	Signature	Title	Date
MARK W RHODES	[signature]	[illegible]	8-2-01

Northwest Linings Representative:

Name	Signature	Title	Date
TROY TAYWOLD	[signature]	SUPERINTENDANT	08 02 01

ENVIROCON REPRESENTATIVE

NAME	SIGNATURE	TITLE	DATE
[illegible]	[signature]	GA/QC	08/02/01

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 05 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative: MARK RHODES

I, the undersigned duly authorized representative of: HYDROMETRICS

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions:~~ ENTIRE ROLL SECONDARY 60 mil LINER

Authorized Representative: MARK RHODES

[illegible] 8-5-01

Name Signature Title Date

Northwest Linings Representative:

Troy Hyward [signature] SUPERINTENDANT 08-05-01

Name Signature Title Date

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 06 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative:

Authorized Representative: DOUG TISDELL

I, the undersigned duly authorized representative of: ENVIROCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions~~: PANELS 1-53 ARE COMPLETE - TO INSTALL 854278 IN THE NEAR FUTURE TO COMPLETE THE CELL

Authorized Representative: DOUG TISDELL

Name	Signature	Title	Date
[illegible]	[illegible]	QA/QC	08-06-01

Northwest Linings Representative:

Name	Signature	Title	Date
TROY JAYWAD	[illegible]	SUPERINTENDANT	08 06 01

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 15 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIRCCON

Contractor's Representative: Doug TISDELL

Owner's Representative: MARK RHODES

Authorized Representative: MARK RHODES

I, the undersigned duly authorized representative of: HYDROKINETICS/ENVIRCCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions~~: PNLS 64-78 PRIMARY OK TO INSTALL NET/FABRIC

Authorized Representative: MARK RHODES

[illegible] 8-15-01

Name Signature Title Date

Northwest Linings Representative:

[illegible] SUPERINTENDENT 8.15.01

Name Signature Title Date

ENVIRCCON Representative

[illegible]

NAME SIG TITLE DATE

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO Date: 08 15 01

Project Location: EAST HELENA

Owner: ASARCO

General Contractor: ENVIROCON

Contractor's Representative: DOUG TISDELL

Owner's Representative: MARK RHODES

Authorized Representative: DOUG TISDELL

I, the undersigned duly authorized representative of: ENVIROCON

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

~~Exceptions:~~ Cell 1 Complete Excluding Fabric 75 x 50'

* CONTRACTOR TO PICK UP MISC TRASH

Authorized Representative: DOUG TISDELL

Name	Signature	Title	Date
Douglas G. Tisdell	[signature]	ENVIRO	08-15-01

Northwest Linings Representative:

Name	Signature	Title	Date
TROY JAYWOLD	[signature]	SUPERINTENDENT	08 15 01

CERTIFICATION OF ACCEPTANCE

Project Name: ASARCO - CAMU - Cell I Date: 10/11/01

Project Location: EAST Helena

Owner: ASARCO, INC

General Contractor: ENVIROCON, Inc

Contractor's Representative: _____

Owner's Representative: _____

Authorized Representative: _____

I, the undersigned duly authorized representative of: ENVIROCON, Inc

do hereby take over and accept the work described above from the date hereof, subject to the exceptions detailed below, and confirm that the work has been completed in accordance with the specifications and the terms and conditions of the contract. There is no apparent damage to the plastic liner, nor is there any interference within or without the surrounding works.

Exceptions: _____

Authorized Representative: _____

Name	Signature	Title	Date
MARK RHODES	Mark Rhodes	QA/QC INSPECTOR	10/11/01

Northwest Linings Representative:

Name	Signature	Title	Date
LARRY MURRAY	Larry Murray	Superv.	10/11/01
Douglas G. Tisdell	Douglas Tisdell	QA/QC Mgr	10/11/01

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655
Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell

SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell

Date: October 10, 2001

To: ASARCO, Inc.

Attn: Darrell Shew

Phone: (406) 227-7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS

☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	625.03	GCL Manufacturer QA/QC Certifications, Bill of Lading.

Remarks: These submittals have been reviewed by the QC Manager to ensure that they comply with the Project Specifications. Any variances are noted below:

Variances: None.

Signed: Douglas G. Tisdell Date: 10-10-01

QC Manager

A Washington Company

OC 05 01 11:41AM - S G

CETCO
LINING TECHNOLOGIES
800.527.9948 www.cetco.com

FAX MEMO	**October 5, 2001**
To: Kurt Wieringa Envirocon fax (406) 227-6062	From: Jim Olsta
cc: Noe Garcia, Lovell	Pages: 3, including cover
Subject: Asarco East Helena CAMU Cap Project GCL MQC Test Data	

Dear Mr. Wieringa:

CETCO has attached the hydrated internal direct shear test data for Bentomat DN lot 200139LO roll 6904 and Claymax 200R lot 200140LO roll 1647 for the Asarco East Helena CAMU Cap project. The other GCL MQC test results for this material were sent previously from our Lovell, Wyoming plant.

If you have any questions, please feel free to contact me.

Sincerely,

Jim Olsta

Jim Olsta
Technical Manager

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
1360 W. SHURE DRIVE
ARLINGTON HEIGHTS, IL 60004
PHONE: (847) 392-6800
FAX: (847) 506-6150

DETERMINATION OF THE COEFFICIENT OF FRICTION BY DIRECT SHEAR METHOD (ASTM D 5321)

Project Name: Asarco

Project No 01-107-1

Requested by: Jim Olsta

Date: 10/8/01

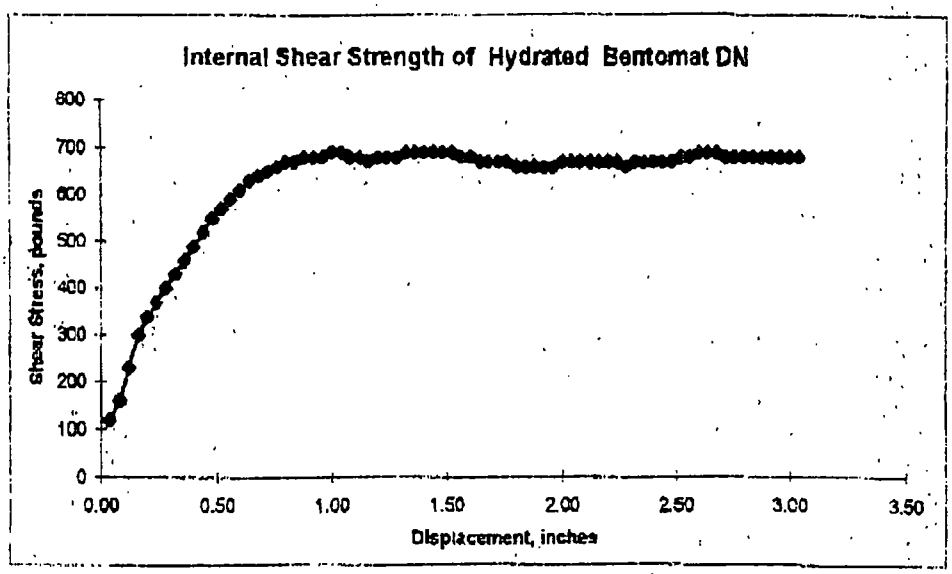
Analyst: N. Pietrowiak

TEST PARAMETERS:

Interface Tested:
Top Surface - Non-Woven Side of Bentomat DN
Bottom Surface - Black Non-Woven Side Of Bentomat DN
Shear Rate, in/min: 0.04
Shape of Specimen: Square
1 sample cut from Lot: 200139LO Roll: 6904
Hydration Time: 48hrs @ Normal Load

TEST RESULTS:

Normal Stress,psf	Peak Stress,psf
200	690



The data and information contained herein is based upon accepted industry practice and standards. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

File Name: 01-107-1

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY

1350 W. SHURE DRIVE
ARLINGTON HEIGHTS, IL 60004

PHONE: (847) 392-5800
FAX: (847) 506-6150

DETERMINATION OF THE COEFFICIENT OF FRICTION BY DIRECT SHEAR METHOD (ASTM D 5321)

Project Name: Asarco

Project No 01-107

Requested by: Jim Olsta

Date: 10/5/01

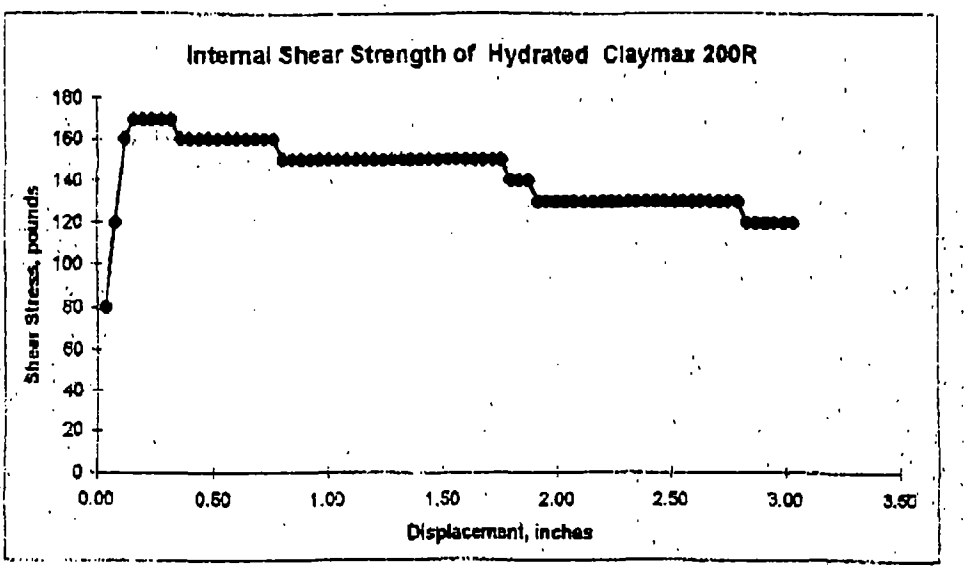
Analyst: N. Pietrowiak

TEST PARAMETERS:

Interface Tested:
Top Surface - Woven Side of Claymax 200
Bottom Surface - Woven Side Of Claymax 200R
Shear Rate, in/min: 0.04
Shape of Specimen: Square
1 sample cut from Lot: 200140LO Roll: 1647
Hydration Time: 48hrs @ Normal Load

TEST RESULTS:

Normal Stress,psf	Peak Stress,psf
200	170



The data and information contained herein is based upon accepted industry practice and standards. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

File Name: 01-107

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
P.O. Box 428 • Lovell, Wyoming 82431
(307) 548-6521 • Fax (307) 548-6413

Date: October 5, 2001
PO: 28803
Order #: 147563

Kurt Wieringa,
Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635
406-227-6059

Dear Kurt Wieringa,

Please find enclosed the MQA/MQC Data Package for GCL shipments to Envirocon, Inc. . These shipments left our CETCO - Lovell, Wy. plant on October 4, 2001 .

If you have any questions regarding the enclosed QA/QC information, please contact me at (800)322-1149 ext:423.

Sincerely,

Noe Garcia
Quality Assurance Coordinator

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA PACKAGE

PROJECT NAME: Asarco East Helena CAMU Cap
East Helena, MT.

CUSTOMER P.O.: 28803

PREPARED FOR: Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635

Telephone # : 406-227-6059

PREPARED BY:

Noe Garcia
Quality Assurance Coordinator
CETCO
P.O. Box 428
92 Hwy. 37
Lovell, Wy. 82431

Telephone #: 800-322-1149 (Ext. 423)
Fax #: (307)548-6927, (307)548-6413
E-Mail: ngarc@cetco.com

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA

FOR ALL GCL MANUFACTURED ON:

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147563
Ship Date:	10/4

CONTENTS:

1. PACKING LIST
2. DAILY CLAYMAX PRODUCTION CERTIFICATION
3. BENTONITE CLAY CERTIFICATION
4. CLAYMAX MANUFACTURING CERTIFICATION AND TEST RESULTS
5. CLAYMAX MQA TRACKING FORM

PACKING LIST

CETCO
00 WEST SHURE DRIVE
INGTON HEIGHTS IL 60004

ORDER NO:.. 000147563
ORDER DATE: 9/06/2001
SHIP DATE:. 10/04/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT DN	SFT SF	200139L0	00006771	150.0	14.0	2100.0	2967.0
LO-BENTOMAT DN	SFT SF	200139L0	00006772	150.0	14.0	2100.0	3018.0
LO-BENTOMAT DN	SFT SF	200139L0	00006773	150.0	14.0	2100.0	3083.0
LO-BENTOMAT DN	SFT SF	200139L0	00006775	150.0	14.0	2100.0	3126.0
LO-BENTOMAT DN	SFT SF	200139L0	00006776	150.0	14.0	2100.0	3124.0
LO-BENTOMAT DN	SFT SF	200139L0	00006787	150.0	14.0	2100.0	2955.0
LO-BENTOMAT DN	SFT SF	200139L0	00006788	150.0	14.0	2100.0	2952.0
LO-BENTOMAT DN	SFT SF	200139L0	00006789	150.0	14.0	2100.0	2921.0
LO-BENTOMAT DN	SFT SF	200139L0	00006790	150.0	14.0	2100.0	2899.0
LO-BENTOMAT DN	SFT SF	200139L0	00006799	150.0	14.0	2100.0	2998.0
LO-BENTOMAT DN	SFT SF	200139L0	00006800	150.0	14.0	2100.0	2978.0
LO-CLAYMAX200R	SFT SF	200140L0	00001685	150.0	15.0	2250.0	3197.0
LO-CLAYMAX200R	SFT SF	200140L0	00001686	150.0	15.0	2250.0	3200.0
LO-CLAYMAX200R	SFT SF	200140L0	00001688	150.0	15.0	2250.0	3207.0
LO-CLAYMAX200R	SFT SF	200140L0	00001694	150.0	15.0	2250.0	3221.0

	========	========
ORDER TOTALS.....	32100.0	45846.0

TOTAL ITEMS..... 15

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

GEOSYNTHETIC CLAY LINER

MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147563
Ship Date:	4-Oct

Colloid Environmental Technologies Company (CETCO) hereby affirms and certifies that all of the Claymax 200R manufactured in this lot achieves the physical and chemical criteria listed on the attached analysis sheet.

Steve Wilkerson
Plant Manager

Subscribed and sworn to before me this 5 day of October 2001.

Notary Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 121804

BENTONITE CLAY CERTIFICATIONS

TECHNICAL DATA SHEET

ORIGIN INFORMATION

BENTONITE

Manufacturer: **Colloid Environmental Technologies Co.**

PRODUCTION

Facility: **Colloid Environmental Technologies Co.**
92 HWY. 37
Lovell, WY 82431

Contact: Steve Wilkerson
(800)-322-1160

Brand Name: CG 50

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 10/1/01

ATTN: Kurt Wieringa.

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 100101A and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	25.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	14.8
Moisture	ASTM D 2216	12.0 % (MAX)	9.6
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.4

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.

147563

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

GEOSYNTHETIC CLAY LINER

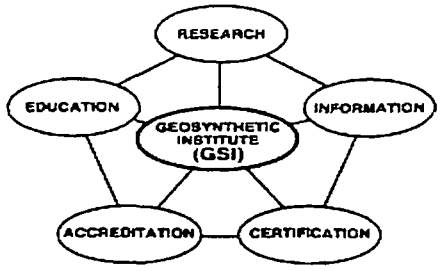
MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147563
Ship Date:	4-Oct

CETCO hereby affirms and certifies that the Claymax 200R material supplied to this project will meet the physical and chemical criteria listed below.

PROPERTY	TEST METHOD	MINIMUM VALUE
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)
Bentonite Mass / Area	ASTM D 5993	* .75 lb/sq.ft. (Min.)
Grab Strength	ASTM D 4632	75 lbs. (330 N)
Grab Elongation	ASTM D 4632	15 Percent Typical
Permeability	ASTM D 5084	5 x 10 (-9) cm/sec. (Max)
Index Flux	ASTM D 5887	1.0 x 10 (-8) m(3)/m(2)/sec. (max.)

*** Reported at 0 % moisture content.**
GAI Lab Accredited Test Methods were followed during conformance testing for:
ASTM D 4632 - Grab Strength and Grab Elongation.
ASTM D 5887 - Index Flux.
ASTM D 5993 - Bentonite Mass/Area.



Colloid Environmental Technologies Co. (CETCO)

Subscribed and sworn to before me this 5 day of October 2001.

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/18/04

OCG#FT2 QCT#FT2
10/05/01 7:27:24

CETCO

GCL QUALITY DATA

LOVELL AMEPICAN COLLOID

SHIP TO: ASARCO EAS
C/O ENVIRO
EAST HELEN

O R D E P # 000147563

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA .075 lb/sqft ASTM D 5993	GRAB ELONGATION % ASTM D 4632	GRAB STRENGTH 75lbs marv ASTM D 4632
LO-CLAYMAX200R	200140LO	00001694	1.00	35.80	168.10
LO-CLAYMAX200R	200140LO	00001688	.82	35.80	168.10
LO-CLAYMAX200R	200140LO	00001686	.95	32.50	175.00
LO-CLAYMAX200R	200140LO	00001685	.95	32.50	175.00

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Bentonite Mass/Area and Moisture content are tested a minimum of every 40,000sf.
Bentonite Mass/Area is reported at 0% moisture content.
Grab Strength is tested a minimum of every 200,000sf.
Peel Strength is tested a minimum of every 40,000sf.
All tensile testing is in the machine direction

*** End of Report ***

GEOSYNTHETIC CLAY LINER
MQA TRACKING FORMS

CETCO
GCL MQA/MQC TRACKING FORM

SHIP TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON
EAST HELENA MT

ORDER NUMBER 000147563

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
LOT# 200140LO									
00001685	LO-CLAYMAX200R	150	2250	3197	8634775		8634776		100101A
00001686	LO-CLAYMAX200R	150	2250	3200	8634775		8634776		100101A
00001688	LO-CLAYMAX200R	150	2250	3207	8634775		8634776		100101A
00001694	LO-CLAYMAX200R	150	2250	3221	8634775		8634776		100101A

TOTAL SQUARE FEET..... 9.000

TOTAL PAGES 1

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
P.O. Box 428 • Lovell, Wyoming 82431
(307) 548-6521 • Fax (307) 548-6413

Date: October 5, 2001
PO: 28803
Order #: 147563

Kurt Wieringa,
Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635
406-227-6059

Dear Kurt Wieringa,

Please find enclosed the MQA/MQC Data Package for GCL shipments to Envirocon, Inc. . These shipments left our CETCO - Lovell, Wy. plant on October 4, 2001 .

If you have any questions regarding the enclosed QA/QC information, please contact me at (800)322-1149 ext:423.

Sincerely,

Noe Garcia
Quality Assurance Coordinator

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA PACKAGE

PROJECT NAME: Asarco East Helena CAMU Cap
East Helena, MT.

CUSTOMER P.O.: 28803

PREPARED FOR: Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635

Telephone # : 406-227-6059

PREPARED BY:

Noe Garcia
Quality Assurance Coordinator
CETCO
P.O. Box 428
92 Hwy. 37
Lovell, Wy. 82431

Telephone #: 800-322-1149 (Ext. 423)
Fax #: (307)548-6927, (307)548-6413
E-Mail: ngarc@cetco.com

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA

FOR ALL GCL MANUFACTURED ON:

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147563
Ship Date:	10/4

CONTENTS:

1. PACKING LIST
2. DAILY GCL PRODUCTION CERTIFICATION
3. NEEDLE DETECTION CERTIFICATION
4. BENTONITE CLAY CERTIFICATION
5. NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION
6. NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION
7. GCL MANUFACTURING CERTIFICATION AND TEST RESULTS
8. GCL MQA TRACKING FORM

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147563
ORDER DATE: 9/06/2001
SHIP DATE:. 10/04/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT DN		SFT	SF 200139L0	00006771	150.0	14.0	2100.0	2967.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006772	150.0	14.0	2100.0	3018.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006773	150.0	14.0	2100.0	3083.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006775	150.0	14.0	2100.0	3126.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006776	150.0	14.0	2100.0	3124.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006787	150.0	14.0	2100.0	2955.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006788	150.0	14.0	2100.0	2952.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006789	150.0	14.0	2100.0	2921.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006790	150.0	14.0	2100.0	2899.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006799	150.0	14.0	2100.0	2998.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006800	150.0	14.0	2100.0	2978.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001685	150.0	15.0	2250.0	3197.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001686	150.0	15.0	2250.0	3200.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001688	150.0	15.0	2250.0	3207.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001694	150.0	15.0	2250.0	3221.0
							========	========
ORDER TOTALS.....							32100.0	45846.0

TOTAL ITEMS..... 15

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

GEOSYNTHETIC CLAY LINER

MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147563
Ship Date:	4-Oct

Colloid Environmental Technologies Company (CETCO) hereby affirms and certifies that all of the BENTOMAT DN manufactured in this lot achieves the physical and chemical criteria listed on the attached analysis sheet.

Steve Wilkerson
Plant Manager

Subscribed and sworn to before me this 5 day of October 2001.

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12-8-04

NEEDLE DETECTION CERTIFICATION

CERTIFICATION STATEMENT

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147563
Ship Date:	4-Oct

This statement is to certify that all components of the BENTOMAT DN manufactured for the above project have been inspected continually for the presence of broken needles through the use of a magnetic removal system.

COLLOID ENVIRONMENTAL TECHNOLOGIES ~~CO. (CETCO~~)

Subscribed and sworn to before me this 5 day of October 2001.

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 1d1804

BENTONITE CLAY CERTIFICATIONS

TECHNICAL DATA SHEET

ORIGIN INFORMATION

BENTONITE

Manufacturer: **Colloid Environmental Technologies Co.**

PRODUCTION

Facility: **Colloid Environmental Technologies Co.**
92 HWY. 37
Lovell, WY 82431

Contact: Steve Wilkerson
(800)-322-1160

Brand Name: CG 50

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 9/24/01

ATTN: Kurt Wieringa,

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 092401A and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	24.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.0
Moisture	ASTM D 2216	12.0 % (MAX)	9.0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.2

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.
147563

NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION

TECHNICAL DATA SHEET

ORIGIN INFORMATION

NON-WOVEN GEOTEXTILE

Manufacturer: **TNS ADVANCED TECHNOLOGIES**

PRODUCTION

Facility: **TNS**
9855 Greenville Highway, Bld. F
Spartanburg, SC. 29301

Contact: Marshall Gaddy 800-867-5181

Brand Name: TNS X060

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

September 7, 2001
REF: TNS X060
Quantity Shipped: 27 rolls
BOL#: 000801826
Location: Lovell WY

Cetco
92 Highway 37
Lovell WY 82431

Dear Sir/Madam:

This is to certify that TNS X060 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS X060 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS X060 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	6.0
Thickness	ASTM D 5199	mils	60
Grab Tensile	ASTM D 4632	lbs	155
Grab Elongation (MD)	ASTM D 4632	%	50 (min)-90(max)
Grab Elongation (XMD)	ASTM D 4632	%	50(min)-105(max)
Puncture	ASTM D 4833	lbs	85

Marshall O. Gaddy

Marshall O. Gaddy
Quality Control Manager

DATE: 9/07/01

TNS MILLS, INC.
NONWOVEN QUALITY DATA
FOR BOL# 000801826

ROLL #	STYL	WDT	LNG	FABR WGHT	THCK	GRAB MD	GRAB XMD	BLNG MD	BLNG XMD	TRAP MD	TRAP XMD	PUNC REST	BRST STRG	FLOW RATE	PERM -ABL	PERM -ITY	AOS
200094128	X060	196	135	6.3	71	161	191	72	90			93			.000	.00	
200094173	X060	196	135	6.4	66	162	192	61	62			100			.000	.00	
200094175	X060	196	135	6.4	66	162	192	61	62			100			.000	.00	
200094176	X060	196	135	6.6	68	170	204	66	64			95			.000	.00	
200094178	X060	196	135	6.6	68	170	204	66	64			95			.000	.00	
200094204	X060	196	135	6.4	71	168	196	63	68			107			.000	.00	
200094205	X060	196	135	6.4	71	168	196	63	68			107			.000	.00	
200094206	X060	196	135	6.7	69	170	213	63	62			100			.000	.00	
200094211	X060	196	135	6.3	68	164	196	58	65			105			.000	.00	
200094212	X060	196	135	6.3	68	169	195	60	63			94			.000	.00	
200094214	X060	196	135	6.3	68	169	195	60	63			94			.000	.00	
200094216	X060	196	135	6.4	67	166	191	61	63			96			.000	.00	
200094217	X060	196	135	6.4	67	166	191	61	63			96			.000	.00	
200094218	X060	196	135	6.6	70	169	204	61	65			97			.000	.00	
200094219	X060	196	135	6.6	70	169	204	61	65			97			.000	.00	
200094224	X060	196	135	6.1	67	165	215	63	70			104			.000	.00	
200094231	X060	196	135	6.5	67	164	222	64	69			116			.000	.00	
200098487	X060	196	135	6.5	75	160	245	82	64			113			.000	.00	
200099041	X060	196	135	6.2	71	161	189	64	74			85			.000	.00	
200099044	X060	196	135	6.1	70	165	182	67	71			94			.000	.00	
200099045	X060	196	135	6.1	70	165	182	67	71			94			.000	.00	
200099051	X060	196	135	6.2	71	158	176	65	73			98			.000	.00	
200099054	X060	196	135	6.4	73	166	194	73	83			103			.000	.00	
200099095	X060	196	135	6.4	72	162	176	58	59			111			.000	.00	
200099105	X060	196	135	6.5	70	174	236	68	67			104			.000	.00	
200099108	X060	196	135	6.4	66	164	212	65	65			106			.000	.00	
200099109	X060	196	135	6.4	66	164	212	65	65			106			.000	.00	

TOTAL NUMBER OF ROLLS 27

NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION

TECHNICAL DATA SHEET

ORIGIN INFORMATION

NON-WOVEN GEOTEXTILE

Manufacturer:	**Colloid Environmental Technologies Co.**
PRODUCTION FACILITY:	**CETCO** **102 Conners Road** **Villa Rica, GA 30180**
CONTACT:	Debbie Bivins 404-459-4995
BRAND NAME:	Standard

NON-WOVEN GEOTEXTILE

MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147563
Ship Date:	4-Oct

CETCO hereby affirms and certifies that the Non-Woven geotextile in the BENTOMAT DN product for the above project has been manufactured to meet the following physical properties.

PROPERTY	TEST METHOD	MINIMUM VALUE
Mass / Area	ASTM D-5261	6.0 OZ./SQ.YD.
Grab Strength	ASTM D-4632	15.0 Lbs MARV (Machine direction)

COLLOID ENVIRONMENTAL TECHNOLOGIES CO. (CETCO)

Subscribed and sworn to before me this 5 day of October 2001.

Notary Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12-8-4

COLLOID ENVIRONMENTAL TECH. CO.
GEOTEXTILE QC DATA

LOVELL AMERICAN COLLOID
PO BOX 428
LOVELL, WY. 82431

SHIP TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON
EAST HELENA MT

ORDER NUMBER: 147563

Material	Lot #	Roll #	Geotextile Mass/Area 6.0 oz/sy marv ASTM D 5261	Grab Strength 15.0 lbs. Marv ASTM D 4632
N/W-WHITE	200134VR	00002337	7.4	97.8
N/W-WHITE	200134VR	00002342	6.7	73.1

TECHNICAL DATA SHEET

ORIGIN INFORMATION

NON-WOVEN GEOTEXTILE

Manufacturer: **TNS ADVANCED TECHNOLOGIES**

PRODUCTION
FACILITY: **TNS**
9855 Greenville Highway, Bld. F
Spartanburg, SC. 29301

CONTACT: Marshall Gaddy 800-867-5181

BRAND NAME: TNS NO60

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

September 19, 2001
REF: TNS N060
Quantity Shipped: 12 rolls
BOL#: 000801985
Location: Lovell WY

Cetco
92 Highway 37
Lovell WY 82431

Dear Sir/Madam:

This is to certify that TNS N060 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS N060 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS N060 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	6.0
Thickness	ASTM D 5199	mils	120
Grab Tensile	ASTM D 4632	lbs	75
Grab Elongation (MD)	ASTM D 4632	%	90(min)
Puncture	ASTM D 4833	lbs	55

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

DATE: 9/20/01

TNS MILLS, INC.
NONWOVEN QUALITY DATA
FOR BOL# 000801985

ROLL #	STYL	WDT	LNG	FABR WGHT	THCK	GRAB MD	GRAB XMD	BLNG MD	ELNG XMD	TRAP MD	TRAP XMD	PUNC REST	BRST STRG	FLOW RATE	PERM -ABL	PERM -ITY	AOS
300076764	N060	196	135	6.7	168	101	146	116	118			80			.000	.00	
300076772	N060	196	135	6.5	167	91	126	114	110			68			.000	.00	
300076773	N060	196	135	6.5	167	91	126	114	110			68			.000	.00	
300076774	N060	196	135	6.5	167	91	126	114	110			68			.000	.00	
300076775	N060	196	135	6.7	167	98	131	113	117			71			.000	.00	
300076776	N060	196	135	6.7	167	98	131	113	117			71			.000	.00	
300076777	N060	196	135	6.7	167	98	131	113	117			71			.000	.00	
300076778	N060	196	135	6.7	167	98	131	113	117			71			.000	.00	
300076779	N060	196	135	6.7	166	95	131	114	117			71			.000	.00	
300076780	N060	196	135	6.7	166	95	131	114	117			71			.000	.00	
300076781	N060	196	135	6.7	166	95	131	114	117			71			.000	.00	
300076782	N060	196	135	6.7	166	95	131	114	117			71			.000	.00	

TOTAL NUMBER OF ROLLS 12

Sep 20 2001 9:42AM

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

GEOSYNTHETIC CLAY LINER

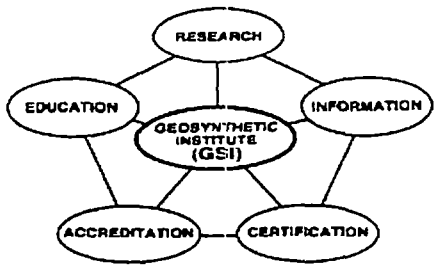
MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147563
Ship Date:	4-Oct

CETCO hereby affirms and certifies that the BENTOMAT DN material supplied to this project will meet the physical and chemical criteria listed below.

PROPERTY	TEST METHOD	MINIMUM VALUE
Peel Strength	ASTM D 4632	15 lbs (65 N)
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)
Bentonite Mass / Area	ASTM D 5993	* .75 lb/sq.ft. (Min.)
Grab Strength	ASTM D 4632	150 Lbs.
Grab Elongation	ASTM D 4632	15 Percent Typical
Permeability	ASTM D 5084	5 x 10 (-9) cm/sec. (Max)
Index Flux	ASTM D 5887	1.0 x 10 (-8) m(3)/m(2)/sec. (max.)

*** Reported at 0 % moisture content.**
GAI Lab Accredited Test Methods were followed during conformance testing for:
ASTM D 4632 - Grab Strength and Grab Elongation.
ASTM D 5887 - Index Flux.
ASTM D 5993 - Bentonite Mass/Area.



Colloid Environmental Technologies Co. (CETCO)

Subscribed and sworn to before me this 5 day of October 2001.

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/6/04

QCG#FT2 QCT#FT2
10/05/01 7:27:45

CETCO

GCL QUALITY DATA

LOVELL AMERICAN COLLOID

SHIP TO: ASARCO EAS
C/O ENVIRO
EAST HELEN

O R D E R # 000147563

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0 75 lb/sqft ASTM D 5993	GRAB STRENGTH 150lbs marv ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632
LO-BENTOMAT DN	200139LO	00006800	.90	304.00	46.40
LO-BENTOMAT DN	200139LO	00006799	.90	304.00	46.40
LO-BENTOMAT DN	200139LO	00006790	.90*	304.00	46.40*
LO-BENTOMAT DN	200139LO	00006789	.98	304.00	46.80
LO-BENTOMAT DN	200139LO	00006788	.98	304.00	46.80
LO-BENTOMAT DN	200139LO	00006787	.98	304.00	46.80
LO-BENTOMAT DN	200139LO	00006776	.98	304.00	46.80
LO-BENTOMAT DN	200139LO	00006775	.98	304.00	46.80
LO-BENTOMAT DN	200139LO	00006773	.98	304.00	46.80
LO-BENTOMAT DN	200139LO	00006772	.98	304.00	46.80
LO-BENTOMAT DN	200139LO	00006771	.98*	304.00*	46.80*

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Bentonite Mass/Area and Moisture content are tested a minimum of every 40,000sf.
Bentonite Mass/Area is reported at 0% moisture content.
Grab Strength is tested a minimum of every 200,000sf.
Peel Strength is tested a minimum of every 40,000sf.
All tensile testing is in the machine direction

*** End of Report ***

GEOSYNTHETIC CLAY LINER
MQA TRACKING FORMS

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
P.O. Box 428 • Lovell, Wyoming 82431
(307) 548 6521 • Fax (307) 548-6413

Date: October 8, 2001
PO: 28803
Order #: 147562

Kurt Wieringa,
Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635
406-227-6059

Dear Kurt Wieringa,

Please find enclosed the MQA/MQC Data Package for GCL shipments to Envirocon, Inc. These shipments left our CETCO - Lovell, Wy. plant on October 5, 2001.

If you have any questions regarding the enclosed QA/QC information, please contact me at (800)322-1149 ext:423.

Sincerely,

Noe Garcia
Quality Assurance Coordinator

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA PACKAGE

PROJECT NAME:	**Asarco East Helena CAMU Cap** **East Helena, MT.**
CUSTOMER P.O.:	**28803**
PREPARED FOR:	**Envirocon, Inc.** **200 Smelter Road** **East Helena, MT. 59635**
Telephone # :	**406-227-6059**

PREPARED BY:	**Noe Garcia** **Quality Assurance Coordinator** **CETCO** P.O. Box 428 92 Hwy. 37 Lovell, Wy. 82431
Telephone #:	800-322-1149 (Ext. 423)
Fax #:	**(307)548-6927, (307)548-6413**
E-Mail:	**ngarc@cetco.com**

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA

FOR ALL GCL MANUFACTURED ON:

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147562
Ship Date:	10/5

CONTENTS:

1. PACKING LIST
2. DAILY CLAYMAX PRODUCTION CERTIFICATION
3. BENTONITE CLAY CERTIFICATION
4. CLAYMAX MANUFACTURING CERTIFICATION AND TEST RESULTS
5. CLAYMAX MQA TRACKING FORM

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147562
ORDER DATE: 9/06/2001
SHIP DATE:. 10/05/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-CLAYMAX200R		SFT	SF 200140L0	00001637	150.0	15.0	2250.0	3253.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001650	150.0	15.0	2250.0	3227.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001651	150.0	15.0	2250.0	3224.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001658	150.0	15.0	2250.0	3220.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001660	150.0	15.0	2250.0	3239.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001661	150.0	15.0	2250.0	3231.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001681	150.0	15.0	2250.0	3211.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001682	150.0	15.0	2250.0	3217.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001683	150.0	15.0	2250.0	3208.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001687	150.0	15.0	2250.0	3199.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001689	150.0	15.0	2250.0	3210.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001690	150.0	15.0	2250.0	3213.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001691	150.0	15.0	2250.0	3206.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001692	150.0	15.0	2250.0	3203.0
LO-CLAYMAX200R		SFT	SF 200140L0	00001693	150.0	15.0	2250.0	3217.0
							========	========
ORDER TOTALS.....							33750.0	48278.0

TOTAL ITEMS..... 15

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

GEOSYNTHETIC CLAY LINER

MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147562
Ship Date:	5-Oct

Colloid Environmental Technologies Company (CETCO) hereby affirms and certifies that all of the Claymax 200R manufactured in this lot achieves the physical and chemical criteria listed on the attached analysis sheet.

Steve Wilkerson
Plant Manager

Subscribed and sworn to before me this 8 day of October 2001.

Notary Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/8/04

BENTONITE CLAY CERTIFICATIONS

TECHNICAL DATA SHEET

ORIGIN INFORMATION

BENTONITE

Manufacturer: **Colloid Environmental Technologies Co.**

PRODUCTION

Facility: **Colloid Environmental Technologies Co.**
92 HWY. 37
Lovell, WY 82431

Contact: Steve Wilkerson
(800)-322-1160

Brand Name: CG 50

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 10/1/01

ATTN: Kurt Wieringa,

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 100101A and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	25.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	14.8
Moisture	ASTM D 2216	12.0 % (MAX)	9.6
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.4

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.

147562

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

GEOSYNTHETIC CLAY LINER

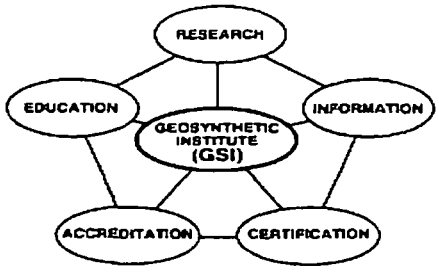
MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147562
Ship Date:	5-Oct

CETCO hereby affirms and certifies that the Claymax 200R material supplied to this project will meet the physical and chemical criteria listed below.

PROPERTY	TEST METHOD	MINIMUM VALUE
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)
Bentonite Mass / Area	ASTM D 5993	* .75 lb/sq.ft. (Min.)
Grab Strength	ASTM D 4632	75 lbs. (330 N)
Grab Elongation	ASTM D 4632	15 Percent Typical
Permeability	ASTM D 5084	5 x 10 (-9) cm/sec. (Max)
Index Flux	ASTM D 5887	1.0 x 10 (-8) m(3)/m(2)/sec. (max.)

*** Reported at 0 % moisture content.**
GAI Lab Accredited Test Methods were followed during conformance testing for:
ASTM D 4632 - Grab Strength and Grab Elongation.
ASTM D 5887 - Index Flux.
ASTM D 5993 - Bentonite Mass/Area.



Colloid Environmental Technologies Co. (CETCO)

Subscribed and sworn to before me this 8 day of October 2001.

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/18/04

OCT#FT2 OCT#FT2 CETCO
10/05/01 11:09:23

GCL QUALITY DATA

LOVELL AMERICAN COLLOID

SHIP TO: ASARCO EAS
C/O ENVIRO
EAST HELEN

O R D E R # 000147562

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA .075 lb/sqft ASTM D 5993	GRAB ELONGATION % ASTM D 4632	GRAB STRENGTH 75lbs marv ASTM D 4632
LO-CLAYMAX200R	200140LO	00001693	1.00	35.80	168.10
LO-CLAYMAX200R	200140LO	00001692	1.00*	35.80	168.10
LO-CLAYMAX200R	200140LO	00001691	.82	35.80	168.10
LO-CLAYMAX200R	200140LO	00001690	.82	35.80	168.10
LO-CLAYMAX200R	200140LO	00001689	.82	35.80	168.10
LO-CLAYMAX200R	200140LO	00001687	.82*	35.80*	168.10*
LO-CLAYMAX200R	200140LO	00001683	.95	32.50	175.00
LO-CLAYMAX200R	200140LO	00001682	.95	32.50	175.00
LO-CLAYMAX200R	200140LO	00001681	.95	32.50	175.00
LO-CLAYMAX200R	200140LO	00001661	.91	32.50	175.00
LO-CLAYMAX200R	200140LO	00001660	.91	32.50	175.00
LO-CLAYMAX200R	200140LO	00001658	.91	32.50	175.00
LO-CLAYMAX200R	200140LO	00001651	.91	32.50	175.00
LO-CLAYMAX200R	200140LO	00001650	91	32 50	175.00
LO-CLAYMAX200R	200140LO	00001637	.91	32.50	175.00

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Bentonite Mass/Area and Moisture content are tested a minimum of every 40,000sf.
Bentonite Mass/Area is reported at 0% moisture content.
Grab Strength is tested a minimum of every 200,000sf.
Peel Strength is tested a minimum of every 40,000sf.
All tensile testing is in the machine direction

*** End of Report ***

GEOSYNTHETIC CLAY LINER
MQA TRACKING FORMS

QCG#TF1 QCT#TF1
10/08/01 11:09:23

CETCO
GCL MQA/MQC TRACKING FORM

SHIP TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON
EAST HELENA MT

ORDER NUMBER 000147562

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
LOT# 200140LO									
00001637	LO-CLAYMAX200R	150	2250	3253	8625854		8634510		100101A
00001650	LO-CLAYMAX200R	150	2250	3227	8634771		8634770		100101A
00001651	LO-CLAYMAX200R	150	2250	3224	8634771		8634770		100101A
00001658	LO-CLAYMAX200R	150	2250	3220	8634771		8634770		100101A
00001660	LO-CLAYMAX200R	150	2250	3239	8634771		8634770		100101A
00001661	LO-CLAYMAX200R	150	2250	3231	8634771		8634770		100101A
00001681	LO-CLAYMAX200R	150	2250	3211	8634775		8634776		100101A
00001682	LO-CLAYMAX200R	150	2250	3217	8634775		8634776		100101A
00001683	LO-CLAYMAX200R	150	2250	3208	8634775		8634776		100101A
00001687	LO-CLAYMAX200R	150	2250	3199	8634775		8634776		100101A
00001689	LO-CLAYMAX200R	150	2250	3210	8634775		8634776		100101A
00001690	LO-CLAYMAX200R	150	2250	3213	8634775		8634776		100101A
00001691	LO-CLAYMAX200R	150	2250	3206	8634775		8634776		100101A
00001692	LO-CLAYMAX200R	150	2250	3203	8634775		8634776		100101A
00001693	LO-CLAYMAX200R	150	2250	3217	8634775		8634776		100101A

TOTAL SQUARE FEET..... 33,750

TOTAL PAGES 1

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
P.O. Box 428 • Lovell, Wyoming 82431
(307) 548-6521 • Fax (307) 548-6413

Date: October 9, 2001
PO: 28803
Order #: 147567

Kurt Wieringa,
Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635
406-227-6059

Dear Kurt Wieringa,

Please find enclosed the MQA/MQC Data Package for GCL shipments to Envirocon, Inc. These shipments left our CETCO - Lovell, Wy. plant on October 8, 2001.

If you have any questions regarding the enclosed QA/QC information, please contact me at (800)322-1149 ext:423.

Sincerely,

Noe Garcia
Quality Assurance Coordinator

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA PACKAGE

PROJECT NAME: Asarco East Helena CAMU Cap
East Helena, MT.

CUSTOMER P.O.: 28803

PREPARED FOR: Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635

Telephone # : 406-227-6059

PREPARED BY:

Noe Garcia
Quality Assurance Coordinator
CETCO
P.O. Box 428
92 Hwy. 37
Lovell, Wy. 82431

Telephone #: 800-322-1149 (Ext. 423)
Fax #: (307)548-6927, (307)548-6413
E-Mail: ngarc@cetco.com

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA

FOR ALL GCL MANUFACTURED ON:

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147567
Ship Date:	10/8

CONTENTS:

1. PACKING LIST
2. DAILY CLAYMAX PRODUCTION CERTIFICATION
3. BENTONITE CLAY CERTIFICATION
4. CLAYMAX MANUFACTURING CERTIFICATION AND TEST RESULTS
5. CLAYMAX MQA TRACKING FORM

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147567
ORDER DATE: 9/06/2001
SHIP DATE:. 10/08/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-CLAYMAX200R		SFT	SF	200140L0	00001649	150.0	15.0	2250.0	3239.0
LO-CLAYMAX200R		SFT	SF	200140L0	00001677	150.0	15.0	2250.0	3237.0
LO-CLAYMAX200R		SFT	SF	200140L0	00001678	150.0	15.0	2250.0	3231.0
LO-CLAYMAX200R		SFT	SF	200140L0	00001679	150.0	15.0	2250.0	3226.0
LO-CLAYMAX200R		SFT	SF	200140L0	00001680	150.0	15.0	2250.0	3220.0
							========	========
ORDER TOTALS.....							11250.0	16153.0

TOTAL ITEMS..... 5

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

GEOSYNTHETIC CLAY LINER

MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147567
Ship Date:	8-Oct

Colloid Environmental Technologies Company (CETCO) hereby affirms and certifies that all of the Claymax 200R manufactured in this lot achieves the physical and chemical criteria listed on the attached analysis sheet.

Steve Wilkerson
Plant Manager

Subscribed and sworn to before me this 9 day of October 2001.

Notary Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 121804

BENTONITE CLAY CERTIFICATIONS

TECHNICAL DATA SHEET

ORIGIN INFORMATION

BENTONITE

Manufacturer: **Colloid Environmental Technologies Co.**

PRODUCTION

Facility: **Colloid Environmental Technologies Co.**
92 HWY. 37
Lovell, WY 82431

Contact: Steve Wilkerson
(800)-322-1160

Brand Name: CG 50

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 10/1/01

ATTN: Kurt Wieringa,

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 100101A and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	25.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	14.8
Moisture	ASTM D 2216	12.0 % (MAX)	9.6
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.4

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.
147567

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

GEOSYNTHETIC CLAY LINER

MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147567
Ship Date:	8-Oct

CETCO hereby affirms and certifies that the Claymax 200R material supplied to this project will meet the physical and chemical criteria listed below.

PROPERTY	TEST METHOD	MINIMUM VALUE
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)
Bentonite Mass / Area	ASTM D 5993	* .75 lb/sq.ft. (Min.)
Grab Strength	ASTM D 4632	75 lbs. (330 N)
Grab Elongation	ASTM D 4632	15 Percent Typical
Permeability	ASTM D 5084	5 x 10 (-9) cm/sec. (Max)
Index Flux	ASTM D 5887	1.0 x 10 (-8) m(3)/m(2)/sec. (max.)

*** Reported at 0 % moisture content.**
GAI Lab Accredited Test Methods were followed during conformance testing for:
ASTM D 4632 - Grab Strength and Grab Elongation.
ASTM D 5887 - Index Flux.
ASTM D 5993 - Bentonite Mass/Area.

Colloid Environmental Technologies Co. (CETCO)

Subscribed and sworn to before me this 8 day of October 2001.

Notary Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/8/04

QCG#FT2 QCT#FT2
10/09/01 9:22:54

CETCO

GCL QUALITY DATA

LOVELL AMERICAN COLLOID

SHIP TO: ASARCO EAS
C/O ENVIRO
EAST HELEN

O R D E R # 000147567

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA .075 lb/sqft ASTM D 5993	GRAB ELONGATION % ASTM D 4632	GRAB STRENGTH 75lbs marv ASTM D 4632
LO-CLAYMAX200P	200140LO	00001680	.95	32.50	175.00
LO-CLAYMAX200R	200140LO	00001679	.95	32.50	175.00
LO-CLAYMAX200R	200140LO	00001678	.95	32.50	175.00
LO-CLAYMAX200R	200140LO	00001677	.95	32.50	175.00
LO-CLAYMAX200R	200140LO	00001649	.91	32.50	175.00

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Bentonite Mass/Area and Moisture content are tested a minimum of every 40,000sf.
Bentonite Mass/Area is reported at 0% moisture content.
Grab Strength is tested a minimum of every 200,000sf.
Peel Strength is tested a minimum of every 40,000sf.
All tensile testing is in the machine direction

*** End of Report ***

GEOSYNTHETIC CLAY LINER
MQA TRACKING FORMS

QCG#TF1 QCT#TF1
10/09/01 9:22:54

CETCO
GCL MQA/MQC TRACKING FORM

SHIP TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON
EAST HELENA MT

ORDER NUMBER 000147567

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
LOT# 200140LO									
00001649	LO-CLAYMAX200R	150	2250	3239	8634771		8634770		100101A
00001677	LO-CLAYMAX200R	150	2250	3237	8634771		8634776		100101A
00001678	LO-CLAYMAX200R	150	2250	3231	8634775		8634776		100101A
00001679	LO-CLAYMAX200R	150	2250	3226	8634775		8634776		100101A
00001680	LO-CLAYMAX200R	150	2250	3220	8634775		8634776		100101A

TOTAL SQUARE FEET..... 11,250

TOTAL PAGES 1

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY

RECAP SHEETS

TO:ENVIROCON
EAST HELENA, MT

FROM: CETCO
LOVELL, WY

TO:KURT/DOUG
PHONE:406-227-6059
FAX:406-227-6062

ATTN: **KATHY**
PHONE: **800-322-1149**
FAX: **307-548-6413**

CUSTOMER P.O.28803
ORDER:51-200R
62 DN

ORDER #		TRUCK	SHIP DATE	SQ FT	DN	200R	BAGS	COMMENTS
147560	1	AMERI-CO 1134	9/25/01	33750.00	0	15	0	
147566	2	AMERI-CO 1474	9/26/01	31500.00	15	0	0	
147561	3	AMERI-CO 1448	9/25/01	31500.00	0	14	70	
147564	4	AMERI-CO 1035	9/26/01	33600.00	15	0	0	
147565	5	AMERI-CO 1152	9/27/01	33600.00	15	0	0	
147563	6	QUALITY 6	10/4/01	32100.00	11	4	0	
147562	7	AMERI-CO 1396	10/5/01	33750.00	0	15	0	
147567	8	PRINTZ 17	10/8/01	1125.00	0	5	0	
TOTALS				230925.00	56.00	53.00	70.00	

AMERI-CO CARRIERS

DELIVERY RECEIPT/BILL OF LADING

1702 E. OVERLAND DRIVE
P.O. BOX 1649
SCOTTSBLUFF, NE 69363-1649

#1 DRIVER'S CODE	Wins	ACCI ORDER NO.	1006981
#2 DRIVER'S CODE		PICKUP DATE	MO 9 DAY 25 YR 01
TRUCK NUMBER	1448	DELIVERY DATE	MO 9 DAY 26 YR 01
TRAILER NO.	464	BILL OF LADING #	147561

		COMPANY NAME	STREET	CITY	ST
FROM	01	CeTco		Lovell	WY
TO (Final)	02	asarco		Hedona	MT
SEAL NUMBER(S)		DELIVERY STOPS		CONSIGNEE SIGNATURE "SEALS INTACT" & VERIFIED	
	1st			[illegible]	
	2nd				
	Final	asarco			

OTHER BILL OF LADING #'S	SHIPPER SIGNATURE	DRIVER'S SIGNATURE	DRIVER UNLOAD Y or N
	X _____ AT ORIGIN	X [illegible] AT ORIGIN	LUMPER FEE $_____

#ITEMS	DESCRIPTION	WEIGHT
14	Rolls Bentonmat	44477
70	Bags Bentonight	3500
NOTE DAMAGES, SHORTAGES & OVERAGES		47977

DELIVERY APPOINTMENTS:
DATE 9-25 TIME_____

ARRIVED	STARTED	FINISHED
645	915	

CUSTOMER

STRAIGHT BILL OF LADING—ORIGINAL—NOT NEGOTIABLE PAGE 0

CARRIER NAME:
CONSIGNED TO: NATIONWIDE
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT.
PHONE: 406 227 6059
SOLD TO: 719 SHIP TO: 08
CONSIGNED TO:
CAR VEHICLE#: 28803

ROUTING/CONTRACT:

DELIVERING CARRIER:
SHIPPER'S NO:
SHIP DATE: 00014756
DEL DATE: 9/17/01 9/17/01
SHIPPER: Colloid Environmental
1500 West Shure Drive
Arlington Heights IL 60004

SHIPPING PLANT:
LOVELL AMERICAN COLLOID
P.O. BOX 423
LOVELL WY 82431

CUSTOMER COMMENTS ALL BAGGED SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS.

QUANTITY	HM	DESCRIPTION OF ARTICLES PROD DESCRIPTION	WEIGHT (SUBJECT TO CORRECTION)
33192.0000		CLAYMAX 200 R	44,477.2800
14 Rolls			

GROSS: .00 TARE: .00 NET: 44,477.28

70 Bags

406-544-4824
"TJ"

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

SETCO
(Signature of Consignor)

If charges are to be prepaid, write or stamp here, "Prepaid."

PREPAID

Shipper liable for line haul charges only.
COD charges to be paid by: Consignee

*MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIALS AS DEFINED IN TITLE 49 OF THE CODE OF FEDERAL REGULATIONS

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

CARRIER:

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation

Per _____

PLACARDS REQUIRED

PLACARDS SUPPLIED ☐ YES ☐ NO—FURNISHED BY CARRIER
DRIVERS SIGNATURE

CUSTOMER

STRAIGHT BILL OF LADING—ORIGINAL—NOT NEGOTIABLE

PAGE 1 OF 1

CARRIER NAME:

DELIVERING CARRIER:

CONSIGNED TO: NATIONWIDE
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

SHIPPER'S NO: 000147561
SHIP DATE: 9/17/01
DEL DATE: 9/17/01

SHIPPER: Colloid Environmental
1500 West Shure Drive
Arlington Heights IL 60004

EAST HELENA MT
PHONE: 406 227 6059

SOLDTO: 719
CONSIGNED NO.#:
CAR/VEHICLE#: 28603

SHIPTO: 08

SHIPPING PLANT: LOVELL AMERICAN COLLOID
P.O. BOX 428
LOVELL WY 82431

ROUTING/CONTRACT:

CUSTOMER COMMENTS ALL BAGGED SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS.

QUANTITY	HM	DESCRIPTION OF ARTICLES PROD DESCRIPTION	WEIGHT (SUBJECT TO CORRECTION)
~~33192.0000~~ 14 Rolls		CLAYMAX 200 R	44,477.2800

GROSS: .00 TARE: .00 NET: 44,477.28

70 Bags

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

CETCO
(Signature of Consignor)

If charges are to be prepaid, write or stamp here, "Prepaid."

PREPAID

Shipper liable for line haul charges only.

COD charges to be paid by: Consignee

*MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIALS AS DEFINED IN TITLE 49 OF THE CODE OF FEDERAL REGULATIONS

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

CARRIER:

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Per

PLACARDS REQUIRED

PLACARDS SUPPLIED

☐ YES ☐ NO—FURNISHED BY CARRIER

DRIVERS SIGNATURE:

ORIGINAL

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147561
ORDER DATE: 9/06/2001
SHIP DATE:. 9/26/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-CLAYMAX200R		SFT	SF 200124LO	00000908	150.0	15.0	2250.0	2912.0
LO-CLAYMAX200R		SFT	SF 200124LO	00000909	150.0	15.0	2250.0	2911.0
LO-CLAYMAX200R		SFT	SF 200124LO	00000911	150.0	15.0	2250.0	2917.0
LO-CLAYMAX200R		SFT	SF 200129LO	00001305	150.0	15.0	2250.0	2899.0
LO-CLAYMAX200R		SFT	SF 200129LO	00001306	150.0	15.0	2250.0	2894.0
LO-CLAYMAX200R		SFT	SF 200129LO	00001307	150.0	15.0	2250.0	2889.0
LO-CLAYMAX200R		SFT	SF 200129LO	00001308	150.0	15.0	2250.0	2884.0
LO-CLAYMAX200R		SFT	SF 200129LO	00001309	150.0	15.0	2250.0	2879.0
LO-CLAYMAX200R		SFT	SF 200129LO	00001311	150.0	15.0	2250.0	2878.0
LO-CLAYMAX200R		SFT	SF 200129LO	00001322	150.0	15.0	2250.0	2922.0
LO-CLAYMAX200R		SFT	SF 200129LO	00001323	150.0	15.0	2250.0	2917.0
LO-CLAYMAX200R		SFT	SF 200134LO	00001480	150.0	15.0	2250.0	3274.0
LO-CLAYMAX200R		SFT	SF 200134LO	00001481	150.0	15.0	2250.0	3279.0
LO-CLAYMAX200R		SFT	SF 200134LO	00001485	150.0	15.0	2250.0	3273.0

ORDER TOTALS.....	31500.0	41728.0

TOTAL ITEMS..... 14

AMERI-CO CARRIERS

DELIVERY RECEIPT/BILL OF LADING

1702 E. OVERLAND DRIVE
P.O. BOX 1649
SCOTTSBLUFF, NE 69363-1649

#1 DRIVER'S CODE	RURR	ACCI ORDER NO.	1006954
#2 DRIVER'S CODE		PICKUP DATE	MO 09 DAY 25 YR 01
TRUCK NUMBER	1174	DELIVERY DATE	MO 09 DAY 26 YR 01
TRAILER NO.	5775	BILL OF LADING #	147560

		COMPANY NAME STREET	CITY	ST
FROM	01	CETCO	Lovell	Wy
TO (Final)	02	ASARCO c/o Envirocon	East Helena	MT
SEAL NUMBER(S)		DELIVERY STOPS	CONSIGNEE SIGNATURE "SEALS INTACT" & VERIFIED	
	1st		[illegible]	
	2nd			
	Final			

OTHER BILL OF LADING #'S	SHIPPER SIGNATURE	DRIVER'S SIGNATURE	DRIVER UNLOAD Y or N
	X _____ AT ORIGIN	X _____ AT ORIGIN	LUMPER FEE $_____

#ITEMS	DESCRIPTION	WEIGHT
15	Rolls Claymax 200R	
		44,500
NOTE DAMAGES, SHORTAGES & OVERAGES		

DELIVERY APPOINTMENTS:
DATE_____TIME_____

ARRIVED	STARTED	FINISHED

CUSTOMER

STRAIGHT BILL OF LADING—ORIGINAL—NOT NEGOTIABLE

PAGE 1 OF

CARRIER NAME: NATIONWIDE
CONSIGNED TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .
PHONE: 406 227 6059

SOLDTO: 719
CONSIGNED P.O.#:
CAR/VEHICLE#: 28803

SHIPTO: 08

ROUTING/CONTRACT:

DELIVERING CARRIER:

SHIPPER'S NO: 000147560
SHIP DATE: 9/17/01
DEL DATE: 9/17/01

SHIPPER: Colloid Environmental
1500 West Shure Drive
Arlington Heights IL 60004

9/25/01
Amico
1134

SHIPPING PLANT: LOVELL AMERICAN COLLOID
P.O. BOX 428
LOVELL WY 82431

CUSTOMER COMMENTS ALL BAGGED SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS.

QUANTITY	HM	DESCRIPTION OF ARTICLES PROD DESCRIPTION	WEIGHT (SUBJECT TO CORRECTION)
33192.0000		CLAYMAX 200 R	44,477.2800

15 Rolls

GROSS: .00 TARE: .00 NET: 44,477.28

Richard L. Burkey

Richard L. Burkey

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

CETCO

(Signature of Consignor)

If charges are to be prepaid, write or stamp here, "Prepaid."

PREPAID

Shipper liable for line haul charges only.

COD charges to be paid by: Consignee

*MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIALS AS DEFINED IN TITLE 49 OF THE CODE OF FEDERAL REGULATIONS

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tarrif if this is a motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tarrif which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

CARRIER:

Richard L. Burkey

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Per

PLACARDS REQUIRED

PLACARDS SUPPLIED

☐ YES ☐ NO—FURNISHED BY CARRIER
DRIVERS SIGNATURE:

CUSTOMER

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147560
ORDER DATE: 9/06/2001
SHIP DATE:. 9/25/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-CLAYMAX200R		SFT SF	200124LO	00000880	150.0	15.0	2250.0	2891.0
LO-CLAYMAX200R		SFT SF	200124LO	00000934	150.0	15.0	2250.0	2903.0
LO-CLAYMAX200R		SFT SF	200129LO	00001313	150.0	15.0	2250.0	2888.0
LO-CLAYMAX200R		SFT SF	200129LO	00001321	150.0	15.0	2250.0	2928.0
LO-CLAYMAX200R		SFT SF	200129LO	00001335	150.0	15.0	2250.0	2886.0
LO-CLAYMAX200R		SFT SF	200129LO	00001336	150.0	15.0	2250.0	2891.0
LO-CLAYMAX200R		SFT SF	200129LO	00001337	150.0	15.0	2250.0	2896.0
LO-CLAYMAX200R		SFT SF	200130LO	00001340	150.0	15.0	2250.0	3027.0
LO-CLAYMAX200R		SFT SF	200130LO	00001350	150.0	15.0	2250.0	3031.0
LO-CLAYMAX200R		SFT SF	200134LO	00001474	150.0	15.0	2250.0	3247.0
LO-CLAYMAX200R		SFT SF	200134LO	00001475	150.0	15.0	2250.0	3254.0
LO-CLAYMAX200R		SFT SF	200134LO	00001476	150.0	15.0	2250.0	3271.0
LO-CLAYMAX200R		SFT SF	200134LO	00001477	150.0	15.0	2250.0	3280.0
LO-CLAYMAX200R		SFT SF	200134LO	00001478	150.0	15.0	2250.0	3282.0
LO-CLAYMAX200R		SFT SF	200134LO	00001479	150.0	15.0	2250.0	3277.0

	========	========
ORDER TOTALS.....	33750.0	45952.0

TOTAL ITEMS..... 15

CARRIERS

#1 DRIVER'S CODE

#2 DRIVER'S CODE

TRUCK NUMBER

TRAILER NO.

ACCI ORDER NO.

PICKUP DATE MO DAY YR

DELIVERY DATE MO DAY YR

BILL OF LADING #

		COMPANY NAME	STREET	CITY	ST
FROM	01				
TO (Final)	02				
SEAL NUMBER(S)		DELIVERY STOPS		CONSIGNEE SIGNATURE "SEALS INTACT" & VERIFIED	
	1st				
	2nd				
	Final				

OTHER BILL OF LADING #'S	SHIPPER SIGNATURE	DRIVER'S SIGNATURE	DRIVER UNLOAD Y or N
	X AT ORIGIN	X AT ORIGIN	LUMPER FEE $

#ITEMS	DESCRIPTION	WEIGHT
NOTE DAMAGES, SHORTAGES & OVERAGES		

DELIVERY APPOINTMENTS:
DATE_____TIME_____

ARRIVED	STARTED	FINISHED

CUSTOMER

STRAIGHT BILL OF LADING—ORIGINAL—NOT NEGOTIABLE PAGE OF

CARRIER NAME: NATIONWIDE
CONSIGNED TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT.
PHONE: 406 227 6059

SOLDTO: 716 SHIPTO: 08
CONSIGNED TO:
CAR/VEHICLE#: 28803

ROUTING/CONTRACT

DELIVERING CARRIER:

SHIPPER'S NO: [illegible]
SHIP DATE: 9/17/01
DEL DATE: 9/17/01

SHIPPER: Colloid Environmental
1500 West Shure Drive
Arlington Heights IL 60004

SHIPPING PLANT: LOVELL AMERICAN COLLOID
P.O. BOX 428
LOVELL WY 82431

CUSTOMER COMMENTS ALL BAGGED SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS.

QUANTITY	HM	DESCRIPTION OF ARTICLES PROD DESCRIPTION	WEIGHT (SUBJECT TO CORRECTION)
31500.0000		BENTOMAT DN (DOUBLE NON-WOVEN) CLOTH, FABRIC OR PIECE GOODS, NOT OTHER THAN FOR THE MANUFACTU CLASS 65 ITEM 49120	40,414.5000 MANUFACTU
15 Rolls			
70.0000		COMMODITY GRANULAR-50 (10502/024) CLAY-BENTONITE-GROUND (CLASS 50) 3295232	3,500.0000

GROSS: .00 TARE: .00 NET: 43,914.50

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

CETCO
(Signature of Consignor)

If charges are to be prepaid, write or stamp here, "Prepaid."

PREPAID

Shipper liable for line haul charges only.

COD charges to be paid by: Consignee

*MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIALS AS DEFINED IN TITLE 49 OF THE CODE OF FEDERAL REGULATIONS

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except [illegible] (contents and condition of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood [illegible] out this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, [illegible] route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion [illegible] route to destination, and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tarrif if this is a motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tarrif which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

CARRIER:

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Per _____

PLACARDS REQUIRED

PLACARDS SUPPLIED

☐ YES ☐ NO—FURNISHED BY CARRIER DRIVERS SIGNATURE.

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147564
ORDER DATE: 9/06/2001
SHIP DATE:. 9/26/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT DN	SFT SF	200139LO	00006901	160.0	14.0	2240.0	3158.0
LO-BENTOMAT DN	SFT SF	200139LO	00006902	160.0	14.0	2240.0	3144.0
LO-BENTOMAT DN	SFT SF	200139LO	00006903	160.0	14.0	2240.0	3142.0
LO-BENTOMAT DN	SFT SF	200139LO	00006904	160.0	14.0	2240.0	3163.0
LO-BENTOMAT DN	SFT SF	200139LO	00006905	160.0	14.0	2240.0	3209.0
LO-BENTOMAT DN	SFT SF	200139LO	00006906	160.0	14.0	2240.0	3112.0
LO-BENTOMAT DN	SFT SF	200139LO	00006907	160.0	14.0	2240.0	3130.0
LO-BENTOMAT DN	SFT SF	200139LO	00006908	160.0	14.0	2240.0	3128.0
LO-BENTOMAT DN	SFT SF	200139LO	00006909	160.0	14.0	2240.0	3130.0
LO-BENTOMAT DN	SFT SF	200139LO	00006910	160.0	14.0	2240.0	3120.0
LO-BENTOMAT DN	SFT SF	200139LO	00006911	160.0	14.0	2240.0	3137.0
LO-BENTOMAT DN	SFT SF	200139LO	00006912	160.0	14.0	2240.0	3146.0
LO-BENTOMAT DN	SFT SF	200139LO	00006913	160.0	14.0	2240.0	3145.0
LO-BENTOMAT DN	SFT SF	200139LO	00006914	160.0	14.0	2240.0	3124.0
LO-BENTOMAT DN	SFT SF	200139LO	00006915	160.0	14.0	2240.0	3126.0

	========	========
ORDER TOTALS.....	33600.0	47114.0

TOTAL ITEMS..... 15

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY

RECAP SHEETS

TO:ENVIROCON
EAST HELENA, MT

FROM: CETCO
LOVELL, WY

TO:KURT/DOUG
PHONE:406-227-6059
FAX:406-227-6062

ATTN: KATHY
PHONE: 800-322-1149
FAX: 307-548-6413

CUSTOMER P.O.28803
ORDER:51-200R
62 DN

ORDER #		TRUCK	SHIP DATE	SQ FT	DN	200R	BAGS	COMMENTS
147560	1	AMERI-CO 1134	9/25/01	33750.00	0	15	0	
147566	2	AMERI-CO 1474	9/26/01	31500.00	15	0	0	
147561	3	AMERI-CO 1448	9/25/01	31500.00	0	14	70	
147564	4	AMERI-CO 1035	9/26/01	33600.00	15	0	0	
TOTALS				130350.00	30.00	29.00	70.00	

AMERI-CO CARRIERS

DELIVERY RECEIPT/BILL OF LADING

1702 E. OVERLAND DRIVE
P.O. BOX 1649
SCOTTSBLUFF, NE 69363-1649

#1 DRIVER'S CODE	BELLJA	ACCI ORDER NO.	1006952
#2 DRIVER'S CODE		PICKUP DATE	MO 09 DAY 27 YR 01
TRUCK NUMBER	1152	DELIVERY DATE	MO 09 DAY 27 YR 01
TRAILER NO.	425	BILL OF LADING #	147565

		COMPANY NAME	STREET	CITY	ST
FROM	01	Lovell Cotco		Lovell	WY
TO (Final)	02	Hanson c/o Envicocon		East Helena	MT
SEAL NUMBER(S)		DELIVERY STOPS		CONSIGNEE SIGNATURE "SEALS INTACT" & VERIFIED	
	1st				
	2nd				
	Final	[illegible]			

OTHER BILL OF LADING #'S	SHIPPER SIGNATURE	DRIVER'S SIGNATURE	DRIVER UNLOAD Y or N
	X _____ AT ORIGIN	X [signature] AT ORIGIN	LUMPER FEE $_____

#ITEMS	DESCRIPTION	WEIGHT
1	[illegible]	40,414
NOTE DAMAGES, SHORTAGES & OVERAGES		

DELIVERY APPOINTMENTS:
DATE_____TIME_____

ARRIVED	STARTED	FINISHED

CUSTOMER

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147565
ORDER DATE: 9/06/2001
SHIP DATE:. 9/27/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT DN		SFT	SF 200139LO	00006886	160.0	14.0	2240.0	3130.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006887	160.0	14.0	2240.0	3118.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006888	160.0	14.0	2240.0	3155.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006889	160.0	14.0	2240.0	3156.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006890	160.0	14.0	2240.0	3150.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006891	160.0	14.0	2240.0	3158.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006892	160.0	14.0	2240.0	3215.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006893	160.0	14.0	2240.0	3235.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006894	160.0	14.0	2240.0	3234.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006895	160.0	14.0	2240.0	3241.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006896	160.0	14.0	2240.0	3233.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006897	160.0	14.0	2240.0	3224.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006898	160.0	14.0	2240.0	3209.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006899	160.0	14.0	2240.0	3185.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006900	160.0	14.0	2240.0	3145.0

	========	========
ORDER TOTALS.....	33600.0	47788.0

TOTAL ITEMS..... 15

STRAIGHT BILL OF LADING—ORIGINAL—NOT NEGOTIABLE

PAGE 1 OF

CARRIER NAME:

CONSIGNED TO: NATIONWIDE
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT
PHONE: 406 227 6059

SOLDTO: 719

CONSIGNED P.O.#:

CAR/VEHICLE#: 28803

ROUTING/CONTRACT:

DELIVERING CARRIER:

SHIPPER'S NO:

SHIP DATE: 000147565
9/17/01

DEL DATE: 9/17/01

SHIPPER:
Colloid Environmental
1500 West Shure Drive
Arlington Heights IL 60004

9/2/10

SHIPTO: 08

SHIPPING PLANT:
LOVELL AMERICAN COLLOID
P.O. BOX 428
LOVELL WY 82431

CUSTOMER COMMENTS ALL BAGGED SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS.

QUANTITY	HM	DESCRIPTION OF ARTICLES PROD DESCRIPTION	WEIGHT (SUBJECT TO CORRECTION)
~~31500.0000~~ 15 Roll		BENTOMAT DN (DOUBLE NON-WOVEN) CLOTH.FABRIC OR PIECE GOODS.NOI,OTHER THAN FOR THE MANUFACTU CLASS 65 ITEM 49120	40,414.5000 MANUFACTUI

GROSS: .00 TARE: .00 NET: 40,414.50

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

CETCO

(Signature of Consignor)

If charges are to be prepaid, write or stamp here, "Prepaid."

PREPAID

Shipper liable for line haul charges only.

COD charges to be paid by: Consignee

*MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIALS AS DEFINED IN TITLE 49 OF THE CODE OF FEDERAL REGULATIONS

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tarrif if this is a motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tarrif which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

CARRIER:

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Per

PLACARDS REQUIRED

PLACARDS SUPPLIED

☐ YES ☐ NO—FURNISHED BY CARRIER

DRIVERS SIGNATURE:

CUSTOMER

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147565
ORDER DATE: 9/06/2001
SHIP DATE:. 9/27/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT DN		SFT	SF 200139LO	00006886	160.0	14.0	2240.0	3130.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006887	160.0	14.0	2240.0	3118.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006888	160.0	14.0	2240.0	3155.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006889	160.0	14.0	2240.0	3156.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006890	160.0	14.0	2240.0	3150.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006891	160.0	14.0	2240.0	3158.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006892	160.0	14.0	2240.0	3215.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006893	160.0	14.0	2240.0	3235.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006894	160.0	14.0	2240.0	3234.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006895	160.0	14.0	2240.0	3241.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006896	160.0	14.0	2240.0	3233.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006897	160.0	14.0	2240.0	3224.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006898	160.0	14.0	2240.0	3209.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006899	160.0	14.0	2240.0	3185.0
LO-BENTOMAT DN		SFT	SF 200139LO	00006900	160.0	14.0	2240.0	3145.0

	========	========
ORDER TOTALS.....	33600.0	47788.0

TOTAL ITEMS..... 15

AMERI-CO CARRIERS

DELIVERY RECEIPT/BILL OF LADING

1702 E. OVERLAND DRIVE
P.O. BOX 1649
SCOTTSBLUFF, NE 69363-1649

#1 DRIVER'S CODE: 800720

#2 DRIVER'S CODE:

TRUCK NUMBER: 1474

TRAILER NO.: 4775

ACCI ORDER NO.: 1006955

PICKUP DATE: MO 09 DAY 26 YR 01

DELIVERY DATE: MO 09 DAY 27 YR 01

BILL OF LADING #

		COMPANY NAME	STREET	CITY	ST
FROM	01	CETCO		LOVELL	WY.
TO (Final)	02	ENVIROCON-ASARCO	EAST HELENA CAMM GP	EAST HELENA	MT.
SEAL NUMBER(S)		DELIVERY STOPS		CONSIGNEE SIGNATURE "SEALS INTACT" & VERIFIED	
	1st			[illegible]	
	2nd				
	Final				

OTHER BILL OF LADING #'S	SHIPPER SIGNATURE	DRIVER'S SIGNATURE	DRIVER UNLOAD Y or N
	X _____ AT ORIGIN	X Robert E. Lee AT ORIGIN	LUMPER FEE $

#ITEMS	DESCRIPTION	WEIGHT
15	BENTONAT FOLLS	40,500
NOTE DAMAGES, SHORTAGES & OVERAGES		

DELIVERY APPOINTMENTS:
DATE 9-26 TIME 1530

ARRIVED	STARTED	FINISHED
9-26	1530	16:30

CUSTOMER

STRAIGHT BILL OF LADING—ORIGINAL—NOT NEGOTIABLE PAGE O

CARRIER NAME:
CONSIGNED TO: [illegible]
[illegible]
C O ENVIROCON

EAST HELENA MT
PHONE:

CONSIGNED P.O.#: SHIPTO:
CAR/VEHICLE#: 28803

ROUTING/CONTRACT:

DELIVERING CARRIER:
SHIPPER'S NO:
SHIP DATE:
SHIPPER: [illegible]

SHIPPING PLANT:
LOVELL AMERICAN [illegible]
P.O. BOX [illegible]
LOVELL [illegible]

CUSTOMER COMMENTS ALL BAGGED SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS.

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

[illegible]

406-544-4824- TJ

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement: The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.	**If charges are to be prepaid, write or stamp here, "Prepaid."**
(Signature of Consignor)	[illegible] **Shipper liable for line haul charges only.** **COD charges to be paid by: Consignee**

***MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIALS AS DEFINED IN TITLE 49 OF THE CODE OF FEDERAL REGULATIONS**

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except [illegible]d (contents and condition of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood [illegible]out this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, [illegible] route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tarrif if this is a motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tarrif which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

CARRIER: Robert E. Smith

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Per _____

PLACARDS REQUIRED

PLACARDS SUPPLIED ☐ YES ☐ NO—FURNISHED BY CARRIER
DRIVERS SIGNATURE:

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147566
ORDER DATE: 9/06/2001
SHIP DATE:. 9/26/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT DN		SFT	SF	200139LO	00006833	150.0	14.0	2100.0	2942.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006834	150.0	14.0	2100.0	2949.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006835	150.0	14.0	2100.0	2959.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006836	150.0	14.0	2100.0	2971.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006837	150.0	14.0	2100.0	2980.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006839	150.0	14.0	2100.0	2958.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006840	150.0	14.0	2100.0	3161.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006841	150.0	14.0	2100.0	2961.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006842	150.0	14.0	2100.0	2965.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006843	150.0	14.0	2100.0	2963.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006844	150.0	14.0	2100.0	2964.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006845	150.0	14.0	2100.0	2955.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006846	150.0	14.0	2100.0	2960.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006878	150.0	14.0	2100.0	2850.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006879	150.0	14.0	2100.0	2852.0

	========	========
ORDER TOTALS.....	31500.0	44390.0

TOTAL ITEMS..... 15

STRAIGHT BILL OF LADING—ORIGINAL—NOT NEGOTIABLE

PAGE O

CARRIER NAME:
CONSIGNED TO: NATIONWIDE
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT
PHONE: 406 227 6059

SOLD TO: 719
CONSIGNEE:
CAR/VEHICLE# 28803

ROUTING/CONTRACT

SHIP TO: C

DELIVERING CARRIER:

SHIPPER'S NO:
SHIP DATE: 000147588
9/17/01

SHIPPER: DATE: 9/17/01
Colloid Environmental
1500 West Shure Drive
Arlington Heights IL 60004

SHIPPING PLANT:
LOVELL AMERICAN COLLOID
P.O. BOX 425
LOVELL WY 82431

CUSTOMER COMMENTS ALL BAGGED SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS.

QUANTITY	HM	DESCRIPTION OF ARTICLES PROD DESCRIPTION	WEIGHT (SUBJECT TO CORRECTION)
~~15174.0000~~ 4 Rolls		CLAYMAX 200 R	20,333.1600
~~4200.0000~~ 11 Rolls		BENTOMAT DN (DOUBLE NON-WOVEN) CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTU CLASS 65 ITEM 49120	5,388.6000 MANUFACTU

GROSS: .00 TARE: .00 NET: 25,721.76

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

CETCO
(Signature of Consignor)

If charges are to be prepaid, write or stamp here, "Prepaid."

PREPAID

Shipper liable for line haul charges only.
COD charges to be paid by: Consignee

*MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIALS AS DEFINED IN TITLE 49 OF THE CODE OF FEDERAL REGULATIONS

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

CARRIER:

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Per

PLACARDS REQUIRED

PLACARDS SUPPLIED

☐ YES ☐ NO—FURNISHED BY CARRIER
DRIVERS SIGNATURE

CUSTOMER

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147563
ORDER DATE: 9/06/2001
SHIP DATE:. 10/04/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT DN		SFT	SF	200139LO	00006771	150.0	14.0	2100.0	2967.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006772	150.0	14.0	2100.0	3018.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006773	150.0	14.0	2100.0	3083.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006775	150.0	14.0	2100.0	3126.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006776	150.0	14.0	2100.0	3124.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006787	150.0	14.0	2100.0	2955.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006788	150.0	14.0	2100.0	2952.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006789	150.0	14.0	2100.0	2921.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006790	150.0	14.0	2100.0	2899.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006799	150.0	14.0	2100.0	2998.0
LO-BENTOMAT DN		SFT	SF	200139LO	00006800	150.0	14.0	2100.0	2978.0
LO-CLAYMAX200R		SFT	SF	200140LO	00001685	150.0	15.0	2250.0	3197.0
LO-CLAYMAX200R		SFT	SF	200140LO	00001686	150.0	15.0	2250.0	3200.0
LO-CLAYMAX200R		SFT	SF	200140LO	00001688	150.0	15.0	2250.0	3207.0
LO-CLAYMAX200R		SFT	SF	200140LO	00001694	150.0	15.0	2250.0	3221.0

ORDER TOTALS.....	32100.0	45846.0

TOTAL ITEMS..... 15

STRAIGHT BILL OF LADING—ORIGINAL—NOT NEGOTIABLE

PAGE OF

CARRIER NAME: NATIONWIDE
CONSIGNED TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .
PHONE: 406 227 6059

SOLDTO: 712
CONSIGNED PO.#:
CAP VEHICLE#: 28803

SHIPTO: 08

ROUTING/CONTRACT:

DELIVERING CARRIER:

SHIPPER'S NO: 000147582
SHIP DATE: 9/17/01
DEL DATE: 9/17/01

SHIPPER: Colloid Environmental
1500 West Shure Drive
Arlington Heights IL 60004

SHIPPING PLANT: LOVELL AMERICAN COLLOID
P.O. BOX 428
LOVELL WY 82431

CUSTOMER COMMENTS ALL BAGGED SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS.

QUANTITY	HM	DESCRIPTION OF ARTICLES PROD DESCRIPTION	WEIGHT (SUBJECT TO CORRECTION)
33192.0000		CLAYMAX 200 R	44,477.2800

GROSS: .00 TARE: .00 NET: 44,477.28

TJ - 406-544-4824

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

CERTIFIED T. J. Finley
Signature of Consignor

If charges are to be prepaid, write or stamp here, "Prepaid."

PREPAID

Shipper liable for line haul charges only.

COD charges to be paid by: Consignee

*MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIALS AS DEFINED IN TITLE 49 OF THE CODE OF FEDERAL REGULATIONS

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood [illegible] out this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, [illegible] route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion [illegible] route to destination, and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tarrif which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

CARRIER:

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Per _____

PLACARDS REQUIRED

PLACARDS SUPPLIED ☐ YES ☐ NO—FURNISHED BY CARRIER
DRIVERS SIGNATURE

CUSTOMER

P A C K I N G L I S T

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147562
ORDER DATE: 9/06/2001
SHIP DATE:. 10/05/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-CLAYMAX200R	SFT SF	200140LO	00001637	150.0	15.0	2250.0	3253.0
LO-CLAYMAX200R	SFT SF	200140LO	00001650	150.0	15.0	2250.0	3227.0
LO-CLAYMAX200R	SFT SF	200140LO	00001651	150.0	15.0	2250.0	3224.0
LO-CLAYMAX200R	SFT SF	200140LO	00001658	150.0	15.0	2250.0	3220.0
LO-CLAYMAX200R	SFT SF	200140LO	00001660	150.0	15.0	2250.0	3239.0
LO-CLAYMAX200R	SFT SF	200140LO	00001661	150.0	15.0	2250.0	3231.0
LO-CLAYMAX200R	SFT SF	200140LO	00001681	150.0	15.0	2250.0	3211.0
LO-CLAYMAX200R	SFT SF	200140LO	00001682	150.0	15.0	2250.0	3217.0
LO-CLAYMAX200R	SFT SF	200140LO	00001683	150.0	15.0	2250.0	3208.0
LO-CLAYMAX200R	SFT SF	200140LO	00001687	150.0	15.0	2250.0	3199.0
LO-CLAYMAX200R	SFT SF	200140LO	00001689	150.0	15.0	2250.0	3210.0
LO-CLAYMAX200R	SFT SF	200140LO	00001690	150.0	15.0	2250.0	3213.0
LO-CLAYMAX200R	SFT SF	200140LO	00001691	150.0	15.0	2250.0	3206.0
LO-CLAYMAX200R	SFT SF	200140LO	00001692	150.0	15.0	2250.0	3203.0
LO-CLAYMAX200R	SFT SF	200140LO	00001693	150.0	15.0	2250.0	3217.0

	========	========
ORDER TOTALS.....	33750.0	48278.0

TOTAL ITEMS..... 15

STRAIGHT BILL OF LADING—ORIGINAL—NOT NEGOTIABLE PAGE O

CARRIER NAME:
CONSIGNED TO: NATIONWIDE
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .
PHONE: 406 227 6059

SOLDTO: 712
CONSIGNED PO.#:
CAR/VEHICLE#: 28803

SHIPTO: 08

ROUTING/CONTRACT:

DELIVERING CARRIER:
SHIPPER'S NO: 000147567
SHIP DATE: 9/17/01
DEL DATE: 9/17/01

SHIPPER:
Colloid Environmental
1500 West Shure Drive
Arlington Heights IL 60004

SHIPPING PLANT:
LOVELL AMERICAN COLLOID
P.O. BOX 428
LOVELL WY 82431

CUSTOMER COMMENTS ALL BAGGED SHIPMENTS LOADED ON FLATBED OR OPEN TOP TRAILERS MUST BE COVERED WITH ADEQUATE TARPAULIN PRIOR TO HIGHWAY MOVEMENT. CARRIER WILL BE HELD FULLY RESPONSIBLE FOR LOSS OR DAMAGE OCCURRING TO UNPROTECTED LOADS.

QUANTITY	HM	DESCRIPTION OF ARTICLES PROD DESCRIPTION	WEIGHT (SUBJECT TO CORRECTION)
31500.0000		BENTOMAT DN (DOUBLE NON-WOVEN) CLOTH,FABRIC OR PIECE GOODS,NOI,OTHER THAN FOR THE MANUFACTUI CLASS 65 ITEM 49120	40,414.5000 MANUFACTUI

LOSS: .00 TARE: .00 NET: 40,414.50

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

CETCO
(Signature of Consignor)

If charges are to be prepaid, write or stamp here, "Prepaid."

PREPAID

Shipper liable for line haul charges only.
COD charges to be paid by: Consignee

*MARK WITH "X" TO DESIGNATE HAZARDOUS MATERIALS AS DEFINED IN TITLE 49 OF THE CODE OF FEDERAL REGULATIONS

RECEIVED, subject to the classifications and lawfully filed tariffs in effect on the date of issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown) marked, consigned, and destined as indicated above which said carrier (the word carrier being understood [illegible]out this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, [illegible]ute, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed as to each carrier of all or any of said property over all or any portion [illegible]ute to destination, and as to each party at any time interested in all or any said property, that every service to be performed hereunder shall be subject to all the terms [illegible]ditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Uniform Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tarrif if this is a motor carrier shipment.
Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, set forth in the classification or tarrif which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

CARRIER:

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Per

PLACARDS REQUIRED

PLACARDS SUPPLIED ☐ YES ☐ NO—FURNISHED BY CARRIER
DRIVERS SIGNATURE:

CUSTOMER

P A C K I N G L I S T

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147567
ORDER DATE: 9/06/2001
SHIP DATE:. 10/08/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-CLAYMAX200R		SFT	SF 200140LO	00001649	150.0	15.0	2250.0	3239.0
LO-CLAYMAX200R		SFT	SF 200140LO	00001677	150.0	15.0	2250.0	3237.0
LO-CLAYMAX200R		SFT	SF 200140LO	00001678	150.0	15.0	2250.0	3231.0
LO-CLAYMAX200R		SFT	SF 200140LO	00001679	150.0	15.0	2250.0	3226.0
LO-CLAYMAX200R		SFT	SF 200140LO	00001680	150.0	15.0	2250.0	3220.0
							========	========
ORDER TOTALS.....							11250.0	16153.0

TOTAL ITEMS..... 5

APPENDIX C

MANUFACTURERS' LITERATURE AND CERTIFICATIONS

C.1 HDPE

A. SUBMITTAL

B. INSTALLATION GUIDE

C. 60 MIL CERTIFICATIONS

D. 40 MIL CERTIFICATIONS

E. WARRANTIES

C.2 GEONET

A. SUBMITTAL

B. MANUFACTURER'S QA/QC PLAN

C. INSTALLATION GUIDE

D. WARRANTIES

C.3 GCL

A. SUBMITTAL

B. INSTALLATION GUIDE

C. CERTIFICATIONS

D. WARRANTIES

Hydrometrics, Inc.®

Consulting Scientists, Engineers & Contractors

TRANSMITTAL NO. 4 (revised)

PROJECT: ASARCO EAST HELENA PLANT
CAMU - PHASE 1 CELL CONSTRUCTION PROJECT
Project# 1237B2

DATE: June 26, 2001

TO: Envirocon, Inc.
500 Taylor Street
Missoula, MT 59802
Phone: (406) 523-1150
Fax: (406) 523-1197

FROM: Hydrometrics, Inc.
2727 Airport Road
Helena, MT 59601
Phone: (406) 443-4150
Fax: (406) 443-4155

ATTN: Kurt Wieringa, Project Manager (227-6059/fax 227-6062/cell 544-0212) and Dan McCaffery (523-1186)

SUBJECT: Submittals

WE ARE SENDING:	SUBMITTED FOR	ACTION TAKEN
☐ Shop Drawings	☐ Approval	X Approved as Submitted
☐ Letter	☐ Your Use	☐ Approved as noted
☐ Prints	☐ As Requested	☐ Returned After Loan
☐ Change Order	☐ Review and Comment	☐ Resubmit
☐ Plans		☐ Submit
☐ Sample	SENT VIA:	☐ Returned
☐ Specifications	☐ Attached	☐ Returned for Correction
X Other: Submittal comments	☐ Separate Cover Via:	☐ Due Date

ITEM	PACKAGE	SUBMITTAL	DRAWING	REV.	ITEM NO.	COPIES	DATE	DESCRIPTION	STATUS
1		Geomembrane					6/6/01	Geomembrane	Approved
1		Geonet					6/6/01	Geonet	Approved
1		Geotextile					6/6/01	Geotextile	Approved

Remarks:

Hydrometrics recommends approval of this submittal that addresses specification requirements from sections 623.02A and 624.02.1B. We also recommend approval of the contractor's request to use low tire pressure ATVs subject to the QA/QC Inspector's verification that there is no detrimental effect on the liner. The proposed 200 mil Geonet may be used in place of the specified 250 mil Geonet. Mike Oelrich, P.E. completed the review, comments and approval of this submittal.

Additional Comments to Northwest Linings Liner Submittal

As shown below, the variance in the properties between the values specified in the project contract documents and Serrot's values are less than 10% and in most cases are insignificant. Although the yield strength of Serrot's 60 mil liner is 3% less than spec, it is more than is required for the CAMU cell liner design. Therefore, Hydrometrics recommends approval of the Serot liners.

Serrot
60 mil HDPE

Item	Liner Nominal Value	Specification 623.02A Table 4	Variance
Tear Strength	42	45	7%
Tensile Strength(yield)	126	130	3%
Elongation (%)	12	13	8%
Break Strength	228	240	5%
Elongation (%)	700	560	
Puncture Resistance	78	80	3%
Stress Crack (Hours)	200	200	--

Serrot
40 mil HDPE

Item	Liner Nominal Value	Specification 623.02A Table 4	Variance
Tear Strength	28	30	7%
Tensile Strength(yield)	84	84	--
Elongation (%)	12	13	8%
Break Strength	152	160	5%
Elongation (%)	700	500	
Puncture Resistance	52	52	--
Stress Crack (Hours)	200	200	--

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655
Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell

SUBMITTAL TRANSMITTAL

From: Dan McCaffery

Date: 6/21/01

To: ASARCO, Inc.

Attn: Darrell Shew

Phone: (406) 227-7173

We are sending via: ☐ Mail ☒ Hand Dlvy ☐ Federal Express ☐ UPS

☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
4	623 & 624	Geomembrane, Geonet, & Geotextile

Remarks: These submittals have been reviewed by the QC Manager to ensure that they comply with the Project Specifications. Any variances are noted below:

Variances: **200 mil Geonet, instead of 250 mil.**

Signed: Dan McCaffery

Project QC Manager

A Washington Corporation

ASARCO EAST HELENA PLANT					
PHASE I CELL CONSTRUCTION PROJECT					
LINER SUBMITTAL					
Specification			**Found @**	**Variance?**	
Section	**Subsection**	**ITEM**	**Tab #**	**(yes/no)**	**Description**
623		**FLEXIBLE MEMBRANE LINER**			
623	02.A	**Fabricator/Installer Qualifications**			
	02.A.1	Installer's project experience	1	NO	
	02.A.2	Installer's supervisor's resume w/ project experience	2	NO	
	02.A.3	Manufacturer's material cut-sheet specs (nominal)	3	NO	(note - both Poly-Flex & Serrot are included)
	02.A.3, Table 4	(specific test methods and requirements)	3	Cut-sheet values are nominal and may be slightly low	
				Roll-specific test results will be within specs, unless a variance is noted herein	
623	02.C	**Warrantee**			
	02.C.1	Installer's 1-year workmanship warrantee	4	NO	
	02.C.1	Manufacturer's 10-year material warrantee	5	NO	(note - both Poly-Flex & Serrot are included)
623	03	**Submittals**			
	03.A.1	Storage, handling, installation & seaming instructions	6	NO	
	03.A.2	Panel layout drawings	7	NO	note attached detail is silghtly different than Detail 2, Drawing 9980
	03.A.3	Installer's field engineer/supervisor's resume	2	NO	
	03.A.4	Installer's QC Manual	6	NO	
(Note: Items 623.03.B through .E will be submitted at the times indicated in each subsection, i.e. "prior to shipment", etc.)					
623	04	**Physical Characteristics**			
	04.C.1	HDPE resin specific gravity specs.	3	NO	
	04.C.2	Geomembrane liner additional specs.	3	NO	
	04.C.3	Table 4 specs.	3	Cut-sheet values are nominal and may be slightly low	
	04.C.4	Roll labelling requirements	@ delivery	Roll-specific test results will be within specs, unless a variance is noted herein	
624		**GEONET**			(250 mil → 200 mil geonet) yes - but already approved under G+P invt. submittal
	02.1.B	**Physical Characteristics**			
	02.1.B.3	Manufacturer's material cut-sheet specs (nominal)	8	Cut-sheet values are nominal and may be slightly low	
	02.1.B.3, Table 5	(specific test methods and requirements)	8	Roll-specific test results will be within specs, unless a variance is noted herein	
	03.E.5	**(Submittals)**			
		Manufacturer's material warrantee	9	NO	
DOT 713.13		**GEOSYNTHETICS**			
	Table 713-1	(specific test methods and requirements)	10	NO	
Manufacturer's Statements of Qualifications and Other Supporting Information			11	na	

High Density Polyethylene (HDPE) – Smooth

Serrot's HDPE geomembranes are produced from first quality, high molecular weight resins and are manufactured specifically for containment of fluids in hydraulic structures. Serrot geomembranes are durable and have been formulated to be resistant to chemicals, ultraviolet degradation and leaching additives. The series of geomembranes shown below is based on a minimum average thickness value equal to the nominal thickness, with the lowest individual of 10 values equal to the nominal thickness minus 10%.

Property	Test Method	Frequency[1]	HD400	HD600	HD800	HD1000
Thickness (nominal) (mils)			40	60	80	100
Thickness (min. ave.) (mils)	D5199	per roll	40	60	80	100
• Lowest individual of 10 values			36	54	72	90
Tensile Properties (min. ave.)	D638 Type IV	50,000 SF				
• Yield Strength (lb/in)	(2 ipm)		84	126	168	210
• Break Strength (lb/in)			152	228	304	380
• Yield Elongation (%)	(1.3" gauge)		12	12	12	12
• Break Elongation (%)	(2.0" gauge)		700	700	700	700
Tear Resistance (min. ave.) (lb)	D1004	50,000 SF	28	42	56	70
Puncture Resistance (min. ave.) (lb)	D4833	50,000 SF	72	108	144	180
	FTMS 101/ Method 2065[2]	Certified	52	78	104	130
Carbon Black Content (range) (%)	D1603/D4218	50,000 SF	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	D5596	50,000 SF	Note	Note	Note	Note
Density (min. ave.) (g/cc)	D1505/D792	Resin Batch	0.940	0.940	0.940	0.940
Stress Crack Resistance (hr)	D5397 (App.)	Resin Batch	200	200	200	200
Dimensional Stability (max. ave.) (%)	D1204	Resin Batch	±2	±2	±2	±2

[1]Testing frequencies are rounded to the nearest full roll.
[2]FTMS 101 has been replaced with D4833. Value shown for comparison purposes only
Carbon black dispersion for 10 different views: all 10 in Categories 1 or 2.

The information contained herein has been compiled by Serrot International, Inc. and is, to the best of our knowledge, true and accurate. This information is offered without warranty. Final determination of suitability for use contemplated is the sole responsibility of the user. This information is subject to change without notice. HDX00E 12/21/99

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NORTHWEST LININGS & GEOTEXTILES PRODUCTS, INC.
CONSTRUCTION QUALITY CONTROL MANUAL
FOR HDPE AND LLDPE CONTAINMENT MEMBRANE
FIELD INSTALLATIONS

NORTHWEST LININGS AND GEOTEXTILES
HDPE/LLDPE-FIELD QUALITY CONTROL MANUAL

I. INTRODUCTION

A. This manual describes the Quality Control Procedures utilized by Northwest Linings (NWL) Installation Personnel to assure quality workmanship and installation integrity of HDPE/LLDPE Geomembranes.

B. Geosynthetic components of lining systems which are addressed in this manual are HDPE/LLDPE Geomembranes. NWL recognizes that specific documentation of the specific installation is required to substantiate this Quality Control Program.

II. HDPE/LLDPE GEOMEMBRANE INSTALLATION

A. Earth Work

1. The general and/or earthwork contractor shall be responsible for preparing and maintaining the subgrade in a condition suitable for liner installation unless agreed otherwise.

2. Surfaces to be lined shall be smooth and free of debris, roots, and angular or sharp rocks to a depth of four (4) inches. All fill shall consist of well-graded material free of organics, trash, clayballs or other harmful matter. No sharp edged stones, stones larger than one (1) inch diameter or hard objects shall be allowed within the top four (4) inches of the subgrade. The surface shall be compacted in accordance with project specifications but in no event below the minimum required to provide a firm unyielding foundation sufficient to permit the movement of vehicles and welding equipment over the surface without causing rutting or other harmful effects. The subgrade shall have no sudden sharp or abrupt changes in grade.

3. The earthwork contractor shall protect the subgrade from becoming too dry, flooding and freezing. Protection, if required, may consist of a thin plastic protective cover (or other material as approved by the engineer) installed over the subgrade until the placement of the liner begins. Subgrade found to have cracks greater than 1/2 inch in width or depth or which exhibit swelling, heaving or other similar conditions shall be reworked by the general contractor to remove these defects.

4. Surface acceptance: Upon request, NWL will provide the Owner's Representative with a written acceptance of the surface to be lined. This acceptance will be limited to an amount of area that NWL is capable of lining in a particular work shift. Subsequent repairs to the subgrade and the surface shall remain the responsibility of the earthwork contractor.

B. Crest Anchorage System

1. The anchor trench shall be excavated by the earthwork contractor to lines and widths shown on the design drawings prior to geomembrane placement.

2. Anchor trenches excavated in clay soils susceptible to desiccation cracks should be excavated only the distance required for that days liner placement to minimize the potential for cracking of the clay soils.

3. Corners in the anchor trench shall be slightly rounded where the geomembrane enters the trench to minimize sharp bends in the liner.

C. Preparation for Geomembrane Deployment

1. Panel Layout: Prior to liner deployment, layout drawings shall be produced to indicate the panel configuration and location of seams.

2. Identification: Each panel used shall be given a numeric or alpha-numeric identifier consistent with the layout drawing. This identification number shall be related to a manufacturing roll number.

D. Field Panel Placement

1. Location: NWL will attempt to install field panels at the location indicated on the layout drawing. If panels are positioned in a location other than that indicated on the layout drawings, the revised location shall be noted in the field on a layout drawing which will be modified at the completion of the project to reflect actual panel locations.

2. Weather Conditions: Geomembrane deployment shall not be done during any precipitation, in the presence of excessive moisture (i.e. fog, dew), in an area of standing or ponded water, or during high winds.

3. Method of Deployment:

   a) The method and equipment used to deploy the panels must not damage the geomembrane or the supporting subgrade surface.

   b) No personnel working on the liner will smoke, wear shoes that can damage the geomembrane, or engage in actions which could result in damage to the geomembrane.

   c) Adequate temporary ballast and/or anchoring, (i.e. sandbags, tires), which will not damage the geomembrane, will be placed to prevent uplift of the liner by wind.

   d) The geomembrane will be deployed in a manner to minimize wrinkles.

4. Any damage to a panel of geomembrane will be repaired in accordance with Section IV. Any area of a panel seriously damaged (torn, twisted, or crimped) will be marked, cut out, and removed from the work area with resulting seaming and/or repairs performed in accordance with Section IV of this document.

E. Field Seaming

1. General Requirements:

   a) Layout: In general, seams shall be oriented parallel to the slope, (down hill) not across the slope. Whenever possible, horizontal seams should be located not less than five (5) feet from the toe of the slope. Each seam shall be numbered in a manner compatible with the panel layout drawing for documentation of seam testing results.

b) Personnel: All personnel performing seaming operations shall be trained in the operation of the equipment being used and will qualify by successfully welding a test seam as described herein. The project foreman will provide direct supervision of all personnel seaming tc verify proper welding procedures are followed.

F. Equipment:

1. Fusion Welding:

Fusion Welding consists of placing a heated wedge, mounted on a self propelled vehicular unit, between two (2) overlapped sheets such that both sheets are heated to temperatures ranging from 600 degrees F. to 950 degrees F. After being heated by the wedge, the overlapped edges pass through a set of preset pressure rollers which compress the panels together forming a continuous homogenous fusion weld. The fusion welder is equipped with a temperature readout device which continuously monitors the temperature of the wedge.

2. Extrusion Fillet Welding:

Extrusion welding consists of introducing a ribbon of molten resin along the edge of the seam overlap to the two sheets to be welded. The molten polymer causes some of the material of each sheet to be liquefied resulting in a homogeneous bond between the molten weld bead and the surfaces of the sheets. The extrusion welder is equipped with gauges giving the temperature in the apparatus and the preheat temperature at the nozzle.

G. Seam Preparation:

1. Fusion Welding:

1. Overlap the panels approximately four (4) inches.

2. Clean the seam area prior to seaming to assure the area is lean and free of moisture, dust, dirt and debris.

3. No grinding is required for fusion welding.

4. Adjust the panels so that seams are aligned with the fewest possible number of wrinkles and "fishmouths".

2. Extrusion Welding:

1. Overlap the panels a minimum of three (3) inches.

2. Temporarily bond the panels to be welded taking care not to damage the geomembrane.

3. Grind seam overlap prior to welding within one (1) hour of welding operation in manner that does not damage the geomembrane.

4. Clean the seam area prior to seaming to assure the area is clean and free of moisture, dust dirt and debris of any kind.

5. Purge the extruder prior to beginning the seam to remove all heat-degraded Extrudate from the barrel.

6. Keep welding rod clean and off the ground.

H. Test Seams:

Test seams shall be performed at the beginning of each seaming period and at least once each five hours for each seaming apparatus used that day. Test seams shall be made on fragment pieces of the liner and under the same conditions as actual seams.

1. Test Seam Length:
   The test seam shall be at least three feet long, made by joining pieces at least 9" in width.

2. Sample Procedures:

   1.Visually inspect the seam for squeeze out, footprint, pressure and general appearance.

   2. Two samples one inch wide shall be cut from the test seam. The samples shall then be tested in peel and shall not fail in the seam. Failure shall be a film tear bond (FTB). If a sample fails, the entire procedure shall be repeated.

   3. If any of the second set of samples fail, the machine shall not be accepted and used for seaming until the problem is corrected and 2 passing tests are achieved.

   4. After completion of the test the remaining portion of the test seam shall be discarded. Documentation of the test seams will be maintained by listing machine I.D. number, operators name, temperature control setting and test results.

   5. Passing test results records shall be maintained on NWL's test weld report form.

   6. If test samples are to act as destructive samples then the sample shall be marked, logged and saved. If samples are to be cut from the actual finished seam for Lab Testing, the test seams shall be discarded per above.

I. General Seaming Procedures:

1. Seaming shall extend to the outside edge of panels to be placed in the anchor trench.

2. While welding a seam, monitor and maintain the proper overlap.

3. Inspect seam area to assure area is clean and free of moisture, dust, dirt and debris of any kind.

4. While welding a seam, monitor temperature gauges to assure proper settings are maintained and that the machine is operating properly.

5. Align wrinkles at the seam overlap to allow welding through a wrinkle.

6. Fishmouths or wrinkles at seam overlaps that cannot be welded through shall be cut along the ridge in order to achieve a flat overlap. The cut area shall be seamed. Any portion where the overlap is inadequate shall be patched with an oval or round patch extending six inches beyond the cut in all directions.

7. All cross/butt seams between two rows of seamed panels shall be welded during the coolest time of the day to allow for contraction of the geomembrane.

8. All "T" joints shall have the overlap from the wedge welder seam trimmed back to allow an extrusion fillet weld. Then grind two inches on either side of the seam and extrusion weld all of the area prepared by grinding.

J. Weather Conditions:

NWL relies on the experience of the Project Superintendent and the results of test seams to determine seaming restriction by weather. Many factors, such as ambient temperature, humidity, wind, sunshine, etc., can effect the integrity of field seams and must be taken into account when deciding whether or not seaming should proceed. Test seams are required *prior to daily production seaming to determine if the weather conditions will effect NWL's* ability to produce quality seams. Additional non-destructive and destructive testing of production seams substantiate the decision made by the Project Superintendent to seam on any given day.

SECTION III Seam Testing-Quality Control-Geomembranes

A. Concept:

NWL installation crews will non-destructively test all field seams over their full length using air pressure testing, vacuum testing or other approved method, to verify the continuity and integrity of the seams.

B. Air Pressure Testing:

The weld seam created by the fusion welding process is composed of two welded seams separated by an unwelded channel approximately 3/8 of an inch wide. This channel permits seams to be tested by inflating the sealed channel with air to a predetermined pressure and observing the stability of the pressurized channel over time.

C. Equipment for air testing:

1. An air pump (manual or motor driven) capable of generating and sustaining a pressure of 30 PSI.

2. A rubber hose with fittings and connections.

3. A sharp hollow needle with a pressure gauge capable of reading and sustaining a pressure of 30 PSI.

4. Procedure for air testing:

5. Seal both ends of the seam to be tested.

6. Insert needle in the sealed channel.

7. Inflate the test channel to a pressure between 25 to 30 PSI, in accordance with the following schedule, close valve, and observe initial pressure after approximately 2 minutes.

INITIAL PRESSURE SCHEDULE*				MAX. PRESSURE DIFF.
MATERIAL	(MIL)	MIN. PSI	MAX. PSI	AFTER 5 MINUTES
	40	25	30	4
	50	26	30	4
	60	27	30	4
	80	30	30	4
	100	30	30	4

* Initial pressure settings are read after a two minute relaxing period. The purpose of this period is to permit the air temperature and pressure to stabilize.

8. Observe and record the air pressure five minutes after the relaxing period ends. If loss of pressure exceeds the value above or if the pressure does not stabilize, locate the faulty area and repair.

9. Upon completion of the pressure test the end of the seam opposite the pressure gauge is cut. A decrease in gauge pressure must be observed or the air channel will be considered blocked and the test will be repeated after the blockage is corrected.

10. Remove needle and seal resulting hole by extrusion welding.

11. Record test results on non-destructive test form

12. In the event of a Non-Complying Air pressure test, the following procedure shall be followed.

13. Check seam-end seals and retest seams.

14. If non-compliance reoccurs, cut one inch samples from each end of the seam and additional samples at the distance specified.

15. Perform destructive field peel test on the samples.

16. If all samples pass destructive testing remove the overlap left by the wedge welder and perform an Air Pressure/Soap Test or vacuum test.

17. If a leak is detected by the air pressure/soap or the vacuum test, repair by extrusion welding. Test repair by vacuum testing.

18. If no leak is discovered air pressure/soap testing, the seam will pass non-destructive testing.

19. If no leak is discovered by vacuum testing, the seam will pass non-destructive testing.

20. If one or more samples fail the peel test, additional samples will be taken.

21. When two passing samples are located, the seam between these two locations will be considered complying. The area outside of this length will be considered non-complying and the entire length extrusion welded.

22. Test the entire length of the repaired seam by vacuum testing.

D. Air Pressure Testing/Soap Testing:

This test is used when the seam fails the air pressure test due to slow pressure loss. The procedure is to constantly supply pressure to the seam air channel while spraying the length with a soap and water solution and visually examining the seam for bubbles. Note: This option is not recommended during high wind conditions.

1. Equipment for Air Pressure/Soap Testing:

    a) The same equipment as the air pressure test.

    b) A soap solution and means to apply the solution.

2. Procedure for Air Pressure/Soap Testing:

1. Trim excess overlap material off at edge of seam

1. Insert needle gauge assembly in opposite ends of the seam to be tested to show that pressure is continuous throughout the channel.

2. Maintain 30 psi

3. Apply soap solution to the weld edge and visually examine for bubbles.

4. If no bubbles appear the problem is with the inside track "secondary weld". This seam is acceptable providing it has passed peel tests.

5. If any bubbles appear on the outside track "Primary weld", repair defect by extrusion welding and vacuum test the repair.

E. Vacuum Testing:

This test is used when the geometry of the weld makes air pressure testing impossible or impractical or when attempting to locate the precise location of a defect believed to exist after air pressure testing.

1. Equipment for vacuum testing:

1. Vacuum box consisting of a rigid housing, a transparent viewing window, a soft neoprene gasket attached to the bottom, port hole or valve assembly and a vacuum gauge.

2. Vacuum pump assembly or compressor with a venturi equipped with a pressure controller and pipe connections.

3. A rubber pressure/vacuum hose with fittings and connections.

4. A soap solution with a means to apply the solution.

2. Procedure for Vacuum Testing:

1. Trim excess overlap from seam.

2. Apply soap solution to the area to be tested.

3. Place the vacuum box over the area and apply sufficient downward pressure to seal the box against the liner.

4. Open the vacuum valve and apply a minimum of 5 in. Hg vacuum to the area as indicated by the gauge on the box.

5. Ensure that a leak-tight seal is created.

6. For a period of not less than thirty seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.

7. If no bubbles appear after thirty seconds, close the valve and move overlap and repeat the process.

3. Procedure for non-complying test:

1. Mark all areas where soap bubbles appear and repair the marked areas.

1. Retest repaired areas.

F. **Destructive Testing:**

The purpose of destructive testing is to determine and evaluate seam strength. These tests require direct sampling and thus subsequent patching. therefore destructive testing should be held to a minimum to reduce the amount of repairs required.

1. Procedure for Destructive Testing:

1. Destructive test samples shall be marked and cut out randomly at a minimum average frequency of one test location every ~~700~~ 500 feet of seam length.

2. Additional test may be taken in areas of contamination, offset welds, visible crystallinity or other potential cause of faulty welds.

1. Sample Size:

1. The sample should be twelve inches wide with a seam fourteen inches long centered Lengthwise in the sample. The sample may be increased in size to accommodate independent lab testing by the owner or by specific project specifications.

2. A one inch sample shall be cut from each end of the test seam for field testing on a calibrated field tensiometer.

3. The one inch wide samples shall be tested in the field for peel. If any field sample fails to pass FTB, it will be assumed the sample fails destructive testing. The procedures outlined in Section 2 shall be followed to locate passing samples to send to the laboratory.

4. If the sample passes the field test, the remaining portion of the sample test strip shall be sent to Northwest Linings for laboratory testing to evaluate seam strength and confirm field testing.

3. Procedure in the event of Destructive Test Failure:

1. Cut additional field samples for testing. In the case of a field production seam, the samples must lie a minimum of ten feet in each direction from the location of the failed sample. Perform a field test with the tensiometer for peel strength. and confirm field testing.

2. If the laboratory samples pass, then reconstruct the seam up to the two passing sample locations.

1. Heat tack the overlap along the length of the seam to be reconstructed and extrusion weld.

2. Vacuum test the extrusion weld.

3. If either of the samples fail then additional samples are taken in accordance with the above procedure until two passing samples are found to establish the zone in which the seam should be reconstructed.

4. All passing seams must be bounded by two locations from which samples passing destructive test have been taken.

5. In the case of reconstructed seams exceeding 150 feet, a sample must be taken and pass destructive testing.

6. All destructive seam samples sent to Northwest Linings shall be numbered and recorded on a destructive seam test form.

3. Northwest Linings Quality Assurance Laboratory Testing:

The remaining destructive sample will be sent to a qualified laboratory and will be tested in "Seam Strength" and "Peel Adhesion" (ASTM D 3083 and ASTM D413) as modified in NSF Standard No. 54. Five specimens shall be tested for each test method with data recorded. Four out of the five specimens must pass for each test in order for the seam to pass the destructive test.

G. Defects and Repairs:

1. Northwest Linings Project Superintendent shall conduct a detailed walk through and visually check all seams and non-seam areas of the geomembrane for defects, holes, blisters and signs of damage during installation.

2. All other NWL installation personnel shall at all times, be on the lookout for any damaged areas. Damaged areas shall be marked and repaired.

3. Repair procedures: Any portion of the geomembrane showing a flaw, or failing destructive or non-destructive test shall be repaired. Several procedures exist for repair, and the decision as to the appropriate procedure shall be made by NWL's Project Superintendent. Procedures available for repair:

1. Patching - used to repair large holes, tears and destructive sample locations. All patches shall extend at least six inches beyond the defect and all corners of patches shall be rounded.

2. Grinding and welding - used to repair sections of extruded seams.

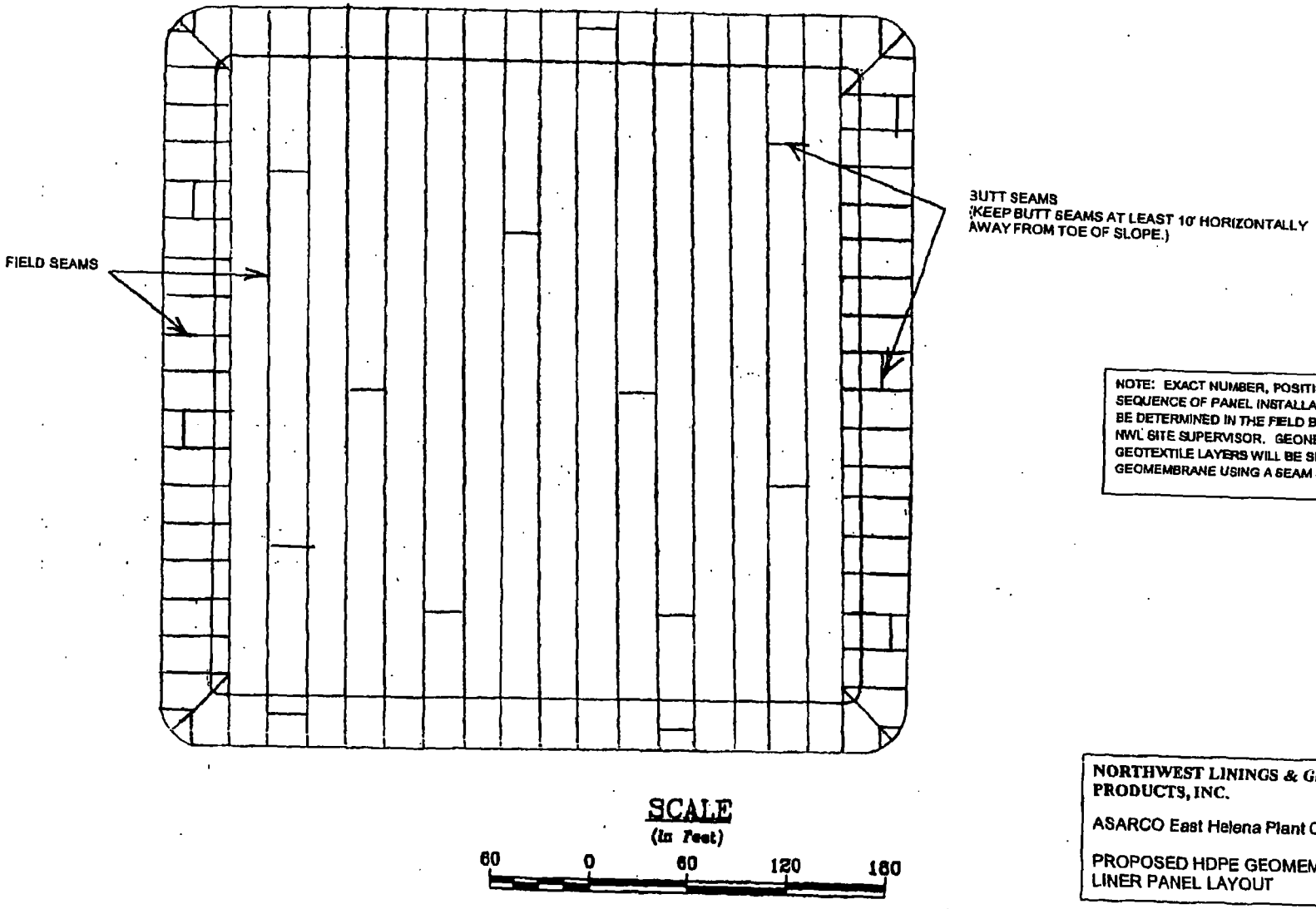
3. Spot welding or seaming - used to repair small tears, pinholes or other minor localized flaws.

4. Capping - used to repair lengths of failed extruded areas.

5. Removal of a bad seam and replacement with a strip of new material seamed into place.

H. Verification of Repairs:

Every repair shall be non-destructively tested using the methods set out in this manual Repairs which pass the non-destructive test shall be deemed adequate. Large repairs may require a destructive test. Repair test results shall be logged on a repair report form. The repair location shall be recorded on a record drawing.

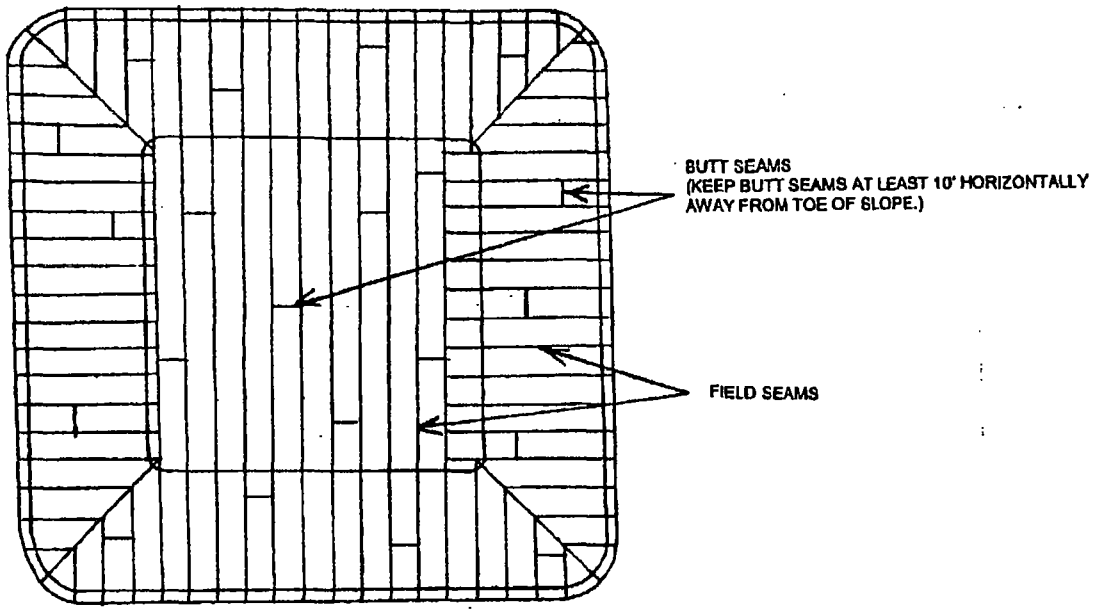


NOTE: EXACT NUMBER, POSITION AND SEQUENCE OF PANEL INSTALLATION WILL BE DETERMINED IN THE FIELD BY THE NWL SITE SUPERVISOR. GEONET AND GEOTEXTILE LAYERS WILL BE SIMILAR TO THE GEOMEMBRANE USING A SEAM SPACING OF 14.5'

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, INC.

ASARCO East Helena Plant CAMU-Phase 1 Cell

PROPOSED HDPE GEOMEMBRANE CELL LINER PANEL LAYOUT



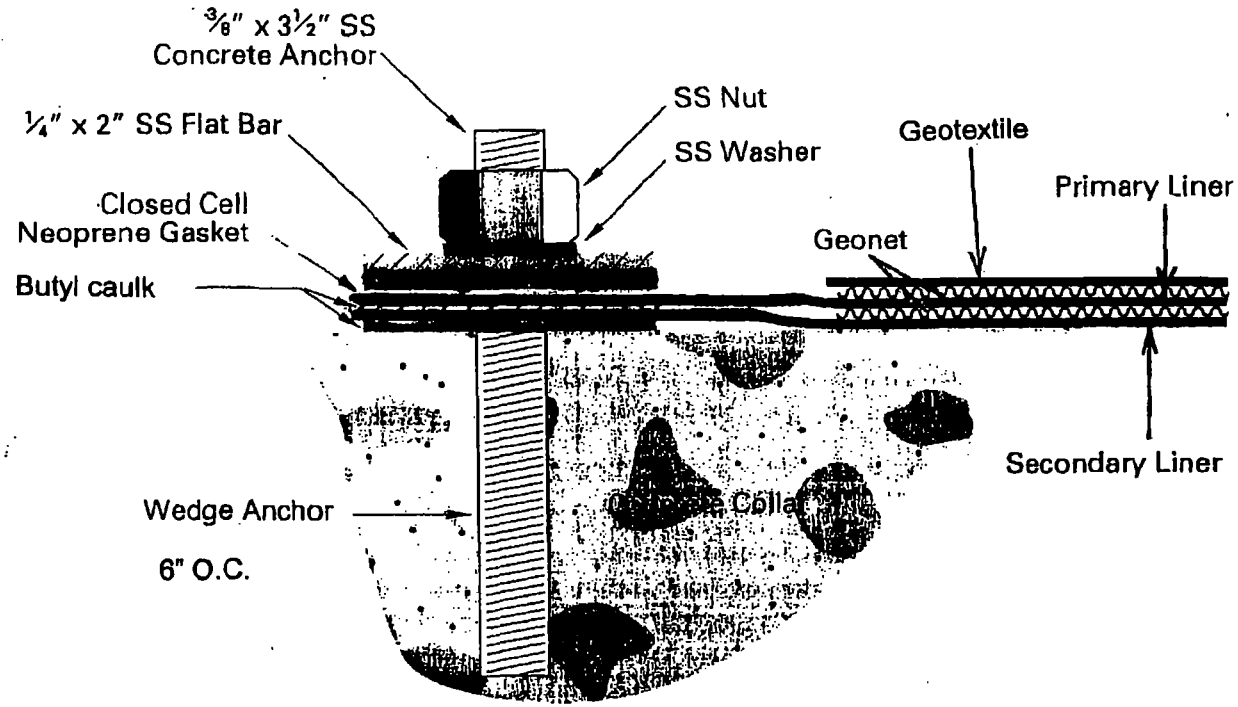
NOTE: EXACT NUMBER, POSITION AND SEQUENCE OF PANEL INSTALLATION WILL BE DETERMINED IN THE FIELD BY THE NWL SITE SUPERVISOR.

SCALE
(In Feet)
50 0 50 100 100

NORTHWEST LININGS & GEOTEXTILE PRODUCTS, INC.

ASARCO East Helena Plant CAMU-Phase 1 Cell

PROPOSED HDPE GEOMEMBRANE CAP PANEL LAYOUT



SCALE: NTS

NORTHWEST LININGS & GEOTEXTILES

LINER TO CONCRETE DETAIL

DOUBLE LINED SYSTEM

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655
Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell

SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell
Date: 7/25/01

To: ASARCO, Inc.
Attn: Darrell Shew
Phone: (406) 227-7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS

☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
4	623	Geomembrane Certificate of Compliance

Remarks: These submittals have been reviewed by the QC Manager to ensure that they comply with the Project Specifications. Any variances are noted below:

Variances: None

Signed: Douglas G. Tisdell
QC Manager

A Washington Company

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

Date : 11/07/01 Shipping / Packing List Page : 1

CUSTOMER: 125-01-18 Bill of Lading: C01318

DESTINATION: EAST HELENA, MT

	Roll Number	Weight (LBS)	Square Feet	Dimensions (FT)	QC
1 PS	060 400 23238B	3,637	11,960.00	23.00 x 520.00	
2 PS	060 400 23244B	3,642	11,960.00	23.00 x 520.00	
3 PS	060 400 23250B	3,633	11,960.00	23.00 x 520.00	
4 PS	060 400 23255B	3,625	11,960.00	23.00 x 520.00	
5 PS	060 400 23267B	3,640	11,960.00	23.00 x 520.00	
	TOTAL	18,177	59,800.00		

2 – 20# SPOOLS OF HDPE EXTRUSION ROD (B# 777) 40 LBS

COLUMBIA GEOSYSTEMS Q.C. DEPARTMENT
Jdy 11/01

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

POLYETHYLENE CERTIFICATE OF ANALYSIS

Project : 125-01-18
Customer : NORTHWEST LININGS & GEOTEXTILE TYPE:PHILLIPS

Project Name : ASARCO SMELTER - ENVIROCON, INC.

Columbia Ref : 125-01-18
We hereby certify that the polyethylene resin for the above identified shipment, meets or exceeds Columbia Geosystem's specifications, below. Testing was performed on each resin blend.

Melt flow index was determined according to ASTM D 1238. Density was determined according to ASTM D 792/1505. Where appropriate, carbon content was determined according to ASTM D 4218. The average test results are listed in the table below.

RESIN SPECIFICATIONS

Melt flow index 1.0 g/10 minutes Maximum
Density - HDPE 0.930 g/cc Minimum
Density - LLDPE 0.926 g/cc Maximum

Lot Number	Columbia Batch #	Melt Flow Index g/10	Density g/cc	Carbon Content %	OIT Min.
8210147	765	0.070	0.938	N/A	N/A

Adolf Nor
Q.C. TECHNICIAN

July 12/2001
DATE

Page 1.1

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

February 14, 2001

PSN# 3797-01

FAX: 403-235-6864

Columbia Geosystems
1415 28th Street N.E.
Calgary AB, Canada T2A 2P6

Greg Sharrun

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-400G
Lot Number:	8210147
P.O. Number:	7266
Date Shipped:	02/12/01
Package:	PSPX 6924
Quantity:	181700 LBS.
HLMI Flow Rate,ASTM D1238:	11.9 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Melt Index, ASTM D1238:	.080 G/10 MIN
Production Date:	02/10/01

Paul S. Newbold
Sr. Certification Systems Specialist

For C ..arol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

CGL BATCH # 765

A/L

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE CERTIFICATE OF ANALYSIS

Customer : NORTHWEST LININGS & GEOTEXTILE

Project Name : ASARCO SMELTER - ENVIROCON, INC.

Columbia Ref # : 125-01-18

We hereby certify that the polyethylene geomembrane for the above-identified shipment meets or exceeds Columbia Geosystems' specifications below. Testing was performed at the indicated frequency.

Columbia Geosystems' manufacturing lines are equipped with spark testers for pinhole detection. The raw polymeric material is first quality polyethylene resin.

HD600 SMOOTH GEOMEMBRANE SPECIFICATIONS

Property	Test Method	Test Value	Test Frequency
Thickness (ave)	ASTM D5199	60 mil	Per Roll
Thickness (min)		54 mil	
•Lowest individual of 25 values			
Tensile Properties	ASTM D638 Type IV		47,840 ft²
•Yield Strength	(2 ipm)	2100 psi(126 lb/in)	
•Break Strength		3800 psi(228 lb/in)	
•Yield Elongation	(1.3" GL)	12 %	
•Break Elongation	(2.0" GL)	700 %	
Tear Resistance	ASTM D1004	700 ppi (42 lb)	47,840 ft²
Puncture Resistance	ASTM D4833	1800 ppi(108 lb)	47,840 ft²
Carbon Dispersion	ASTM D5596/3015	CAT 1 or 2	47,840 ft²
Carbon Content	ASTM D4218/1603	2 - 3 %	47,840 ft²
Dimensional Stab.	ASTM D1204	+/- 2.0 %	Resin Batch
Density	ASTM D792/1505	0.940 g/cc	Resin Batch
NTCL, single point	ASTM D5397 (App)	200 hours	Resin Batch

Adolf Vaz
Quality Control Supervisor

July 12/2001
Date

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-18

Roll Number	Thick Min mil	Thick Ave mil	Density g/cc	Carbon Cont. %	Carbon Disp	Stress Yield MD psi	Stress Yield TD psi
765B01-23240B	58.0	60.6	0.946	2.46	CAT 1	2738	2800
765B01-23244B	58.0	60.8		2.46	CAT 1	2695	2793
765A01-23252B	58.0	60.8		2.30	CAT 1	2816	2907
765B01-23256B	58.0	60.3	0.947	2.47	CAT 1	2861	2881
765A01-23268B	58.0	60.9		2.35	CAT 1	2880	2958

Page 1.1 Cont...

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-18

Roll Number	Stress Break MD psi	Stress Break TD psi	Strain Yield MD %	Strain Yield TD %	Strain Break MD %	Strain Break TD %	Tear Resist MD ppi
765B01-23240B	5046	5156	19.2	16.8	819	883	947
765B01-23244B	5235	5011	18.7	17.1	845	867	942
765A01-23252B	5068	5105	16.9	16.1	828	891	899
765B01-23256B	5081	5032	17.7	16.4	842	866	891
765A01-23268B	5195	5119	17.1	15.8	854	893	903

Page 1.2 Cont...

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-18

Roll Number	Tear Resist TD ppi	Punct Resist ASTM ppi	Dimen Stabili MD %	Dimen Stabili TD %
765B01-23240B	893	2262		
765B01-23244B	884	2260		
765A01-23252B	878	2248		
765B01-23256B	842	2313	-0.13	0.10
765A01-23268B	871	2271		

Adolf Nor
Q.C. TECHNICIAN

July 12/2001
DATE

Page 1.3

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

Date : 11/07/01 Shipping / Packing List Page : 1

CUSTOMER: 125-01-18 Bill of Lading: C01318

DESTINATION: EAST HELENA, MT

	Roll Number	Weight (LBS)	Square Feet	Dimensions (FT)	QC
1 PS	060 400 23238B	3,637	11,960.00	23.00 x 520.00	
2 PS	060 400 23244B	3,642	11,960.00	23.00 x 520.00	
3 PS	060 400 23250B	3,633	11,960.00	23.00 x 520.00	
4 PS	060 400 23255B	3,625	11,960.00	23.00 x 520.00	
5 PS	060 400 23267B	3,640	11,960.00	23.00 x 520.00	
	TOTAL	18,177	59,800.00		

2 – 20# SPOOLS OF HDPE EXTRUSION ROD (B# 777) 40 LBS

COLUMBIA GEOSYSTEMS
Q.C. DEPARTMENT
July 11/01

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

POLYETHYLENE CERTIFICATE OF ANALYSIS

Project : 125-01-18
Customer : NORTHWEST LININGS & GEOTEXTILE TYPE:PHILLIPS

Project Name : ASARCO SMELTER - ENVIROCON, INC.

Columbia Ref : 125-01-18
We hereby certify that the polyethylene resin for the above identified shipment, meets or exceeds Columbia Geosystem's specifications, below. Testing was performed on each resin blend.

Melt flow index was determined according to ASTM D 1238. Density was determined according to ASTM D 792/1505. Where appropriate, carbon content was determined according to ASTM D 4218. The average test results are listed in the table below.

RESIN SPECIFICATIONS

Melt flow index 1.0 g/10 minutes Maximum
Density - HDPE 0.930 g/cc Minimum
Density - LLDPE 0.926 g/cc Maximum

Lot Number	Columbia Batch #	Melt Flow Index g/10	Density g/cc	Carbon Content %	OIT Min.
8210147	765	0.070	0.938	N/A	N/A

Adolf Nor
Q.C. TECHNICIAN

July 12/2001
DATE

Page 1.1

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

February 14, 2001

PSN# 3797-01

FAX: 403-235-6864

Columbia Geosystems
1415 28th Street N.E.
Calgary AB, Canada T2A 2P6

Greg Sharrun

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-400G
Lot Number:	8210147
P.O. Number:	7266
Date Shipped:	02/12/01
Package:	PSPX 6924
Quantity:	181700 LBS.
HLMI Flow Rate,ASTM D1238:	11.9 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Melt Index, ASTM D1238:	.080 G/10 MIN
Production Date:	02/10/01

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

CGL BATCH # 765

A/L

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE CERTIFICATE OF ANALYSIS

Customer : NORTHWEST LININGS & GEOTEXTILE

Project Name : ASARCO SMELTER - ENVIROCON, INC.

Columbia Ref # : 125-01-18

We hereby certify that the polyethylene geomembrane for the above-identified shipment meets or exceeds Columbia Geosystems' specifications below. Testing was performed at the indicated frequency.

Columbia Geosystems' manufacturing lines are equipped with spark testers for pinhole detection. The raw polymeric material is first quality polyethylene resin.

HD600 SMOOTH GEOMEMBRANE SPECIFICATIONS

Property	Test Method	Test Value	Test Frequency
Thickness (ave)	ASTM D5199	60 mil	Per Roll
Thickness (min)		54 mil	
•Lowest individual of 25 values			
Tensile Properties	ASTM D638 Type IV		47,840 ft²
•Yield Strength	(2 ipm)	2100 psi(126 lb/in)	
•Break Strength		3800 psi(228 lb/in)	
•Yield Elongation	(1.3" GL)	12 %	
•Break Elongation	(2.0" GL)	700 %	
Tear Resistance	ASTM D1004	700 ppi (42 lb)	47,840 ft²
Puncture Resistance	ASTM D4833	1800 ppi(108 lb)	47,840 ft²
Carbon Dispersion	ASTM D5596/3015	CAT 1 or 2	47,840 ft²
Carbon Content	ASTM D4218/1603	2 - 3 %	47,840 ft²
Dimensional Stab.	ASTM D1204	+/- 2.0 %	Resin Batch
Density	ASTM D792/1505	0.940 g/cc	Resin Batch
NTCL, single point	ASTM D5397 (App)	200 hours	Resin Batch

Adolf Vaz
Quality Control Supervisor

July 12/2001
Date

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-18

Roll Number	Thick Min mil	Thick Ave mil	Density g/cc	Carbon Cont. %	Carbon Disp	Stress Yield MD psi	Stress Yield TD psi
765B01-23240B	58.0	60.6	0.946	2.46	CAT 1	2738	2800
765B01-23244B	58.0	60.8		2.46	CAT 1	2695	2793
765A01-23252B	58.0	60.8		2.30	CAT 1	2816	2907
765B01-23256B	58.0	60.3	0.947	2.47	CAT 1	2861	2881
765A01-23268B	58.0	60.9		2.35	CAT 1	2880	2958

Page 1.1 Cont...

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-18

Roll Number	Stress Break MD psi	Stress Break TD psi	Strain Yield MD %	Strain Yield TD %	Strain Break MD %	Strain Break TD %	Tear Resist MD ppi
765B01-23240B	5046	5156	19.2	16.8	819	883	947
765B01-23244B	5235	5011	18.7	17.1	845	867	942
765A01-23252B	5068	5105	16.9	16.1	828	891	899
765B01-23256B	5081	5032	17.7	16.4	842	866	891
765A01-23268B	5195	5119	17.1	15.8	854	893	903

Page 1.2 Cont...

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-18

Roll Number	Tear Resist TD ppi	Punct Resist ASTM ppi	Dimen Stabili MD %	Dimen Stabili TD %
765B01-23240B	893	2262		
765B01-23244B	884	2260		
765A01-23252B	878	2248		
765B01-23256B	842	2313	-0.13	0.10
765A01-23268B	871	2271		

Adolf Nor

Q.C. TECHNICIAN

July 12/2001

DATE

Page 1.3

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

Date : 11/07/01 **Shipping / Packing List** Page : 1

CUSTOMER: 125-01-18 Bill of Lading: C01318

DESTINATION: EAST HELENA, MT

	Roll Number	Weight (LBS)	Square Feet	Dimensions (FT)	QC
1 PS	060 400 23238B	3,637	11,960.00	23.00 x 520.00	
2 PS	060 400 23244B	3,642	11,960.00	23.00 x 520.00	
3 PS	060 400 23250B	3,633	11,960.00	23.00 x 520.00	
4 PS	060 400 23255B	3,625	11,960.00	23.00 x 520.00	
5 PS	060 400 23267B	3,640	11,960.00	23.00 x 520.00	
	TOTAL	18,177	59,800.00		

2 – 20# SPOOLS OF HDPE EXTRUSION ROD (B# 777) 40 LBS

COLUMBIA GEOSYSTEMS
Q.C. DEPARTMENT
Jdy 11/01

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

POLYETHYLENE CERTIFICATE OF ANALYSIS

Project : 125-01-18
Customer : NORTHWEST LININGS & GEOTEXTILE TYPE:PHILLIPS

Project Name : ASARCO SMELTER - ENVIROCON, INC.

Columbia Ref : 125-01-18
We hereby certify that the polyethylene resin for the above identified shipment, meets or exceeds Columbia Geosystem's specifications, below. Testing was performed on each resin blend.

Melt flow index was determined according to ASTM D 1238. Density was determined according to ASTM D 792/1505. Where appropriate, carbon content was determined according to ASTM D 4218. The average test results are listed in the table below.

RESIN SPECIFICATIONS

Melt flow index 1.0 g/10 minutes Maximum
Density - HDPE 0.930 g/cc Minimum
Density - LLDPE 0.926 g/cc Maximum

Lot Number	Columbia Batch #	Melt Flow Index g/10	Density g/cc	Carbon Content %	OIT Min.
8210147	765	0.070	0.938	N/A	N/A

Adolf Nagy
Q.C. TECHNICIAN

July 12/2001
DATE

Page 1.1

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

February 14, 2001

PSN# 3797-01

FAX: 403-235-6864

Columbia Geosystems
1415 28th Street N.E.
Calgary AB, Canada T2A 2P6

Greg Sharrun

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-400G
Lot Number:	8210147
P.O. Number:	7266
Date Shipped:	02/12/01
Package:	PSPX 6924
Quantity:	181700 LBS.
HLMI Flow Rate,ASTM D1238:	11.9 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Melt Index, ASTM D1238:	.080 G/10 MIN
Production Date:	02/10/01

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

CGL BATCH # 765

A/L

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE CERTIFICATE OF ANALYSIS

Customer : NORTHWEST LININGS & GEOTEXTILE

Project Name : ASARCO SMELTER - ENVIROCON, INC.

Columbia Ref # : 125-01-18

We hereby certify that the polyethylene geomembrane for the above-identified shipment meets or exceeds Columbia Geosystems' specifications below. Testing was performed at the indicated frequency.

Columbia Geosystems' manufacturing lines are equipped with spark testers for pinhole detection. The raw polymeric material is first quality polyethylene resin.

HD600 SMOOTH GEOMEMBRANE SPECIFICATIONS

Property	Test Method	Test Value	Test Frequency
Thickness (ave)	ASTM D5199	60 mil	Per Roll
Thickness (min)		54 mil	
•Lowest individual of 25 values			
Tensile Properties	ASTM D638 Type IV		47,840 ft.²
•Yield Strength	(2 ipm)	2100 psi (126 lb/in)	
•Break Strength		3800 psi (228 lb/in)	
•Yield Elongation	(1.3" GL)	12 %	
•Break Elongation	(2.0" GL)	700 %	
Tear Resistance	ASTM D1004	700 ppi (42 lb)	47,840 ft.²
Puncture Resistance	ASTM D4833	1800 ppi (108 lb)	47,840 ft.²
Carbon Dispersion	ASTM D5596/3015	CAT 1 or 2	47,840 ft.²
Carbon Content	ASTM D4218/1603	2 - 3 %	47,840 ft.²
Dimensional Stab.	ASTM D1204	+/- 2.0 %	Resin Batch
Density	ASTM D792/1505	0.940 g/cc	Resin Batch
NTCL, single point	ASTM D5397 (App)	200 hours	Resin Batch

Adolf Vaz
Quality Control Supervisor

July 12/2001
Date

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-18

Roll Number	Thick Min mil	Thick Ave mil	Density g/cc	Carbon Cont. %	Carbon Disp	Stress Yield MD psi	Stress Yield TD psi
765B01-23240B	58.0	60.6	0.946	2.46	CAT 1	2738	2800
765B01-23244B	58.0	60.8		2.46	CAT 1	2695	2793
765A01-23252B	58.0	60.8		2.30	CAT 1	2816	2907
765B01-23256B	58.0	60.3	0.947	2.47	CAT 1	2861	2881
765A01-23268B	58.0	60.9		2.35	CAT 1	2880	2958

Page 1.1 Cont...

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-18

Roll Number	Stress Break MD psi	Stress Break TD psi	Strain Yield MD %	Strain Yield TD %	Strain Break MD %	Strain Break TD %	Tear Resist MD ppi
765B01-23240B	5046	5156	19.2	16.8	819	883	947
765B01-23244B	5235	5011	18.7	17.1	845	867	942
765A01-23252B	5068	5105	16.9	16.1	828	891	899
765B01-23256B	5081	5032	17.7	16.4	842	866	891
765A01-23268B	5195	5119	17.1	15.8	854	893	903

Page 1.2 Cont...

SERROT INTERNATIONAL, INC.

Columbia Geosystems Ltd., a subsidiary

GEOMEMBRANE STANDARD TESTING CERTIFICATION

PROJECT # 125-01-18

Roll Number	Tear Resist TD ppi	Punct Resist ASTM ppi	Dimen Stabili MD %	Dimen Stabili TD %
765B01-23240B	893	2262		
765B01-23244B	884	2260		
765A01-23252B	878	2248		
765B01-23256B	842	2313	-0.13	0.10
765A01-23268B	871	2271		

Adolf Nor
Q.C. TECHNICIAN

July 12/2001
DATE

Page 1.3

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655
Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell

SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell
Date: 09/10/01

To: ASARCO, Inc. / Hydrometrics
Attn: Darrell Shew / Dale Wells
Phone: (406) 227-7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS

☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
2	623	Manufacturer 40 mil. Geomembrane Certificate of Compliance

Remarks: These submittals have been reviewed by the QC Manager to ensure that they comply with the Project Specifications. Any variances are noted below:

Variances: None

Signed: Douglas G. Tisdell 09-10-01

QC Manager

A Washington Company

POLY-FLEX, INC. 2800 W. Marshall Drive Grand Prairie, Texas 75051 USA

888-765-9359 972-337-7113 FAX 972-337-7233

CERTIFICATION DOCUMENTS

To: Northwest Linings
21000 77th Avenue South
Kent, WA 98032

Date: 9/6/01
Poly-Flex Proj # : 200583
Customer PO: C-896
Project Name: Envirocon

Attn: Kirk Lileskare
Fax No: 253-872-0246
Number of pages including cover: 6

Departure Date: 9/4/01
Destination: East Helena, MT
Carrier:

Trip No: 123924
Freight: PPD

Additional Notes:

Distribution of Documents:

Shipment Inspection Sheet: 1
Roll Certification: 1
Resin Certification: 2
Other:

Attached please find documents for the above referenced shipment. Please let us know if you have any questions.

Sincerely,

Russell Searcy

Russell Searcy
888-765-9359 (x7269)

CERTIFICATION SHEET

DATE: September 6, 2001

POLY-FLEX, INC.
2000 W. Marshall Drive
Grand Prairie, Texas 75051

PROJECT NO: 200583 ORDER NO: 425786
TRIP NO: 123924 CERTIFIED BY:

TEST DESCRIPTION		THICKNESS	CARBON BLACK	TEAR	PUNCTURE	TENSILE @ YIELD	ELONG @ YIELD	TENSILE @ BREAK	ELONG @ BREAK	CAR. BLK. DISPERSION	DENSITY	ESCR (cond. B)
ASTM METHOD		D1593	D1603	D1004	4833	D638	D638	D638	D638	D5596	D1505	D1693
(modifications)		min/avg										2000 hrs
UNITS		mils	%	lb	lb	ppi	%	ppi	%		gm/cc	PASS
40HD SPECIFICATION		36/40	2.0-3.0	28	72	84	12	152	700	Cat 1or2	0.940	
ROLL NUMBER	BLEND											(Start)
G9-4-01 201-X	8210489	36/ 40	2.2	37	112	97	16	200	773	Cat 2	0.946	PASS
G9-4-01 234-X	8210489	36/ 41	2.8	35	111	91	15	199	790	Cat 2	0.947	PASS
G9-4-00 671-X	7100476	36/ 42	2.0	37	114	102	18	187	744	Cat 1	0.942	PASS

Poly-Flex

Geomembrane Shipment Inspection

Tractor # _____ Trailer # _____ Date: 04-Sep-01 TRIP 123924

Drop #	1	Drop #	[redacted]	Drop #		Drop #	
Poly-Flex #	210424(425941)	Poly-Flex #		Poly-Flex #		Poly-Flex #	
Customer:	BUCKBOARD	Customer:		Customer:		Customer:	
Destination:	GREEN RIVER, WY	Destination:		Destination:		Destination:	
Carrier:		Carrier:		Carrier:		Carrier:	

	Blend	Roll Number	Weight	Roll Description
1	8210313	G9-6-01- 0497- X	2,617	23' X 370' X .060HD
2	8210313	G9-6-01- 0534- X	2,533	23' X 350' X .060HD
3	8210331	G9-6-01- 0675- X	1,718	23' X 240' X .060HD
4	8210485	G9-6-01- 0757- X	1,813	23' X 2580' X .060HD
5	8210643	G9-6-01- 0958- X	1,705	23' X 240' X .060HD
6	8210432	G9-6-01- 0990- X	1,735	23' X 240' X .060HD
7	8210646	G9-6-01- 1396- X	2,935	23' X 390' X .060HD
8	8201756	G9-6-01- 1510- X	2,140	23' X 330' X .060HD
9				
10	[redacted]			
11				
12				
13				
14				
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18				
19				
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21			17,196	
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I certify that all loading requirements and roll conditions were inspected and approved.

_____
Truck Loader

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

April 16, 2001

PSN# 9373-01

FAX: 972-337-7407

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

NCTL, ASTM D5397-95 Appendix (modified), Avg: >500 hours (not tested on each lot)

Type:	HHM TR-400G
Lot Number:	8210435
P.O. Number:	929586
Date Shipped:	04/17/01
Package:	PSPX 2201
Quantity:	185500 LBS.
HLMI Flow Rate, ASTM D1238:	11.0 G/10 MIN
Melt Index, ASTM D1238:	.080 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Production Date:	04/13/01

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7396

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE: (713) 475-3000
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

June 30, 2000

KSL# 16799-00

FAX: 972-337-7407

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

NCTL, ASTM D5397-95 Appendix (modified), Avg: >500 hours (not tested on each lot)

Type:	HHM TR-400G
Lot Number:	7100476
P.O. Number:	927268 (e)
Date Shipped:	06/30/00
Package:	PSPX 6622
Quantity:	181800 LBS.
HLMI Flow Rate, ASTM D1238:	10.6 G/10 MIN
Melt Index, ASTM D1238:	.070 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Production Date:	04/06/00

Karen S. Lively
Quality Assurance Manager

For COA questions call Connie Buckner, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7396

POLYFLEX, INC.

2800 W. Marshall Drive Grand Prairie, Texas 75051 USA

888-765-9359 972-337-7113 FAX 972-337-7233

CERTIFICATION DOCUMENTS

To: Northwest Linings
21000 77th Avenue South
Kent, WA. 98032

Date: 9/4/01
Poly-Flex Proj # : 200583
Customer PO: C-896
Project Name: Envirocon

Attn: Kirk Lilieskare
Fax No: 253-872-0245
Number of pages including cover: 6

Departure Date: 8/31/01
Destination: E. Helena, MT
Carrier:

Trip No: 123763
Freight: PPD

Additional Notes:

Distribution of Documents:

Shipment Inspection Sheet: 1
Roll Certification: 1
Resin Certification: 3
Other:

Attached please find documents for the above referenced shipment. Please let us know if you have any questions.

Sincerely,

Russell Searcy

Russell Searcy
888-765-9359 (x7259)

CERTIFICATION SHEET

DATE: September 4, 2001

POLY-FLEX, INC.
2000 W. Marshall Drive
Grand Prairie, Texas 75051

PROJECT NO: 200583
ORDER NO: 424949
TRIP NO: 123763
CERTIFIED BY: [signature]

TEST DESCRIPTION		THICKNESS	CARBON BLACK	TEAR	PUNCTURE	TENSILE @ YIELD	ELONG @ YIELD	TENSILE @ BREAK	ELONG @ BREAK	CAR. BLK. DISPERSION	DENSITY	ESCR (cond. B)
ASTM METHOD		D1593	D1603	D1004	4833	D638	D638	D638	D638	D5596	D1505	D1693
(modifications)		min/avg										2000 hrs
UNITS		mils	%	lb	lb	ppi	%	ppi	%		gm/cc	PASS
40HD SPECIFICATION		36/40	2.0-3.0	28	72	84	12	152	700	Cat 1or2	0.940	
ROLL NUMBER	BLEND											(Start)
G9-4-01 161-75	8210490	36/ 41	2.1	36	118	94	15	190	739	Cat 1	0.945	05/24/01
G9-4-01 485-75	8210749	36/ 42	2.3	38	110	100	19	202	778	Cat 1	0.948	07/20/01
G9-4-01 491-75	8210749	36/ 43	2.3	38	119	105	18	201	763	Cat 1	0.948	07/20/01
G9-4-01 493-75	8201754	36/ 42	2.7	40	117	104	18	206	764	Cat 2	0.948	07/20/01
G9-4-01 494-75	8201754	36/ 43	2.7	40	117	104	18	208	764	Cat 2	0.948	07/20/01
G9-4-01 495-75	8201754	36/ 43	2.2	39	112	103	18	209	802	Cat 2	0.948	07/20/01
G9-4-01 497-75	8201754	36/ 43	2.2	39	112	103	18	209	802	Cat 2	0.948	07/20/01
G9-4-01 498-75	8201754	36/ 43	2.3	39	115	104	18	203	772	Cat 2	0.948	07/20/01
G9-4-01 498-75	8201754	36/ 43	2.3	39	115	104	18	203	772	Cat 2	0.948	07/20/01
G9-4-01 502-75	8201754	36/ 42	2.2	38	115	102	18	202	762	Cat 2	0.948	07/20/01
G9-4-01 510-75	8201754	36/ 43	2.3	38	119	104	18	199	755	Cat 1	0.947	07/20/01
G9-4-01 514-75	8201754	36/ 43	2.7	39	119	109	18	189	777	Cat 1	0.947	07/20/01

Poly-Flex

Geomembrane Shipment Inspection

Tractor # _____ Trailer # _____ Date: 31-Aug-01 TRIP 123763

Drop #	1	Drop #		Drop #		Drop #	
Poly-Flex #	200563(424949)	Poly-Flex #		Poly-Flex #		Poly-Flex #	
Customer:	NORTHWEST LNG	Customer:		Customer:		Customer:	
Destination:	E. HELENA, MT	Destination:		Destination:		Destination:	
Carrier:		Carrier:		Carrier:		Carrier:	

	Blend	Roll Number	Weight	Roll Description
1	8210490	G9-4-01- 0161- 75	3,584	23' X 750' X .040HD
2	8210749	G9-4-01-[illegible]- 75	3,544	23' X 750' X .040HD
3	8210749	G9-4-01- 0491- 75	3,630	23' X 750' X .040HD
4	8201754	G9-4-01- 0493- 75	3,599	23' X 750' X .040HD
5	8201754	G9-4-01- 0494- 75	3,563	23' X 750' X .040HD
6	8201754	G9-4-01- 0495- 75	3,599	23' X 750' X .040HD
7	8201754	G9-4-01- 0497- 75	3,613	23' X 750' X .040HD
8	8201754	G9-4-01- 0498- 75	3,585	23' X 750' X .040HD
9	8201754	G9-4-01- 0499- 75	3,569	23' X 750' X .040HD
10	8201754	G9-4-01- 0502- 75	3,609	23' X 750' X .040HD
11	8201754	G9-4-01- 0510- 75	3,617	23' X 750' X .040HD
12	8201754	G9-4-01- 0514- 75	3,608	23' X 750' X .040HD
13				
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21			43,120	
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I certify that all loading requirements and roll conditions were inspected and approved.

_____
Truck Loader

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

February 07, 2001

PSN# 3292-01

FAX: 972-337-7407

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

NCTL, ASTM D5397-95 Appendix (modified), Avg: >500 hours
(not tested on each lot)

Type:	HHM TR-400G
Lot Number:	8201754
P.O. Number:	928946
Date Shipped:	02/07/01
Package:	PSPX 2522
Quantity:	186700 LBS.
HLMI Flow Rate, ASTM D1238:	10.3 G/10 MIN
Melt Index, ASTM D1238:	.080 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Production Date:	12/01/00

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7396

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

June 01, 2001

PSN# 13379-01

FAX: 972-337-7407

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

NCTL, ASTM D5397-95 Appendix (modified), Avg: >500 hours (not tested on each lot)

Type:	HHM TR-400G
Lot Number:	8210749
P.O. Number:	529844
Date Shipped:	06/01/01
Package:	PSPX 7033
Quantity:	184750 LBS.
HLMI Flow Rate, ASTM D1238:	11.2 G/10 MIN
Melt Index, ASTM D1238:	.100 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Production Date:	05/30/01

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7396

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P O Box 792 Pasadena TX 77501

April 16, 2001

PSN# 9274-01

FAX: 972-337-7417

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

NCTL, ASTM D5397-95 Appendix (modified), Avg: >500 hours (not tested on each lot)

Type:	EHM TR-400G
Lot Number:	9210490
P.O. Number:	929586
Date Shipped:	04/16/01
Package:	PSPX 2287
Quantity:	186300 LBS.
HLMI Flow Rate,ASTM D1238:	10.2 G/10 MIN
Melt Index, ASTM D1238:	.070 G/10 MIN
Density, ASTM D1505:	.938 G/CC
Production Date:	04/13/01

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7356

STRAIGHT BILL OF LADING - SHORT FORM

ORIGINAL - NOT NEGOTIABLE

127305

SHIPPER'S NO. PB 425786

CARRIER:

CARRIER NO. (SCAC) 200583

RECEIVED, subject to individually determined rates or contracts that have been agreed upon in writing between the carrier and shipper, if applicable, otherwise to the rates, classifications and rules that have been established by the carrier and are available to the shipper on request

At WAREHOUSE 01 6/30 200 1 From Poly-Flex, Inc.

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as shown below, which said carrier agrees to carry to destination, if on its route, otherwise to deliver to another carrier on the route to said destination. Every service to be performed hereunder shall be subject to all the terms and conditions not prohibited by law.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading and the said terms and conditions are hereby agreed to by the shipper and accepted for himself, his affiliates and his assigns.

CONSIGNED TO

NORTHWEST LININGS C/O
ENVIROCON, INC.
200 SMELTER AVENUE
EAST HELENA, MT 59635
TRUCK 1 OF 2
CONTACT: TJ 406-549-4824

PHONE 406-549-4824 P.O. C-896

COMMENTS

QUANTITY	CODE	DESCRIPTION
3 R	** 010842 **	40MIL HDPE SMOOTH; ODD LENGT

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:

The carrier should not make delivery of this shipment without payment of freight and all other lawful charges.

Poly-Flex, Inc.
(Signature of Consignor)

If charges are to be prepaid, write or stamp here: "To be Prepaid."

PRE-PAID

Date 7/4/01

Pulled

Checked

Loaded

ANY DISAGREEMENT ARISING OUT OF THE SALE, USE, OR TRANSPORTATION OF THIS SHIPMENT OR THE EXECUTION AND/OR TERMS OF THIS BILL OF LADING SHALL BE SUBMITTED TO BINDING ARBITRATION ADMINISTERED BY THE AMERICAN ARBITRATION ASSOCIATION. THE PARTIES HEREBY AGREE THAT NEITHER PARTY SHALL BE ENTITLED TO AN AWARD FOR PUNITIVE DAMAGES OR ATTORNEY COSTS. THE JUDGMENT OF THE ARBITRATION MAY BE ENTERED IN ANY COURT HAVING JURISDICTION THEREOF.

WHSE ID #

TOTAL WEIGHT 6,946

3
PIECES SHIPPED

3
PIECES RECEIVED

*If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is a carrier's or shipper's weight.
NOTE-Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:
per

SIGNATURE CERTIFIES ACCEPTANCE OF QUANTITIES, AND SIZES OF MATERIALS AS INDICATED.

Carrier hereby designates the broker (if any) as its agent for the collection of prepaid freight charges. When freight charges are paid to broker, carrier agrees not to hold shipper or consignee liable for said charges.

RECEIVER SIGNATURE

Poly-Flex, Inc. Shipper, Carrier Per Driver Date

2978.6.0
Permanent post-office address of shipper, 2000 W. Marshall Dr., Grand Prairie TX 75051 Time

1254330830

CUSTOMER COPY

(972) 647-4374

SKID WEIGHT SHEET

Tractor # _____ Trailer # _____ Date: 9/4/01 TRIP # 123924

	Roll Number	Weight	Blend	Roll Description
1	69-6-01-0675	1657	8&10331	
2	69-6-01-0959	1718		
3	0990	1735		
4	0757	1813		
5	1510	2140		
6	0534	2533		
7	0497	2617		
8	1398	2935		
9	69-4-00-671			
10	201			
11	234			
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TOTAL WEIGHT OF LOAD		LOGGED BY	
TRACTOR WEIGHT		CHECKED BY	
EMPTY TRAILER WEIGHT		LOADED BY	
LIGHT WEIGHT TICKET		PAPER WORK BY	
EST HEAVY WEIGHT		SECURITY	
TOTAL WEIGHT DIFFERENCE			

...ription for transportation according to the applicable regulations of the Department of Transportation.

This Shipping Order must be legibly filled in, in ink, in indelible Pencil, or in Carbon, and retained by the Agent.

55106

Shipper No. PB 4124949

Control No. 144622

Date 09-03-01

DOUG ANDRUS DISTRIBUTING, INC.
Idaho Falls, Idaho 83402
(Name of Carrier) (SCAC)

TO: Consignee NORTHWEST LINING C/O
On Collect on Delivery shipments, the letters "COD" must appear before consignee's name - or as otherwise provided in Item 430, Sec. 1.

FROM: Shipper DOUG ANDRUS DIST

Street 5 MERCER INC 200 SUMMER

Street YARD

Destination S. HELENA, MT. Zip Code

Origin Idaho Falls, ID. Zip Code

Route

TRL # 1005

Vehicle Number 982

No. Shipping Units	* HM	Kind of Packaging, Description of Articles, Special Marks and Exceptions	Weight (Subject to Correction)	RATE	CHARGES
12		23' X 750' 10 ga.	41,620		
	1	Used Roll			
		Received T.J. Figley			
		T.J. Figley			
	3	Rolls Damaged			

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

Note—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shippper to be not exceeding

$ _____ per _____

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement.
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

TOTAL CHARGES: $

FREIGHT CHARGES: FREIGHT PREPAID except when box at right is checked. Check box if charges are to be collect ☐

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is m[illegible] agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all or any of said property, that every service to [illegible]ed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
S[illegible] hereby certifies that he is familiar with all the bill of lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER

PER

CARRIER DOUG ANDRUS DISTRIBUTING, INC.

PER Martin E. Campanto

DATE 09-03-01

2

BLCC-602-3

* Mark with "X" to designate Hazardous Material as defined in Title 49 of the Code of Federal Regulations.

TRIP NUMBER **123763** WH: 01 SCHEDULED 8/30/01 13:00
FORMER TRIP ACTUAL
ROUTING MT-1 TRAILER TYPE Flatbed
FIRST DROP EAST HELENA, MT LAST DROP EAST HELENA, MT
VENDOR **ADDISON FOODS TRANSPORTATION** CARRIER
DRIVER TRIP WEIGHT 41,620
TRACTOR NO. TRAILER NO. SEAL NO.
TOTAL MILES 1,545

INSTRUCTIONS:

****

DELIVERY
DROP NO. **1** SALESMAN PETE BALDERRAMA APPOINTMENT
CUSTOMER P.O. C-896 ORDER NO. 424949
SHIP TO **NORTHWEST LININGS C/O**
ENVIROCON, INC.
200 SMELTER AVENUE
EAST HELENA, MT 59635
406-549-4824 FAX 253-872-0245

FILL IN ACTUAL DELIVERY DATE/TIME/HUB:
____/____/____ ____:____ _____

DO NOT DELIVER BEFORE CANCEL DATE
DELIVERY INSTRUCT TRUCK 1 OF 2
CONTACT: TJ 406-549-4824

****

HUB READING OUT: _____ HUB READING IN: _____

BACKHAULS

BH#	PICKUP NAME	ADDRESS	HUB	DELIVER NAME	ADDRESS	HUB

SKID WEIGHT SHEET

Tractor # 816 Trailer # 1005 Date: 8-31-9 TRIP # 123763

	Roll Number	Weight	Blend	Roll Description
1	G9-401-491-26	3830	8210749	23"X750'X040HD
2	514	3608	8201754	
3	495	3589	[redacted] 8201754	
4	497	3613		
5	494	3563		
6	493	3589		
7	499	3569		
8	498	3585		
9	510	3617		
10	502	3609		
11	485	3544	8210749	
12	161	3584	8210480	
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29				
30				

TOTAL WEIGHT OF LOAD	[redacted]	LOGGED BY	[redacted]
TRACTOR WEIGHT	[redacted]	CHECKED BY	[redacted]
EMPTY TRAILER WEIGHT	[redacted]	LOADED BY	[redacted]
LIGHT WEIGHT TICKET	[redacted]	PAPERWORK BY	[redacted]
EST HEAVY WEIGHT	[redacted]	SECURETY	[redacted]
TOTAL WEIGHT DIFFERENCE	[redacted]	[redacted]	[redacted]

POLY-FLEX, INC. 2800 W. Marshall Drive Grand Prairie, Texas 75051 USA

888-765-9359 972-337-7113 FAX 972-337-7232

CERTIFICATION DOCUMENTS

To: Northwest Linings
21000 77th Avenue South
Kent, WA 98032

Date: 9/6/01
Poly-Flex Proj # : 200583
Customer PO: C-896
Project Name: Envirocon

Attn: Kirk Lileskare
Fax No: 253-872-0246
Number of pages including cover: 5

Departure Date: 9/4/01
Destination: East Helena, MT
Carrier:

Trip No: 123924
Freight: PPD

Additional Notes:

Distribution of Documents:

Shipment Inspection Sheet: 1
Roll Certification: 1
Resin Certification: 2
Other:

Attached please find documents for the above referenced shipment. Please let us know if you have any questions.

Sincerely,

Russell Searcy

Russell Searcy
888-765-9359 (x7269)

CERTIFICATION SHEET

DATE: September 5, 2001

POLY-FLEX, INC.
2000 W. Marshall Drive
Grand Prairie, Texas 75051

PROJECT NO: 200583 ORDER NO: 425786
TRIP NO: 123924 CERTIFIED BY:

TEST DESCRIPTION			THICKNESS	CARBON BLACK	TEAR	PUNCTURE	TENSILE @ YIELD	ELONG @ YIELD	TENSILE @ BREAK	ELONG @ BREAK	CAR. BLK. DISPERSION	DENSITY	ESCR (grand. B)
ASTM METHOD			D1593	D1603	D1004	4833	D638	D638	D638	D638	D5596	D1505	D1693
(modification)			min/avg										2000 hrs
UNITS			mils	%	lb	lb	ppi	%	ppi	%		gm/cc	PASS
40HD		SPECIFICATION	36/40	2.0-3.0	28	72	84	12	152	700	Cat 1or2	0.940	
ROLL NUMBER		BLEND											(Start)
G9-4-01	201-X	8210489	36/ 40	2.2	37	112	97	16	200	773	Cat 2	0.946	PASS
G9-4-01	234-X	8210489	36/ 41	2.8	35	111	91	15	199	790	Cat 2	0.947	PASS
G9-4-00	671-X	7100476	36/ 42	2.0	37	114	102	18	187	744	Cat 1	0.942	PASS

Poly-Flex

Geomembrane Shipment Inspection

Tractor # _____ Trailer # _____ Date: 04-Sep-01 TRIP 123924

Drop #	1	Drop #	[redacted]	Drop #		Drop #	
Poly-Flex #	210424(425941)	Poly-Flex #		Poly-Flex #		Poly-Flex #	
Customer:	BUCKBOARD	Customer:		Customer:		Customer:	
Destination:	GREEN RIVER, WY	Destination:		Destination:		Destination:	
Carrier:		Carrier:		Carrier:		Carrier:	

	Blend	Roll Number	Weight	Roll Description
1	8210313	G9-6-01- 0497- X	2,617	23' X 370' X .060HD
2	8210313	G9-6-01- 0534- X	2,533	23' X 350' X .060HD
3	8210331	G9-6-01- 0675- X	1,718	23' X 240' X .060HD
4	8210485	G9-6-01- 0757- X	1,813	23' X 2580' X .060HD
5	8210643	G9-6-01- 0959- X	1,705	23' X 240' X .060HD
6	8210432	G9-6-01- 0990- X	1,735	23' X 240' X .060HD
7	8210646	G9-6-01- 1398- X	2,935	23' X 390' X .060HD
8	8201756	G9-6-01- 1510- X	2,140	23' X 330' X .060HD
9				
10	[redacted]			
11				
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17				
18				
19				
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21			17,196	
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30				

I certify that all loading requirements and roll conditions were inspected and approved.

_____
Truck Loader

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

April 16, 2001

PSN# 9273-01

FAX: 972-337-7407

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

NCTL, ASTM D5397-95 Appendix (modified), Avg: >500 hours (not tested on each lot)

Type:	HHM TR-400G
Lot Number:	8210435
P.O. Number:	929586
Date Shipped:	04/17/01
Package:	PSPX 2201
Quantity:	185500 LBS.
HLMI Flow Rate, ASTM D1238:	11.0 G/10 MIN
Melt Index, ASTM D1238:	.080 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Production Date:	04/13/01

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7396

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE (713) 475-3600
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

June 30, 2000

KSL# 16799-00

FAX: 972-337-7407

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

NCTL, ASTM D5397-95 Appendix (modified), Avg: >500 hours
(not tested on each lot)

Type:	HHM TR-400G
Lot Number:	7100476
P.O. Number:	927268 (e)
Date Shipped:	06/30/00
Package:	PSPX 6622
Quantity:	181800 LBS.
HLMI Flow Rate, ASTM D1238:	10.6 G/10 MIN
Melt Index, ASTM D1238:	.070 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Production Date:	04/06/00

Karen S. Lively
Quality Assurance Manager

For COA questions call Connie Buckner, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7396

POLYFLEX, INC.

2800 W. Marshall Drive Grand Prairie, Texas 75051 USA

888-765-9359 972-337-7113 FAX 972-337-7233

CERTIFICATION DOCUMENTS

To: Northwest Linings
21000 77th Avenue South
Kent, WA. 98032

Date: 9/4/01
Poly-Flex Proj # : 200583
Customer PO: C-896
Project Name: Envirocon

Attn: Kirk Liiaakare
Fax No: 253-872-0246
Number of pages including cover: 6

Departure Date: 8/31/01
Destination: E. Helena, MT
Carrier:

Trip No: 123763
Freight: PPD

Additional Notes:

Distribution of Documents:

Shipment Inspection Sheet: 1
Roll Certification: 1
Resin Certification: 3
Other:

Attached please find documents for the above referenced shipment. Please let us know if you have any questions.

Sincerely,

Russell Searcy

Russell Searcy
888-765-9359 (x7269)

CERTIFICATION SHEET

DATE: September 4, 2001

POLY-FLEX, INC.
2000 W. Marshall Drive
Grand Prairie, Texas 75051

PROJECT NO: 200583
ORDER NO: 424949
TRIP NO: 123763
CERTIFIED BY: [signature]

TEST DESCRIPTION			THICKNESS	CARBON BLACK	TEAR	PUNCTURE	TENSILE @ YIELD	ELONG @ YIELD	TENSILE @ BREAK	ELONG @ BREAK	CAR. BLK. DISPERSION	DENSITY	ESCR (cond. B)
ASTM METHOD			D1593	D1603	D1004	4833	D638	D638	D638	D638	D5596	D1505	D1693
(modifications)			min/avg										2000 hrs
UNITS			mils	%	lb	lb	ppi	%	ppi	%		gm/cc	PASS
40HD	SPECIFICATION		36/40	2.0-3.0	28	72	84	12	152	700	Cat 1or2	0.940	
ROLL NUMBER		BLEND											(Start)
G9-4-01	161-75	8210490	36/ 41	2.1	36	116	94	15	190	739	Cat 1	0.945	06/24/01
G9-4-01	485-75	8210749	36/ 42	2.3	38	110	100	19	202	779	Cat 1	0.948	07/20/01
G9-4-01	491-75	8210749	36/ 43	2.3	38	119	105	18	201	763	Cat 1	0.948	07/20/01
G9-4-01	493-75	8201754	36/ 42	2.7	40	117	104	18	206	764	Cat 2	0.948	07/20/01
G9-4-01	494-75	8201754	36/ 43	2.7	40	117	104	18	206	764	Cat 2	0.948	07/20/01
G9-4-01	495-75	8201754	36/ 43	2.2	39	112	103	18	209	802	Cat 2	0.948	07/20/01
G9-4-01	497-75	8201754	36/ 43	2.2	39	112	103	18	209	802	Cat 2	0.948	07/20/01
G9-4-01	498-75	8201754	36/ 43	2.3	39	115	104	18	203	772	Cat 2	0.948	07/20/01
G9-4-01	498-75	8201754	36/ 43	2.3	39	115	104	18	203	772	Cat 2	0.948	07/20/01
G9-4-01	502-75	8201754	36/ 42	2.2	38	115	102	18	202	762	Cat 2	0.948	07/20/01
G9-4-01	510-75	8201754	36/ 43	2.3	38	119	104	18	199	755	Cat 1	0.947	07/20/01
G9-4-01	514-75	8201754	36/ 43	2.7	39	119	109	18	189	777	Cat 1	0.947	07/20/01

Poly-Flex

Geomembrane Shipment Inspection

Tractor # _____ Trailer # _____ Date: 31-Aug-01 TRIP 123763

Drop #	1	Drop #		Drop #		Drop #	
Poly-Flex #	200583(424949)	Poly-Flex #		Poly-Flex #		Poly-Flex #	
Customer:	NORTHWEST LNG	Customer:		Customer:		Customer:	
Destination:	E. HELENA, MT	Destination:		Destination:		Destination:	
Carrier:		Carrier:		Carrier:		Carrier:	

	Blend	Roll Number	Weight	Roll Description
1	8210490	G9-4-01- 0161- 75	3,584	23' X 750' X .040HD
2	8210749	G9-4-01- [illegible]- 75	3,544	23' X 750' X .040HD
3	8210749	G9-4-01- 0491- 75	3,630	23' X 750' X .040HD
4	8201754	G9-4-01- 0493- 75	3,599	23' X 750' X .040HD
5	8201754	G9-4-01- 0494- 75	3,563	23' X 750' X .040HD
6	8201754	G9-4-01- 0495- 75	3,599	23' X 750' X .040HD
7	8201754	G9-4-01- 0497- 75	3,613	23' X 750' X .040HD
8	8201754	G9-4-01- 0498- 75	3,585	23' X 750' X .040HD
9	8201754	G9-4-01- 0499- 75	3,569	23' X 750' X .040HD
10	8201754	G9-4-01- 0502- 75	3,609	23' X 750' X .040HD
11	8201754	G9-4-01- 0510- 75	3,617	23' X 750' X .040HD
12	8201754	G9-4-01- 0514- 75	3,608	23' X 750' X .040HD
13				
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21			43,120	
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30				

I certify that all loading requirements and roll conditions were inspected and approved.

_____
Truck Loader

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

February 07, 2001

PSN# 3292-01

FAX: 972-337-7407

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

NCTL, ASTM D5397-95 Appendix (modified), Avg: >500 hours (not tested on each lot)

Type:	HHM TR-400G
Lot Number:	8201754
P.O. Number:	928946
Date Shipped:	02/07/01
Package:	PSPX 2522
Quantity:	186700 LBS.
HLMI Flow Rate, ASTM D1238:	10.3 G/10 MIN
Melt Index, ASTM D1238:	.080 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Production Date:	12/01/00

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7396

Chevron Phillips Chemical Company LLP

Houston Chemical Complex
P.O. Box 792, Pasadena, TX 77501

June 01, 2001

PSN# 13379-01

FAX: 972-337-7407

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

NCTL, ASTM D5397-95 Appendix (modified), Avg: >500 hours (not tested on each lot)

Type:	HHM TR-400G
Lot Number:	8210749
P.O. Number:	929844
Date Shipped:	06/01/01
Package:	PSPX 7033
Quantity:	184750 LBS.
HLMI Flow Rate, ASTM D1238:	11.2 G/10 MIN
Melt Index, ASTM D1238:	.100 G/10 MIN
Density, ASTM D1505:	.937 G/CC
Production Date:	05/30/01

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7396

Chevron Phillips Chemical Company LP

Houston Chemical Complex
P.O. Box 792 Pasadena TX 77501

April 16, 2001

PSN# 9274-01

FAX: 972-337-7417

Poly America, Inc.
2000 West Marshall Drive
Grand Prairie, TX 75051

Dee Averitte

This letter will certify that the Marlex* resin shown below, as supplied by Chevron Phillips Chemical Company, conforms to our manufacturing specification.

NCTL, ASTM D5397-95 Appendix (modified), Avg: >500 hours (not tested on each lot)

Type:	HHM TR-400G
Lot Number:	8210490
P.O. Number:	929586
Date Shipped:	04/16/01
Package:	PSPX 2287
Quantity:	186300 LBS.
HLMI Flow Rate, ASTM D1238:	10.2 G/10 MIN
Melt Index, ASTM D1238:	.070 G/10 MIN
Density, ASTM D1505:	.938 G/CC
Production Date:	04/13/01

Paul S. Newbold
Sr. Certification Systems Specialist

For COA questions call Carol Meza, 713-475-3625

* Reg. U.S. Pat. Off.

cc: QA-File-RC

Lisa
FAX: 972-337-7233

Jim Nobert
FAX: 972-337-7396

STRAIGHT BILL OF LADING - SHORT FORM

ORIGINAL - NOT NEGOTIABLE

127305

SHIPPER'S NO. PB 425786

CARRIER:

CARRIER NO. (SCAC) 200583

RECEIVED, subject to individually determined rates or contracts that have been agreed upon in writing between the carrier and shipper, if applicable, otherwise to the rates, classifications and rules that have been established by the carrier and are available to the shipper on request

At WAREHOUSE 01 8/30 200 1 From Poly-Flex, Inc.

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as shown below, which said carrier agrees to carry to destination, if on its route, otherwise to deliver to another carrier on the route to said destination. Every service to be performed hereunder shall be subject to all the terms and conditions not prohibited by law.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading and the said terms and conditions are hereby agreed to by the shipper and accepted for himself, his affilitates and his assigns.

CONSIGNED TO

NORTHWEST LININGS C/O
ENVIROCON, INC.
200 SMELTER AVENUE
EAST HELENA, MT 59635
TRUCK 1 OF 2
CONTACT: TJ 406-549-4824

PHONE 406-549-4824 P.O. C-896

COMMENTS

QUANTITY	CODE	DESCRIPTION
3 R	** 010842 **	40MIL HDPE SMOOTH; ODD LENGT

Subject to Section 7 of conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:

The carrier should not make delivery of this shipment without payment of freight and all other lawful charges.

Poly-Flex, Inc.
(Signature of Consignor)

If charges are to be prepaid, write or stamp here: "To be Prepaid."

PRE-PAID

Date 7/4/01

Pulled

Checked

Loaded

ANY DISAGREEMENT ARISING OUT OF THE SALE, USE, OR TRANSPORTATION OF THIS SHIPMENT OR THE EXECUTION AND/OR TERMS OF THIS BILL OF LADING SHALL BE SUBMITTED TO BINDING ARBITRATION ADMINISTERED BY THE AMERICAN ARBITRATION ASSOCIATION. THE PARTIES HEREBY AGREE THAT NEITHER PARTY SHALL BE ENTITLED TO AN AWARD FOR PUNITIVE DAMAGES OR ATTORNEY COSTS. THE JUDGMENT OF THE ARBITRATION MAY BE ENTERED IN ANY COURT HAVING JURISDICTION THEREOF.

127924

2

WHSE ID #

TOTAL WEIGHT 6,946

3 PIECES SHIPPED

3 PIECES RECEIVED

RECEIVER SIGNATURE

*If the shipment moves between two ports by a carrier by water, the law requires that the bill of lading shall state whether it is a carrier's or shipper's weight.
NOTE-Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding:

per

SIGNATURE CERTIFIES ACCEPTANCE OF QUANTITIES, AND STATE OF MATERIALS AS INDICATED.

Carrier hereby designates the broker (if any) as its agent for the collection of prepaid freight charges. When freight charges are paid by shipper or agrees not to hold shipper or consignee liable for said charges.

Poly-Flex, Inc. Shipper, Carrier Glacier Carriers Per William Gla Driver

Date

Time

2978.6.0
Permanent post-office address of shipper, 2000 W. Marshall Dr., Grand Prairie TX 75051

CUSTOMER COPY

1254330830 (972) 647-4374

SKID WEIGHT SHEET

Tractor # _____ Trailer # _____ Date: 9/4/01 TRIP # 123924

	Roll Number	Weight	Blend	Roll Description
1	69-6-01-0675	1657	8&10331	
2	69-6-01-0959	1718		
3	0990	1735		
4	0757	1813		
5	1510	2140		
6	0534	2533		
7	0494	2687		
8	1398	2935		
9	69-4-00-671			
10	201			
11	234			
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TOTAL WEIGHT OF LOAD		LOGGED BY	
TRACTOR WEIGHT		CHECKED BY	
EMPTY TRAILER WEIGHT		LOADED BY	
LIGHT WEIGHT TICKET		PAPER WORK BY	
HEAVIEST HEAVY WEIGHT		SECURITY	
TOTAL WEIGHT DIFFERENCE			

...tion for transportation according to the applicable regulations of the Department of Transportation.

This Shipping Order must be legibly filled in, in ink, in indelible Pencil, or in Carbon, and retained by the Agent.

55106

Shipper No. PB 1241949

Control No. 144622

Date 09-03-01

DOUG ANDRUS DISTRIBUTING, INC.
Idaho Falls, Idaho 83402
(Name of Carrier) (SCAC)

TO: Name NORTHWEST LEASING C/O

FROM: Shipper DOUG ANDRUS DIST

On Collect on Delivery shipments, the letters "COD" must appear before consignee's name - or as otherwise provided in Item 430, Sec. 1.

Street 5 MACDONALD TRL 200 SUMMER

Street YARD

Destination S. HELENA, MT. Zip Code

Origin Idaho Falls, ID. Zip Code

Route

TRL # 1005

Vehicle Number 982

No. Shipping Units	* HM	Kind of Packaging, Description of Articles, Special Marks and Exceptions	Weight (Subject to Correction)	RATE	CHARGES
12		23' X 750' 10ga.	41,620		
	1	Used Roll			
		Received T.J. Finley			
		T. J Finley			
	3	Rolls Damaged			

REMIT C.O.D. TO: ADDRESS

COD Amt: $

C.O.D. FEE: PREPAID ☐ COLLECT ☐ $

Note—Where the rate is dependent on value, shippers are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shippper to be not exceeding

$ _____ per _____

Subject to Section 7 of the conditions, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement.
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

(Signature of Consignor)

TOTAL CHARGES: $

FREIGHT CHARGES.
FREIGHT PREPAID except when box at right is checked
Check box if charges are to be collect ☐

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Bill of Lading, the property described above in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated above which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is agreed as to each carrier of all or any of, said property over all or any portion of said route to destination and as to each party at any time interested in all of any of said property, that every service to be performed hereunder shall be subject to all the bill of lading terms and conditions in the governing classification on the date of shipment.
Shipper hereby certifies that he is familiar with all the bill of lading terms and conditions in the governing classification and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

SHIPPER

PER

CARRIER DOUG ANDRUS DISTRIBUTING, INC.

PER Mark E. Pugsley

DATE 09-03-01

2

BLCC-602-3

* Mark with "X" to designate Hazardous Material as defined in Title 49 of the Code of Federal Regulations.

TRIP NUMBER **123763** WH: 01 SCHEDULED 8/30/01 13:00
FORMER TRIP ACTUAL
ROUTING MT-1 TRAILER TYPE Flatbed
FIRST DROP EAST HELENA, MT LAST DROP EAST HELENA, MT
VENDOR **ADDISON FOODS TRANSPORTATION** CARRIER
DRIVER TRIP WEIGHT 41,620
TRACTOR NO. TRAILER NO. SEAL NO.
TOTAL MILES 1,545

INSTRUCTIONS:

****

DELIVERY
DROP NO. 1 SALESMAN PETE BALDERRAMA APPOINTMENT
CUSTOMER P.O. C-896 ORDER NO. 424949
SHIP TO **NORTHWEST LININGS C/O**
ENVIROCON, INC.
200 SMELTER AVENUE
EAST HELENA, MT 59635
406-549-4824 FAX 253-872-0245

FILL IN ACTUAL DELIVERY DATE/TIME/HUB:
____/____/____ ____:____ _____

DO NOT DELIVER BEFORE CANCEL DATE
DELIVERY INSTRUCT TRUCK 1 OF 2
CONTACT: TJ 406-549-4824

****

HUB READING OUT: _____ HUB READING IN: _____

BACKHAULS

BH#	PICKUP NAME	ADDRESS	HUB	DELIVER NAME	ADDRESS	HUB

SKID WEIGHT SHEET

Tractor # 816 Trailer # 1005 Date: 8-31-9 TRIP # 123763

	Roll Number	Weight	Blend	Roll Description
1	G9-401-491-25	3630	8210749	23"X750'X040HD
2	514	3608	8201754	
3	495	3589	[redacted] 8201754	
4	497	3613		
5	494	3563		
6	493	3589		
7	499	3569		
8	498	3585		
9	510	3617		
10	502	3609		
11	485	3544	8210749	
12	161	3584	8210480	
13				
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TOTAL WEIGHT OF LOAD		LOGGED BY	
TRACTOR WEIGHT		CHECKED BY	
EMPTY TRAILER WEIGHT		LOADED BY	
LIGHT WEIGHT TICKET		PAPERWORK BY	
HEAVIEST HEAVY WEIGHT		SECURETY	
TOTAL WEIGHT DIFFERENCE			

EVERGREEN TECHNOLOGIES, INC.

GEONET NS 1300 / 1400 / 1500 / 1600 / 1700

Evergreen NS Series drainage nets are a three dimensional High Density Polethylene net structures formed by intersecting strands which provide Uniform Channels, Open Area and Thickness to assure Uniform Flow throughout the structure. ETI geonets are Crush Resistant and have a Low Compressibility capable of maintaining High Transmissivity under a Range of Loading Conditions. The geonet is manufactured with Carbon Black to provide Ultra-Violet Stabilization. Virgin Resins used in the production of ETI geonets consist of at least 97% polyethylene with a **Melt Flow** range between **0.1 and 1.0** grams per 10 minutes (ASTM D1238), and a **Density Range** of **0.932 to 0.970** grams per cubic centimeter (ASTM D1505). Geonet is delivered to the jobsite in roll form with each roll having unique identification and QA traceability. **NS Series geonets** conform to the property values listed in the tables below:

Property	TEST METHODS	UNITS	NS1300	NS1400	NS1500	NS1600	ND1700	SPECIFICATION[1]	TEST FREQUENCY
QA CERTIFIED TEST PARAMETERS									
	Mechanical Properties								
• Transmissivity[2] normal pressure = 15,000psf; i=1.00	ASTM D 4716-95 metal plate/net/metal plate	m²/sec (E-04)	7	10	14	15	17	MARV	200,000 SF (or per project req)
• MD Ultimate Tensile Strength	ASTM D 5035-95	kN/m	5.9	8.4	11.4	16.0	16.0		
		(ppi)	(33)	(48)	(65)	(90)	(90)	MARV	50,000 SF
• XMD Ultimate Tensile Strength	ASTM D 5035-95	kN/m	2.2	2.4	2.6	4.0	5.3		
		(ppi)	(12)	(13.7)	(15)	(22)	(30)	MARV	50,000 SF
• Thickness	ASTM D 5199-91	mm	4.1	5.1	6.4	6.4	7.6		
		(mil)	(160)	(200)	(250)	(250)	(300)	MARV	50,000 SF
• Mass per Unit Area	ASTM D 5261	g/m²	732	791	952	1260	1343		
		(lbs/ft²)	(.150)	(.162)	(.195)	(.258)	(.275)	MARV	50,000 SF
• Roll Length	direct measure	m	91.5	91.5	91.5	91.5	91.5		
		(ft)	(300)	(300)	(300)	(300)	(300)	nominal	Each roll
• Roll Width	direct measure	m	4.2	4.2	4.2	4.2	4.2		
		(ft)	(14.0)	(14.0)	(14.0)	(14.0)	(14.0)	nominal	Each roll
	UV Stabilization								
• Carbon Black	ASTM D 4218-91 (OR ASTM D 1603-94)	(% weight)	(2.0)	(2.0)	(2.0)	(2.0)	(2.0)	MARV	50,000 SF
PRODUCT INFORMATION									
• Roll Weight		kg	286	309	372	492	524		
		(lbs)	(630)	(680)	(820)	(1,084)	(1,155)	typical	N/A
• Roll Diameter		m	N/A	N/A	N/A	N/A	N/A		
		(in)	(28)	(30)	(34)	(34)	(34)	nominal	N/A
• Core I.D.		mm	100	100	100	100	100		
		(in)	(4)	(4)	(4)	(4)	(4)	nominal	N/A
• Labeling:		Product code, roll dimensions, finished product lot number and roll number.							

Notes:

1. MARV is defined as the one-sided 97.5% confidence limit obtained through long-term production data (mean - 2* standard deviations) and represents the minimum allowable sample roll average for each specific test.
2. Transmissivity results reported by Evergreen Technologies, Inc. are based on standard index test conditions. Actual performance is dependent upon site specific conditions. Please contact Evergreen Technologies, Inc. for site specific transmissivity testing.

ETI

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EVERGREEN
TECHNOLOGIES, INC.

June 20, 2001

Mr. Mark Wells
Northwest Linings & Geotextile Products, Inc.
21000 77th Avenue S.
Kent, WA 98032

SUBJECT: Technical Submittal - ETI NS1400 Geonet and TG650 Geotextile for ASARCO-East Helena Smelter-CAMU Phase 1 Cell - MT

Dear Mr. Wells:

The following is a brief outline regarding the Geotextile, Geonet and Geocomposite manufactured by Evergreen Technologies, Incorporated. ETI has more than 17 years of experience in manufacturing nonwoven geotextiles, geonets and geocomposites. We were the first company to manufacture synthetic drainage geonets and geocomposites and pioneered the system of replacing conventional sand and gravel drainage materials in landfill applications. ETI has sold more than 250,000,000 square feet of drainage products and is the only company producing geonets, geocomposites and geotextiles in one location as a single-source manufacturer

ETI drainage net is a three dimensional polyethylene net structure formed by intersecting strands and providing uniform channels, open area and thickness to assure uniform flow throughout the structure. It is crush resistant and has a low compressibility capable of maintaining high transmissivity under a range of loading conditions. The geonet is manufactured with carbon black to provide ultra-violet stabilization.

ETI drainage composites consist of a three dimensional polyethylene net with a continuous filament, nonwoven, polypropylene, needle-punched geotextile heat bonded to one or both sides of the drainage net core.

ETI Geotextiles are manufactured from one hundred percent polypropylene polymer. During the pre-extrusion heating process, a very effective ultra-violet light stabilizer is thoroughly mixed into the molten polymer. The resulting extruded filament is continuously drawn down from the top of the extrusion tower by an air current traveling at approximately 4 - 6 thousands m/min. During this "draw down" process the fiber is stretched and this results in a sophisticated molecular re-orientation.

ETI

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The fiber is then randomly laid out and carried on a conveyor belt into a series of needling machines. Each of these contains literally thousands of barbed needles, which move up and down through the web of fibers causing a complete entanglement. After leaving the last needling machine, the fabric is drawn into a heated stretching chamber. Here it is stretched both in machine and cross machine direction to optimize the isometric properties of the finished geotextile. Finally, the nonwoven geotextile is rolled, packaged and placed in storage ready for shipment. Each stage of the process, from acceptance of polymer to the placing of the product in a storage area location is recorded in a computerized sequence. Every single roll which leaves Evergreen Technologies' production line can be traced back to the details of each segment of its manufacture and each quality assurance test to which samples of its production batch were taken. This unique process allows Evergreen Technologies to produce a variety of needle-free spunbonded, needle-punched, nonwoven geotextiles which currently range from 3 to 32 ounces per square yard (100 to 1085 g/m^2).

After a detailed review of Section 624-Geonet, and Section 622, Table 713-1 Geotextiles & Geomembranes, of the project specifications provided, ETI finds no discrepancies with the manufacturer's properties, but wishes to clarify the following:

Section 624-Geonet
Table 5. Geonet Specifications

Property	Minimum Requirement
Compressive Strength	100.0 psi

- ETI's NS1400 Geonet exceeds the specification with a historical average of 108 psi. ETI will certify to the compressive strength requirement of 100.0 psi.

Property	Minimum Requirement
Transmissivity @ 4000 psf	2.4 gpm/ft

- ETI routinely tests transmissivity at a normal stress of 15,000 psf @ a gradient of 1.0, yielding a flow rate of 7.149 gpm/ft of width. At 5,000 psf @ gradient of 1.0, NS1400 yields a flow rate of 10.449 gpm/ft. ETI will certify to the required flow rate of 2.4 gpm/ft @ 4,000 psf.

- Enclosed for your review are transmissivity charts showing flow rates as well as a table indicating historical compressive strength data.

ETI looks forward to providing our high quality geocomposite to Northwest Linings & Geotextile Products, Inc. for the ASARCO East Helena Smelter Project. We are certain that you will find our materials, delivery and service to be of the highest quality. Please feel free to contact me directly at (800) 984-9784 if any further information or documentation is required.

Sincerely,

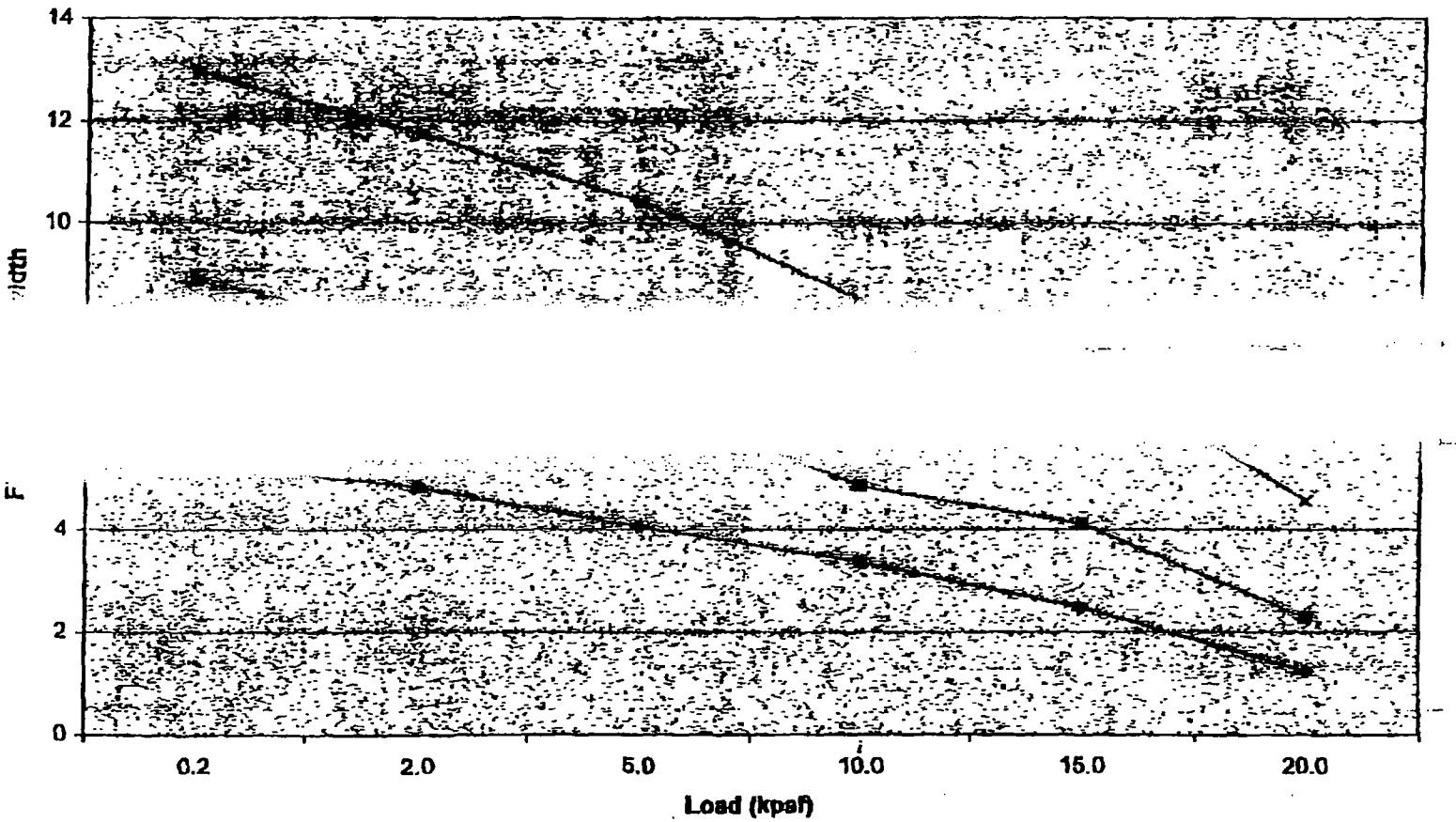
Billy Carruth

Billy Carruth
Technical Representative
Evergreen Technologies, Inc.

Evergreen Technologies, Inc

NS 1400 Flow Rate gpm\ft width

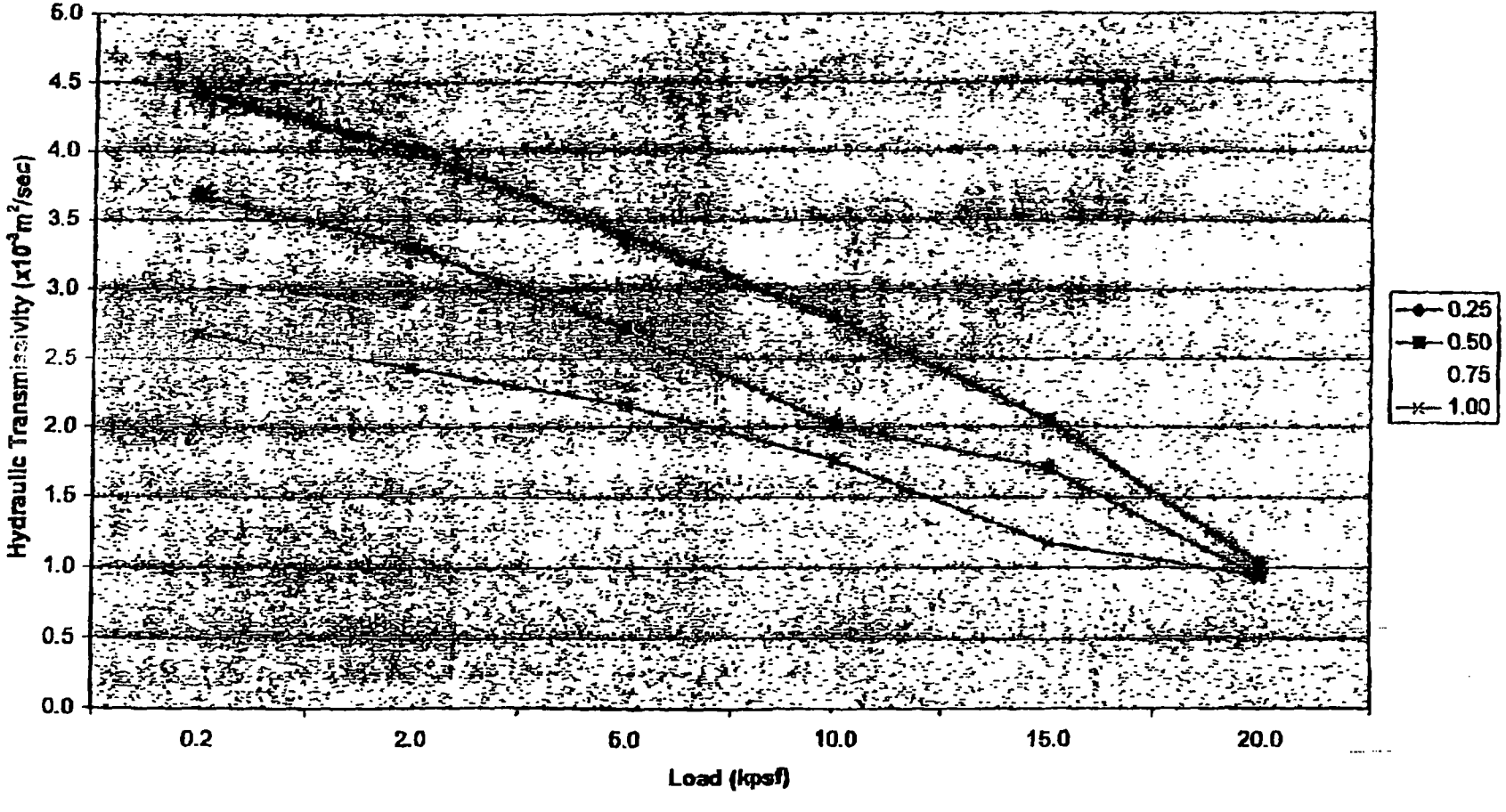
By Gradient



Evergreen Technologies, Inc

NS 1400 Transmissivity

By Gradient



Evergreen Technologies, Inc

NS1400 Data (Geonet)

Hydraulic Transmissivity ($x10^{-3} m^2/sec$)

Load (kpsf) \ Gradient	0.25	0.50	0.75	1.00
0.2	4.4046	3.6780	3.0468	2.6840
2.0	4.0107	3.3093	2.8405	2.4354
5.0	3.3767	2.7131	2.4357	2.1630
10.0	2.7975	2.0163	1.8825	1.7679
15.0	2.0500	1.7063	1.5448	1.1798
20.0	1.0351	0.9440	0.8484	0.9525

Flow Rate per Unit Width gpm/ft width

Load (kpsf) \ Gradient	0.25	0.50	0.75	1.00
0.2	5.319	8.884	11.039	12.966
2.0	4.844	7.993	10.291	11.765
5.0	4.078	6.553	8.825	10.449
10.0	3.379	4.870	6.820	8.540
15.0	2.476	4.121	5.597	7.149
20.0	1.250	2.280	3.074	4.601

NS 1405

Compressive Strength
ASTM D1621

Sample ID	PSI	
50278-03	138.8	
50300-02	112.0	
50300-13	140.8	
50301-01	138.0	
50278-38	141.6	
50270-01	113.8	
50273-89	124.5	
50278-40	129.8	
50292-89	146.1	
50292-148	144.4	
	132.8	MEAN
	146.1	MAX
	112.0	MIN
	12.3	STD DEV
	108.1	MARV

EVERGREEN
TECHNOLOGIES, INC.

DRAINAGE NETS, DRAINAGE COMPOSITES, AND GEOTEXTILES

Manufacturer's Quality Control/Quality Assurance Plan

ETI follows ISO 9000 guidelines for MQC/MQA activities

ETI

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3. MANUFACTURING MONITORING AND SAMPLING

The production group shall:

- Continuously monitor the visual appearance and sampling of the product.
- Provide raw material samples to the quality assurance group as instructed by the QA Manager or his/her assignee.
- Provide finished product samples to quality assurance group at the frequency suggested by the Quality Assurance Manager or his/her Assignee.

4. MANUFACTURING QUALITY CONTROL TESTING

Testing frequency shall be performed as follows:

1. At the beginning of a product change, the 1st, 6th, and 24th rolls will be sampled.
2. The first and last rolls of every lot shall be sampled and tested.
3. If there are no product changes or non-conformities in testing, a roll shall be tested at the minimum required frequency as per Tables 1.0, 2.0, and 3.0 (see Appendix I, page 9).
4. Any time a nonconformity occurs, the rolls preceding the failing roll shall be tested to determine the beginning of the non-conformity.
5. At any time, random samples shall be taken as requested by the Quality Assurance group.

The Quality Assurance group shall:

- Perform all quality control tests on raw material and finished product. All tests shall be conducted according to the most current ASTM or accepted industry standard procedures as determined by the quality assurance group.
- Monitor the visual appearance and quality of the product by randomly requesting a sample of the product being produced. Assure conformity of the manufactured product to quality assurance requirements.
- Classify all rolls produced and label all rolls consistent with product classification and labeling procedures.

c. Shipping

All geotextile and geocomposite rolls shall be shipped and stored in opaque protective covering. This protection is not necessary for geonet. The contractor shall notify the site Engineer (if applicable) at least 24 hours prior to scheduled delivery. No materials shall be unloaded without the owner's representative being present. Product delivered to the site shall be inspected for damage, and unloaded and stored with minimal handling. The contractor shall assist the owner's representative in conducting inventory, handling and sampling of the product.

d. Storage and Handling

ETI Geotextiles are shipped and stored in opaque protective covering. Roll(s) whose protective covering has been damaged during handling must be protected from ultraviolet light exposure, precipitation or other inundation, soil, mud, dirt, debris, puncture, cutting or other damaging or deleterious conditions.

ETI Drainage Nets (geonets) have been stabilized against ultraviolet light by adding carbon black to the base polyethylene resin. Consequently, they can be stored outdoors without coverage during construction. Protection with opaque wrapping necessary for geotextiles and geocomposites is not required however, wrapping or sheltering is recommended to keep the net clean. If geonet rolls have become covered with dirt or dust, they shall be washed with water prior to installation. Dirt or dust in the installed drainage net can be transported by liquids and subsequently deposited, which may cause clogging.

ETI Drainage Composites are wrapped in plastic to protect the geotextile portion of the material. Once, the drainage composite arrives on site, the contractor may choose to store the product under a tarp or inside storage facility for added protection against damage due to handling, or from contact with blades or sharp tools.

Drainage net, geocomposite, or geotextile rolls shall not be stored directly on the ground. Wedges or other methods shall be used to prevent movement of rolls during placement and storage. The use of hooks, tongs or other sharp tools or instruments must be avoided when handling product rolls.

8. INSTALLATION GUIDELINES

a. Product Monitoring

The Contractor shall visually inspect all rolls for imperfections, faulty areas and possible damage prior to installation. All defective rolls must be marked and repaired in accordance with approved methods.

When connecting drainage net or composite rolls side-by-side: (1) the roll edges shall be overlapped a minimum of three inches or according to the engineer's recommendation; (2) the geonet shall be tied approximately every five feet; and (3) the geotextile shall be overlapped a minimum of three inches to allow for seaming.

When connecting drainage net or composite rolls end-to-end: (1) the roll shall be overlapped a minimum of one foot; (2) the geonet shall be tied approximately every six inches across the roll end; and (3) the geotextile shall be mechanically seamed to cover the geonet.

e. Protection Against Wind Action

ETI drainage products placed on a horizontal grade or slope shall be secured against wind action by sand bags, tires, or other alternative methods.

f. Cover

All geotextiles shall be covered within 14 days. If the geotextile will be left exposed for more than 14 days, the manufacturer shall be asked to review ultraviolet exposure conditions. Geotextiles, which will be left exposed for more than 14 days, shall be routinely sampled and tested for tensile strengths every four weeks. Samples shall be taken from the exposed geotextile and these areas properly repaired. If the tensile strength of the geotextile falls below 80% of the original values, within the time frame of recommended exposure, the defective material shall be replaced.

Geotextile Testing

1. Mass/Area (ASTM D 5261) 18 specimens are cut across the entire width of the geotextile roll using a sharp edged 100 cm^2 circular sample cutting die and a punch press. Each conditioned specimen is weighed on an electronic balance to the nearest 0.01 g. A computer connected to the balance receives the output and calculates the average mass and standard deviation for each sample and the sample lot.

2. Grab Tensile (ASTM D 4632) 12 specimens are cut in each the machine and cross direction using a 4" x 8" sample cutting die and punch press. The conditioned specimens are tested in standard atmosphere for tensile strength on an Instron Machine with 1 x 2 in. clamps, using a gauge length of 75 mm and a strain rate of 300 mm/min. This data is directly received by a computer, which calculates the average and standard deviation for tensile strength and elongation for each sample and the sample lot.

3. Trapezoidal Tear Strength (ASTM D 4533) 12 specimens, 3" x 8", are cut in each the machine and cross direction using a sample cutting die and a punch press. A trapezoidal shape is marked on each specimen using an isosceles trapezoid template and a 5/8" notch is cut at the center of the one-inch edge. The conditioned specimen is clamped in an Instron, along the edges of the trapezoidal shape, and tensile force is applied at a constant strain rate of 300 mm/minute, so that the notch propagates through the specimen. The tensile force required to accomplish this is electronically registered. The average and standard deviation are electronically calculated and stored.

4. Thickness (ASTM D 5199) 12 specimens each 3 inches in diameter, are cut using a sample cutting die and a punch press. A micrometer device is used to accurately measure the thickness of the conditioned geotextile under a predetermined normal force of 2 kPa. The average and standard deviation are calculated to the nearest 0.002 mm and reported for each sample and the sample lot.

5. Puncture Resistance Strength (ASTM D 4833) 12 specimens each 4 inches in diameter, are cut across the width of the geotextile roll using a sample cutting die and a punch press. Each conditioned specimen is clamped in an Instron, between two rough surfaced plates (to avoid slippage), and is punctured using a probe which is in conformance with ASTM D 4833. The average and standard deviation are electronically calculated and stored.

6. Mullen Burst Strength (ASTM D 3786) 18 circular samples, 5 inches in diameter, are cut across the width of the geotextile roll using a sample cutting die and a punch press. Each conditioned specimen is clamped in a motor driven 'Hydraulic Diaphragm Bursting Tester' and the force required to burst the specimen using a rubber diaphragm is recorded electronically by a computer. The average and standard deviation are electronically calculated and stored.

3. Strip Tensile (ASTM D 5035) The 5 specimens used for the thickness test are also used for the tensile test. The conditioned specimens are tested in standard atmosphere for tensile strength on an Instron Machine, using an initial separation of 4 inches and a constant strain rate of 500 mm/minute until yield. This data is directly received by a computer, which calculates the average and standard deviation for tensile strength for each of the 5 samples.

4. Melt Flow Index (ASTM D 1238) Each lot of resin is tested for conformance to specifications. 3.7-5.0 gms of resin are accurately measured and charged into the heated chamber (190-230 C) of a Tinius Olsen Plastometer. The flow of the polymer through the chamber is measured using an automated timing device under different weights (2.06 Kg and 5.0 Kg). Melt Index, in gms/10 minutes, is then calculated by a computer connected to the Plastometer.

5. Carbon Black Content (ASTM D4218) A weighed quantity of polyethylene is placed in a muffle furnace set at 600 degrees C. The sample is allowed to remain in the furnace for 5 minutes, burning off the polyethylene and leaving only the carbon black. The carbon black is allowed to cool in a desiccator for 15 minutes and is then weighed. The amount of carbon black is calculated as a percentage of the original sample weight.

6. Density (ASTM D1505) Three geonet specimens, cut to 0.5 cm, are placed in a density column filled with isopropyl alcohol. The location of the specimens is observed with respect to glass standards in the graduated cylinder. The density is then determined by using the graduations etched in the density column and results are reported in grams per cubic centimeter.

7. Transmissivity (ASTM D4716) This test measures the in-plane flow of water across a 12 in. x 14 in. sample in the machine direction. In the standard test, the sample is placed between 2 steel plates, with a confining applied stress of 15,000 psf and a hydraulic gradient of 1.0. The test is repeated twice and results are averaged for the three specimens. The test can also be performed using site specific parameters. During the test, a graduated reservoir is used to capture the flow of water and the actual data measured is the length of time required for 1.9 gallons of water to pass through the structure. This time value is converted through a series of calculations to acquire transmissivity values at 20 degrees C, in units of square meters per second.

Geocomposite Testing

1. Peel Strength (ASTM F904) This test measures the force necessary to pull geotextile away from geonet once the two materials have been thermally bonded together. Five specimens are die cut to 4 in. x 8 in. across the roll width, with the long dimension being the machine direction. The geotextile is separated by hand from the composite and clamped in one jaw of the Instron, while the other jaw clamps the geonet. The initial separation distance is 2 inches. The strain rate for the test is 2 inches per minute. The Instron jaws separate until the fabric is pulled completely away from the geonet and the force values for the individual specimens and the average of 5

APPENDIX II

PROJECT REFERENCE LIST

	PROJECT	CONTACT	PRODUCT(S)	QUANTITY	DATE
1	Waste Management Pine Bluff Landfill Ball Ground, GA	Waste Management Ray Chewning (404) 898-9243	DC4200/TG750	1,042,720 sf	12/9/99
2	Browning-Ferris Industries UWL Landfill Buford, GA	Browning-Ferris Industries John Barnard (770) 271-3575	DC4200/TG750 TG750	1,229,645 sf 57,000 sy	11/29/9
3	Town of Hempstead Merrick Landfill Hempstead, NY	Tully Construction Al McDonnel (718) 446-7000	DC4200/TG650 TG650	504,641 sf 42,000 sy	11/24/99
4	Howard County Alpha Ridge Landfill Marriottsville, MD	Geopacific Lining Kirk Lilleskare (206) 284-2378	DC4200/TG700	3,298,050 sf	10/5/99
5	Los Angeles County Puente Hills Landfill Whittier, CA	Serrot International, Inc. Grayden Renshaw 702-566-8600	NS1400 DC4200/TG700 /TG800 TG700	554,400 sf 1,217,768 sf 76,500 sy	10/1/99
6	Alabama DOT Hwy 24 Project Russellville, AL	Rogers Group Larry Lyles (256) 740-2074	TG500	173,333 sy	10/1/99
7	Republic Industries Valley View Landfill Sulpher, KY	Republic Industries Chip Simmons (606) 223-3824	DC4200/TG600 /TG1000	799,390 sf	9/28/99
8	Metro Waste Authority Metro Park Landfill Mitchelleville, IA	Geopacific Lining, Inc. Kirk Lilleskare (206) 284-2378	DC4200/TG600	2,206,200 sf	9/24/99
9	Mt. Carmel Landfill Mount Carmel, PA	Watersaver Company, Inc. Stan Slifer (303) 289-1818	TG600 TG800	103,500 sy 119,000 sy	9/10/99
10	Chemung County Chemung County Landfill Lowman, NY	Chenango Contracting Chuck Rhoades (607) 729-8500	DC4200/TG550	418,950 sf	9/10/99

21	USA Waste Charles City Landfill Charles City, VA	USA Waste Dwayne Edwards (804) 966-7146	DC4205/TG700	568,013 sf	11/19/97
22	Laidlaw Waste Lone Mountain Landfill Waynoka, OK	Laidlaw Waste Mike Howard (405) 697-3500	NS1405	1,037,400 sf	11/10/97
23	Anderson Air Force Base Guam	Serrot Corporation Tom Sparks (702) 566-8600	TG1000 DC4205/TG750	104,400 sy 1,002,375 sf	10/29/97
24	Jackson Co. Dept. of Public Works Dalton Road Landfill Jackson, MI	Environmental Liners Don Haley (970) 565-9540	DC4205/TG700	530,000 sf	10/7/97
25	Iowa Army Ammunition Plant Middletown, IA	Manhattan Environmental Prashant Khanna (319) 573-7843	NS1305	796,620 sf	9/19/97
26	City Management Carleton Farms Landfill New Boston, MI	City Management Paul Mazanec (313) 654-0060	NS1405	873,600 sf	9/18/97
27	CE Remediation Armco Landfill Butler, PA	CE Remediation Rick Rose (412) 638-7021	NS1405	720,900 sf	8/29/97
28	NRG Pagel Landfill Rockford, IL	NRG Tom Hilbert (815) 874-4806	DC4205/TG600	856,300 sf	8/12/97
29	City of New York, Dept. of Sanitation Edgemere Landfill Far Rockaway, NY	Environmental Liners Don Lloyd (718) 945-4718	NS1305	3,284,400 sf	7/30/97
30	Rumpke Waste Montgomery County Landfill Jeffersonville, KY	Rumpke Waste Stanley Anderson (606) 498-6798	DC4205/TG600 TG600	488,025 sf 3,000 sy	7/30/97

APPENDIX III

MATERIAL PROPERTY DATA SHEET

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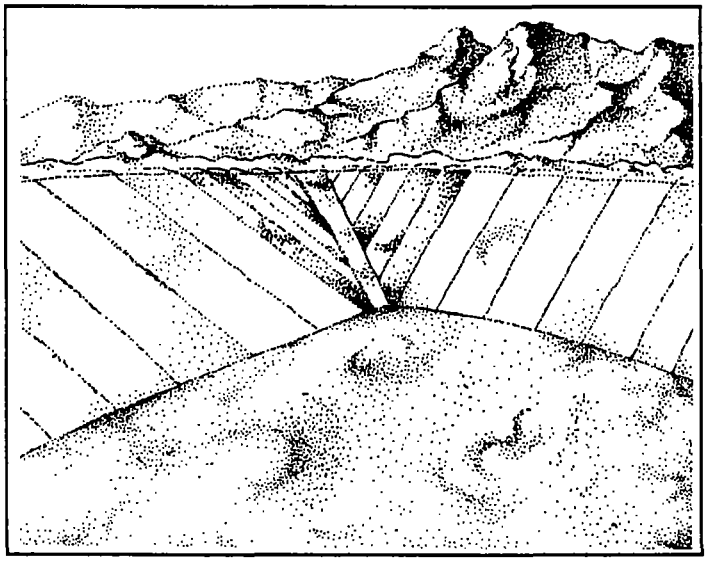


DRAINAGE NET AND COMPOSITE INSTALLATION GUIDE

Introduction

ETI is a leading manufacturer of a broad range of drainage nets and composites. Used as a replacement for sand or gravel drainage layers in landfills, our drainage products provide more reliable, easier to install leachate collection and detection layers.

Our drainage composites are comprised of drainage nets with ETI geotextiles bonded to one or both sides.

This document serves as a guideline for the construction and quality control of the installation of ETI Drainage Nets and Composites.

Storage and Handling

ETI Drainage Nets (geonets) have been stabilized against ultraviolet light by adding carbon black to the polyethylene resin. Consequently, they can be stored outdoors without coverage during construction. Protection with opaque wrapping necessary for geotextiles and some geomembranes are not required. However, wrapping or sheltering is recommended to keep the net clean. If geonet rolls have become covered with dirt or dust, they should be washed prior to installation. Dirt or dust in the installed drainage net can be transported by liquids and subsequently deposited, which may cause clogging. This requirement is similar to washing aggregate prior to use in a drainage layer or trench.

ETI Drainage Composites are wrapped in plastic to protect the geotextile portion of the material. Once the drainage composite arrives on site, the contractor may choose to store the product under a tarp or inside a storage facility (if available) for extra protection against damage to the drainage composite, mishandling, or contact with blades or sharp tools.

Ground Preparation

ETI Drainage Nets are never to be placed in direct contact with the ground. If a geonet is placed on a geomembrane, consult with the geomembrane manufacturer's recommendations for ground preparation to ensure that the geomembrane will not be punctured. If a geonet is placed on a geotextile, remove any stones likely to puncture the geotextile.

Installation

ETI Drainage Nets and Composites are flexible and easy to place. Due to their tensile strength, they can be placed on steep slopes. Recommendations for placement are as follows:

Placement on a Horizontal Area (Drainage Nets and Composites)

Geonet rolls can easily be unrolled. The preferred method consists of placing the geonet roll on a fixed spindle and unwinding it. Overlap and secure the product by methods described in the "Joining Adjacent Product Rolls" section.

If necessary, product rolls can be unrolled horizontally across a slope at the toe. For example, in a landfill where a double layer of geonet is required at the toe of the slope, the first layer of geonet will be unrolled from the top of the slope, and the second layer will be unrolled across the slope at the toe.

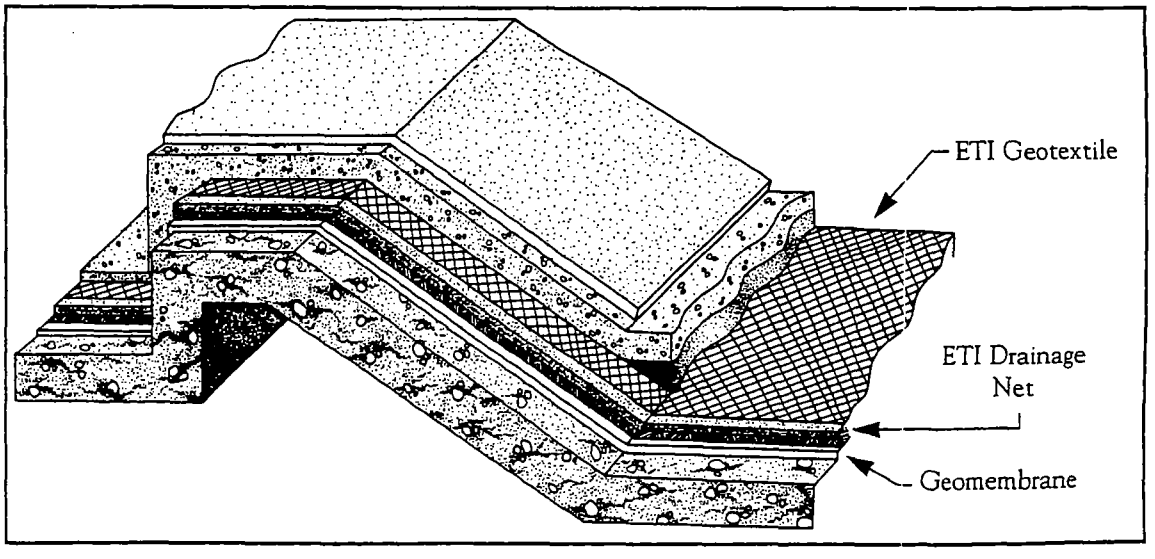
Placement and Anchoring on a Slope (Drainage Nets and Composites)

- Place the material around a fixed spindle at the top of the slope, and pull the end down the slope; or
- Pull the product into position by unrolling it on a flat area near the top or bottom of the slope; or
- If on a relatively flat slope, extend the product down the slope while the end of the roll is temporarily secured at the top of the slope. However, by doing so, it is difficult to align the material to ensure uniform overlap of adjacent rolls.
- Rolls of drainage net and composite should not be allowed to roll freely down a slope, as it could be dangerous. Product lengths must be known prior to unrolling, and the path likely to be followed must be cleared.
- Geonets should be anchored at the top of the slope to prevent them from sliding along the slope. A convenient method is to place the top end of the net in the anchor trench with the geomembrane(s) placed beneath and/or above the geonet.

  The anchor trench can also be used to provide temporary anchorage of the geomembrane while the geonet is being installed. The geonet or composite must be held in place by securely compacting soil within the anchor trench. Care should be taken not to entrap soil or stones within the net channels from the soil excavated in the anchor trench.

Joining Adjacent Product Rolls (Drainage Nets and Composites)

- When connecting drainage net or composite rolls side-by-side: (1) the roll edges should be overlapped a minimum of three inches or according to the engineer's recommendation; (2) the material should be tied approximately every five feet; and (3) the geotextile should be overlapped a minimum of three inches to allow for seaming.



▲ Figure 1: Typical Anchor Trench Detail

- When connecting drainage net or composite rolls end-to-end: (1) the roll should be overlapped a minimum of one foot; (2) the material should be tied approximately every six inches across the roll end; and (3) the geotextile should be mechanically seamed to cover the geonet.

Connections that could be subjected to tensile stresses (during or after installation of materials adjacent to the geonet, such as geomembranes, geotextiles or soil) should be made by tying adjacent overlapping geonet layers using plastic fasteners, wire ties, or polymer braids, preferably white or colored for easy inspection.

Placement and Seaming (Drainage Composite Only)

- On slopes steeper than 10°, drainage composite should be anchored at the top of the slope to prevent it from sliding (see Figure 1).

- Fill material should be placed, spread, and compacted in such a manner to ensure: (1) the drainage composite is not damaged; (2) there is minimal slippage of the drainage composite on underlying geosynthetics; and (3) there are no excess tensile stresses on the drainage composite.

  The drainage composite should be protected from mud, dirt, dust, wet cement, and similar materials which may adhere to the geotextile or core net.

- Seaming methods can include loose overlaps, sewing, or heat bonding. Emphasis must be placed on creating a seam that prevents soil intrusion into the geonet core. Mechanical seams typically are the preferred method to ensure the integrity of the bond.

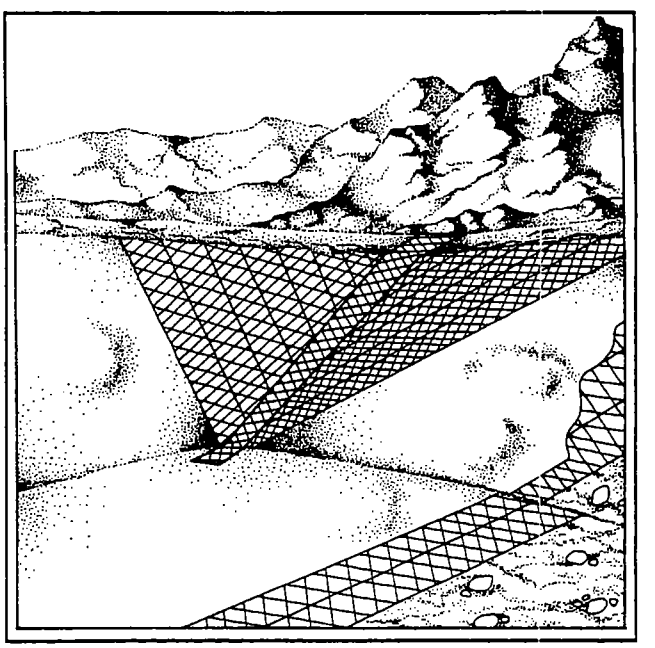
- Any damaged geotextile should be covered with extra geotextile before backfilling. The patching geotextile can be thermally bonded to the geotextile on the composite.

Securing Against Wind Action (Drainage Nets and Composites)

ETI drainage products placed on a horizontal area or slope should be secured against wind action by sand bags, reclaimed tires, or other alternative methods to weigh down the product. On a slope, it may be necessary to attach sand bags and tires to the top using ropes. Welding of the geonet to the geomembrame (especially HDPE) is not recommended.

Placement in Corners/Stacking (Drainage Nets and Composites)

In the corners of side slopes of rectangular landfills or liquid impoundments, geonets and composites should be overlapped (see Figure 2).



▲ Figure 2: Placing Drainage Net in Corners

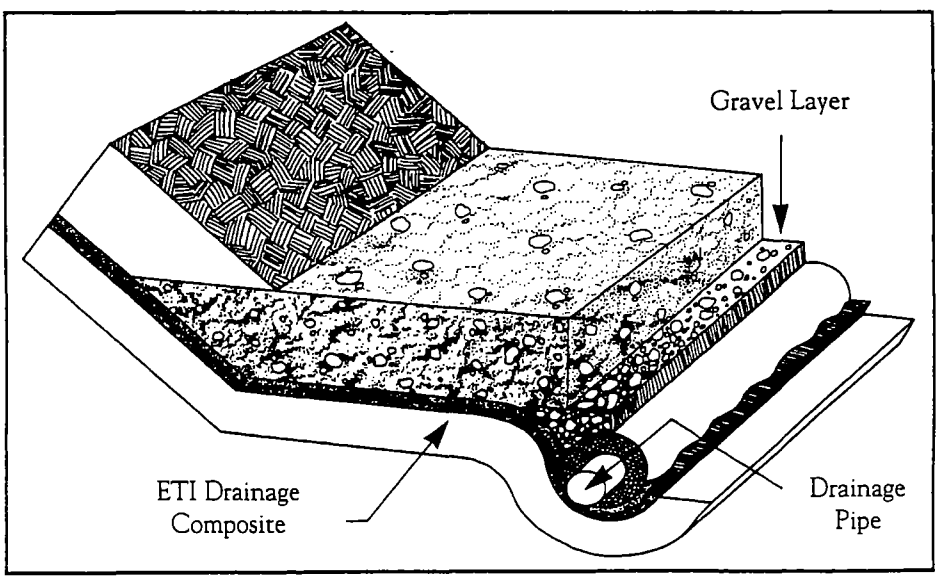
An extra roll of geonet or composite can be unrolled in the corner after the placement of the regular material for the following reasons:

- Flow rate is expected to be higher in corners than anywhere else on the slopes; and
- In corners, there is more risk than anywhere else that strands from one layer of geonet may penetrate channels of the next layer.

When several layers of geonet are stacked, care should be taken to prevent strands from one layer penetrating the channels of the next layer, thereby significantly reducing the transmissivity. This typically does not happen if stacked nets are placed in the same direction.

Connection to Drainage Systems (Drainage Nets and Composites)

ETI drainage products can be connected to both pipe and gravel drainage systems. Connection with a drainage pipe is usually achieved by wrapping the drainage net core around the pipe, using a geotextile as a filter between the aggregate and the pipe (see Figure 3).



▲ Figure 3: Connection of Drainage Composite to Drainage Pipe

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655
Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell

SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell

Date: September 10, 2001

To: ASARCO, Inc.

Attn: Darrell Shew

Phone: (406) 227-7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS

☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	625.03	GCL Submittals

Remarks: These submittals have been reviewed by the QC Manager to ensure that they comply with the Project Specifications. Any variances are noted below:

Variances:
* **Bentonite Fluid Loss - Maximum fluid loss of 18ml. instead of 15 ml.**
* **GCL Permeability Test Method ASTM D 5887 instead of ASTM D 5084**
* **5 (five) year standard warranty instead of 10 (ten) year warranty with temperature range inclusions. (Sample warranty included in submittal).**

Please Note: Warranty period may be extended at discretion of CETCO regional Sales Manager.

Signed: Douglas G. Tisdell Date: 09-10-01

QC Manager

A Washington Company

CETCO

September 6, 2001

Mr. Doug Tisdell
Envirocon, Inc.
200 Smelter Road
East Helena, MT 59635

Subject: GCL Manufacturer Qualifications, ASARCO East Helena Smelter CAMU Cap 1, East Helena, Montana

Dear Doug:

This letter outline's CETCO manufacturing qualifications to produce the Claymax 200R Bentomat DN for the above-mentioned project. CETCO is the world's largest GCL manufacturer, and has four manufacturing facilities worldwide, including two in the United States (Lovell, WY and Fairmount, GA).

CETCO's manufacturing facility in Lovell, Wyoming produces over 30 million sf of GCL each year; therefore, CETCO will have no problem meeting the demand for the estimated GCL quantity of 250,000 sf for this project.

If you have any additional questions, please telephone me at 949-598-9424.

Sincerely,

Brad Miller
Regional Manager

BHM/bhm

Lining Technologies Group
25105 Bellota
Mission Viejo, California
949-598-9424; Fax 949-598-9554

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COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
1500 West Shure Drive • Arlington Heights, IL 60004-1440 • USA
(847) 392-5800 • Fax (847) 506-6150
http://www.cetco.com

Attn: Douglas
Envirocon

Re: Asarco East CAMU Cap

Date: September 10, 2001

From: William Urchik

Dear Sir,

Please accept this as clarification that the industry standard for Fluid Loss of bentonite per ASTM D 5891 is 18ml maximum. CETCO certifies that it manufactures GCLs in which the bentonite will meet this requirement.

Yours truly,

William Urchik
Product Development Engineer
CETCO

SAMPLE

CETCO
PRODUCT NAME ®
5 YEAR SAMPLE WARRANTY

JOB NAME
CITY, ST

WARRANTY PERIOD MAY BE EXTENDED AT DISCRETION OF REGIONAL SALES MGR.

Colloid Environmental Technologies Company "CETCO" warrants to the owner that all bentonite-coated fiber mat ("the product") supplied for the project will be free from manufacturing defects in material and workmanship for a period of FIVE (5) years, provided, however, that this warranty is subject to the conditions that neither the installing contractor nor any third party have used, misused, modified or damaged the Products after delivery to the project and that the back fill used in conjunction with the Products contains no calcium, magnesium, or other divalent cations, and is properly compacted. CETCO's liability hereunder in any case is expressly limited to, at CETCO's election, the replacement of defective Products, repair of the Products, or the repayment of an amount equal to the purchase price of such products, whether such claims are for breach of warranty or contract, negligence, tort, or otherwise. Owner agrees to inspect the Products promptly on delivery and notify CETCO in writing within fifteen (15) days of any alleged defects. In any event, any claim under this warranty shall be made within one month (30 days) after the cause of the action has occurred.

Note: Warranties with respect to workmanship regarding installation of the Products, if any, are provided by the installing contractor only.

THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES NOT EXPRESSLY SET FORTH HEREIN, WHETHER EXPRESSED OR IMPLIED BY OPERATIONS OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, SUITABILITY FOR THE SPECIFIC APPLICATION, AND/OR PATENT AND TRADEMARK NON-INFRINGEMENT.

CETCO shall not be liable for installation, removal or re-installation cost, or for any other incidental or consequential losses, damages or expenses, lost profits, delays or slowdown, lost goodwill, damage to other property etc., directly or indirectly arising from the sale, handling or use of Products, or from any other cause relating thereto.

SAMPLE
Colloid Environmental Technologies Company

EFFECTIVE DATE: _____

Post-it® Fax Note 7671	Date 9/11/01 # of pages ▶ 1
To DOUG	From JIM OLSTA
Co./Dept. ENVIROCON	Co. CETCO
Phone #	Phone #
Fax # (406) 227-6062	Fax #

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
Lining Technologies www.cetco.com

Claymax® 200R Certified Properties

Claymax "200R" is an unreinforced GCL consisting of a layer of sodium bentonite between two woven geotextiles, which are continuously adhered together.

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY, ft^2 (m^2)	CERTIFIED VALUES
Bentonite Swell Index[1]	ASTM D 5890	1 per 50 tons	24 mL/2g min.
Bentonite Fluid Loss[1]	ASTM D 5891	1 per 50 tons	18 mL max.
Bentonite Mass/Area[2]	ASTM D 5993	40,000 ft^2 (4,000 m^2)	0.75 lb/ft^2 (3.6 kg/m^2)
GCL Grab Strength[3]	ASTM D 4632	200,000 ft^2 (20,000 m^2)	150 lbs (660 N)
GCL Peel Strength	ASTM D 4632	N/A	N/A
GCL Index Flux[4]	ASTM D 5887	Weekly	1×10^{-8} $m^3/m^2/sec$
GCL Permeability[4]	ASTM D 5084	Weekly	5×10^{-9} cm/s
GCL Hydrated Internal Shear Strength[5]	ASTM D 5321	Periodic	50 psf (2.4 kPa) typical

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 deaired 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 5×10^{-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 Peak value measured at 200 psf (10 kPa) normal stress. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

1500 West Shure Drive Arlington Heights, Illinois 60004 [800] 527.9948 tel [847] 392.5800 fax [847] 577.5571

Claymax® 200R Panel and Roll Specifications

STANDARD PANEL SPECIFICATIONS

Panel Dimensions*.....**13.8** ft. (**4.2** m) wide; **150** ft. (**45.7** m) long
Total Panel Area.....**2,075** sq. ft. (**193** sq. m)
Effective Area.....**1,973** sq. ft. (**183** sq. m)
{Assumes 6-in. (150 mm) edge overlap and 2-ft. (600 mm) end overlap}

STANDARD ROLL SPECIFICATIONS

Dimensions.....**14.5** ft. (**4.4** m) wide w/ core; **20** in. (**510** mm) diameter
Nominal Weight.....**2,600** lbs. (**1,180** kg)
Core Size.....**4** in. (**100** mm) I.D. Inner core plug measures 2.5 in. (**63** mm)
Packaging.....**8**-mil (**0.2** mm) U.V.-resistant polyethylene sleeve

STANDARD SHIPPING SPECIFICATIONS

Shipment Size.....**15** rolls per truckload

UNLOADING AND HANDLING EQUIPMENT

Core Pipe and Spreader Bar.....**16** ft. (**4.3** m) long, **3.5** in. (**89** mm) O.D., XXH
OR: Solid steel pipe
OR: Stinger attachment for forklift
Chains or Straps.....**2** required; each approximately **12** ft. (**3.7** m) long
Equipment.....Front end loader or forklift (typical)

* Custom lengths/widths available

The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

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Lining Technologies www.cetco.com

Bentomat® DN Certified Properties

Bentomat "DN" is a reinforced GCL consisting of a layer of sodium bentonite between two geotextiles, which are needlepunched together.

MATERIAL PROPERTY	TEST METHOD	TEST FREQUENCY, ft^2 (m^2)	CERTIFIED VALUES
Bentonite Swell Index[1]	ASTM D 5890	1 per 50 tons	24 mL/2g min.
Bentonite Fluid Loss[1]	ASTM D 5891	1 per 50 tons	18 mL max.
Bentonite Mass/Area[2]	ASTM D 5993	40,000 ft^2 (4,000 m^2)	0.75 lb/ft^2 (3.6 kg/m^2)
GCL Grab Strength[3]	ASTM D 4632	200,000 ft^2 (20,000 m^2)	150 lbs (400 N)
GCL Peel Strength[3]	ASTM D 4632	40,000 ft^2 (4,000 m^2)	15 lbs (65 N)
GCL Index Flux[4]	ASTM D 5887	Weekly	1×10^{-8} $m^3/m^2/sec$
GCL Permeability[4]	ASTM D 5084	Weekly	5×10^{-9} cm/sec
GCL Hydrated Internal Shear Strength[5]	ASTM D 5321	Periodic	500 psf (24 kPa) typical

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 deaired 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 5×10^{-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 Peak value measured at 200 psf (10 kPa) normal stress. Site-specific materials, GCL products, and test conditions must be used to verify internal and interface strength of the proposed design.

1500 West Shure Drive Arlington Heights, Illinois 60004 [800] 527.9948 tel [847] 392.5800 fax [847] 577.5571

Bentomat® DN Panel and Roll Specifications

STANDARD PANEL SPECIFICATIONS

Panel Dimensions*.....**14** ft. (**4.3** m) wide; **150** ft. (**45.7** m) long
Total Panel Area.....**2,100** sq. ft. (**195** sq. m)
Effective Area.....**1,998** sq. ft. (**185** sq. m)
{Assumes 6-in. (150 mm) edge overlap and 2-ft. (600 mm) end overlap}

STANDARD ROLL SPECIFICATIONS

Dimensions.....**16** ft. (**4.88** m) wide w/ core; **24** in. (**610** mm) diameter
Nominal Weight.....**2,600** lbs. (**1,180** kg)
Core Size (I.D.).....**4** in. (**100** mm) I.D. Inner core plug measures **2.5** in. (**63** mm)
Packaging.....**8**-mil (**0.2** mm) U.V.-resistant polyethylene sleeve

STANDARD SHIPPING SPECIFICATIONS

Shipment Size.....**15** rolls per truckload or container load
Granular Bentonite.....**50**-lb. (**23** kg) bags

UNLOADING AND HANDLING EQUIPMENT

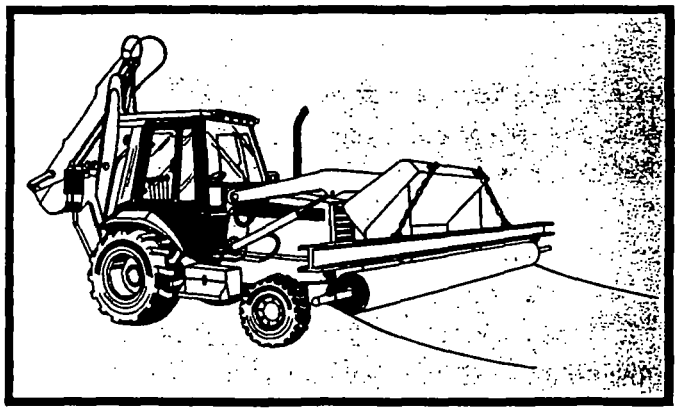
Core Pipe and Spreader Bar.....**18** ft. (**5.5** m) long, **2.5** in. (**63** mm) Nominal Pipe Size, XXH
OR: Solid steel pipe
OR: Stinger attachment for forklift
Chains or Straps.....**2** required; each approximately **12** ft. (**3.7** m) long
Equipment.....Front end loader or forklift (typical)

* Custom lengths/widths available

The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

1500 West Shure Drive Arlington Heights, Illinois 60004 [800] 527.9948 tel [847] 392.5800 fax [847] 577.5571

Installation Guidelines



BENTOMAT®
CLAYMAX®

Geosynthetic Clay Liner

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
LINING TECHNOLOGIES GROUP www.cetco.com

1 Introduction

1.1 This document provides procedures for the installation of CETCO's GCLs in a manner that maximizes safety, efficiency, and the physical integrity of the GCL.

1.2 These guidelines are based upon several years of experience at a variety of sites and should be generally applicable to any type of lining project using CETCO's GCLs. The user should contact CETCO if it is believed that conditions at a particular site warrant modifications to these guidelines.

1.3 The performance of the GCL is wholly dependent on the quality of its installation. It is the installer's responsibility to adhere to these guidelines, and to the project specifications and drawings, as closely as possible. It is the engineer's and owner's responsibility to provide construction quality assurance (CQA) for the installation, to ensure that the installation has been executed properly. This document covers only installation procedures.

2 Equipment Requirements

2.1 CETCO GCLs are delivered in rolls weighing 2,500-2,700 lbs. (1,2251 - 1,140 kg). It is necessary to support this weight using an appropriate core pipe as indicated in Table 1. For any installation, the core pipe must not deflect more than 3 inches (75 mm) as measured from end to midpoint when a full GCL roll is lifted.

Table 1. Core Pipe Requirements

Product	Nominal GCL Roll Size, W x L Ft. (m)	Typical GCL Roll Wt., lbs. (kg)	Interior Core Size, in. (mm)	Core Pipe Length x Diameter, ft. x in. (m x mm)	Minimum Core Pipe Strength
Bentomat CL, ST, DN	15 x 150 (4.6 x 45)	2,700 (1,225)	4 (100)	18 x 3 (5.5 x 75)	XXH
Claymax 200R, 600CL	13.8 x 125 (4.2 x 38)	2,500 (1,140)	4 (100)	16 x 3 (4.9 x75)	XXH

2.2 Lifting chains or straps appropriately rated, should be used in combination with a spreader bar made from an I-beam as shown in the cover illustration. The spreader bar ensures that the lifting chains or straps do not chafe against the ends of the GCL roll, allowing it to rotate freely during installation.

2.3 A front end-loader, backhoe, dozer, or other equipment can be utilized with the spreader bar and core bar. Alternatively, a forklift with a "stinger" attachment may be used for on-site handling and, in

certain cases, installation. A forklift without a stinger attachment should not be used to lift or handle the GCL rolls. Stinger attachments specially fabricated to fit various forklift makes and models are available through CETCO.

2.4 When installing over certain geosynthetic materials, a 4-wheel, all-terrain vehicle (ATV) can be used to deploy the GCL from behind. An ATV can be driven directly on the GCL provided that no sudden stops, starts, or turns are made.

2.5 Additional equipment needed for installation of CETCO's GCLs includes:

- Utility knife and spare blades (for cutting the GCL).
- Granular bentonite or bentonite mastic (for overlapped seams of GCLs with needlepunched, non-woven geotextiles and for sealing around structures and details). Both are available from CETCO.
- Waterproof tarpaulins (for temporary cover on installed material as well as for stockpiled rolls).
- Optional chalk line marker to simplify bentonite placement at seams (when installing a GCL with needlepunched, non-woven geotextile components).
- Optional flat-bladed vise grips (for positioning the GCL panel by hand).

3 Subgrade Preparation

3.1 Subgrade surfaces consisting of granular soils or gravel may not be acceptable due to their large void fraction and puncture potential. In high head (greater than one foot) applications subgrade soils should possess a particle size distribution such that at least 80 percent of the soil is finer than a #60 sieve (0.250 mm).

3.2 When the GCL is placed over an earthen subgrade, the subgrade surface must be in accordance with the project specifications. Engineer's approval of the subgrade must be obtained prior to installation. The finished surface should be firm and unyielding, without abrupt elevation changes, voids, cracks, ice, or standing water.

3.3 The subgrade surface must be smooth and free of vegetation, sharp-edged rocks, stones, sticks, construction debris, and other foreign matter that could contact the GCL. The subgrade should be rolled with a smooth-drum compactor to remove any wheel ruts, footprints, or other abrupt grade changes. Furthermore, all protrusions extending more than 0.5 inch (12 mm) from the subgrade surface shall either be removed, crushed, or pushed into the surface with a smooth-drum compactor. The GCL may be installed on a frozen subgrade, but the subgrade soil in the unfrozen state should meet the above requirements.

4 Unloading

4.1 In most cases, CETCO GCLs are delivered on flatbed trucks. To unload the rolls from the flatbed, insert the core pipe through the roll. This may require removal of the core plug, which should be replaced after the roll is unloaded. Secure the lifting straps or chains to each end of the core pipe, and to the spreader bar mounted on the lifting equipment. Hoist the roll straight up; make sure its weight is evenly distributed so that it does not tilt or sway when lifted.

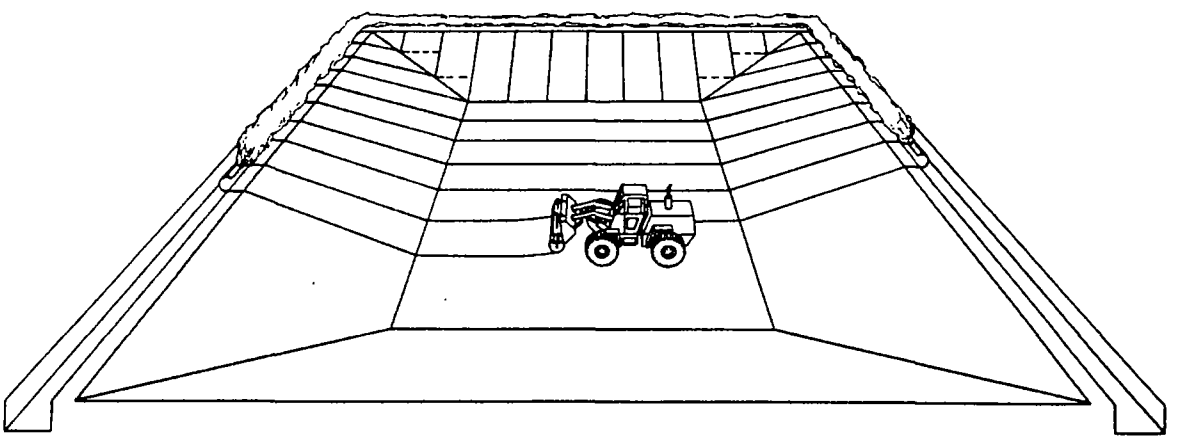
4.2 CETCO GCLs are also delivered in closed shipping containers. To remove the roll from the container, it is best to utilize a forklift mounted with a "stinger" attachment. Guide the stinger as far as possible through the core and lift the roll up and out of the container.

5 Installation

5.1 GCL rolls should be taken to the working area of the site in their original packaging. Prior to deployment, the packaging should be carefully removed without damaging the GCL. The orientation of the GCL (i.e., which side faces up) may be important if the GCL has two different geotextiles. Unless otherwise specified, however, the GCL should be installed such that the product name printed on one side of the GCL faces up.

5.2 Equipment which could damage the GCL should not be allowed to travel directly on it. Acceptable installation, therefore, may be accomplished such that the GCL is unrolled in front of the backwards-moving equipment (Figure 1). If the installation equipment causes rutting of the subgrade, the subgrade must be restored to its originally accepted condition before placement continues.

Figure 1. Typical Bentomat®/Claymax® installation strategy



5.3 GCL rolls should not be released on the slope and allowed to unroll freely by gravity.

5.4 Care must be taken to minimize the extent to which the GCL is dragged across the subgrade in order to avoid damage to the bottom surface of the GCL. A temporary geosynthetic subgrade covering commonly known as a slip sheet or rub sheet may be used to reduce friction damage during placement.

5.5 The GCL should be placed so that seams are parallel to the direction of the slope. End-of-roll seams should also be located at least 3 ft. (1 m) from the toe and crest of slopes steeper than 4H:1V.

5.6 All GCL panels should lie flat on the underlying surface, with no wrinkles or folds, especially at the exposed edges of the panels.

5.7 The GCL should not be installed in standing water or during rainy weather. Only as much GCL shall be deployed as can be covered at the end of the working day with soil, a geomembrane, or a temporary waterproof tarpaulin. The GCL shall not be left uncovered overnight. If the GCL is hydrated when no confining stress is present, it may be necessary to remove and replace the hydrated material. The project engineer and CQA inspector should be consulted for specific guidance if premature hydration occurs.

5.8 In hot weather conditions, Claymax must be covered with a soil layer within eight hours of deployment.

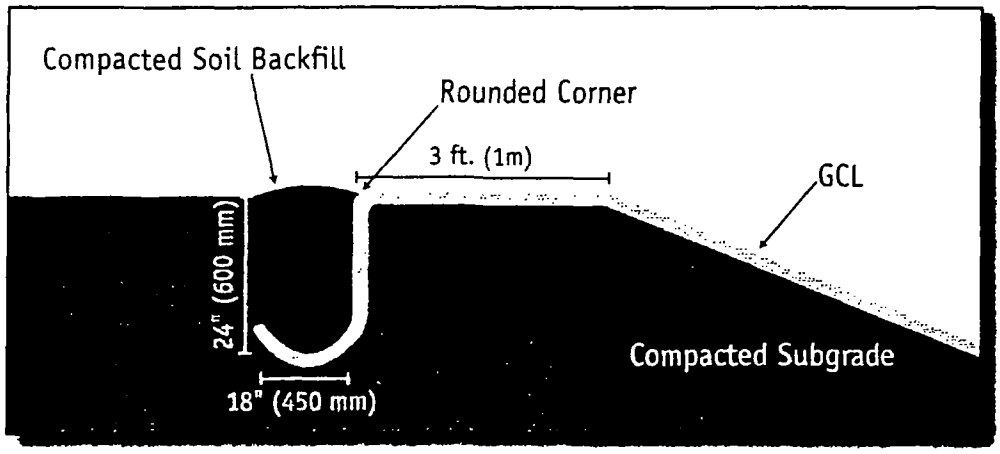
6 Anchorage

6.1 If required by the project drawings, the end of the GCL roll should be placed in an anchor trench at the top of a slope. The front edge of the trench should be rounded to eliminate any sharp corners that could cause excessive stress on the GCL. Loose soil should be removed or compacted into the floor of the trench.

6.2 Sufficient anchorage may alternately be obtained by extending the end of the GCL roll back from the crest of the slope. The length of this "runout" anchor is project-specific.

6.3 If a trench is used for anchoring the end of the GCL, soil backfill should be placed in the trench to provide resistance against pullout. The size and shape of the trench, as well as the appropriate backfill procedures, should be in accordance with the project drawings and specifications. Typical dimensions are shown in Figure 2.

Figure 2. Typical anchor trench design



6.4 The GCL should be placed in the anchor trench such that it covers the entire trench floor but does not extend up the rear trench wall.

7 Seaming

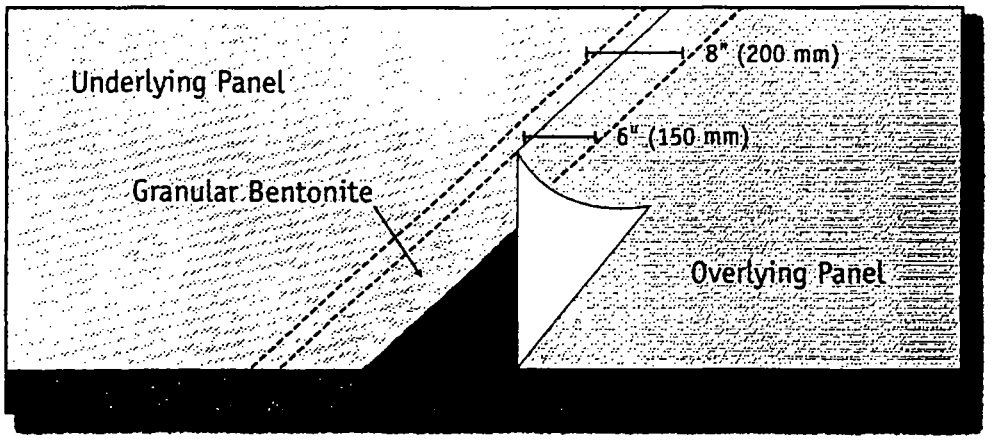
7.1 GCL seams are constructed by overlapping their adjacent edges. Care should be taken to ensure that the overlap zone is not contaminated with loose soil or other debris. Supplemental bentonite is required for CETCO Bentomat GCLs but not Claymax 200R or 600CL.

7.2 Unless otherwise specified, the minimum dimension of the longitudinal overlap should be 6 inches (150 mm). End-of-roll overlapped seams should be similarly constructed, but the minimum overlap should measure 24 inches (600 mm).

7.3 Seams at the ends of the panels should be constructed such that they are shingled in the direction of the grade to prevent the potential for runoff flow to enter the overlap zone. End panel overlap seams on slopes are permissible, provided adequate slope stability analysis has been conducted (i.e. the GCL is not expected to be in tension).

7.4 Bentonite-enhanced seams are constructed first by overlapping the adjacent panels as instructed above, exposing the underlying edge, and then applying a continuous bead or fillet of granular sodium bentonite (supplied with the GCL) along a zone defined by the edge of the underlying panel and the 6-inch (150 mm) line (Figure 3). The minimum application rate at which the bentonite is applied is one quarter pound per lineal foot (0.4 kg/m).

Figure 3. Bentonite-enhanced overlapped seam

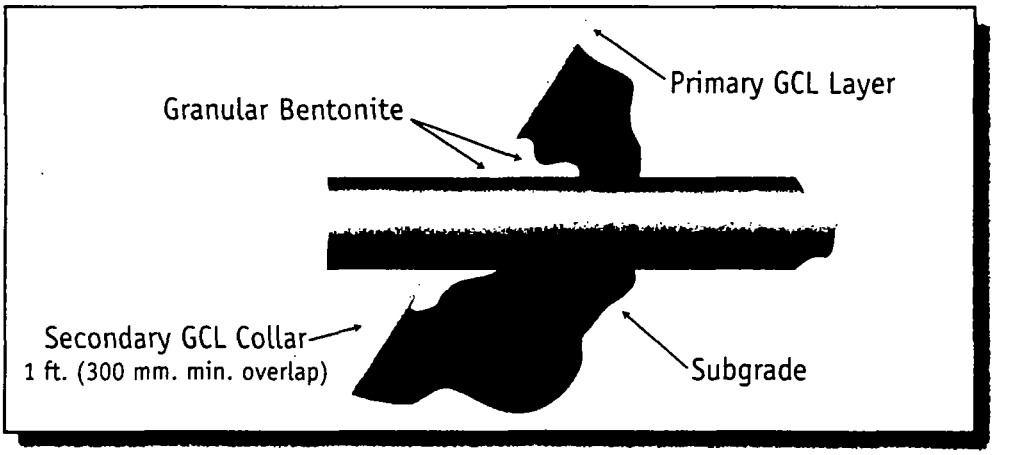


8 Sealing Around Penetrations and Structures

8.1 Cutting the GCL should be performed using a sharp utility knife. Frequent blade changes are recommended to avoid irregular tearing of the geotextile components of the GCL during the cutting process.

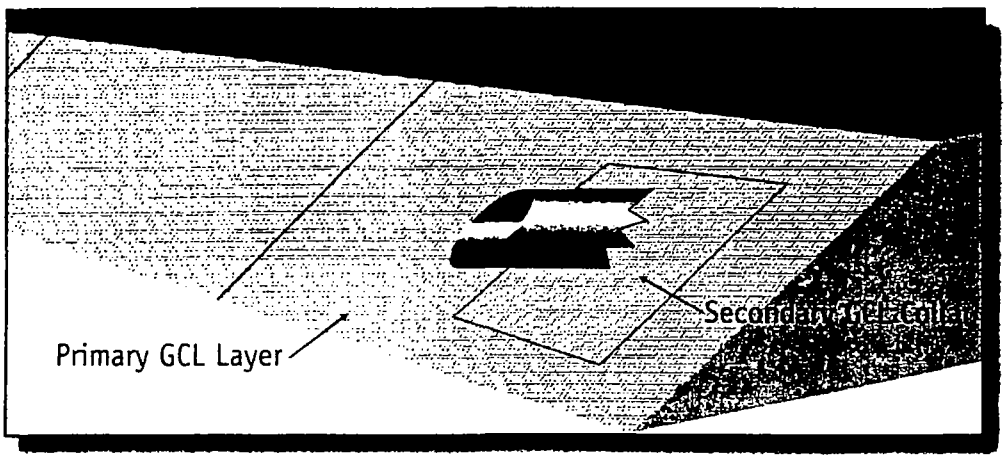
8.2 The GCL should be sealed around penetrations and structures embedded in the subgrade in accordance with Figures 4 through 6. Granular bentonite or a bentonite mastic shall be used liberally (approx. 2 lbs./ln ft. or 3 kg/m) to seal the GCL to these structures.

Figure 4a. Cross-section of a horizontal pipe penetration



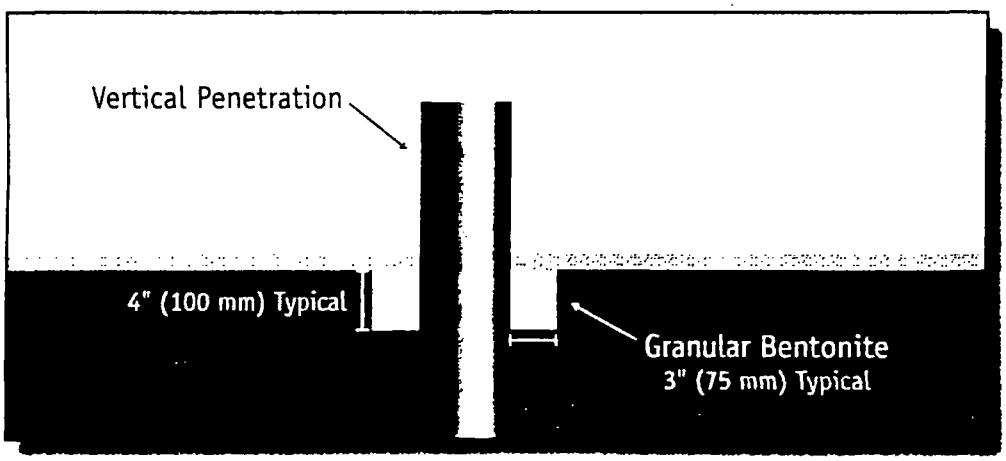
8.3 When the GCL is placed over an earthen subgrade, a "notch" should be excavated into the subgrade around the penetration (Figure 4a). The notch should then be backfilled with granular bentonite or bentonite mastic.

Figure 4b. Isometric view of a completed horizontal pipe penetration



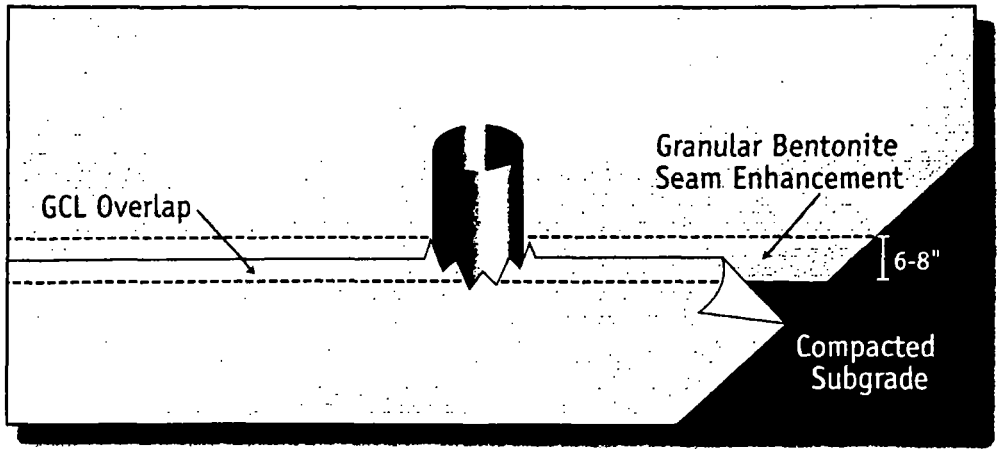
8.4 A secondary collar of GCL should be placed around the penetration as shown in Figure 4b. It is helpful to first trace an outline of the penetration on the GCL and then cut a "star" pattern in the collar to enhance the collar's fit to the penetration.

Figure 5a. Cross-section of a vertical penetration



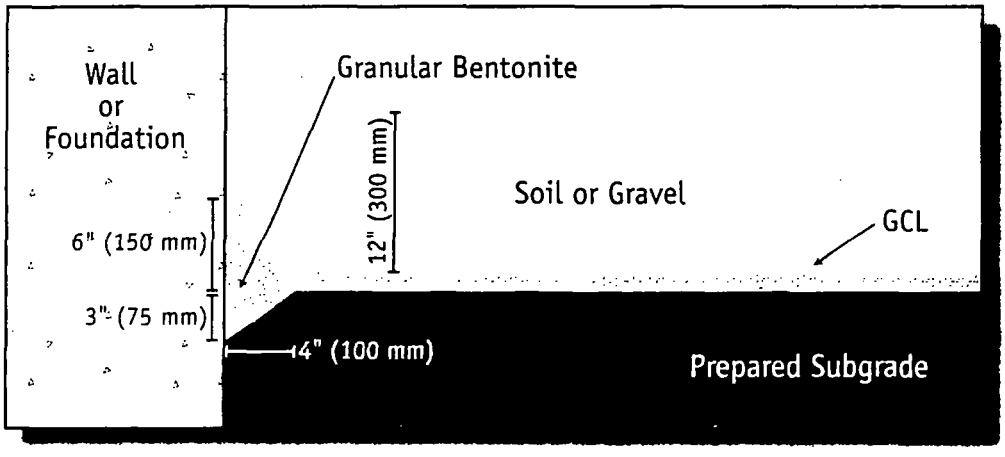
8.5 Vertical penetrations are prepared by notching into the subgrade as shown in Figure 5a. The penetration is completed with two separate pieces of GCL as shown in Figure 5b. A secondary collar is optional in this case.

Figure 5b. Isometric view of the completed vertical penetration



8.6 When the GCL is terminated at a structure or wall that is embedded into the subgrade, the subgrade should be notched as described in sections 8.3 and 8.5. The notch is filled with granular bentonite, and the GCL should be placed over the notch and up against the structure (Figure 6). The connection to the structure can be accomplished by placement of soil or stone backfill in this area.

Figure 6. Cross-section of GCL seal against an embedded structure or wall

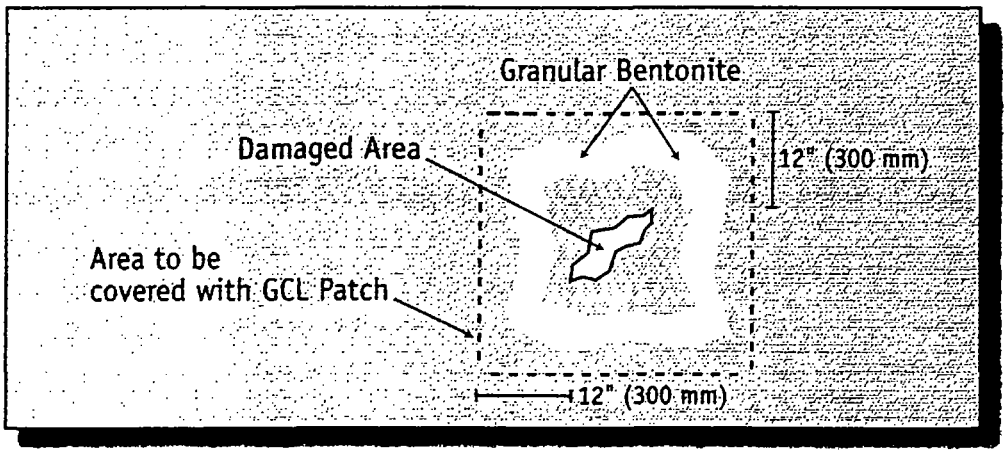


9 Damage Repair

9.1 If the GCL is damaged (torn, punctured, perforated, etc.) during installation, it may be possible to repair it by cutting a patch to fit over the damaged area (Figure 7). The patch should be obtained from a new GCL roll and should be cut to size such that a minimum overlap of 12 inches (300 mm)

is achieved around all parts of the damaged area. Granular bentonite or bentonite mastic should be applied around the damaged area prior to placement of the patch. It may be necessary to use an adhesive such as wood glue to affix the patch in place so that it is not displaced during cover placement. Smaller patches also may be tucked under the damaged area to prevent patch movement.

Figure 7. Damage repair by patching



10 Cover Placement

10.1 Cover soils should be free of angular stones or other foreign matter that could damage the GCL. Cover soils should be approved by the Engineer with respect to particle size, uniformity, and chemical compatibility. Consult your CETCO representative if cover soils with high concentrations of calcium (e.g., limestone, dolomite) are present.

10.2 Recommended cover soils typically have a particle size distribution ranging between fines and 1 inch (25 mm).

10.3 Soil cover shall be placed over the GCL using construction equipment that minimizes stresses on the GCL. A minimum thickness of 1 foot (300 mm) of cover should be maintained between the equipment tires/tracks and the GCL at all times during the covering process. In frequently trafficked areas or roadways, a minimum thickness of 2 feet (600 mm) is required.

10.4 The final thickness of soil cover on the GCL varies with the application. A minimum cover layer must be at least 1 foot (300 mm) thick to provide confining stress to the GCL and prevent damage by equipment, erosion, etc.

10.5 Soil cover should be placed in a manner that prevents the soil from entering the GCL overlap zones. Soil cover should be pushed up slopes, not down slopes, to minimize tensile forces on the GCL.

10.6 When a textured geomembrane is installed over the GCL, a temporary geosynthetic covering known as a slip sheet or rub sheet should be used to minimize friction during placement and to allow the textured geomembrane to be more easily moved into its final position.

11 Hydration

11.1 In cases where the containment of non-aqueous liquids is required, it may be necessary to hydrate the covered GCL with water prior to use. Hydration is usually accomplished by natural rainfall and/or absorption of moisture from soil.

11.2 If manual hydration is necessary, water can be introduced by flooding the lined area or using a sprinkler system. Contact CETCO for specific procedures in these cases.

12 Shipping, Handling and Storage

12.1 All lot and roll numbers should be recorded and compared to the packing list. Each roll of GCL should also be visually inspected during unloading to determine if any packaging has been damaged. Damage, whether obvious or suspected, should be recorded and marked.

12.2 Major damage suspected to have occurred during transit should be reported immediately to the carrier and to CETCO. The nature of the damage should also be indicated on the bill of lading with the specific lot and roll numbers.

12.3 The party directly responsible for unloading the GCL should refer to this manual prior to shipment to ascertain the appropriateness of their unloading equipment and procedures. Unloading and on-site handling of the GCL should be supervised to ensure these goals are achieved. Roll dimensions and weights will vary with the dimensions of the product ordered.

12.4 Rolls should be stacked in a manner that prevents them from sliding or rolling from the stacks. This can be accomplished by frequent chocking of the bottom layer of rolls. Rolls should be stacked no higher than the height at which the spreader bar assembly can be safely handled by laborers (typically no higher than four). Rolls should never be stacked on end.

12.5 Rolls should be stored at the job site away from high-traffic areas but sufficiently close to the active work area to minimize handling. The designated storage area should be flat, dry and stable. Moisture protection of the GCL is provided by its packaging; however, an additional tarpaulin or plastic sheet is recommended.

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
LINING TECHNOLOGIES GROUP www.cetco.com

NOTICE: This document is intended for use as a GENERAL GUIDELINE for the installation of CETCO's GCLs. The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

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CETCO

CETCO GCL

MANUFACTURING QUALITY ASSURANCE AND QUALITY CONTROL MANUAL

Version 5.0, March 1997

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POLICY STATEMENT

The (geosynthetic clay liner) GCL Manufacturing Quality Assurance/Quality Control Manual has been prepared by Colloid Environmental Technologies Company (CETCO), a wholly owned subsidiary of American Colloid Company. The manual conforms with all provisions of the Quality Assurance Policy of American Colloid Company. This policy states that our primary goal is to achieve optimum productivity while assuring full customer satisfaction. To reach this goal, CETCO is committed to the pursuit of continuous improvement of all processes and materials utilized in the manufacture of GCL.

The efforts of all employees involved in the production of GCLs shall be directed towards this goal.

SECTION 1

INTRODUCTION

1.1 Definitions

This manual contains objectives and criteria for maintaining CETCO geosynthetic clay liner (GCL) *manufacturing quality control* and *manufacturing quality assurance* as defined below:

Manufacturing quality control (MQC) refers to a planned system of inspections for directly monitoring and controlling the quality of the GCL product during the manufacturing process. MQC is performed by CETCO to ensure that the specified values for GCLs are achieved.

Manufacturing quality assurance (MQA) refers to a planned system of activities that provide assurance that the manufactured GCLs product actually meets its specified properties.

The above definitions, provided by Koerner and Daniel,* imply that MQC procedures are implemented to control the product *during* manufacture, while MQA procedures are implemented to ensure the product meets specifications *after* manufacture. CETCO GCLs are assembled from three component materials, meaning that there are *four* materials streams (two geosynthetics, the clay, and the finished product) which are subject to either MQA or MQC. Quality control procedures are implemented on those components and finished products which are manufactured by CETCO. Quality assurance procedures are implemented on the components of GCL that are furnished by outside suppliers. Therefore, this manual contains an integrated series of procedures that may be classified as both MQA and MQC, as determined by the source of the component materials.

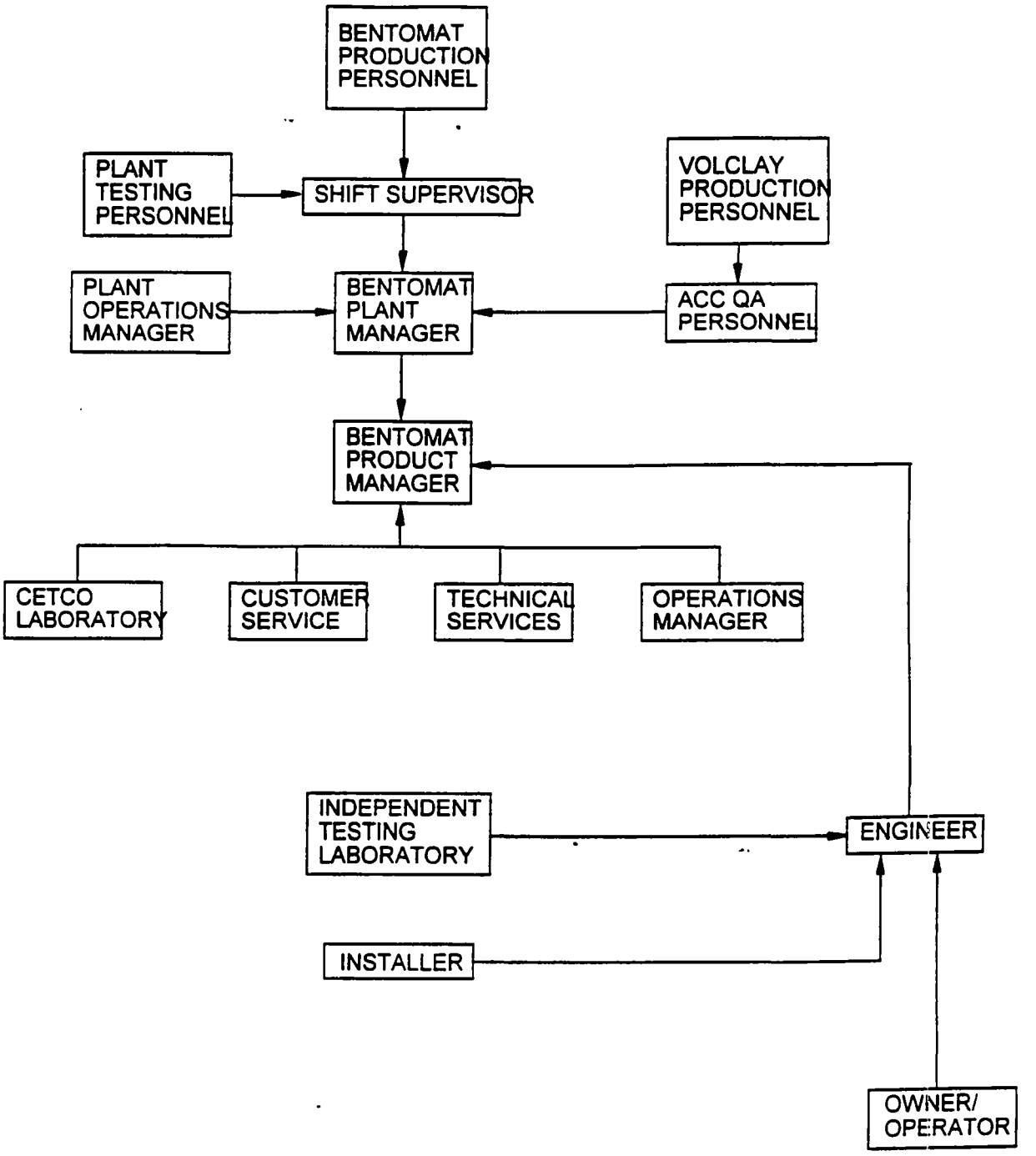
The organizational structure of the CETCO GCL MQA/MQC program is depicted in Figure 1-1. The "core" quality personnel are shown in the center of the diagram. with peripheral quality support provided by the other personnel. For each project, the CETCO GCL Sales Manager is the key liaison between the manufacturer and the engineer. and any special MQA/MQC issues which deviate from this manual should be communicated between these two parties prior to production for the project. Figure 1-2 presents the Contract Review process for discrepancies between contract specifications and CETCO standard GCL specifications.

1.2 MQA/MQC Objectives

CETCO GCLs are utilized in a wide variety of important environmental and engineering applications which often provide protection of human health and the environment from contaminated soil or water. Accordingly, CETCO GCLs have been designed with certain engineering properties which make it suitable for use in these critical applications. The quality of CETCO GCLs have a direct influence on the degree of environmental protection they provide. It is therefore of paramount importance that the entire manufacturing process for CETCO GCLs is tightly controlled and monitored through the implementation of a comprehensive quality program.

FIGURE 1-1

CETCO GCL MQA/MQC PROGRAM ORGANIZATION CHART



This manual establishes the manufacturing guidelines and product testing procedures necessary to ensure that CETCO GCLs meet all of their design specifications. Where applicable, established ASTM sampling and testing methodologies and protocols for GCLs or its components are specified for use. Some methods, however, have not been standardized for GCLs. In these cases, existing ASTM standards are used and modified as necessary to be applicable to the testing of GCLs. Tests for which related ASTM methods do not exist for GCLs are instead presented in this manual in a format that is designed to be understandable and easily followed by plant personnel.

The remainder of this manual is presented in three sections. Section 2 contains test procedures for GCLs and each of its components, and Section 3 describes the record keeping and reporting procedures which will document adherence to this plan and will verify the overall quality of the product. Lastly, Section 4 presents in tabular form an overall summary of the manufacturing QA/QC program.

1.3 Revisions

Because one of CETCO's corporate commitments is continual product improvement, the procedures specified in this manual may require some modifications as such improvements occur. Interim revisions to the existing manual will be issued as required, and the manual itself will be updated and reissued on a regular basis to incorporate recent revisions. It is every employee's responsibility to remain abreast of the continued revisions to the quality program.

1.4 Audits

Formal internal audits of the GCL manufacturing quality program will be conducted annually by CETCO in order to determine the adequacy of quality procedures and the degree of conformance with these procedures. Informal audits will be conducted on an as-needed basis by plant management.

Results of the audits will be distributed to the CETCO Corporate Quality Department, to the Plant Manager, and to corporate management. If the audit reveals that major corrective actions are required to achieve conformance with quality objectives, a quality improvement plan will be prepared and submitted to the Corporate Quality Department. A file of all audits and corrective action plans will be maintained by CETCO. Implementation of the quality improvement plan will be managed by the Corporate Quality Department.

* Koerner, R.M. and D.E. Daniel (1992) *Manufacturing and Construction Quality Control and Quality Assurance of Geosynthetics.* Proceedings of the 6th GRI Seminar: MQC/MQA and CQC/CQA of Geosynthetics. December 10-11, 1992. Philadelphia, PA. pp. 1-14.

SECTION 2

MQA/MQC PROCEDURES

This section of the CETCO GCL Manufacturing QA/QC Manual describes specific procedures carried out to evaluate the quality of each GCL component (top geosynthetic. bottom geosynthetic, bentonite clay), the quality of the actual production process, and the quality of the finished GCL product. This program allows immediate verification of critical production parameters used to monitor production quality, while the laboratory test program will verify the specified engineering characteristics of the GCL.

2.1 Geosynthetic Components

Depending upon the type of GCL the top and bottom geosynthetic components may consist either of a woven geotextile, nonwoven geotextile, or flexible membrane liner laminiated to a geotextile. ASTM D5889 states the minimum types of tests and their frequencies for the MQC of the geosynthetic materials used in the GCL.

2.1.1 Woven Geotextile

The woven geotextile is manufactured elsewhere and is delivered to the GCL plant in rolls 900 to 1,500 yards long, depending on the style being used. CETCO receives and maintains on file manufacturer's certifications stating that the products meet the engineering specifications listed in Table 2-1.

Each roll in the lot is labeled with its lot and roll number. and the date and time at which a roll is placed into GCL production is recorded on the daily operating log (Appendix B). This procedure allows the usage of the woven geotextile to be tracked such that its lot and roll number can be directly determined from the corresponding GCL roll number.

Although the overall quality of the woven geotextile is assured through its manufacturer. additional testing is conducted by CETCO of woven geotextile. Full roll-width samples are obtained as illustrated in Figure 2-2 from each roll and are tested for those properties listed in Table 2-1. This testing provides a means for confirming or more accurately determining the specifications attributed to the woven geotextile by its manufacturer. The procedures for these tests are identical to those described in detail in Section 2.2.

If CETCO's test results indicate that the woven geotextile does not meet its quality criteria. material will not be used for GCL production unless further testing confirms that the geotextile is acceptable with respect to its required mass per unit area and grab strength values. Statistical evaluation of the test data will be employed to make this determination.

TABLE 2-1

MQA PARAMETERS FOR GEOTEXTILE COMPONENT OF GCL

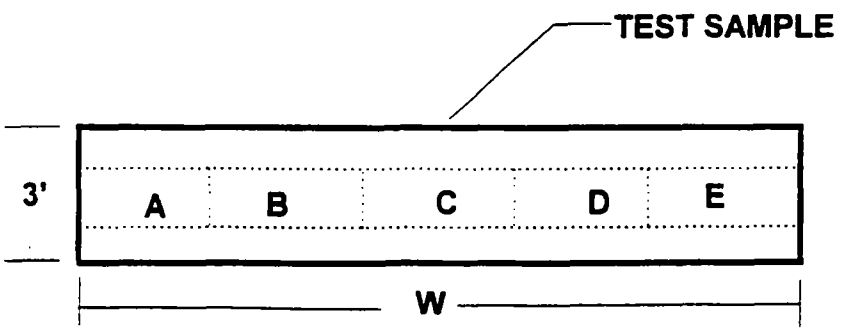
PROPERTY	TEST METHOD	FREQUENCY	RECORDED VALUE[1]
Grab Strength	ASTM D 4632	200,000 sq ft	Typical and MARV
Mass per Unit Area	ASTM D 5261	200,000 sq ft	MARV

NOTES:

1. Values represent geotextile prior to incorporation into GCL.

FIGURE 2-2

GUIDE FOR OBTAINING SAMPLES AND TEST SPECIMENS



NOTES:

1. Dashed lines represent acceptable "windows" from which test specimens A, B, C, D. and E are cut.

2. The specimens are cut at random locations within each window. For the standard 15-foot wide Bentomat product. the windows are 3 ft long; for the standard 13.83 ft-wide Claymax products, the windows are 2.75 ft long; for the 12-foot wide Bentomat product. the windows are 2.4 feet long.

3. All samples must be cut using a sharp utility knife.

4. At least one specimen used in mass per unit area testing is archived (see Section 3).

5. The above figure depicts sampling guidelines for all geotextiles as well as the finished product.

TABLE 2-2

MQC PARAMETERS FOR FML/GEOTEXTILE LAMINATE COMPONENT OF CLAYMAX 600 SERIES GCL

PROPERTY	TEST METHOD	FREQUENCY	RECORDED VALUE[1]
Grab Strength	ASTM D 4632	200.000 sq ft	MARV
Thickness	ASTM D 5199	200.000 sq ft	MARV
Mass per Unit Area	ASTM D 5261	100.000 sq ft	Typical & MARV

NOTES:

1. Values represent FML/geotextile laminate prior to incorporation into GCL.

2.1.2 Non-Woven Geotextile

The non-woven needlepunched geotextile is manufactured by CETCO or is manufactured elsewhere and is also subjected to conformance tests at the plant. Samples of the non-woven geotextile are tested according to the parameters listed in Table 2-1 for mass per unit area and for its tensile properties. Using a utility knife, full roll-width samples are cut from the end of the roll. Specimens are cut from each sample for density and tensile testing as shown in Figure 2-2. The number of test specimens may be refined as sample variability data is developed from the MQA program.

Mass per unit area testing of the specimens cut from the sample of non-woven geotextile is performed in general accordance with ASTM D 5261. Tensile testing of the non-woven geotextile is also conducted on these specimens. Grab strength tests on these specimens are performed in general accordance with ASTM D 4632.

If testing reveals the nonwoven geotextile does not meet its quality criteria. material will not be used for GCL production unless further testing confirms that the geotextile is acceptable with respect to its required mass per unit area and grab strength values. Statistical evaluation of the test data will be employed to make this determination.

2.1.3 Flexible Membrane Liner Laminated to Geosynthetic

RESERVED

2.2 Sodium Bentonite

ASTM D5889 identifies the minimum types of tests and their frequencies for the MQC of GCLs. Granular sodium bentonite incorporated into the GCL is supplied by one of CETCO's western bentonite plants. The sodium bentonite is mined, processed, and shipped to CETCO's GCL plant CETCO maintains rigid specifications for all of its bentonite products and provides test data for each shipment received at the GCL plant. Appendix C provides a specification sheet for the base clay used in the production of GCL.

The sodium bentonite is typically railed or trucked to the GCL plants. Truckload shipments weigh approximately 46,000 lbs. and railcars hold 50 tons. The clay testing is therefore performed one per truck or railcar, but a minimum of every 50 tons. QA procedures for bentonite shipped to the GCL plant primarily involve collecting and maintaining Certificates of Analysis (C.O.A.'s) issued by the CETCO bentonite with each bentonite shipment. A sample C.O.A. is presented in Appendix G as part of the discussion in Section 3 on record keeping and reporting.

The quality parameter for the sodium bentonite are its free swell and fluid loss because free swell and fluid loss usually have a direct influence on GCL hydraulic performance. The clay in CETCO GCLs has a minimum free swell of 24 mL/2g, as determined in accordance with ASTM D5890. The clay in CETCO GCLs has a maximum fluid loss value of 18 mL when tested in

accordance with ASTM D5891. A summary of the bentonite MQA parameters is provided in Table 2-3.

The CETCO bentonite C.O.A.'s are received and retained at the GCL plant, and the accompanying clay lot numbers are recorded in the operations log using procedures similar to those described in Section 2.1 for the geosynthetic components. In order to coordinate the usage of the certified bentonite and the production of GCL, the lot number and the time/date of use is recorded in the daily log. Thus, the daily log allows every roll of GCL to be traced to the bentonite lot number. More information regarding the reporting and record keeping procedures is presented in Section 3.

2.3 Production Processes

The machinery utilized for the production of GCLs is highly controlled, and critical production parameters are automatically monitored. Human input into the manufacturing process is critical, however, to the extent necessary to maintain the machinery and the requisite QA/QC information. As described below, quality control procedures during production focus primarily on maintaining the calibration and operation of the production system.

2.3.1 Punch Density (Bentomat GCLs Only)

Punch density refers to the number of needlepunched fibers per unit area joining the top and bottom geotextiles of the Bentomat GCLs. The correct punch density has been determined to correspond to various operational paramters which are maintained during production. Calibration of the needling machinery is performed regularly, and Bentomat peel test results provide a quantitative verification that the punch density meets minimum standards.

2.3.2 Stitch Bonding (Claymax Shear Pro 'SP' GCLs only)

Stitch bonding refers to stitching joining the upper and lower geosynthetics of the Claymax GCLs. The proper stitch tension has been determined to correspond to various operational parameters which are maintained during production.

2.3.3 Roll Length and Width

The dimensions of the GCL panels are directly evaluated. Length measurements are made through continuous monitoring by an electronic linear measuring device connected to the wind-up roll at the end of the production line. When the standard length of 150 feet is reached. the roll is cut and prepared for storage or shipment. Periodically, a GCL roll is manufactured to a length of 153 feet such that a full roll-width QA sample may be taken.

TABLE 2-3

MQA PARAMETERS FOR SODIUM BENTONITE COMPONENT OF GCL

PROPERTY[1]	TEST METHOD	FREQUENCY	REQUIRED VALUE
Free Swell	ASTM D 5890	every 50 tonnes	24 mL/2g minimum
Fluid Loss	ASTM D 5891	every 50 tonnes	18 mL maximum
Moisture Content	ASTM D 2216	every 50 tonnes	10 typical
Particle Size[2]	ASTM D 422	every 50 tonnes	100 % typ. - #10 mesh 1 % typ. - #200 mesh

NOTES:

1. These parameters are for the bentonite incorporated into the GCL and do not necessarily reflect the properties of the bentonite in the finished product. This is especially the case with moisture content.

2. Particle size range based on available bentonite supply. Particle size may change depending on bentonite availability.

It is noted that shorter rolls are produced when production is temporarily suspended for materials re-supply. These short rolls are often useful for completing the square footage requirements for a particular job. The length of all short rolls is recorded as well.

The correct width of either 13.8 or 15 feet is maintained by periodic width measurements are made prior to roll-up using a tape measure placed perpendicular to the machine direction of the GCL.

2.3.4 External Markings

GCLs are furnished with two dashed lines ("lap line" at 6 inches and "match line" at 9 inches) on each end of the upper geosynthetic to facilitate its installation. The lines are applied to the finished GCL as it passes by a system of rotating stationary inking devices. The ink reservoirs are checked frequently during each shift to ensure an adequate supply during production. Visual observations of lap line placement are also conducted by the shift supervisor. The system is automated and requires few adjustments, although the locations of the lines are measured at a frequency of at least once per shift. The lines on standard rolls of GCL are located within 1/4 inch of the 6 and 9-inch points as measured perpendicular from each edge..

The upper geosynthetic side of the product is marked with the word "CETCO" to facilitate product identification.

2.3.5 Equipment Inspection

The mechanical equipment and appurtenant devices used in the manufacture of GCL are regularly inspected and maintained in accordance with the overall plant maintenance program.

2.4 Finished GCL

This section of the manual describes the sampling and testing procedures implemented to ensure that each roll of GCL has been manufactured to meet its standard design specifications. ASTM D5889 outlines the minimum types of tests and their frequency for the MQC of the finished GCL. Besides the clay mass per unit area, clay moisture content, grab tensile strength and flux listed in ASTM D5899, CETCO also perfoms peel strenght testing on its Bentomat products. Based on testing frequency, rolls are identified during production so that their length may be extended by 3 feet in order to accommodate sampling. Table 2-4 presents the finished GCL MQA test specifications.

The bentonite mass per unit area test procedures are performed in accordance with ASTM D 5993. It must be noted that an accurate bentonite mass per unit area determination requires that the moisture content of the finished product also be determined. In ASTM D5993, bentonite mass per unit area is defined as the *dried* mass per area of the *bentonite*, as opposed to the mass per area of the entire GCL. In other words, dried bentonite mass per area is calculated by subtracting out the weight of the water in a GCL sample *and* the weight of the geosynthetics. The geosynthetic weights are *typical* values because it is neither possible nor practical to attempt

removal of the bentonite entirely from the GCL in order to weigh each component separately. Until more variability data is obtained. five test specimens will be cut from each full roll-width sample as shown in Figure 2-2. The number of test specimens obtained per sample may be modified as variability data is generated.

The specimens for tensile testing are prepared from the same sample and are tested according to the procedures in ASTM D 4632. No fewer than five specimens per sampling event will be tested. The number of specimens to be tested and the specified tensile properties may be modified slightly as additional variability data is accumulated.

Index flux and hydraulic conductivity testing are performed at a rate of one per lot. A random sample of minimum 18" by roll width is sent to CETCO's Arlington Heights laboratory for testing. Index flux is run per ASTM D5887 and hydraulic conductivity is calculated by measuring the thickness by ASTM D5199 and using the formulas presented in ASTM D 5084.

Peel testing is performed on Bentomat needlepunched products at a minimum frequency of one per 40,000 square feet. Method ASTM D 4632 is used as a basis for determining specimen size and general procedure. In the peel test, a Bentomat specimen is partly de-laminated by cutting the needlepunched bonds between the geotextiles just enough to allow each geotextile to be separately inserted into the grips of the tensile testing device. The specimen is peeled at the same rate as specified in ASTM D 4632, and the peak resistance is recorded as the peel strength for that specimen.

Specimens of finished GCL are archived for 12 months and then are discarded. These samples can be utilized for post-project testing if a dispute arises. However, it is the **purchaser's responsibility** to ensure that representative samples of Bentomat are retained if testing is requested after this one-year period has expired.

TABLE 2-4

MQA/MQC PARAMETERS FOR BENTOMAT

PROPERTY	TEST METHOD[1]	FREQUENCY[2]	REQUIRED VALUE[3]
Bentonite Mass/Area[4]	ASTM D 5261	40,000 sq ft	0.75 lbs./sq ft
Moisture Content[5]	ASTM D 4643	40.000 sq ft	25 percent typical
Grab Strength[6]	ASTM D 4632	200.000 sq ft	90 lbs for ST 150 lbs. for DN
Peel Strength[6]	ASTM D 4632	40.000 sq ft	15 lbs minimum
Index Flux[7]	ASTM D 5887	Weekly	1×10^{-8} $m^3/m^2/sec$ max.
Permeability[7]	ASTM D 5084	Weekly	5×10^{-9} cm/sec max.

NOTES:

1. ASTM methods are also modified wherever necessary to facilitate the testing of a GCL rather than a geotextile.

2. The test frequency listed is based on ASTM D5889. Actual frequency may vary due to roll dimensions.

3. All values are minimum average roll values (MARVs) unless otherwise indicated.

4. Bentonite mass per unit area is exclusive of the average weight of the geotextiles and is normalized to 0 percent moisture as determined by ASTM D 5993.

5. Moisture content of the bentonite.

6. Tensile values represent testing with the test specimens oriented in the machine direction.

7. Index flux and permeability with deaired distilled water at 5 psi maximum confining stress and 2 psi head.

2.5 Plant Storage and Handling

Care is taken at the plant to handle and store the finished rolls of GCL in a manner that prevents damage to the product and its packaging. All handling of the product must be executed with a forklift or other suitable vehicle outfitted with a carpet pole or "stinger." The stinger must be strong enough to support the weight of a full roll of GCL with minimal bending.

After the completion of planned plant improvements, GCL storage will be limited to stacks no higher than 7 rolls. This will provide easy equipment access and will minimize the chance for damage to the roll core and to the GCL itself. The inventories of GCL and its component materials will be rotated for additional protection against potential long-term, storage-related damage.

SECTION 3

RECORDING AND RECORD KEEPING

GCL is manufactured from three different raw materials. each requiring its own QA/QC sting and record keeping. The finished GCL product also requires testing, so compre nsive documentation of all GCL manufacturing activities is essential in order to properly man:ge the large amount of information generated during production. This section of the GCL MQ.V/MQC Manual lists the quality-related information recorded and provides the procedures for maintaining the records.

3.1 Plant Records

Daily Operations Log. Plant records include both a continuous daily operations log and a log of test data. Items included in the daily production log include:

- Name of the person maintaining the log.
- Current date and shift.
- Current lot and roll number in production.
- Length and width of each roll produced.
- Written verification of proper production parameters.
- A record of raw material usage, including lot/roll numbers and date of use.
- Documentation of relevant information affecting production.

QA Log. A separate log is maintained at the plant to record information pertaining to test data. Information included in the QA log includes:

- QA test results summarized in tabular form.
- Date, time. lot. and roll number of all tested samples.
- Name of person conducting the tests.
- Action taken if test results were unsatisfactory.

The QA log may be kept electronically as data is tabulated directly on an available computer or may be kept in writing, at the discretion of the shift supervisor.

For future reference. both of these logs shall be maintained at the plant indefinitely. Copies of test results recorded on the QA log will be provided as required. The daily production log and the QA log are the most important means by which GCL quality is documented; therefore, these logs must be neatly and accurately maintained.

Product Labeling. Adhesive labels are placed on the outer wrap of every GCL roll and on the core. Roll numbers are written directly on one corner of the non-woven geotextile immediately prior to packaging. Thus even if the adhesive labels are entirely missing or illegible. the GCL roll number is still provided on the product itself. The labels themselves provide the following information:

- Length and width of roll.
- Total weight of roll.
- Product identification (material codes and type designation).
- Lot number and roll number.

Packing Slips. The plant provides the site manager or his designate with a packing slip for each shipment of GCL to a the project site. The packing slip includes the following information:

- CETCO order number and customer P.O. number.
- GCL lot numbers, roll numbers, roll dimensions, and roll weights.
- Shipment address.

Copies of the packing slips shall be maintained at the plant.

3.2 CETCO Laboratory Records

CETCO shall maintain complete records of all testing performed at its laboratory in the event that supplemental MQA testing is required for a particular project. Using standard laboratory record keeping procedures, CETCO shall maintain records of:

- Results of physical tests on geosynthetic components. bentonite. and GCL.
- Statistical evaluations of test data.
- Documentation of follow-up action. if any. after evaluation of test data.

3.3 GCL Manufacturing Certification Reports

Each shipment of GCL for which MQA/MQC documentation is required will be properly accompanied by the completed manufacturing certification statement shown in Appendix G. The statement indicates to the customer that the purchased GCL complies with all of the quality criteria specified in this manual.

Raw MQA/MQC data (in other words, documentation for the certifications originally sent with the GCL order) will be furnished as necessary. This information will contain all QA test results (except index flux and hydraulic conductivity) in tabular form, along with CETCO test specification, for each lot of GCL produced. The certifications for the bentonite clay and the QA tracking forms will also be included in this report. The MQA/MQC reports will be furnished to the purchaser corresponding to the GCL lot and roll numbers associated with each project for which this information is required. Due to the time required to run the index flux and hydraulic conductivity testing, this information will be forwarded as necessary under separate cover.

SECTION 4

SUMMARY OF GCL MQA/MQC PLAN

This section provides a tabular summary of the of the MQA/MQC plan for finished GCL and its component materials. Table 4-1 and Table 4-2 serve as convenient references for the overall scope of the plan but should not be used until the plan is read and understood in its entirety. The tables illustrate that the plan is designed to provide comprehensive verification of GCL quality. It is emphasized that the program will be amended as required to conform to future product/process improvements.

TABLE 4-1
BENTOMAT MQA/MQC PLAN SUMMARY[1]
Version 5.0, effective March 1997 (revised November 1997)

MATERIAL	QUALITY PARAMETER[1]	TEST METHOD[2]	TEST FREQUENCY[3]	CERTIFIED VALUE[4]
Bentonite[5]	Swell Index	ASTM D 5890	50 tonnes	24 mL/2g min.
	Fluid Loss	ASTM D 5891	50 tonnes	18 mL max.
	Moisture Content	ASTM D 2216	50 tonnes	10 percent typical.
	Particle Type: Granular[6]	ASTM D 421	50 tonnes	100% typical - #10 1% typical - #200
Bentomat CL	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq ft	0.75 lb/sq ft
	Moisture Content[8]	ASTM D 4643	40,000 sq ft	25 percent typical
	Grab Strength[9]	ASTM D 4632	200,000 sq ft	120 lbs for CL
	Peel Strength[9]	ASTM D 4632	40,000 sq ft	15 lbs
	Index Flux[11]	ASTM D 5887 or E96	Weekly	1×10^{-9} $m^3/m^2/sec$
	Permeability[11]	ASTM D 5084 or E96	Weekly	5×10^{-10} cm/sec
Bentomat DN	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq ft	0.75 lb/sq ft
	Moisture Content[8]	ASTM D 4643	40,000 sq ft	25 percent typical
	Grab Strength[9]	ASTM D 4632	200,000 sq ft	150 lbs for DN
	Peel Strength[9]	ASTM D 4632	40,000 sq ft	15 lbs
	Index Flux[10]	ASTM D 5887	Weekly	1×10^{-8} $m^3/m^2/sec$
	Permeability[10]	ASTM D 5084	Weekly	5×10^{-9} cm/sec
Bentomat ST	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq ft	0.75 lb/sq ft
	Moisture Content[8]	ASTM D 4643	40,000 sq ft	25 percent typical
	Grab Strength[9]	ASTM D 4632	200,000 sq ft	90 lbs for ST
	Peel Strength[9]	ASTM D 4632	40,000 sq ft	15 lbs
	Index Flux[10]	ASTM D 5887	Weekly	1×10^{-8} $m^3/m^2/sec$
	Permeability[10]	ASTM D 5084	Weekly	5×10^{-9} cm/sec

NOTES:

1. Please refer to the CETCO GCL MQA/MQC manual for additional details regarding this information. Also, the listed values of each parameter are subject to change as manufacturing processes are refined. Contact CETCO for confirmation of this information.
2. ASTM procedures modified as necessary to facilitate the testing of a GCL instead of a geotextile.
3. The listed test frequency is based on ASTM D 5889 *Standard Practice for Quality Control of Geosynthetic Clay Liners*. Actual frequency of all tests may vary slightly due to varying roll dimensions.
4. All required values listed are minimum average roll values (MARVs) unless otherwise indicated.
5. These parameters are for the bentonite before it is incorporated into the finished Bentomat/Claymax product.
6. All bentonite is granular type. The particle size distribution may vary slightly.
7. Mass per unit area of the bentonite component of the Bentomat/Claymax, obtained by weighing an oven-dried sample of known area and subtracting the typical geotextile mass per unit area values. The resulting values are normalized to a reference moisture content of 0 percent.
8. Moisture content of the bentonite, exclusive of the geotextiles.
9. All tensile testing represent values with the test specimens oriented in the machine direction.
10. ASTM D 5887 Index Flux and ASTM D 5084 Hydraulic Conductivity test with deaired-distilled deionized water at 80 psi (551 kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. This flux value is equivalent to a permeability of 5×10^{-9} cm/sec for typical GCL thickness.
11. ASTM D 5887 Index Flux and ASTM D 5084 Hydraulic Conductivity test with deaired-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 95 gal/acre/day. This flux value is equivalent to a permeability of 5×10^{-10} cm/sec for typical GCL thickness. Alternatively, hydraulic conductivity can be determined by performing water vapor transmisivity testing (ASTM E 96) on the membrane side of the GCL and using the conversion outlined by Koerner (1994). 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.

TABLE 4-2
CLAYMAX MQA/MQC PLAN SUMMARY[1]
Version 5.0, November 1997

MATERIAL	QUALITY PARAMETER[1]	TEST METHOD[2]	TEST FREQUENCY[3]	CERTIFIED VALUE[4]
Bentonite[5]	Swell Index	ASTM D 5890	50 tonnes	24 mL/2g min.
	Fluid Loss	ASTM D 5891	50 tonnes	18 mL max.
	Moisture Content	ASTM D 2216	50 tonnes	10 percent typical.
	Particle Type: Granular[6]	ASTM D 421	50 tonnes	100% typical - #10 1% typical - #200
Claymax 200R	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq ft	0.75 lb/sq ft
	Moisture Content[8]	ASTM D 4643	40,000 sq ft	40 percent typical
	Grab Strength[9]	ASTM D 4632	200,000 sq ft	75 lbs (330 N)
	Peel Strength[9]	ASTM D 4632	N/A	N/A
	Index Flux[10]	ASTM D 5887	Weekly	1×10^{-4} $m^3/m^2/sec$
	Permeability[10]	ASTM D 5084	Weekly	5×10^{-9} cm/sec
Claymax 600CL	Bentonite Mass/Area[7]	ASTM D 5993	40,000 sq ft	0.75 lb/sq ft
	Moisture Content[8]	ASTM D 4643	40,000 sq ft	40 percent typical
	Grab Strength[9]	ASTM D 4632	200,000 sq ft	75 lbs (330 N)
	Peel Strength[9]	ASTM D 4632	N/A	N/A
	Index Flux[10]	ASTM D 5887 or E96	Weekly	1×10^{-9} $m^3/m^2/sec$
	Permeability[10]	ASTM D 5084 or E96	Weekly	5×10^{-10} cm/sec

NOTES:

1. Please refer to the CETCO GCL MQA/MQC manual for additional details regarding this information. Also, the listed values of each parameter are subject to change as manufacturing processes are refined. Contact CETCO for confirmation of this information.
2. ASTM procedures modified as necessary to facilitate the testing of a GCL instead of a geotextile.
3. The listed test frequency is based on ASTM D 5889 *Standard Practice for Quality Control of Geosynthetic Clay Liners*. Actual frequency of all tests may vary slightly due to varying roll dimensions.
4. All required values listed are minimum average roll values (MARVs) unless otherwise indicated.
5. These parameters are for the bentonite before it is incorporated into the finished Bentomat product.
6. All bentonite is granular type. The particle size distribution may vary slightly.
7. Mass per unit area of the bentonite component of the Bentomat, obtained by weighing an oven-dried sample of known area and subtracting the typical geotextile mass per unit area values. The resulting values are normalized to a reference moisture content of 0 percent.
8. Moisture content of the bentonite, exclusive of the geotextiles.
9. All tensile testing represent values with the test specimens oriented in the machine direction.
10. ASTM D 5887 Index Flux and ASTM D 5084 Hydraulic Conductivity test with deaired-distilled deionized water at 80 psi (551 kPa) cell pressure, 77 psi (531 kPa) headwater pressure and 75 psi (517 kPa) tailwater pressure. This flux value is equivalent to a permeability of 5×10^{-9} cm/sec for typical GCL thickness.
11. ASTM D 5887 Index Flux and ASTM D 5084 Hydraulic Conductivity test with deaired-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 95 gal/acre/day. This flux value is equivalent to a permeability of 5×10^{-10} cm/sec for typical GCL thickness. Alternatively, hydraulic conductivity can be determined by performing water vapor transmisivity testing (ASTM E 96) on the membrane side of the GCL and using the conversion outlined by Koerner (1994). 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.

APPENDIX A

REFERENCED STANDARDS AND TEST METHODS

APPENDIX B

TEST METHOD FOR:

BENTONITE MASS PER UNIT AREA

REFERENCED STANDARDS AND TEST METHODS

ASTM D 421 Standard Practice of Dry Preparation of Soil Samples for Particle-Size Analysis and Determination of Soil Constants

ASTM D2216 Standard Test Method for Laboratory Determination of Moisture Content of Soil and Rock

ASTM D4632 Standard Test Method for Grab Breking Load and Elongation of Geotextiles

ASTM D4643 Determination of Moisture Content of Soil by the Microwave Oven Method

ASTM D5084 Standard Test Method for Measurement of Hydraulic Conductivity of Saturated Pourous Materials Using a Flexible Wall Permeameter

ASTM D5261 Standard Test Method for Measuring Mass Per Unit Area of Geotextiles

ASTM D5887 Standard Test Method or Measurement of Index Flux Through Saturated GCL Specimens Using a Flexible Wall Permeameter

ASTM D5889 Standard Practice for Quality Control of GCLs

ASTM D5890 Standard Test Method for Swell Index Measurement of the Clay Mineral Component of GCLs

ASTM D5891 Standard Test Method for Measurement of Fluid Loss of Clay Mineral Component of GCLs

ASTM D5993 Standard Test Method for Measuring the Mass Per Unit Area of GCLs (not yet in print- See Appendix B)

TEST METHOD FOR DETERMINING GCL BENTONITE MASS PER UNIT AREA (Continued)

3. **specimen and the other half discarded. Record the mass of bentonite discarded in the spreadsheet *BENTMPA.XLS*.**

4. Place each specimen individually on the scale. **Weigh each specimen in grams and record the results as the Total Mass of GCL Composite in the spreadsheet *BENTMPA.XLS*.**

5. Dry each specimen in the microwave oven, leaving the tared plate beneath the specimens.

6. Again place each specimen individually on the scale. **Weigh each specimen in grams and record the results as the Dry Mass of GCL Composite in the spreadsheet *BENTMPA.XLS*.**

7. **Record the Area of each Specimen in square inches in the spreadsheet *BENTMPA.XLS*.**

8. **Record the Mass Per Unit Area of the Upper and Lower Textiles in ounces per square yard in the spreadsheet *BENTMPA.XLS*. The typical textile mass per unit area should be recorded.**

9. **The spreadsheet *BENTMPA.XLS* will automatically calculate the mass per unit area of each specimen at 0% moisture content. The spreadsheet will also determine the average bentonite mass per unit area of the five specimens.**

Results

The mass per unit area at 0% moisture content of each of the 5 specimens must be greater than or equal to 0.75 psf (3,660 g/m^2).

Action

If any of the 5 mass per unit area values do not achieve the minimum acceptable density stated above, the test must be repeated on 5 additional specimens taken from adjacent locations on the test sample. If 9 of the 10 mass per unit area at 0% values exceed 0.75 psf, the roll is acceptable. If not, the roll should not be accepted for this shipment, and the 2 GCL rolls manufactured immediately before and after the rejected roll should be sampled as described in Step 4 above. The same acceptance/rejection criteria should be applied to these rolls. This process should be repeated until the acceptance criteria are achieved.

Reporting

Print the spreadsheet *BENTMPA.XLS*. Enter the average bentonite mass per unit area (lb/sf) at 0% moisture content into the quality control portion of the inventory control system.

TEST METHOD FOR DETERMINING BENTONITE MASS PER UNIT AREA

Use

The purpose of this test is to provide a means of determining the bentonite mass per unit area contained within CETCO GCLs. The test will also provide a close approximation of the moisture content of the clay. Note that the precise mass per unit area and moisture content values cannot be determined unless the geotextiles are separated from the GCL. Because of the time required to separate the geotextiles and the difficulty in doing so without sustaining clay loss, the geotextiles are not removed. Their contribution to the total mass per unit area of the GCL specimens will be mathematically subtracted, using a factor based on the typical mass per unit area of each. Because this factor is relatively small in comparison to the overall mass per unit area, and because the geotextiles have little variation in mass per unit area, the potential error that could result is negligible.

Frequency

One sample roll should be manufactured 3 feet extra long for every 40,000 ft^2 of GCL manufactured (once per every 18 rolls of Bentomat (150 ft long x 15 ft wide; once per every 19 rolls of Claymax (150 ft long x 13.83 ft wide)). Obtain 5 test specimens per sample.

Personnel

Roll-up operator
QA Tester

Equipment

Sharp utility knife or textile cutter
Microwave oven
Laboratory scale or balance
Cutting template (4" x 8" or 32 in^2)

Procedures

1. Cut a 3-foot full roll-width sample from each designated roll.

2. **Record the Plant Location, Date, Lot Number, Roll Number and Laboratory Technician's name on the spreadsheet *BENTMPA.XLS*.**

3. **Use a template to cut 5 test specimens randomly across the width of the sample. One specimen should be taken from each of the five "windows" shown in Figure 2-2.** Minimize edge loss of bentonite by placing a tared plate beneath the sample. **Any waste clay (including on the cutting die or razor) should be collected from each individual specimen and divided in half. One half of the waste clay should be added to the test**

APPENDIX C

TEST METHOD FOR:

BENTOMAT PEEL STRENGTH

TEST METHOD FOR DETERMINING BENTOMAT PEEL STRENGTH

Use

The purpose of this test is to provide a means of evaluating the index peel strength Bentomat. The test is used to evaluate whether it is necessary to replace needles during Bentomat production.

Frequency

One sample roll should be manufactured 3 feet extra long for every 40,000 square feet of GCL manufactured. Obtain five test specimens per sample.

Personnel

Roll-up operator
QA Tester

Equipment

Sharp utility knife or textile cutter
Tensile testing device
Cutting template (1 sq ft)

Procedures

1. Cut a 3-foot full roll-width sample from each designated roll.

2. Use a template to cut five 4" by 8" specimens from the sample.

3. Draw a line across the 4-inch width of each specimen, exactly 2.5 inches from one end.

4. Use a utility knife to slice the needlepunched bonds between the two geotextiles, from the end of each specimen to the 2.5-inch line drawn previously.

5. Mount the specimen in the tensile testing device such that the upper jaw contains the woven geotextile and the lower jaw contains the non-woven geotextile. The jaws should be set at a baseline distance of one inch apart.

6. Use the tensile testing device to peel each specimen at the same rate as is done for standard tensile testing.

TEST METHOD FOR DETERMINING BENTOMAT PEEL STRENGTH (Continued)

Reporting

Record the maximum peel strength for each specimen. The peel strength results for the three specimens should be averaged. and this average should be recorded, rounding off to one digit after the decimal.

Results

The average peel strength must be greater than or equal to 15 lbs..

Action

If the average peel strength value does not achieve the minimum requirements stated above. the test must be repeated on 5 additional specimens taken from adjacent locations on the test sample. If the average peel strength of the 5 additional speciments exceeds 15 lbs. the roll is acceptable. If not, the roll should not be accepted for this shipment. and the two GCL rolls manufactured immediately before and after the rejected roll should be sampled as described above. The same acceptance/rejection criteria should be applied to these rolls. This process should be repeated until the acceptance criteria are achieved.

APPENDIX D

SAMPLE CETCO GCL MQA/MQC REPORT

CETCO

SAMPLE PACKAGE

GEOSYNTHETIC CLAY LINER

MANUFACTURING QA/QC DATA PACKAGE

ENGINEER: Contact Name

PREPARED FOR: Contact Person
Company Name
Address
City, State Zip Code

PREPARED BY: Cynthia Willix
CETCO
P.O. Box 88
234 Gordon Street
Fairmount, GA 30139
Telephone# (706) 337-5316
Fax# (706) 337-2215

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
234 Gordon Street • Fairmount, GA 30139 • USA
(706) 337-5316 • Fax (706) 337-7334

DATE

Contact Person
Company Name
Address
City, State Zip Code

Dear Sir/Madam:

Please find enclosed the MQA/MQC Data Package for Geosynthetic Clay Liner (GCL) shipment(s) to Project Name, (City, State).
This/These shipment(s) left our CETCO - Fairmount, GA, plant on (ship date)

If you have any questions regarding the enclosed QA/QC information, please contact me @ 1-800-220-2536.

Sincerely,

Cynthia Willix

Cynthia Willix
Quality Assurance Coordinator

DAILY GEOSYNTHETIC CLAY LINER PRODUCTION CERTIFICATION

CETCO

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

TO: Contact Person
Company Name
Address
City, State Zip Code

PROJECT: Project Name

ORDER # Bill of Lading #(s)

CETCO hereby affirms and certifies that all of the Geosynthetic Clay Liner manufactured in this lot achieves the physical and chemical criteria listed below:

PROPERTY	TEST METHOD	MINIMUM VALUE
Bentonite Mass/Area	ASTM D 5993	0.75 lb/sq. ft.*
Grab Strength	ASTM D 4632	75 lbs.*
Index Flux	ASTM D 5887	1.0 x 10(-8) cm(3)/cm(2)/sec*
Permeabilty	ASTM D 5084	5 x 10(-9) cm/sec*

Cynthia Willis
Colloid/Environmental Technologies Co. (CETCO)

Subscribed and sworn to before me this _____day of_____19___.

_____
Notary Public

* Reported at 0% moisture content.
* GCL has been continously inspected for broken needles.
* Properties, test methods and values may vary depending on type of product.

QCGIFT2 QCTIFT2
8/05/97 14:11:20

COLLOID ENVIRONMENTAL TECH CO
GCL QUALITY DATA

FAIRMOUNT, GA
234 GORDON ST
FAIRMOUNT GA 30139

SHIP TO: [redacted]

ORDER # [redacted]

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB ELONGATION 10% Typical ASTM D 4632	GRAB STRENGTH 90 lbs ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632
030-BENTOMAT ST	199731030	00003559	.96	14.00	117.00	36.10
030-BENTOMAT ST	199731030	00003558	.96	14.00	117.00	36.10
030-BENTOMAT ST	199731030	00003555	.96	14.00	117.00	36.10
030-BENTOMAT ST	199731030	00003554	.96	14.00	117.00	36.10
030-BENTOMAT ST	199731030	00003553	.96	14.00	117.00	36.10
030-BENTOMAT ST	199731030	00003551	1.03	14.00	117.00	29.70
030-BENTOMAT ST	199731030	00003548	1.03	14.00	117.00	21.40
030-BENTOMAT ST	199731030	00003543	1.03	14.00	117.00	21.40
030-BENTOMAT ST	199731030	00003539	.93	14.00	117.00	35.80
030-BENTOMAT ST	199731030	00003538	.93	14.00	117.00	35.80
030-BENTOMAT ST	199731030	00003531	.93	14.00	117.00	35.80
030-BENTOMAT ST	199731030	00003527	.93	14.00	117.00	35.80
030-BENTOMAT ST	199731030	00003526	.93	14.00	117.00	35.80
030-BENTOMAT ST	199731030	00003516	.92	14.00	117.00	28.10
030-BENTOMAT ST	199731030	00003501	.96	13.20	102.00	36.70

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested. If an asterisk is not present, test results are based on the previous roll tested.
Mass Area and Moisture content are tested a minimum of every 40,000sf.
Grab Strength is tested a minimum of every 200,000sf.
Bentonite Mass/Area is reported at 0% moisture content.

*** End of Report ***

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY 37
LOVELL, WYO. 82431

DATE: 17-Jun-97

TO: CETCO - CLAYMAX CORP.
234 GORDON RD.

FAIRMOUNT, GA. 30139

ATTN: QUALITY CONTROL

Dear Sirs:

A shipment of CG 50
left our Lovell, WY plant on 16-Jun-97
in BN 446323
as requested on your order no. VERBAL

A sample from this shipment was tested, and gave the following results:

TEST	METHOD	REQ. SPECIFICATION	ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0%	0
PASSING 200 MESH	ASTM C 136	1.0 % MAX	0.4
MOISTURE	ASTM D 5891	12.0% MAX.	8.4
FREE SWELL	ASTM D 2216	24 MIN.	24
FLUID LOSS	ASTM D 5890	18.0 MAX.	12.4

We hereby certify that the results shown above represent this shipment.
Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: R.P.

Approved By: MOSES BRISENO

CETCO

In any correspondence regarding this shipment, please refer to our
Order Number 59236

QCGITEI QCTITEI
8/05/97 14:11:20

COLLOID ENVIRONMENTAL TECH CO
GCL MQA/MQC TRACKING FORM

CETCO FAIRMOUNT PLANT
234 GORDON ST
FAIRMOUNT GA 30139

SHIP TO: [redacted]

ORDER NUMBER [redacted]

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOSYNTHETIC TOP LOT#	GEOSYNTHETIC TOP ROLL#	GEOSYNTHETIC BOTTOM LOT#	GEOSYNTHETIC BOTTOM ROLL#	CLAY LOT#
LOT# 199731030									
00003501	030-BENTOMAT ST	150	2250	2801	209406		199731010	00003810	446323
00003516	030-BENTOMAT ST	150	2250	2763	205532		199731010	00003816	301588
00003526	030-BENTOMAT ST	150	2250	2823	205532		199731010	00003765	301588
00003527	030-BENTOMAT ST	150	2250	2805	205532		199731010	00003765	301588
00003537	030-BENTOMAT ST	150	2250	2834	983851		199731010	00003808	301588
00003538	030-BENTOMAT ST	150	2250	2771	983851		199731010	00003808	301588
00003539	030-BENTOMAT ST	150	2250	2804	983851		199731010	00003851	301588
00003543	030-BENTOMAT ST	150	2250	2771	983851		199731010	00003808	301588
00003548	030-BENTOMAT ST	150	2250	2740	983851		199731010	00003808	301588
00003551	030-BENTOMAT ST	150	2250	2793	983851		199731010	00003808	301588
00003553	030-BENTOMAT ST	150	2250	2789	983851		199731010	00003808	301588
00003554	030-BENTOMAT ST	150	2250	2775	983851		199731010	00003808	301588
00003555	030-BENTOMAT ST	150	2250	2780	983851		199731010	00003808	301588
00003558	030-BENTOMAT ST	150	2250	2734	983851		199731010	00003808	301588
00003559	030-BENTOMAT ST	150	2250	2761	983851		199731010	00003768	301588

TOTAL SQUARE FEET..... 33,750

TOTAL PAGES 1

ENVIROCON

500 Taylor Street / 59802
P.O. Box 16655
Missoula, MT 59808
TEL (406) 523-1150 FAX (406) 543-7987

ASARCO's E. Helena Plant
RCRA Landfill Phase I Cell

SUBMITTAL TRANSMITTAL

From: Douglas G. Tisdell

Date: October 01, 2001

To: ASARCO, Inc.

Attn: Darrell Shew

Phone: (406) 227-7173

We are sending via: ☐ Mail ☒ Hand Delivery ☐ Federal Express ☐ UPS

☒ Enclosed ☐ Separately

QUANTITY	SPEC. SECTION	DESCRIPTION
1	625.03	GCL QA/QC Certifications

Remarks: These submittals have been reviewed by the QC Manager to ensure that they comply with the Project Specifications. Any variances are noted below:

Variances: None.

Signed: Douglas G. Tisdell Date: 10-01-01

QC Manager

A Washington Company

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
P.O. Box 428 • Lovell, Wyoming 82431
(307) 548-6521 • Fax (307) 548-6413

Date: September 26, 2001
PO: 28803
Order #: 147560

Kurt Wieringa,
Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635
406-227-6059

Dear Kurt Wieringa,

Please find enclosed the MQA/MQC Data Package for GCL shipments to Envirocon, Inc. . These shipments left our CETCO - Lovell, Wy. plant on September 25, 2001 .

If you have any questions regarding the enclosed QA/QC information, please contact me at (800)322-1149 ext:423.

Sincerely,

Noe Garcia
Quality Assurance Coordinator

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
P.O. Box 428 • Lovell, Wyoming 82431
(307) 548-6521 • Fax (307) 548-6413

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA PACKAGE

PROJECT NAME: Asarco East Helena CAMU Cap
East Helena, MT.

CUSTOMER P.O.: 28803

PREPARED FOR: Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635

Telephone # : 406-227-6059

PREPARED BY:

Noe Garcia
Quality Assurance Coordinator
CETCO
P.O. Box 428
92 Hwy. 37
Lovell, Wy. 82431

Telephone #: 800-322-1149 (Ext. 423)
Fax #: (307)548-6927, (307)548-6413
E-Mail: ngarc@cetco.com

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA

FOR ALL GCL MANUFACTURED ON:

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147560
Ship Date:	9/25

CONTENTS:

1. PACKING LIST
2. DAILY CLAYMAX PRODUCTION CERTIFICATION
3. BENTONITE CLAY CERTIFICATION
4. CLAYMAX MANUFACTURING CERTIFICATION AND TEST RESULTS
5. CLAYMAX MQA TRACKING FORM

PACKING LIST

CETCO
[illegible]00 WEST SHURE DRIVE
[illegible]LINGTON HEIGHTS IL 60004

ORDER NO:.. 000147560
ORDER DATE: 9/06/2001
SHIP DATE:. 9/25/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-CLAYMAX200R		SFT	SF 200124L0	00000880	150.0	15.0	2250.0	2891.0
LO-CLAYMAX200R		SFT	SF 200124L0	00000934	150.0	15.0	2250.0	2903.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001313	150.0	15.0	2250.0	2888.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001321	150.0	15.0	2250.0	2928.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001335	150.0	15.0	2250.0	2886.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001336	150.0	15.0	2250.0	2891.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001337	150.0	15.0	2250.0	2896.0
LO-CLAYMAX200R		SFT	SF 200130L0	00001340	150.0	15.0	2250.0	3027.0
LO-CLAYMAX200R		SFT	SF 200130L0	00001350	150.0	15.0	2250.0	3031.0
LO-CLAYMAX200R		SFT	SF 200134L0	00001474	150.0	15.0	2250.0	3247.0
LO-CLAYMAX200R		SFT	SF 200134L0	00001475	150.0	15.0	2250.0	3254.0
LO-CLAYMAX200R		SFT	SF 200134L0	00001476	150.0	15.0	2250.0	3271.0
LO-CLAYMAX200R		SFT	SF 200134L0	00001477	150.0	15.0	2250.0	3280.0
LO-CLAYMAX200R		SFT	SF 200134L0	00001478	150.0	15.0	2250.0	3282.0
LO-CLAYMAX200R		SFT	SF 200134L0	00001479	150.0	15.0	2250.0	3277.0

ORDER TOTALS.....	33750.0	45952.0

TOTAL ITEMS..... 15

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

GEOSYNTHETIC CLAY LINER

MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147560
Ship Date:	25-Sep

Colloid Environmental Technologies Company (CETCO) hereby affirms and certifies that all of the Claymax 200R manufactured in this lot achieves the physical and chemical criteria listed on the attached analysis sheet.

Shem McArthur
Production Coordinator

Subscribed and sworn to before me this 26 day of September 2001.

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/8/04

BENTONITE CLAY CERTIFICATIONS

TECHNICAL DATA SHEET

ORIGIN INFORMATION

BENTONITE

Manufacturer: **Colloid Environmental Technologies Co.**

PRODUCTION

Facility: **Colloid Environmental Technologies Co.**
92 HWY. 37
Lovell, WY 82431

Contact: Shem McArthur
(800)-322-1160

Brand Name: CG 50

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 6/13/01

ATTN: Kurt Wieringa,

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from **CETCO,** Order Number See Below

A sample of the CG 50 was tested from Lot Number 061301B and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	**0**
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	**26.0**
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	**15.2**
Moisture	ASTM D 2216	12.0 % (MAX)	**8.0**
Passing 200 Mesh	ASTM D 421	1 % (Max)	**0.6**

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.

147560

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 6/14/01

ATTN: Kurt Wieringa,

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 061401A and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	24.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	17.2
Moisture	ASTM D 2216	12.0 % (MAX)	9.6
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.4

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.

147560

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: **Envirocon, Inc.** DATE: **7/17/01**

ATTN: **Kurt Wieringa,**

Dear Customer:

The BENTONITE that is used to produce our GCL is **CG 50** from **CETCO,** Order Number **See Below**

A sample of the CG 50 was tested from Lot Number **071701C** and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	**0**
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	**24.0**
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	**16.0**
Moisture	ASTM D 2216	12.0 % (MAX)	**9.0**
Passing 200 Mesh	ASTM D 421	1 % (Max)	**0.8**

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: **SW, JH, FF.**

Approved By: **Noe Garcia**

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.

147560

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 7/25/01

ATTN: Kurt Wieringa,

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 072501B and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	26.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	16.0
Moisture	ASTM D 2216	12.0 % (MAX)	8.8
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.6

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.

147560

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 8/20/01

ATTN: Kurt Wieringa.

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 082001B and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	24.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.8
Moisture	ASTM D 2215	12.0 % (MAX)	9.0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.4

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.

147560

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

GEOSYNTHETIC CLAY LINER

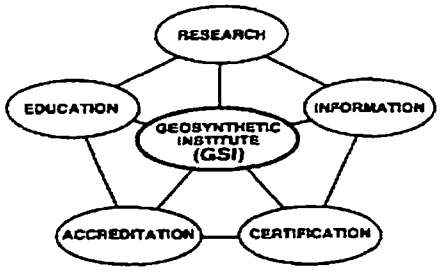
MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147560
Ship Date:	25-Sep

CETCO hereby affirms and certifies that the Claymax 200R material supplied to this project will meet the physical and chemical criteria listed below.

PROPERTY	TEST METHOD	MINIMUM VALUE
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)
Bentonite Mass / Area	ASTM D 5993	* .75 lb/sq.ft. (Min.)
Grab Strength	ASTM D 4632	75 lbs. (330 N)
Grab Elongation	ASTM D 4632	15 Percent Typical
Permeability	ASTM D 5084	5 x 10 (-9) cm/sec. (Max)
Index Flux	ASTM D 5887	1.0 x 10 (-8) m(3)/m(2)/sec. (max.)

*** Reported at 0 % moisture content.**
GAI Lab Accredited Test Methods were followed during conformance testing for:
ASTM D 4632 - Grab Strength and Grab Elongation.
ASTM D 5887 - Index Flux.
ASTM D 5993 - Bentonite Mass/Area.



Colloid Environmental Technologies Co. (CETCO)

Subscribed and sworn to before me this 26 day of September 2001.

Notary Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/8/04

QCG#FT2 QCT#FT2
9/26/01 12:10:09

CETCO

GCL QUALITY DATA

LOVELL AMERICAN COLLOID

SHIP TO: ASARCO EAS
C/O ENVIRO
EAST HELEN

O R D E R # 000147560

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA .075 lb/sqft ASTM D 5993	GRAB ELONGATION % ASTM D 4632	GRAB STRENGTH 75lbs marv ASTM D 4632
LO-CLAYMAX200R	200134LO	00001479	.97	27.40	182.80
LO-CLAYMAX200R	200134LO	00001478	.97	27.40	182.80
LO-CLAYMAX200R	200134LO	00001477	.97	27.40	182.80
LO-CLAYMAX200R	200134LO	00001476	.97	27.40	182.80
LO-CLAYMAX200R	200134LO	00001475	.97	27.40	182.80
LO-CLAYMAX200R	200134LO	00001474	.97*	27.40*	182.80*
LO-CLAYMAX200R	200130LO	00001350	.95	32.80	178.90
LO-CLAYMAX200R	200130LO	00001340	.95	32.80	178.90
LO-CLAYMAX200R	200129LO	00001337	.96	29.10	207.60
LO-CLAYMAX200R	200129LO	00001336	.96	29.10	207.60
LO-CLAYMAX200R	200129LO	00001335	.96	29.10	207.60
LO-CLAYMAX200R	200129LO	00001321	.96	29.10	201.60
LO-CLAYMAX200R	200129LO	00001313	.96	29.10	201.60
LO-CLAYMAX200R	200124LO	00000934	.92	30.50	171.20
LO-CLAYMAX200R	200124LO	00000880	92	30.50	171.20

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Bentonite Mass/Area and Moisture content are tested a minimum of every 40,000sf.
Bentonite Mass/Area is reported at 0% moisture content.
Grab Strength is tested a minimum of every 200,000sf.
Peel Strength is tested a minimum of every 40,000sf.
All tensile testing is in the machine direction

*** End of Report ***

GEOSYNTHETIC CLAY LINER MQA TRACKING FORMS

CETCO
GCL MQA/MQC TRACKING FORM

SHIP TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON
EAST HELENA MT

ORDER NUMBER 000147560

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
LOT# 200124LO									
00000880	LO-CLAYMAX200R	150	2250	2891	8563584		8535785		061301B
00000934	LO-CLAYMAX200R	150	2250	2903	8599517		8591933		061401A
LOT# 200129LO									
00001313	LO-CLAYMAX200R	150	2250	2888	8625860		8629793		071701C
00001321	LO-CLAYMAX200R	150	2250	2928	8625860		8629793		071701C
00001335	LO-CLAYMAX200R	150	2250	2886	8625860		8625852		071701C
00001336	LO-CLAYMAX200R	150	2250	2891	8625860		8625852		071701C
00001337	LO-CLAYMAX200R	150	2250	2896	8625691		8625852		071701C
LOT# 200130LO									
00001340	LO-CLAYMAX200R	150	2250	3027	8629802		8614669		072501B
00001350	LO-CLAYMAX200R	150	2250	3031	8610891		8614669		072501B
LOT# 200134LO									
00001474	LO-CLAYMAX200R	150	2250	3247	8614674		8625861		082001B
00001475	LO-CLAYMAX200R	150	2250	3254	8634507		8625861		082001B
00001476	LO-CLAYMAX200R	150	2250	3271	8634507		8625861		082001B
00001477	LO-CLAYMAX200R	150	2250	3280	8634507		8625861		082001B
00001478	LO-CLAYMAX200R	150	2250	3282	8634507		8625861		082001B
00001479	LO-CLAYMAX200R	150	2250	3277	8634507		8625861		082001B

TOTAL SQUARE FEET..... 33,750

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
P.O. Box 428 • Lovell, Wyoming 82431
(307) 548-6521 • Fax (307) 548-6413

Date: September 27, 2001
PO: 28803
Order #: 147561

Kurt Wieringa,
Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635
406-227-6059

Dear Kurt Wieringa,

Please find enclosed the MQA/MQC Data Package for GCL shipments to Envirocon, Inc. . These shipments left our CETCO - Lovell, Wy. plant on September 26, 2001 .

If you have any questions regarding the enclosed QA/QC information, please contact me at (800)322-1149 ext:423.

Sincerely,

Noe Garcia
Quality Assurance Coordinator

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA PACKAGE

PROJECT NAME: Asarco East Helena CAMU Cap
East Helena, MT.

CUSTOMER P.O.: 28803

PREPARED FOR: Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635

Telephone # : 406-227-6059

PREPARED BY:

Noe Garcia
Quality Assurance Coordinator
CETCO
P.O. Box 428
92 Hwy. 37
Lovell, Wy. 82431

Telephone #: 800-322-1149 (Ext. 423)
Fax #: (307)548-6927, (307)548-6413
E-Mail: ngarc@cetco.com

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA

FOR ALL GCL MANUFACTURED ON:

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147561
Ship Date:	9/26

CONTENTS:

1. PACKING LIST
2. DAILY GCL PRODUCTION CERTIFICATION
3. NEEDLE DETECTION CERTIFICATION
4. BENTONITE CLAY CERTIFICATION
5. GCL MANUFACTURING CERTIFICATION AND TEST RESULTS
6. GCL MQA TRACKING FORM

PACKING LIST

CETCO
00 WEST SHURE DRIVE
LINGTON HEIGHTS IL 60004

ORDER NO:.. 000147561
ORDER DATE: 9/06/2001
SHIP DATE:. 9/26/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-CLAYMAX200R		SFT	SF 200124L0	00000908	150.0	15.0	2250.0	2912.0
LO-CLAYMAX200R		SFT	SF 200124L0	00000909	150.0	15.0	2250.0	2911.0
LO-CLAYMAX200R		SFT	SF 200124L0	00000911	150.0	15.0	2250.0	2917.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001305	150.0	15.0	2250.0	2899.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001306	150.0	15.0	2250.0	2894.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001307	150.0	15.0	2250.0	2889.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001308	150.0	15.0	2250.0	2884.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001309	150.0	15.0	2250.0	2879.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001311	150.0	15.0	2250.0	2878.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001322	150.0	15.0	2250.0	2922.0
LO-CLAYMAX200R		SFT	SF 200129L0	00001323	150.0	15.0	2250.0	2917.0
LO-CLAYMAX200R		SFT	SF 200134L0	00001480	150.0	15.0	2250.0	3274.0
LO-CLAYMAX200R		SFT	SF 200134L0	00001481	150.0	15.0	2250.0	3279.0
LO-CLAYMAX200R		SFT	SF 200134L0	00001485	150.0	15.0	2250.0	3273.0

	========	========
ORDER TOTALS.....	31500.0	41728.0

TOTAL ITEMS..... 14

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

GEOSYNTHETIC CLAY LINER

MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147561
Ship Date:	26-Sep

Colloid Environmental Technologies Company (CETCO) hereby affirms and certifies that all of the Claymax 200R manufactured in this lot achieves the physical and chemical criteria listed on the attached analysis sheet.

Shem McArthur
Production Coordinator

Subscribed and sworn to before me this 27 day of September 2001.

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/8/04

BENTONITE CLAY CERTIFICATIONS

TECHNICAL DATA SHEET

ORIGIN INFORMATION

BENTONITE

Manufacturer: **Colloid Environmental Technologies Co.**

PRODUCTION

Facility: **Colloid Environmental Technologies Co.**
92 HWY. 37
Lovell, WY 82431

Contact: Shem McArthur
(800)-322-1160

Brand Name: CG 50

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 6/13/01

ATTN: Kurt Wieringa,

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 061301B and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	26.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.2
Moisture	ASTM D 2216	12.0 % (MAX)	8.0
Passing 200 Mesh	*ASTM D 421*	*1 % (Max)*	0.6

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.

147561

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 7/17/01

ATTN: Kurt Wieringa,

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 071701C and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	24.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	16.0
Moisture	ASTM D 2216	12.0 % (MAX)	9.0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.8

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.

147561

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: **Envirocon, Inc.** DATE: **8/20/01**

ATTN: **Kurt Wieringa,**

Dear Customer:

The BENTONITE that is used to produce our GCL is **CG 50** from **CETCO,** Order Number **See Below**

A sample of the CG 50 was tested from Lot Number **082001B** and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	**0**
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	**24.0**
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	**15.8**
Moisture	ASTM D 2216	12.0 % (MAX)	**9.0**
Passing 200 Mesh	ASTM D 421	1 % (Max)	**0.4**

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: **SW, JH, FF.**

Approved By: **Noe Garcia**

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.

147561

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

GEOSYNTHETIC CLAY LINER

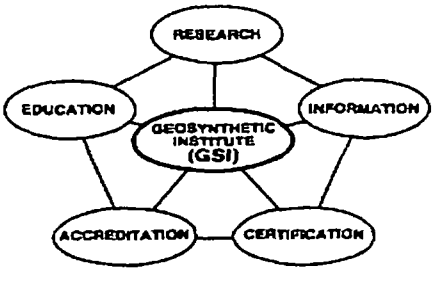
MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147561
Ship Date:	26-Sep

CETCO hereby affirms and certifies that the Claymax 200R material supplied to this project will meet the physical and chemical criteria listed below.

PROPERTY	TEST METHOD	MINIMUM VALUE
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)
Bentonite Mass / Area	ASTM D 5993	* .75 lb/sq.ft. (Min.)
Grab Strength	ASTM D 4632	75 lbs. (330 N)
Grab Elongation	ASTM D 4632	15 Percent Typical
Permeability	ASTM D 5084	5 x 10 (-9) cm/sec. (Max)
Index Flux	ASTM D 5887	1.0 x 10 (-8) m(3)/m(2)/sec. (max.)

*** Reported at 0 % moisture content.**
GAI Lab Accredited Test Methods were followed during conformance testing for:
ASTM D 4632 - Grab Strength and Grab Elongation.
ASTM D 5887 - Index Flux.
ASTM D 5993 - Bentonite Mass/Area.



Colloid Environmental Technologies Co. (CETCO)

Subscribed and sworn to before me this 27 day of September 2001.

Notary Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/18/04

QCG#FT2 QCT#FT2
9/27/01 9:47:40

CETCO

GCL QUALITY DATA

LOVELL AMERICAN COLLOID

SHIP TO: ASARCO EAS
C/O ENVIRO
EAST HELEN

O R D E R # 000147561

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA .075 lb/sqft ASTM D 5993	GRAB ELONGATION % ASTM D 4632	GRAB STRENGTH 75lbs marv ASTM D 4632
LO-CLAYMAX200R	200134LO	00001485	.97	27.40	182.80
LO-CLAYMAX200R	200134LO	00001481	.97	27.40	182.80
LO-CLAYMAX200R	200134LO	00001480	.97	27.40	182.80
LO-CLAYMAX200R	200129LO	00001323	.96	29 10	201.60
LO-CLAYMAX200R	200129LO	00001322	.96	29.10	201.60
LO-CLAYMAX200R	200129LO	00001311	.96	29.10	201.60
LO-CLAYMAX200R	200129LO	00001309	.96	29.10	201.60
LO-CLAYMAX200R	200129LO	00001308	.96	29.10	201.60
LO-CLAYMAX200R	200129LO	00001307	.96	29.10	201.60
LO-CLAYMAX200R	200129LO	00001306	.96	29.10	201.60
LO-CLAYMAX200R	200129LO	00001305	.96	29.10	201.60
LO-CLAYMAX200R	200124LO	00000911	.89	30.50	171.20
LO-CLAYMAX200R	200124LO	00000909	.89	30.50	171.20
LO-CLAYMAX200R	200124LO	00000908	.89	30.50	171.20

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Bentonite Mass/Area and Moisture content are tested a minimum of every 40,000sf.
Bentonite Mass/Area is reported at 0% moisture content.
Grab Strength is tested a minimum of every 200,000sf.
Peel Strength is tested a minimum of every 40,000sf.
All tensile testing is in the machine direction

*** End of Report ***

GEOSYNTHETIC CLAY LINER
MQA TRACKING FORMS

QCG#TF1 QCT#TF1
9/27/01 9:47:39

CETCO
GCL MQA/MQC TRACKING FORM

SHIP TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON
EAST HELENA MT

ORDER NUMBER 000147561

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
LOT# 200124LO									
00000908	LO-CLAYMAX200R	150	2250	2912	8592720		8592713		061301B
00000909	LO-CLAYMAX200R	150	2250	2911	8592720		8592713		061301B
00000911	LO-CLAYMAX200R	150	2250	2917	8592720		8592713		061301B
LOT# 200129LO									
00001305	LO-CLAYMAX200R	150	2250	2899	8625860		8629793		071701C
00001306	LO-CLAYMAX200R	150	2250	2894	8625860		8629793		071701C
00001307	LO-CLAYMAX200R	150	2250	2889	8625860		8629793		071701C
00001308	LO-CLAYMAX200R	150	2250	2884	8625860		8629793		071701C
00001309	LO-CLAYMAX200R	150	2250	2879	8625860		8629793		071701C
00001311	LO-CLAYMAX200R	150	2250	2878	8625860		8629793		071701C
00001322	LO-CLAYMAX200R	150	2250	2922	8625860		8629793		071701C
00001323	LO-CLAYMAX200R	150	2250	2917	8625860		8629793		071701C
LOT# 200134LO									
00001480	LO-CLAYMAX200R	150	2250	3274	8634507		8625861		082001B
00001481	LO-CLAYMAX200R	150	2250	3279	8634507		8625861		082001B
00001485	LO-CLAYMAX200R	150	2250	3273	8634507		8625861		082001B

TOTAL SQUARE FEET..... 31.500

TOTAL PAGES 1

CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
P.O. Box 428 • Lovell, Wyoming 82431
(307) 548-6521 • Fax (307) 548-6413

Date: September 27, 2001
PO: 28803
Order #: 147564, 147566

Kurt Wieringa,
Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635
406-227-6059

Dear Kurt Wieringa,

Please find enclosed the MQA/MQC Data Package for GCL shipments to Envirocon, Inc. These shipments left our CETCO - Lovell, Wy. plant on September 26, 2001.

If you have any questions regarding the enclosed QA/QC information, please contact me at (800)322-1149 ext:423.

Sincerely,

Noe Garcia
Quality Assurance Coordinator

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA PACKAGE

PROJECT NAME: Asarco East Helena CAMU Cap
East Helena, MT.

CUSTOMER P.O.: 28803

PREPARED FOR: Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635

Telephone # : 406-227-6059

PREPARED BY:

Noe Garcia
Quality Assurance Coordinator
CETCO
P.O. Box 428
92 Hwy. 37
Lovell, Wy. 82431

Telephone #: 800-322-1149 (Ext. 423)
Fax #: (307)548-6927, (307)548-6413
E-Mail: ngarc@cetco.com

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA

FOR ALL GCL MANUFACTURED ON:

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147564, 147566
Ship Date:	9/26

CONTENTS:

1. PACKING LIST
2. DAILY GCL PRODUCTION CERTIFICATION
3. NEEDLE DETECTION CERTIFICATION
4. BENTONITE CLAY CERTIFICATION
5. NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION
6. NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION
7. *GCL MANUFACTURING CERTIFICATION AND TEST RESULTS*
8. GCL MQA TRACKING FORM

PACKING LIST

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147564
ORDER DATE: 9/06/2001
SHIP DATE:. 9/26/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT DN		SFT	SF	200139L0	00006901	160.0	14.0	2240.0	3158.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006902	160.0	14.0	2240.0	3144.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006903	160.0	14.0	2240.0	3142.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006904	160.0	14.0	2240.0	3163.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006905	160.0	14.0	2240.0	3209.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006906	160.0	14.0	2240.0	3112.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006907	160.0	14.0	2240.0	3130.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006908	160.0	14.0	2240.0	3128.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006909	160.0	14.0	2240.0	3130.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006910	160.0	14.0	2240.0	3120.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006911	160.0	14.0	2240.0	3137.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006912	160.0	14.0	2240.0	3146.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006913	160.0	14.0	2240.0	3145.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006914	160.0	14.0	2240.0	3124.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006915	160.0	14.0	2240.0	3126.0

ORDER TOTALS.....	33600.0	47114.0

TOTAL ITEMS..... 15

P A C K I N G L I S T

CETCO
1500 WEST SHURE DRIVE
ARLINGTON HEIGHTS IL 60004

ORDER NO:.. 000147566
ORDER DATE: 9/06/2001
SHIP DATE:. 9/26/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT DN		SFT	SF	200139L0	00006833	150.0	14.0	2100.0	2942.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006834	150.0	14.0	2100.0	2949.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006835	150.0	14.0	2100.0	2959.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006836	150.0	14.0	2100.0	2971.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006837	150.0	14.0	2100.0	2980.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006839	150.0	14.0	2100.0	2958.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006840	150.0	14.0	2100.0	3161.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006841	150.0	14.0	2100.0	2961.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006842	150.0	14.0	2100.0	2965.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006843	150.0	14.0	2100.0	2963.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006844	150.0	14.0	2100.0	2964.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006845	150.0	14.0	2100.0	2955.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006846	150.0	14.0	2100.0	2960.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006878	150.0	14.0	2100.0	2850.0
LO-BENTOMAT DN		SFT	SF	200139L0	00006879	150.0	14.0	2100.0	2852.0

	========	========
ORDER TOTALS.....	31500.0	44390.0

TOTAL ITEMS..... 15

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

GEOSYNTHETIC CLAY LINER

MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147564, 147566
Ship Date:	26-Sep

Colloid Environmental Technologies Company (CETCO) hereby affirms and certifies that all of the BENTOMAT DN manufactured in this lot achieves the physical and chemical criteria listed on the attached analysis sheet.

Shem McArthur
Production Coordinator

Subscribed and sworn to before me this 27 day of September 2001.

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 1/18/04

NEEDLE DETECTION CERTIFICATION

CERTIFICATION STATEMENT

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147564, 147566
Ship Date:	26-Sep

This statement is to certify that all components of the BENTOMAT DN manufactured for the above project have been inspected continually for the presence of broken needles through the use of a magnetic removal system.

COLLOID ENVIRONMENTAL TECHNOLOGIES CO. (CETCO)

Subscribed and sworn to before me this 27 day of September 2001.

Notary Public

IVOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 10/13/04

BENTONITE CLAY CERTIFICATIONS

TECHNICAL DATA SHEET

ORIGIN INFORMATION

BENTONITE

Manufacturer: **Colloid Environmental Technologies Co.**

PRODUCTION

Facility: **Colloid Environmental Technologies Co.**
92 HWY. 37
[illegible] 82431

Contact: Shem McArthur
(800)-322-1160

Brand Name: CG 50

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 9/24/01

ATTN: Kurt Wieringa,

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 092401A and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	24.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.0
Moisture	ASTM D 2216	12.0 % (MAX)	9.0
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.2

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.
147564, 147566

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 9/24/01

ATTN: Kurt Wieringa.

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 092401B and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	25.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	15.2
Moisture	ASTM D 2216	12.0 % (MAX)	9.6
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.4

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.
147564, 147566

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 9/26/01

ATTN: Kurt Wieringa,

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 092601A and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	26.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	14.8
Moisture	ASTM D 2216	12.0 % (MAX)	8.8
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.8

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.
147564, 147566

NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION

TECHNICAL DATA SHEET

ORIGIN INFORMATION

NON-WOVEN GEOTEXTILE

Manufacturer: **TNS ADVANCED TECHNOLOGIES**

PRODUCTION

Facility: **TNS**
9855 Greenville Highway, Bld. F
Spartanburg, SC. 29301

Contact: Marshall Gaddy 800-867-5181

Brand Name: TNS X060

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

July 20, 2001
REF: TNS X060
Quantity Shipped: 27 rolls
BOL#: 000506608
Location: Lovell WY

Cetco
92 Highway 37
Lovell WY 82431

Dear Sir/Madam:

This is to certify that TNS X060 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS X060 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS X060 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	6.0
Thickness	ASTM D 5199	mils	60
Grab Tensile	ASTM D 4632	lbs	155
Grab Elongation (MD)	ASTM D 4632	%	50 (min)-90(max)
Grab Elongation (XMD)	ASTM D 4632	%	50(min)-105(max)
Puncture	ASTM D 4833	lbs	85

Marsha Gaddy
Marshall O
Quality [illegible] Manager

TNS MILLS, INC.
NONWOVEN QUALITY DATA
FOR BOL# 000506608

ROLL #	STYL	WDT	LNG	FABR WGHT	THCK	GRAB MD	GRAB XMD	ELNG MD	ELNG XMD	TRAP MD	TRAP XMD	PUNC REST	BRST STRG	FLOW RATE	PERM -ABL	PERM -ITY	AOS
200094123	X060	196	135	6.7	72	178	198	73	85			109			.000	.00	
200094158	X060	196	135	6.2	66	160	207	60	63			97			.000	.00	
200094167	X060	196	135	6.5	69	165	196	58	63			95			.000	.00	
200094169	X060	196	135	6.5	68	169	187	57	63			99			.000	.00	
200094196	X060	196	135	6.3	69	180	199	66	68			111			.000	.00	
200094197	X060	196	135	6.3	69	180	199	66	68			111			.000	.00	
200094199	X060	196	135	6.6	67	177	220	60	67			97			.000	.00	
200094201	X060	196	135	6.3	64	175	196	65	70			920			.000	.00	
200094220	X060	196	135	6.6	70	169	204	61	66			97			.000	.00	
200094222	X060	196	135	6.6	70	169	204	61	66			97			.000	.00	
200094223	X060	196	135	6.1	67	165	215	63	70			104			.000	.00	
200094225	X060	196	135	6.1	67	165	215	63	70			104			.000	.00	
200094227	X060	196	135	6.2	67	163	193	60	64			105			.000	.00	
200094228	X060	196	135	6.2	67	163	193	60	64			105			.000	.00	
200094229	X060	196	135	6.2	67	163	193	60	64			105			.000	.00	
200094230	X060	196	135	6.5	67	184	222	64	69			116			.000	.00	
200094232	X060	196	135	6.5	67	184	222	64	69			116			.000	.00	
200094234	X060	196	135	6.2	67	177	193	65	67			99			.000	.00	
200094235	X060	196	135	6.2	67	177	193	65	67			99			.000	.00	
200094238	X060	196	135	6.4	66	180	212	61	63			112			.000	.00	
200094240	X060	196	135	6.2	63	167	201	61	67			90			.000	.00	
200094243	X060	196	135	6.4	67	178	204	64	66			96			.000	.00	
200094245	X060	196	135	6.6	67	177	220	60	67			97			.000	.00	
200094246	X060	196	135	6.6	67	177	220	60	67			97			.000	.00	
200094247	X060	196	135	6.6	67	177	220	60	67			97			.000	.00	
200094250	X060	196	135	6.3	64	175	196	65	70			920			.000	.00	
200098053	X060	196	135	6.2	70	171	180	64	73			92			.000	.00	

TOTAL NUMBER OF ROLLS 27

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

September 7, 2001
REF: TNS X060
Quantity Shipped: 27 rolls
BOL#: 000801826
Location: Lovell WY

Cetco
92 Highway 37
Lovell WY 82431

Dear Sir/Madam:

This is to certify that TNS X060 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS X060 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS X060 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	6.0
Thickness	ASTM D 5199	mils	60
Grab Tensile	ASTM D 4632	lbs	155
Grab Elongation (MD)	ASTM D 4632	%	50 (min)-90(max)
Grab Elongation (XMD)	ASTM D 4632	%	50(min)-105(max)
Puncture	ASTM D 4833	lbs	85

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

DATE: 9/07/01

TNS MILLS, INC.
NONWOVEN QUALITY DATA
FOR BOL# 000801826

ROLL #	STYL	WDT	LNG	FABR WGHT	THCK	GRAB MD	GRAB XMD	ELNG MD	ELNG XMD	TRAP MD	TRAP XMD	PUNC REST	BRST STRG	FLOW RATE	PERM -ABL	PERM -ITY	AOS
200094128	X060	196	135	6.3	71	161	191	72	90			93			.000	.00	
200094173	X060	196	135	6.4	66	162	192	61	62			100			.000	.00	
200094175	X060	196	135	6.4	66	162	192	61	62			100			.000	.00	
200094176	X060	196	135	6.6	68	170	204	66	64			95			.000	.00	
200094178	X060	196	135	6.6	68	170	204	66	64			95			.000	.00	
200094204	X060	196	135	6.4	71	168	196	63	68			107			.000	.00	
200094205	X060	196	135	6.4	71	168	196	63	68			107			.000	.00	
200094206	X060	196	135	6.7	69	170	213	63	62			100			.000	.00	
200094211	X060	196	135	6.3	68	164	196	58	65			105			.000	.00	
200094212	X060	196	135	6.3	68	169	195	60	63			94			.000	.00	
200094214	X060	196	135	6.3	68	169	195	60	63			94			.000	.00	
200094216	X060	196	135	6.4	67	166	191	61	63			96			.000	.00	
200094217	X060	196	135	6.4	67	166	191	61	63			96			.000	.00	
200094218	X060	196	135	6.6	70	169	204	61	66			97			.000	.00	
200094219	X060	196	135	6.6	70	169	204	61	66			97			.000	.00	
200094224	X060	196	135	6.1	67	165	215	63	70			104			.000	.00	
200094231	X060	196	135	6.5	67	184	222	64	69			116			.000	.00	
200098487	X060	196	135	6.5	75	160	245	82	64			113			.000	.00	
200099041	X060	196	135	6.2	71	161	189	64	74			85			.000	.00	
200099044	X060	196	135	6.1	70	165	182	67	71			94			.000	.00	
200099045	X060	196	135	6.1	70	165	182	67	71			94			.000	.00	
200099051	X060	196	135	6.2	71	158	176	65	73			98			.000	.00	
200099054	X060	196	135	6.4	73	166	194	73	83			103			.000	.00	
200099095	X060	196	135	6.4	72	162	176	58	59			111			.000	.00	
200099105	X060	196	135	6.5	70	174	236	68	67			104			.000	.00	
200099108	X060	196	135	6.4	66	164	212	65	65			106			.000	.00	
200099109	X060	196	135	6.4	66	164	212	65	65			106			.000	.00	

TOTAL NUMBER OF ROLLS 27

NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION

TECHNICAL DATA SHEET

ORIGIN INFORMATION

NON-WOVEN GEOTEXTILE

Manufacturer: **Colloid Environmental Technologies Co.**

PRODUCTION
FACILITY: **CETCO**
102 Conners Road
Villa Rica, GA 30180

CONTACT: Debbie Bivins 404-459-4995

BRAND NAME: Standard

NON-WOVEN GEOTEXTILE

MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147564, 147566
Ship Date:	26-Sep

CETCO hereby affirms and certifies that the Non-Woven geotextile in the BENTOMAT DN product for the above project has been manufactured to meet the following physical properties.

PROPERTY	TEST METHOD	MINIMUM VALUE
Mass / Area	ASTM D-5261	6.0 OZ./SQ.YD.
Grab Strength	ASTM D-4632	6.0 Lbs.

COLLOID ENVIRONMENTAL TECHNOLOGIES CO. (CETCO)

Subscribed and sworn to before me this 22 day of September 2001.

Notary Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/2/04

COLLOID ENVIRONMENTAL TECH. CO.
GEOTEXTILE QC DATA

LOVELL AMERICAN COLLOID
PO BOX 428
LOVELL, WY. 82431

SHIP TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON
EAST HELENA MT

ORDER NUMBER: 147564, 147566

Material	Lot #	Roll #	Geotextile Mass/Area 6.0 oz/sy marv ASTM D 5261	Grab Strength 6.0 lbs. Marv ASTM D 4632
N/W-WHITE	200137VR	00002451	7.3	23.5
N/W-WHITE	200137VR	00002467	6.6	33.0
N/W-WHITE	200138VR	00002580	6.9	35.3
N/W-WHITE	200131VR	00002126	6.9	36.8
N/W-WHITE	200132VR	00002155	6.9	44.4

TECHNICAL DATA SHEET

ORIGIN INFORMATION

NON-WOVEN GEOTEXTILE

Manufacturer: **TNS ADVANCED TECHNOLOGIES**

PRODUCTION
FACILITY: **TNS**
9855 Greenville Highway, Bld. F
Spartanburg, SC. 29301

CONTACT: Marshall Gaddy 800-867-5181

BRAND NAME: TNS NO60

TNS
ADVANCED TECHNOLOGIES

9655 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

September 19, 2001
REF: TNS N060
Quantity Shipped: 12 rolls
BOL#: 000801985
Location: Lovell WY

Cetco
92 Highway 37
Lovell WY 82431

Dear Sir/Madam:

This is to certify that TNS N060 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS N060 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS N060 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	6.0
Thickness	ASTM D 5199	mils	120
Grab Tensile	ASTM D 4632	lbs	75
Grab Elongation (MD)	ASTM D 4632	%	90(min)
Puncture	ASTM D 4833	lbs	55

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

DATE: 9/20/01

TNS MILLS, INC.
NONWOVEN QUALITY DATA
FOR BOL# 000801985

ROLL #	STYL	WDT	LNG	FABR WGHT	THCK	GRAB MD	GRAB XMD	ELNG MD	ELNG XMD	TRAP MD	TRAP XMD	PUNC REST	BRST STRG	FLOW RATE	PERM -ABL	PERM -ITY	AOS
300076764	N060	196	135	6.7	168	101	146	116	118			80			.000	.00	
300076772	N060	196	135	6.5	167	91	126	114	110			68			.000	.00	
300076773	N060	196	135	6.5	167	91	126	114	110			68			.000	.00	
300076774	N060	196	135	6.5	167	91	126	114	110			68			.000	.00	
300076775	N060	196	135	6.7	167	98	131	113	117			71			.000	.00	
300076776	N060	196	135	6.7	167	98	131	113	117			71			.000	.00	
300076777	N060	196	135	6.7	167	98	131	113	117			71			.000	.00	
300076778	N060	196	135	6.7	167	98	131	113	117			71			.000	.00	
300076779	N060	196	135	6.7	166	95	131	114	117			71			.000	.00	
300076780	N060	196	135	6.7	166	95	131	114	117			71			.000	.00	
300076781	N060	196	135	6.7	166	95	131	114	117			71			.000	.00	
300076782	N060	196	135	6.7	166	95	131	114	117			71			.000	.00	

TOTAL NUMBER OF ROLLS 12

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

GEOSYNTHETIC CLAY LINER

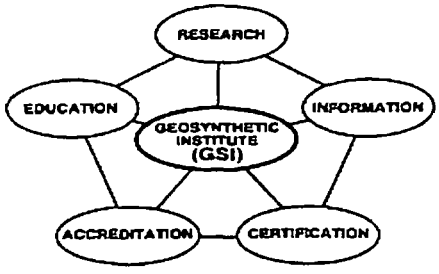
MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147564, 147566
Ship Date:	26-Sep

CETCO hereby affirms and certifies that the BENTOMAT DN material supplied to this project will meet the physical and chemical criteria listed below.

PROPERTY	TEST METHOD	MINIMUM VALUE
Peel Strength	ASTM D 4632	15 lbs (65 N)
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)
Bentonite Mass / Area	ASTM D 5993	* .75 lb/sq.ft. (Min.)
Grab Strength	ASTM D 4632	150 Lbs.
Grab Elongation	ASTM D 4632	15 Percent Typical
Permeability	ASTM D 5084	5 x 10 (-9) cm/sec. (Max)
Index Flux	ASTM D 5887	1.0 x 10 (-8) m(3)/m(2)/sec. (max.)

*** Reported at 0 % moisture content.**
GAI Lab Accredited Test Methods were followed during conformance testing for:
ASTM D 4632 - Grab Strength and Grab Elongation.
ASTM D 5887 - Index Flux.
ASTM D 5993 - Bentonite Mass/Area.



Colloid Environmental Technologies Co. (**CETCO**)

Subscribed and sworn to before me this 27 day of September 2001.

Notary-Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 1/21/04

QCG#FT2 QCT#FT2
9/27/01 7:23:15

CETCO

GCL QUALITY DATA

LOVELL AMERICAN COLLOID

SHIP TO: ASARCO EAS
C/O ENVIRO
EAST HELEN

O R D E R # 000147564

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 150lbs marv ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632
LO-BENTOMAT DN	200139LO	00006915	.90	299.50	44.70
LO-BENTOMAT DN	200139LO	00006914	.90	299.50	44.70
LO-BENTOMAT DN	200139LO	00006913	.90	299.50	44.70
LO-BENTOMAT DN	200139LO	00006912	.90	299.50	44.70
LO-BENTOMAT DN	200139LO	00006911	.90	299.50	44.70
LO-BENTOMAT DN	200139LO	00006910	.90	299.50	44.70
LO-BENTOMAT DN	200139LO	00006909	.90	299.50	44.70
LO-BENTOMAT DN	200139LO	00006908	.90	299.50	44.70
LO-BENTOMAT DN	200139LO	00006907	.90	299.50	44.70
LO-BENTOMAT DN	200139LO	00006906	.90	299.50	44.70
LO-BENTOMAT DN	200139LO	00006905	.90	299.50	44.70
LO-BENTOMAT DN	200139LO	00006904	.90	299.50	44.70
LO-BENTOMAT DN	200139LO	00006903	.90*	299.50	44.70*
LO-BENTOMAT DN	200139LO	00006902	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006901	.95	299.50	54.80

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Bentonite Mass/Area and Moisture content are tested a minimum of every 40,000sf.
Bentonite Mass/Area is reported at 0% moisture content.
Grab Strength is tested a minimum of every 200,000sf.
Peel Strength is tested a minimum of every 40,000sf.
All tensile testing is in the machine direction

*** End of Report ***

QCG#FT2 QCT#FT2
9/27/01 7:23:43

CETCO

GCL QUALITY DATA

LOVELL AMERICAN COLLOID

SHIP TO: ASARCO BAS
C/O ENVIRO
EAST HELEN

O R D E R # 000147566

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 150lbs marv ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632
LO-BENTOMAT DN	200139LO	00006879	.98	258.60	29.80
LO-BENTOMAT DN	200139LO	00006878	.98	258.60	29.80
LO-BENTOMAT DN	200139LO	00006846	.91	304.00	31.40
LO-BENTOMAT DN	200139LO	00006845	.91	304 00	31.40
LO-BENTOMAT DN	200139LO	00006844	.91	304.00	31.40
LO-BENTOMAT DN	200139LO	00006843	.91	304.00	31.40
LO-BENTOMAT DN	200139LO	00006842	.91	304.00	31.40
LO-BENTOMAT DN	200139LO	00006841	.91	304.00	31.40
LO-BENTOMAT DN	200139LO	00006840	.91	304.00	31.40
LO-BENTOMAT DN	200139LO	00006839	.91	304.00	31.40
LO-BENTOMAT DN	200139LO	00006837	.91	304.00	31.40
LO-BENTOMAT DN	200139LO	00006836	.91	304.00	31.40
LO-BENTOMAT DN	200139LO	00006835	.91	304.00	31.40
LO-BENTOMAT DN	200139LO	00006834	.91	304.00	31.40
LO-BENTOMAT DN	200139LO	00006833	.91	304.00	31.40

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Bentonite Mass/Area and Moisture content are tested a minimum of every 40,000sf.
Bentonite Mass/Area is reported at 0% moisture content.
Grab Strength is tested a minimum of every 200,000sf.
Peel Strength is tested a minimum of every 40,000sf.
All tensile testing is in the machine direction

*** End of Report ***

GEOSYNTHETIC CLAY LINER MQA TRACKING FORMS

QCG#TF1 QCT#TF1
9/27/01 7:23:15

CETCO
GCL MQA/MQC TRACKING FORM

SHIP TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON
EAST HELENA MT

ORDER NUMBER 000147564

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
LOT# 200139LO									
00006901	LO-BENTOMAT DN	160	2240	3158	200094219		200138VR	00002580	092601A
00006902	LO-BENTOMAT DN	160	2240	3144	200094219		200137VR	00002451	092601A
00006903	LO-BENTOMAT DN	160	2240	3142	200094219		200137VR	00002451	092601A
00006904	LO-BENTOMAT DN	160	2240	3163	200094219		200137VR	00002451	092601A
00006905	LO-BENTOMAT DN	160	2240	3209	200094219		200137VR	00002451	092601A
00006906	LO-BENTOMAT DN	160	2240	3112	200094219		200137VR	00002451	092601A
00006907	LO-BENTOMAT DN	160	2240	3130	200094219		200137VR	00002451	092601A
00006908	LO-BENTOMAT DN	160	2240	3128	200094219		200137VR	00002451	092601A
00006909	LO-BENTOMAT DN	160	2240	3130	200094219		200137VR	00002451	092601A
00006910	LO-BENTOMAT DN	160	2240	3120	200094128		200137VR	00002451	092601A
00006911	LO-BENTOMAT DN	160	2240	3137	200094128		200137VR	00002467	092601A
00006912	LO-BENTOMAT DN	160	2240	3146	200094128		200137VR	00002467	092601A
00006913	LO-BENTOMAT DN	160	2240	3145	200094128		200137VR	00002467	092601A
00006914	LO-BENTOMAT DN	160	2240	3124	200094128		200137VR	00002467	092601A
00006915	LO-BENTOMAT DN	160	2240	3126	200094128		200137VR	00002467	092601A

TOTAL SQUARE FEET..... 33,600

TOTAL PAGES 1

SUMMARY OF BENTOMAT DIRECT SHEAR TEST DATA
INTERNAL

Lab[1]	Report Date	Interface Tested[2]	Normal Stresses (psi)	Bentomat Moisture[3]	Shear Rate (in/min)	Peak Friction Angle (deg)	Residual Friction Angle (deg)[4]	Apparent Peak Cohesion (psf)	Comments
GRI	04-18-91	Internal ST	.5 - 1 - 5 - 10 - 20	Dry	0.035	42	ND	288	
		Internal ST	.1 - .5 - 1 - 5 - 10	Hydrated	0.035	37	"	115	
		Internal ST	.1 - .5 - 1 - 5 - 10	Hydrated	0.035	39	"	173	Hydrated in leachate
UTA	08-12-91	Internal	6 - 9 - 14 - 19	Hydrated	0.000131	26	ND	619	
GA	09-04-92	Internal ST	0.5 - 1 - 2 - 4 - 10	Hydrated	0.0025	27	8	43	Slow shear rate
GSC	12-07-93	Internal ST	0.35 - 1 - 2 - 3.5	Dry	0.04	57	ND	370	
		Internal ST	0.5 - 1 - 2 - 4 - 10	Hydrated	0.04	59	"	265	
GSC	02-02-94	Internal ST	14 - 70 - 142	Hydrated	0.04	24	7	700	
GSC	07-15-94	Internal ST	0.35 - 1 - 2 - 3.5	Hydrated	0.04	59	31	271	cross machine dir.
Cetco	07-11-95	Internal	14 - 28 - 50	Hydrated	0.04	31	2.2	626	Hydrated 72 hours
GSC	03-12-96	Internal ST	2 - 4 - 6	Hydrated	0.04	34	ND	423	
GSC	07-03-96	Internal ST	0.7 - 1.4 - 2.0	Hydrated	0.04	43	ND	220	

TR-114bm
Revised 12/00

1500 W. Shure Drive • Arlington Heights, IL 60004 • USA • (847) 392-5800 • FAX (847) 577-5571 /www.CETCO.com
A wholly owned subsidiary of AMCOL International

The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

SUMMARY OF BENTOMAT DIRECT SHEAR TEST DATA
INTERNAL (Continued)

Lab[1]	Report Date	Interface Tested[2]	Normal Stresses (psi)	Bentomat Moisture[3]	Shear Rate (in/min)	Peak Friction Angle (deg)	Residual Friction Angle (deg)[4]	Apparent Peak Cohesion (psf)	Comments
GSC	08-26-96	Internal ST	7 - 8.7 - 10.5	Hydrated	0.04	34	10	755	
		Internal ST	7 - 8.7 - 10.5	Hydrated	0.04	37	11	630	
		Internal ST	7 - 8.7 - 10.5	Hydrated	0.04	38	8	685	
GSC	11-08-96	Internal ST	0.7 - 1.4 - 2.8	Hydrated	0.04	45	ND	339	
		Internal ST	0.7 - 1.4 - 2.8	Hydrated	0.04	35	ND	350	
		Internal ST	0.7 - 1.4 - 2.8	Hydrated	0.04	48	ND	277	
		Internal ST	0.7 - 1.4 - 2.8	Hydrated	0.04	51	ND	273	
		Internal ST	0.7 - 1.4 - 2.8	Hydrated	0.04	47	ND	270	
GSC	01-09-97	Internal DN	0.7 - 1.4 - 2.8	Hydrated	0.04	44	ND	242	
GSC	02-20-97	Internal ST	0.35 - 1.4 - 3.5	Hydrated	0.04	34	ND	292	

TR-114bm
Revised 12/00

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SUMMARY OF BENTOMAT DIRECT SHEAR TEST DATA
INTERNAL (Continued)

Lab[1]	Report Date	Interface Tested[2]	Normal Stresses (psi)	Bentomat Moisture[3]	Shear Rate (in/min)	Peak Friction Angle (deg)	Residual Friction Angle (deg)[4]	Apparent Peak Cohesion (psf)	Comments
PUWL	06-02-97	Internal ST	5 - 10 - 20 - 40	Hydrated	0.04	31.4	3.9	2190	Residual @ 4-5"
		Internal ST	2.5 - 5 - 10 - 20	Hydrated	0.04	41.3	5.8	972	Residual @ 3-4"
STS	8-29-97	Internal ST	0.35 - 1.4 -3.5	Hydrated	0.04	60.9	ND	700.5	
GSC	9-11-97	Internal DN	1 – 2 – 5	Hydrated	0.04	52	ND	510	
			1 – 2 – 5	Hydrated	0.04	52	ND	390	
TRI	12-01-97	Internal DN	0.35 – 0.7 – 1.4	Hydrated	0.001	54.8	40	0	
			3.5 – 7 – 14	Hydrated	0.001	18	11.7	263	
GSC	06-30-98	Internal ST	0.7 – 2.1 – 4.2	Hydrated	0.0016	50	ND	259	
PL	08-14-98	Internal ST	5 – 20 – 45	Hydrated	0.004	28	8	406	
		Internal ST	5 – 20 – 45	Hydrated	0.004	29	8	347	
		Internal ST	5 – 20 – 45	Hydrated	0.004	25	9	563	
		Internal ST	5 – 20 – 45	Hydrated	0.004	25	9	713	
		Internal ST	5 – 20 – 45	Hydrated	0.004	26	7	521	

1500 W. Shure Drive • Arlington Heights, IL 60004 • USA • (847) 392-5800 • FAX (847) 577-5571 /www.CETCO.com
A wholly owned subsidiary of AMCOL International

The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

SUMMARY OF BENTOMAT DIRECT SHEAR TEST DATA
INTERNAL (Continued)

Lab[1]	Report Date	Interface Tested[2]	Normal Stresses (psi)	Bentomat Moisture[3]	Shear Rate (in/min)	Peak Friction Angle (deg)	Residual Friction Angle (deg)[4]	Apparent Peak Cohesion (psf)	Comments
		Internal ST	5 – 20 – 45	Hydrated	0.004	26	11	597	
		Internal ST	5 – 20 – 45	Hydrated	0.004	26	8	559	
TRI	09-22-98	Internal DN	17 – 32 - 75	Hydrated	0.04	35.6	ND	899	
GSC	04-28-99	Internal CL	104 – 139 - 174	Hydrated	0.04	15	7	3880	
PL	06-16-99	Internal ST	5 - 20 - 45	Hydrated	0.004	21	14	316	
		Internal ST	5 - 20 - 45	Hydrated	0.004	18	11	357	
		Internal ST	5 - 20 - 45	Hydrated	0.004	19	10	357	
GSC	06-30-99	Internal DN	14- 28- 56- 112	Hydrated	0.04	18	8	1190	
GSC	05-30-00	Internal ST	150- 250- 400	Hydrated	0.04	10.8	6	2880	6" x 6" shear box

TR-114bm
Revised 12/00

1500 W. Shure Drive • Arlington Heights, IL 60004 • USA • (847) 392-5800 • FAX (847) 577-5571 /www.CETCO.com
A wholly owned subsidiary of AMCOL International

The information and data contained herein are believed to be accurate and reliable. CETCO makes no warranty of any kind and accepts no responsibility for the results obtained through application of this information.

Notes:

[1] AGP = AGP Laboratories Inc., (now Geotesting Express) Arlington, TX (12-inch direct shear box)
ATE = Atlanta Testing & Engrg. (now QORE), Atlanta, GA (12-inch direct shear box)
CETCO = CETCO, Arlington Heights, IL (12-inch direct shear box)
CGC = Cumberland Geotechnical Consultants, Carlisle, PA (12-inch direct shear box)
Emcon = Emcon Assoc. (now IT Corp.), Mahwah, NJ (12-inch direct shear box)
GA = Golder Associates, Denver, Colorado (12-inch direct shear box)
GRI = Geosynthetic Research Institute, Drexel University, Philadelphia, PA (Wykeham Farrance device)
GSC = GeoSyntec Consultants, Atlanta, Georgia (12-inch direct shear box)
PL= Precision Laboratory, Orange, CA (12-inch direct shear box)
PUWL = Purdue University, W. Lafayette, IN (16" x 42" direct shear box)
SL = Singleton Labs, Inc.(12-inch shear box)
STS = STS Consultants, Ltd., Vernon Hills, IL (12-inch direct shear box)
TRI = TRI Laboratory, Austin, TX (12-inch direct shear box)
UTA = University of Texas at Austin, Civil Engineering Laboratory (2.4-inch direct shear box)
VE = Vector Engineering, Grass Valley, CA (12-inch direct shear box)

2 Internal = Failure forced within the Bentomat (between the geotextiles).
NW = *Non-woven geotextile of Bentomat.*
W = Woven geotextile of Bentomat.
CLS = Smooth flexible membrane liner laminated onto Bentomat CL and Claymax 600CL
CLT = Textured flexible membrane liner laminated onto Bentomat CLT

[3] "Dry" = specimen was tested in the as-received moisture state which is typically 30 percent.
"Hydrated" = specimen was hydrated prior to testing, *although the actual hydration methods and durations vary.*
All hydrated specimens were hydrated with distilled or tap water, unless otherwise noted.

4 Residual at 2" displacement unless noted
ND = Not Determined

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CETCO
COLLOID ENVIRONMENTAL TECHNOLOGIES COMPANY
P.O. Box 428 • Lovell, Wyoming 82431
(307) 548-6521 • Fax (307) 548-6413

Date: September 28, 2001
PO: 28803
Order #: 147565

Kurt Wieringa,
Envirocon, Inc.
200 Smelter Road
East Helena, MT. 59635
406-227-6059

Dear Kurt Wieringa,

Please find enclosed the MQA/MQC Data Package for GCL shipments to Envirocon, Inc. . These shipments left our CETCO - Lovell, Wy. plant on September 27, 2001 .

If you have any questions regarding the enclosed QA/QC information, please contact me at (800)322-1149 ext:423.

Sincerely,

Noe Garcia
Quality Assurance Coordinator

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA PACKAGE

PROJECT NAME:	**Asarco East Helena CAMU Cap** **East Helena, MT.**
CUSTOMER P.O.:	**28803**
PREPARED FOR:	**Envirocon, Inc.** **200 Smelter Road** **East Helena, MT. 59635**
Telephone # :	**406-227-6059**

PREPARED BY:	**Noe Garcia** **Quality Assurance Coordinator** **CETCO** P.O. Box 428 92 Hwy. 37 Lovell, Wy. 82431
Telephone #:	800-322-1149 (Ext. 423)
Fax #:	**(307)548-6927, (307)548-6413**
E-Mail:	**ngarc@cetco.com**

GEOSYNTHETIC CLAY LINER

MANUFACTURING
QA / QC DATA

FOR ALL GCL MANUFACTURED ON:

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147565
Ship Date:	9/27

CONTENTS:

1. PACKING LIST
2. DAILY GCL PRODUCTION CERTIFICATION
3. NEEDLE DETECTION CERTIFICATION
4. BENTONITE CLAY CERTIFICATION
5. NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION
6. NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION
7. GCL MANUFACTURING CERTIFICATION AND TEST RESULTS
8. GCL MQA TRACKING FORM

PACKING LIST

CETCO
00 WEST SHURE DRIVE
INGTON HEIGHTS IL 60004

ORDER NO:.. 000147565
ORDER DATE: 9/06/2001
SHIP DATE:. 9/27/2001

SOLD TO: 719
ENVIROCON, INC.
P.O. BOX 16655

MISSOULA MT 59808

SHIP FROM:. LOVELL AMERICAN COLLO
FRT TERMS:. PREPAID & ADD
SHIP VIA:.. NATIONWIDE

SHIP TO: 08
ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON

EAST HELENA MT .

PO: 28803

PRODUCT	SIZE	U/M	LOT #	ROLL#	LNGTH	WIDTH	SHIP QTY	WEIGHT
LO-BENTOMAT DN		SFT	SF 200139L0	00006886	160.0	14.0	2240.0	3130.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006887	160.0	14.0	2240.0	3118.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006888	160.0	14.0	2240.0	3155.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006889	160.0	14.0	2240.0	3156.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006890	160.0	14.0	2240.0	3150.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006891	160.0	14.0	2240.0	3158.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006892	160.0	14.0	2240.0	3215.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006893	160.0	14.0	2240.0	3235.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006894	160.0	14.0	2240.0	3234.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006895	160.0	14.0	2240.0	3241.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006896	160.0	14.0	2240.0	3233.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006897	160.0	14.0	2240.0	3224.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006898	160.0	14.0	2240.0	3209.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006899	160.0	14.0	2240.0	3185.0
LO-BENTOMAT DN		SFT	SF 200139L0	00006900	160.0	14.0	2240.0	3145.0

	========	========
ORDER TOTALS.....	33600.0	47788.0

TOTAL ITEMS..... 15

GEOSYNTHETIC CLAY LINER MANUFACTURING CERTIFICATION

GEOSYNTHETIC CLAY LINER

MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147565
Ship Date:	27-Sep

Colloid Environmental Technologies Company (CETCO) hereby affirms and certifies that all of the BENTOMAT DN manufactured in this lot achieves the physical and chemical criteria listed on the attached analysis sheet.

Shem McArthur
Production Coordinator

Subscribed and sworn to before me this 28 day of September 2001.

Notary Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/6/04

NEEDLE DETECTION CERTIFICATION

CERTIFICATION STATEMENT

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147565
Ship Date:	27-Sep

This statement is to certify that all components of the BENTOMAT DN manufactured for the above project have been inspected continually for the presence of broken needles through the use of a magnetic removal system.

COLLOID ENVIRONMENTAL TECHNOLOGIES CO. (**CETCO**)

Subscribed and sworn to before me this 28 day of September 2001.

Notary Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 1/11/04

BENTONITE CLAY CERTIFICATIONS

TECHNICAL DATA SHEET

ORIGIN INFORMATION

BENTONITE

Manufacturer: **Colloid Environmental Technologies Co.**

PRODUCTION

Facility: **Colloid Environmental Technologies Co.**
92 HWY. 37
Lovell, WY 82431

Contact: Shem McArthur
(800)-322-1160

Brand Name: CG 50

BENTONITE
CERTIFICATE OF ANALYSIS

CETCO
92 HWY. 37
LOVELL, WY 82431

TO: Envirocon, Inc. DATE: 9/26/01

ATTN: Kurt Wieringa,

Dear Customer:

The BENTONITE that is used to produce our GCL is CG 50 from CETCO, Order Number See Below

A sample of the CG 50 was tested from Lot Number 092601A and was provided the following test results below.

TEST	METHOD	REQ. SPECIFICATION	ROLL # Daily Results ACTUAL RESULTS
RET. 10 MESH	ASTM C 136	0 PERCENT	0
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.	26.0
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)	14.8
Moisture	ASTM D 2216	12.0 % (MAX)	8.8
Passing 200 Mesh	ASTM D 421	1 % (Max)	0.8

We hereby certify that the results shown above represent this shipment. Tests were conducted using American Standard Test Methods and/or customer approved laboratory procedures.
Product made in the U.S.A.

Tests Conducted By: SW, JH, FF.

Approved By: Noe Garcia

In any correspondence regarding this shipment, please refer to our Order Numbers listed below.

147565

NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION

TECHNICAL DATA SHEET

ORIGIN INFORMATION

NON-WOVEN GEOTEXTILE

Manufacturer: **TNS ADVANCED TECHNOLOGIES**

PRODUCTION

Facility: **TNS**
9855 Greenville Highway, Bld. F
Spartanburg, SC. 29301

Contact: Marshall Gaddy 800-867-5181

Brand Name: TNS X060

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

September 7, 2001
REF: TNS X060
Quantity Shipped: 27 rolls
BOL#: 000801826
Location: Lovell WY

Cetco
92 Highway 37
Lovell WY 82431

Dear Sir/Madam:

This is to certify that TNS X060 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS X060 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS X060 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	6.0
Thickness	ASTM D 5199	mils	60
Grab Tensile	ASTM D 4632	lbs	155
Grab Elongation (MD)	ASTM D 4632	%	50 (min)-90(max)
Grab Elongation (XMD)	ASTM D 4632	%	50(min)-105(max)
Puncture	ASTM D 4833	lbs	85

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

DATE: 9/07/01

TNS MILLS, INC.
NONWOVEN QUALITY DATA
FOR BOL# 000801826

ROLL #	STYL	WDT	LNG	FABR WGHT	THCK	GRAB MD	GRAB XMD	ELNG MD	ELNG XMD	TRAP MD	TRAP XMD	PUNC REST	BRST STRG	FLOW RATE	PERM -ABL	PERM -ITY	AOS
200094128	X060	196	135	6.3	71	161	191	72	90			93			.000	.00	
200094173	X060	196	135	6.4	66	162	192	61	62			100			.000	.00	
200094175	X060	196	135	6.4	66	162	192	61	62			100			.000	.00	
200094176	X060	196	135	6.6	68	170	204	66	64			95			.000	.00	
200094178	X060	196	135	6.6	68	170	204	66	64			95			.000	.00	
200094204	X060	196	135	6.4	71	168	196	63	68			107			.000	.00	
200094205	X060	196	135	6.4	71	168	196	63	68			107			.000	.00	
200094206	X060	196	135	6.7	69	170	213	63	62			100			.000	.00	
200094211	X060	196	135	6.3	68	164	196	58	65			105			.000	.00	
200094212	X060	196	135	6.3	68	169	195	60	63			94			.000	.00	
200094214	X060	196	135	6.3	68	169	195	60	63			94			.000	.00	
200094216	X060	196	135	6.4	67	166	191	61	63			96			.000	.00	
200094217	X060	196	135	6.4	67	166	191	61	63			96			.000	.00	
200094218	X060	196	135	6.6	70	169	204	61	65			97			.000	.00	
200094219	X060	196	135	6.6	70	169	204	61	65			97			.000	.00	
200094224	X060	196	135	6.1	67	165	215	63	70			104			.000	.00	
200094231	X060	196	135	6.5	67	164	222	64	69			116			.000	.00	
200098487	X060	196	135	6.5	75	160	245	82	64			113			.000	.00	
200099041	X060	196	135	6.2	71	161	189	64	74			85			.000	.00	
200099044	X060	196	135	6.1	70	165	182	67	71			94			.000	.00	
200099045	X060	196	135	6.1	70	165	182	67	71			94			.000	.00	
200099052	X060	196	135	6.2	71	158	176	65	73			98			.000	.00	
200099054	X060	196	135	6.4	73	166	194	73	83			103			.000	.00	
200099095	X060	196	135	6.4	72	162	176	58	59			111			.000	.00	
200099105	X060	196	135	6.5	70	174	236	68	67			104			.000	.00	
200099108	X060	196	135	6.4	66	164	212	65	65			106			.000	.00	
200099109	X060	196	135	6.4	66	164	212	65	65			106			.000	.00	

TOTAL NUMBER OF ROLLS 27

NON-WOVEN GEOTEXTILE MANUFACTURER'S CERTIFICATION

TECHNICAL DATA SHEET

ORIGIN INFORMATION

NON-WOVEN GEOTEXTILE

Manufacturer: **Colloid Environmental Technologies Co.**

PRODUCTION
FACILITY: **CETCO**
102 Conners Road
Villa Rica, GA 30180

CONTACT: Debbie Bivins 404-459-4995

BRAND NAME: Standard

NON-WOVEN GEOTEXTILE

MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147565
Ship Date:	27-Sep

CETCO hereby affirms and certifies that the Non-Woven geotextile in the BENTOMAT DN product for the above project has been manufactured to meet the following physical properties.

PROPERTY	TEST METHOD	MINIMUM VALUE
Mass / Area	ASTM D-5261	6.0 OZ./SQ.YD.
Grab Strength	ASTM D-4632	6.0 Lbs.

COLLOID ENVIRONMENTAL TECHNOLOGIES CO. (CETCO)

Subscribed and sworn to before me this 28 day of September 2001.

Notary Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/8/04

COLLOID ENVIRONMENTAL TECH. CO.
GEOTEXTILE QC DATA

LOVELL AMERICAN COLLOID
PO BOX 428
LOVELL, WY. 82431

SHIP TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON
EAST HELENA MT

ORDER NUMBER: 147565

Material	Lot #	Roll #	Geotextile Mass/Area 6.0 oz/sy marv ASTM D 5261	Grab Strength 6.0 lbs. Marv ASTM D 4632
N/W-WHITE	200138VR	00002580	[illegible]9	35.3

TOTAL PAGES 1

TECHNICAL DATA SHEET

ORIGIN INFORMATION

NON-WOVEN GEOTEXTILE

Manufacturer: **TNS ADVANCED TECHNOLOGIES**

PRODUCTION
FACILITY: **TNS**
9855 Greenville Highway, Bld. F
Spartanburg, SC. 29301

CONTACT: Marshall Gaddy 800-867-5181

BRAND NAME: TNS NO60

TNS
ADVANCED TECHNOLOGIES

9855 Greenville Highway
Building F
Spartanburg, SC 29301
800-867-5181
fax: 864-949-6222

September 20, 2001
REF: TNS N060
Quantity Shipped: 12 rolls
BOL#: 000802000
Location: Lovell WY

Cetco
92 Highway 37
Lovell WY 82431

Dear Sir/Madam:

This is to certify that TNS N060 is a 100% polypropylene, nonwoven, needle-punched fabric. TNS N060 is resistant to degradation due to ultraviolet exposure and resists commonly encountered soil chemicals, insects, mildew, and is non-biodegradable. Polypropylene is stable within a pH range of 2 to 13. TNS N060 conforms to the physical properties listed in the following table:

FABRIC PROPERTY	TEST METHOD	UNITS	M.A.R.V
Weight	ASTM D 5261	oz/sy	6.0
Thickness	ASTM D 5199	mils	120
Grab Tensile	ASTM D 4632	lbs	75
Grab Elongation (MD)	ASTM D 4632	%	90(min)
Puncture	ASTM D 4833	lbs	55

Marshall O. Gaddy
Marshall O. Gaddy
Quality Control Manager

DATE: 9/20/01

TNS MILLS, INC.
NONWOVEN QUALITY DATA
FOR BOL# 000802000

ROLL #	STYL	WDT	LNG	FABR WGHT	THCK	GRAB MD	GRAB XMD	ELNG MD	ELNG XMD	TRAP MD	TRAP XMD	PUNC REST	BRST STRG	FLOW RATE	PERM -ABL	PERM -ITY	AOS
300076755	N060	196	135	6.4	169	101	132	118	119			93			.000	.00	
300076787	N060	196	135	6.5	175	103	152	114	127			69			.000	.00	
300076789	N060	196	135	6.5	175	103	152	114	127			69			.000	.00	
300076790	N060	196	135	6.7	173	102	145	112	125			72			.000	.00	
300076791	N060	196	135	6.7	173	102	145	112	125			72			.000	.00	
300076792	N060	196	135	6.7	173	102	145	112	125			72			.000	.00	
300076793	N060	196	135	6.5	173	102	138	114	126			79			.000	.00	
300076794	N060	196	135	6.5	173	102	138	114	126			79			.000	.00	
300076795	N060	196	135	6.5	173	102	138	114	126			79			.000	.00	
300076796	N060	196	135	6.7	168	109	136	115	122			73			.000	.00	
300076797	N060	196	135	6.7	168	109	136	115	122			73			.000	.00	
300076798	N060	196	135	6.7	168	109	136	115	122			73			.000	.00	

TOTAL NUMBER OF ROLLS 12

GEOSYNTHETIC CLAY LINER QUALITY TEST RESULTS

GEOSYNTHETIC CLAY LINER

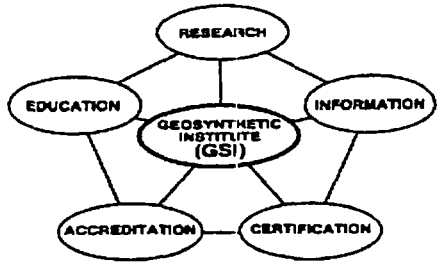
MANUFACTURING CERTIFICATION

Project Name:	Asarco East Helena CAMU Cap
Prepared For:	Envirocon, Inc.
Customer PO:	28803
Order Number:	147565
Ship Date:	27-Sep

CETCO hereby affirms and certifies that the BENTOMAT DN material supplied to this project will meet the physical and chemical criteria listed below.

PROPERTY	TEST METHOD	MINIMUM VALUE
Peel Strength	ASTM D 4632	15 lbs (65 N)
Bentonite Free Swell	ASTM D 5890	24 mL / 2g MIN.
Bentonite Fluid Loss	ASTM D 5891	18.0 mL (MAX)
Bentonite Mass / Area	ASTM D 5993	* .75 lb/sq.ft. (Min.)
Grab Strength	ASTM D 4632	150 Lbs.
Grab Elongation	ASTM D 4632	15 Percent Typical
Permeability	ASTM D 5084	5 x 10 (-9) cm/sec. (Max)
Index Flux	ASTM D 5887	1.0 x 10 (-8) m(3)/m(2)/sec. (max.)

*** Reported at 0 % moisture content.**
GAI Lab Accredited Test Methods were followed during conformance testing for:
ASTM D 4632 - Grab Strength and Grab Elongation.
ASTM D 5887 - Index Flux.
ASTM D 5993 - Bentonite Mass/Area.



Colloid Environmental Technologies Co. (CETCO)

Subscribed and sworn to before me this 28 day of September 2001.

Notary Public

NOE GARCIA - NOTARY PUBLIC
COUNTY OF BIG HORN
STATE OF WYOMING
MY COMMISSION EXPIRES 12/1/04

QCG#FT2 QCT#FT2
9/28/01 9:20.06

CETCO

GCL QUALITY DATA

LOVELL AMERICAN COLLOID

SHIP TO: ASARCO EAS
C/O ENVIRO
EAST HELEN

O R D E R # 000147565

MATERIAL	LOT No.	ROLL No	BENTONITE MASS/AREA 0.75 lb/sqft ASTM D 5993	GRAB STRENGTH 150lbs marv ASTM D 4632	PEEL STRENGTH 15 lbs ASTM D 4632
LO-BENTOMAT DN	200139LO	00006900	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006899	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006898	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006897	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006896	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006895	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006894	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006893	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006892	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006891	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006890	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006889	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006888	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006887	.95	299.50	54.80
LO-BENTOMAT DN	200139LO	00006886	.95*	299.50*	54.80*

NOTE:

An asterisk indicates the actual test done on the roll and the roll tested.
If an asterisk is not present, test results are based on the previous roll tested.
Bentonite Mass/Area and Moisture content are tested a minimum of every 40,000sf.
Bentonite Mass/Area is reported at 0% moisture content.
Grab Strength is tested a minimum of every 200,000sf.
Peel Strength is tested a minimum of every 40,000sf.
All tensile testing is in the machine direction

*** End of Report ***

GEOSYNTHETIC CLAY LINER
MQA TRACKING FORMS

QCG#TF1 QCT#TF1
9/28/01 9:20:06

CETCO
GCL MQA/MQC TRACKING FORM

SHIP TO: ASARCO EAST HELENA CAMU CAP
C/O ENVIROCON
EAST HELENA MT

ORDER NUMBER 000147565

ROLL#	MATERIAL	ROLL LENGTH	SQUARE FEET	ROLL WEIGHT	GEOTEXTILE TOP LOT#	GEOTEXTILE TOP ROLL#	GEOTEXTILE BOTTOM LOT#	GEOTEXTILE BOTTOM ROLL#	CLAY LOT#
LOT# 200139LO									
00006886	LO-BENTOMAT DN	160	2240	3130	200099054		300076794		092601A
00006887	LO-BENTOMAT DN	160	2240	3118	200099054		300076794		092601A
00006888	LO-BENTOMAT DN	160	2240	3155	200099054		300076794		092601A
00006889	LO-BENTOMAT DN	160	2240	3156	200099054		300076794		092601A
00006890	LO-BENTOMAT DN	160	2240	3150	200099054		300076794		092601A
00006891	LO-BENTOMAT DN	160	2240	3158	200099054		300076794		092601A
00006892	LO-BENTOMAT DN	160	2240	3215	200094211		300076794		092601A
00006893	LO-BENTOMAT DN	160	2240	3235	200094211		200138VR	00002580	092601A
00006894	LO-BENTOMAT DN	160	2240	3234	200094211		200138VR	00002580	092601A
00006895	LO-BENTOMAT DN	160	2240	3241	200094211		200138VR	00002580	092601A
00006896	LO-BENTOMAT DN	160	2240	3233	200094211		200138VR	00002580	092601A
00006897	LO-BENTOMAT DN	160	2240	3224	200094211		200138VR	00002580	092601A
00006898	LO-BENTOMAT DN	160	2240	3209	200094211		200138VR	00002580	092601A
00006899	LO-BENTOMAT DN	160	2240	3185	200094211		200138VR	00002580	092601A
00006900	LO-BENTOMAT DN	160	2240	3145	200094211		200138VR	00002580	092601A

TOTAL SQUARE FEET..... 33,600

TOTAL PAGES 1

APPENDIX D

PROJECT VIDEO

TARGET SHEET

EPA REGION VIII

SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 2058231

SITE NAME: EAST HELENA NPL (OU2-RV1 RESIDENTIAL)

DOCUMENT DATE: 01/01/2002

DOCUMENT NOT SCANNED

Due to one of the following reasons:

- ☐ PHOTOGRAPHS
- ☐ 3-DIMENSIONAL
- ☐ OVERSIZED
- ☑ AUDIO/VISUAL
- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
- ☐ NOT AVAILABLE
- ☐ TYPES OF DOCUMENTS NOT TO BE SCANNED
  (Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

APPENDIX D PROJECT VIDEO (DVD)

Contact the Superfund Records Center to view available document.
(303) 312-6473

APPENDIX E

AS-BUILT DRAWINGS

ASARCO INCORPORATED

EAST HELENA PLANT
CAMU (RCRA LANDFILL) - PHASE I CELL
FINAL AS-BUILT DRAWINGS

DECEMBER 2001

DRAWING LIST		
SUPPLIED BY	DWG. NO.	TITLE
CONSTRUCTION DRAWINGS		
GENERAL		
Hydrometrics	08-1-9970	DRAWING INDEX & VICINITY MAP
Hydrometrics	08-1-9971	WASTE STOCKPILES AND HAUL ROUTES
CIVIL		
Hydrometrics	08-1-9972	CROSS SECTIONS
Hydrometrics	08-1-9973	EXCAVATION SITE PLAN AND EROSION CONTROL PLAN – EXCAVATION PHASE
Hydrometrics	08-1-9974	ACCESS ROAD SECTIONS AND DETAILS
Hydrometrics	08-1-9975	EROSION CONTROL PLAN – WASTE PLACEMENT PHASE
Hydrometrics	08-1-9976	LEACHATE DETECTION, COLLECTION, AND REMOVAL SYSTEM SECTIONS AND DETAILS
Hydrometrics	08-1-9977	PRIMARY AND SECONDARY SUMP DETAILS
Hydrometrics	08-1-9978	EROSION CONTROL PLAN – CAP CONSTRUCTION PHASE
Hydrometrics	08-1-9979	RUNOFF CONTROL POND PLAN AND RIPRAP SLOPE DRAIN DETAILS
Hydrometrics	08-1-9980	FINISHED GRADE PLAN WITH GAS VENT LOCATIONS AND DETAILS
Hydrometrics	08-1-9981	MISCELLANEOUS DETAILS
Hydrometrics	08-1-9982	RAILROAD CROSSING AND FENCE PENETRATION DETAILS AND SECTIONS
Hydrometrics	08-1-9983	SOUTHEAST LOWER LAKE AREA GRADING PLAN AND SECTIONS
Hydrometrics	08-1-9984	CONSTRUCTION LAYOUT-PLAN
Hydrometrics	08-1-9985	TYPICAL SECTION OF COMPLETED CAMU

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Hydrometrics, Inc.
Consulting Scientists, Engineers, and Contractors

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SCALE AS NOTED
DRAWN BY 00249 8/25/00
CHECKED BY SMY
APPROVED MICHAEL J. OELRICH 9785PE PROFESSIONAL ENGINEER

ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, 59635

ASARCO INCORPORATED–EAST HELENA PLANT
CAMU (RCRA LANDFILL) – PHASE I CELL
DRAWING INDEX AND VICINITY MAP
FINAL AS-BUILT DRAWING

N.Y. APPROP. NO.
PLANT NO.
ASARCO
DRAWING NUMBER 08-1-9970
REV. 1

UPDATE TIME: 2:38PM
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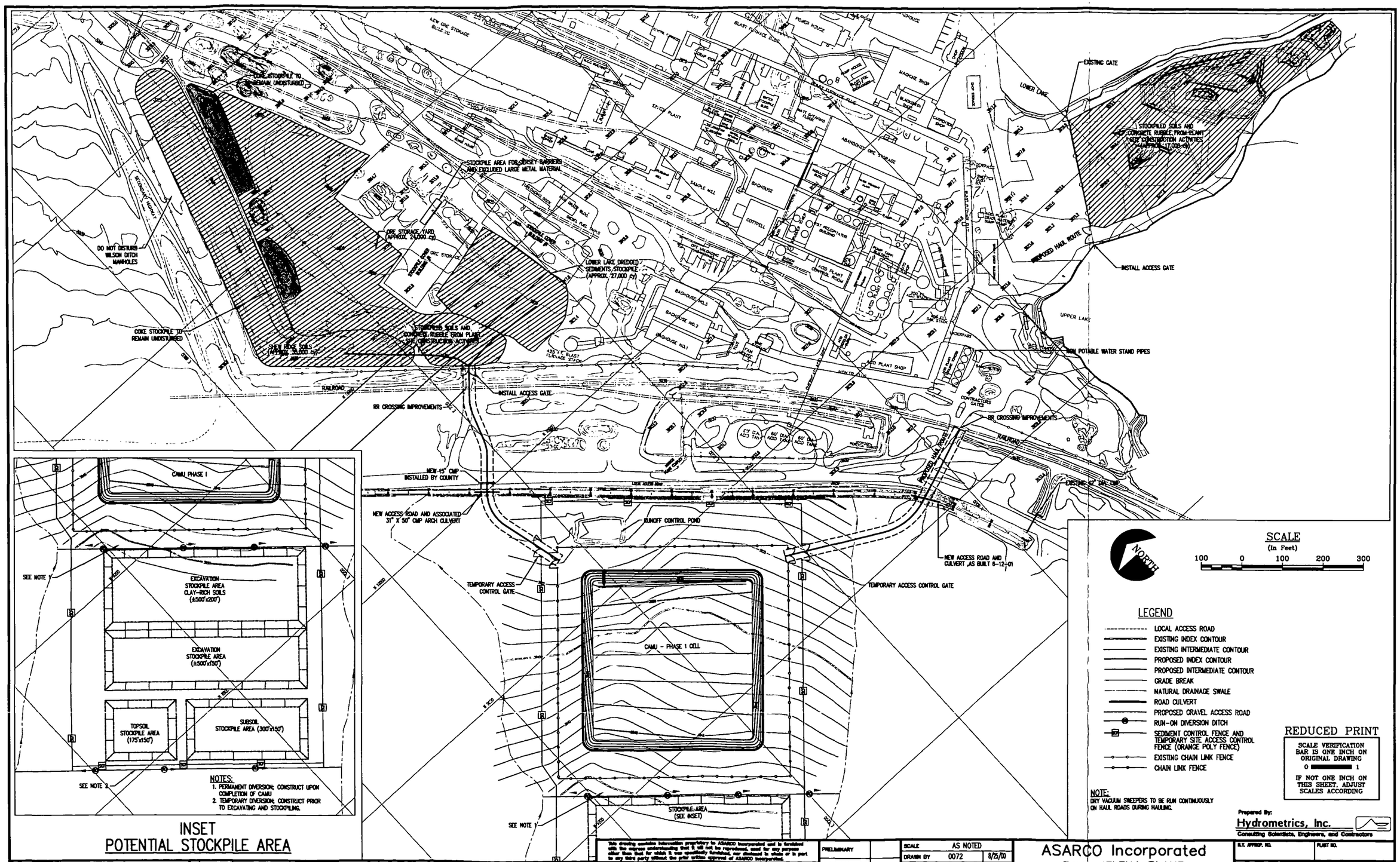

INSET
POTENTIAL STOCKPILE AREA

SCALE
(in Feet)
100 0 100 200 300

NORTH

LEGEND

- LOCAL ACCESS ROAD
- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- GRADE BREAK
- NATURAL DRAINAGE SWALE
- ROAD CULVERT
- PROPOSED GRAVEL ACCESS ROAD
- RUN-ON DIVERSION DITCH
- SEDIMENT CONTROL FENCE AND TEMPORARY SITE ACCESS CONTROL FENCE (ORANGE POLY FENCE)
- EXISTING CHAIN LINK FENCE
- CHAIN LINK FENCE

NOTE:
DRY VACUUM SWEEPERS TO BE RUN CONTINUOUSLY ON HAUL ROADS DURING HAULING.

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DRAWN BY	0072	8/25/00
CHECKED BY	SMY	10/11/00
APPROVED		10/12/00

MICHAEL A. GEURCH 9/TASPE

ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, 59635

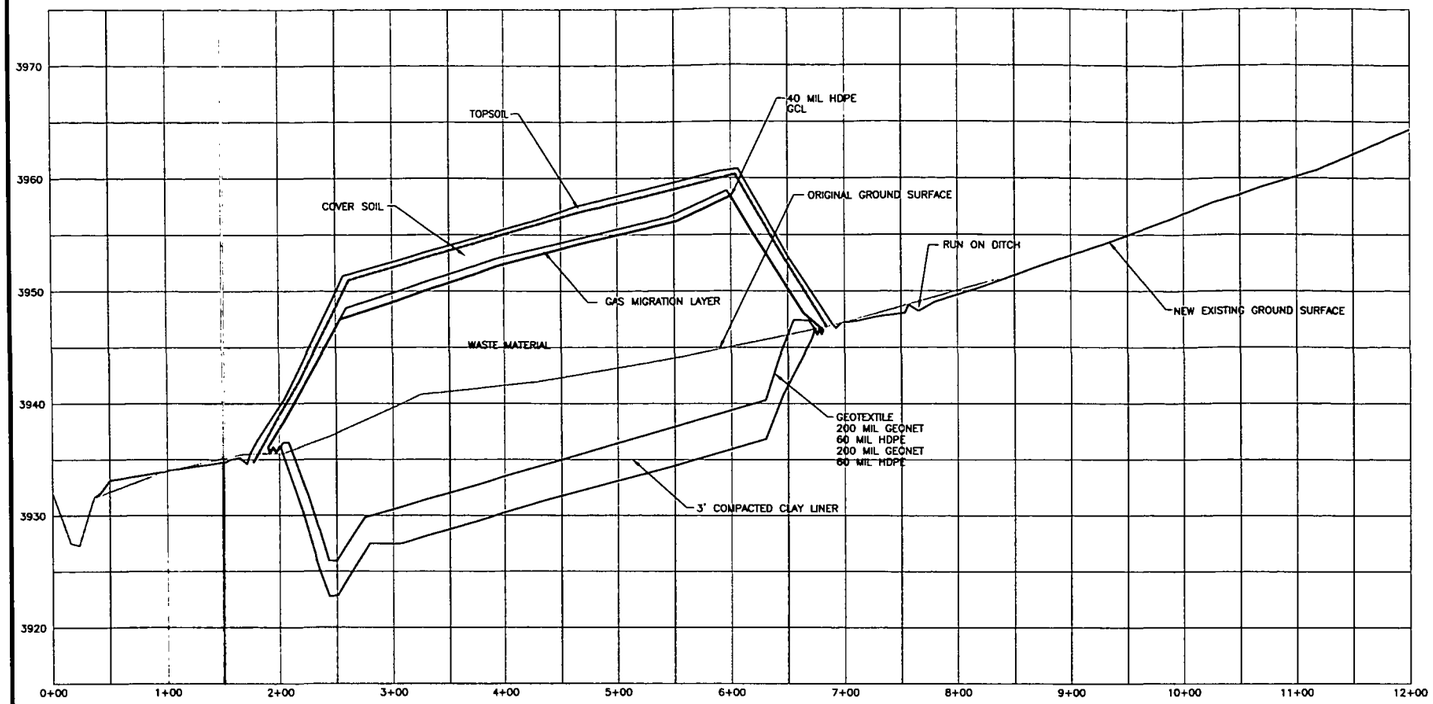
ASARCO INCORPORATED-EAST HELENA PLANT
CAMU (RCRA LANDFILL) - PHASE I CELL
WASTE STOCKPILES AND HAUL ROUTES
FINAL AS-BUILT DRAWING

R.V. APPROP. NO. | PLANT NO.

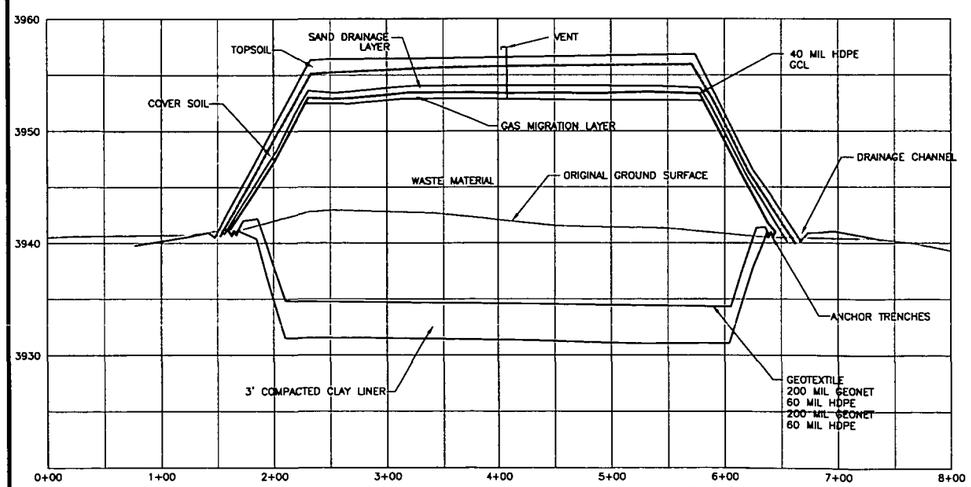
ASARCO

DRAWING NUMBER: 08-1-9971
REV. 1

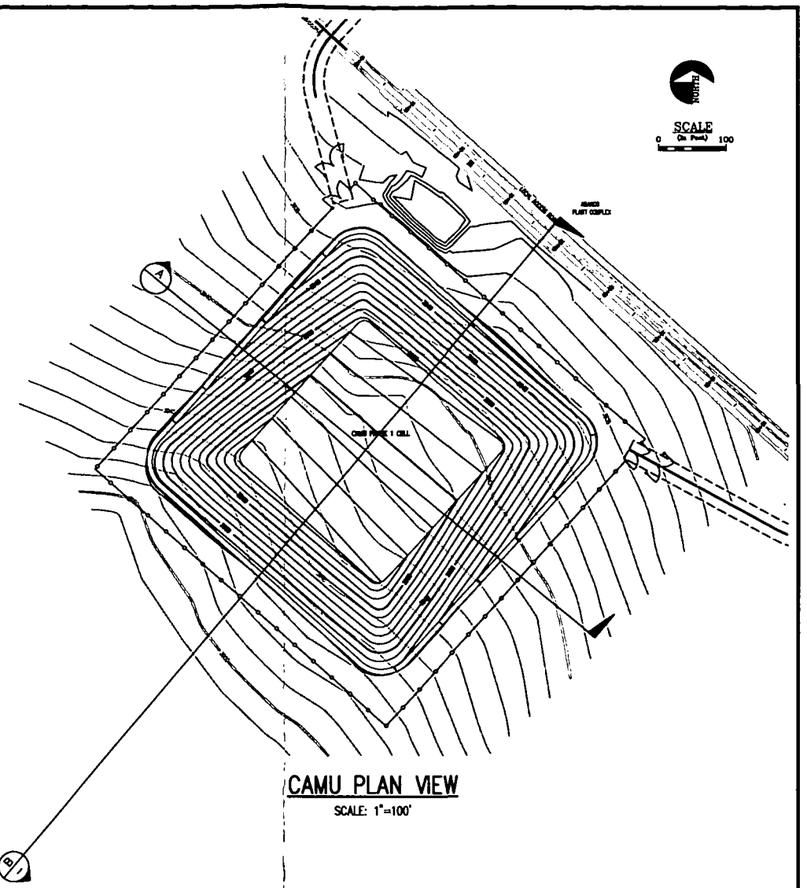
UPDATE TIME: 1:25PM



SECTION A
SCALE: (H) 1"=60'
(V) 1"=6'



SECTION B
SCALE: (H) 1"=60'
(V) 1"=6'



CAMU PLAN VIEW
SCALE: 1"=100'

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APPROVED		10/12/00

MICHAEL J. OELRICH 9785PE PROFESSIONAL ENGINEER

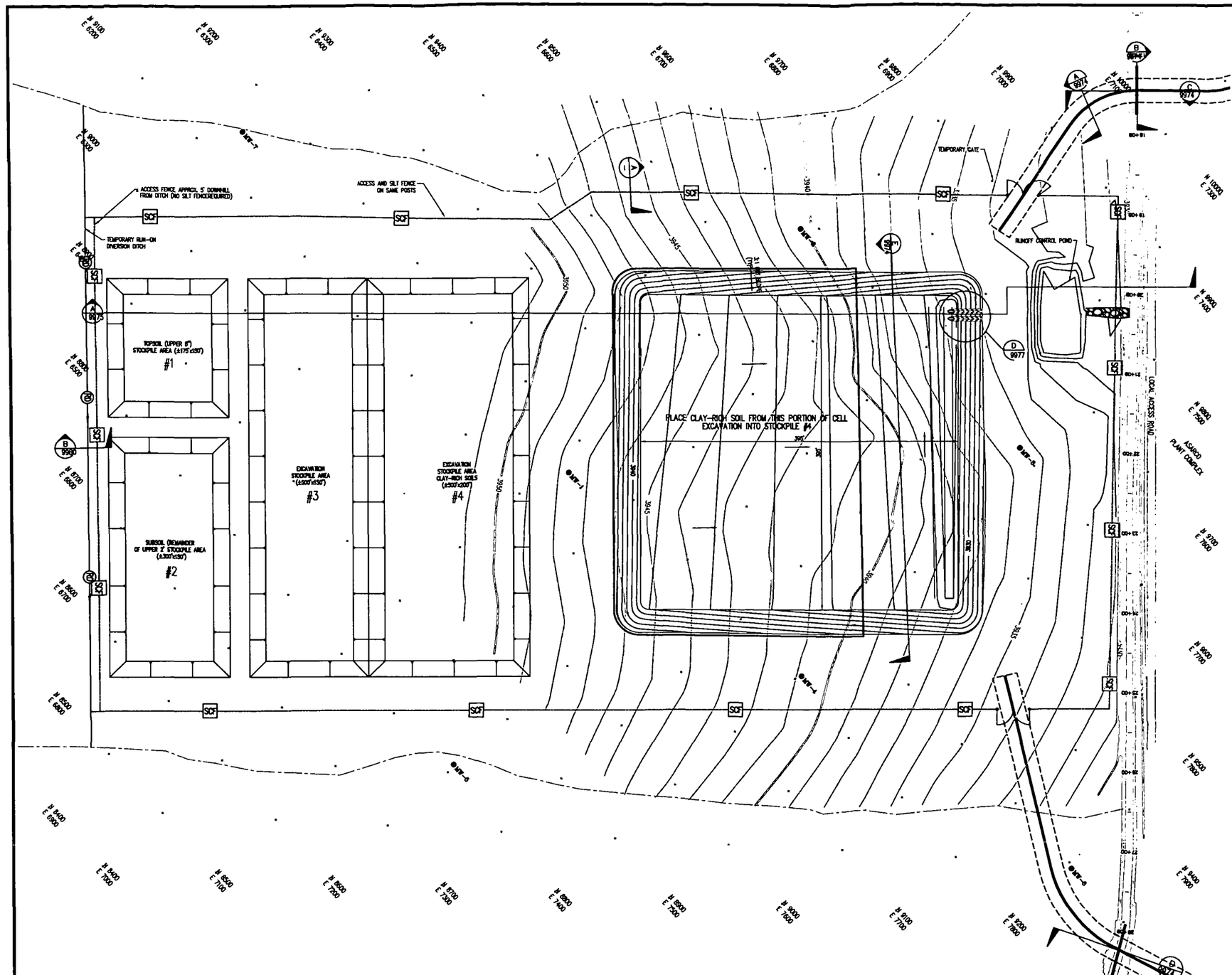
ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, 59635

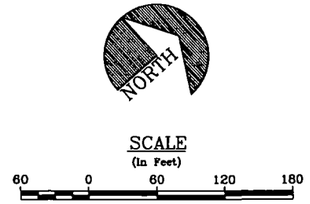
ASARCO INCORPORATED-EAST HELENA PLANT
CAMU (RCRA LANDFILL) - PHASE I CELL
CROSS SECTIONS
FINAL AS-BUILT DRAWING

B.T. APPROP. NO.
PLANT NO.

ASARCO

DRAWING NUMBER 08-1-9972
REV. 1

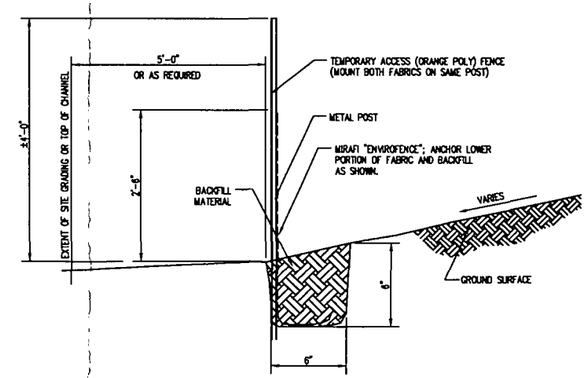




LEGEND

- LOCAL ACCESS ROAD
- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- GRADE BREAK
- ROAD CULVERT
- PROPOSED GRAVEL ACCESS ROAD
- SCF — SEDIMENT CONTROL & SAFETY FENCE
- RD — RUN-ON DIVERSION DITCH
- RIPRAP SLOPE DRAIN
- DRAINAGE FLOW DIRECTION
- MONITORING WELL

NOTES:
1. PLACE UPPER 8" OF TOPSOIL FROM EXCAVATION OF CELL INTO STOCKPILE #1
2. PLACE REMAINDER OF UPPER 2' OF SOIL FROM EXCAVATION OF CELL INTO STOCKPILE #2
3. PLACE CLAY-RICH FROM SOUTHWEST PORTION OF CELL EXCAVATION INTO STOCKPILE #4
4. PLACE REMAINDER OF CELL EXCAVATION IN STOCKPILE #3
5. DO NOT DISTURB EXISTING MONITORING WELLS.



SECTION A — ACCESS AND SEDIMENT CONTROL FENCE DETAIL
SCALE: NTS

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EROSION CONTROL PLAN – EXCAVATION PHASE

SCALE: 1"=60'

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APPROVED	MICHAEL A. DELRICH	10/12/00

MICHAEL A. DELRICH — STATE OF MONTANA — REGISTERED PROFESSIONAL ENGINEER

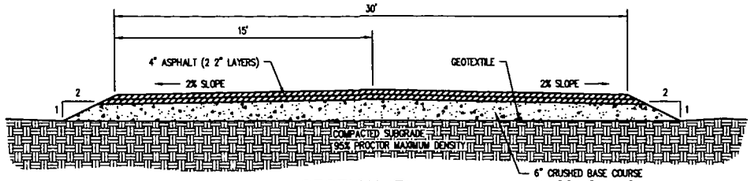
ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, 59635

ASARCO INCORPORATED–EAST HELENA PLANT
CAMU (RCRA LANDFILL) – PHASE I CELL EXCAVATION SITE PLAN AND
EROSION CONTROL PLAN – EXCAVATION PHASE
FINAL AS-BUILT DRAWING

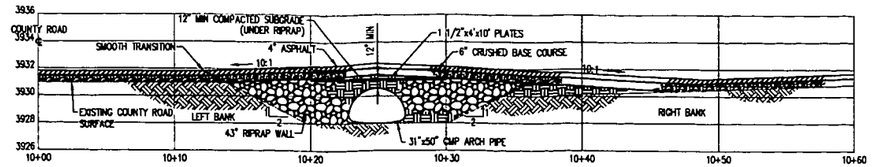
B.V. APPROP. NO. | PLANT NO.

ASARCO

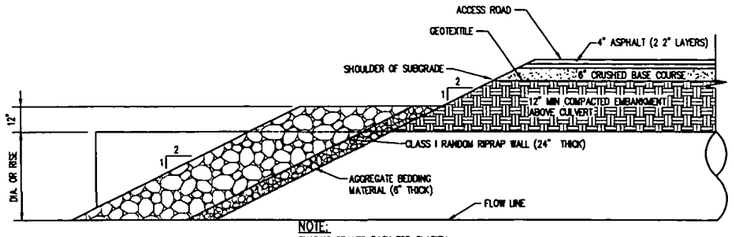
DRAWING NUMBER: 08-1-9973
REV.: 1



SECTION (A / 9973) ACCESS ROAD
SCALE: NTS

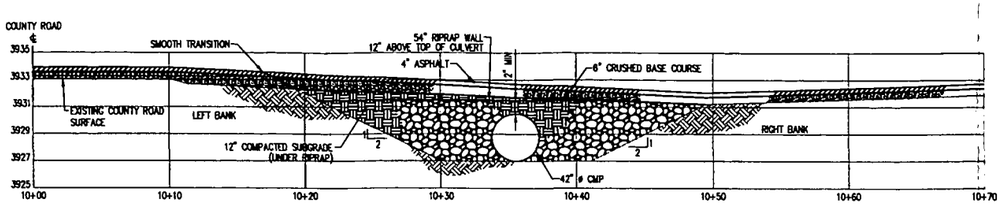


SECTION (C / 9973) NORTHWEST ACCESS ROAD
SCALE: (H & V) 1"=5

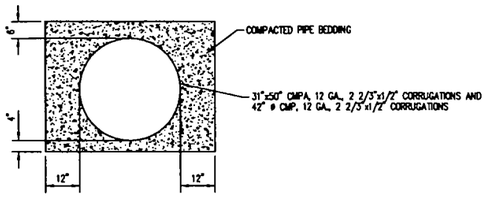


NOTE:
SHADING GRAYED BACK FOR CLARITY

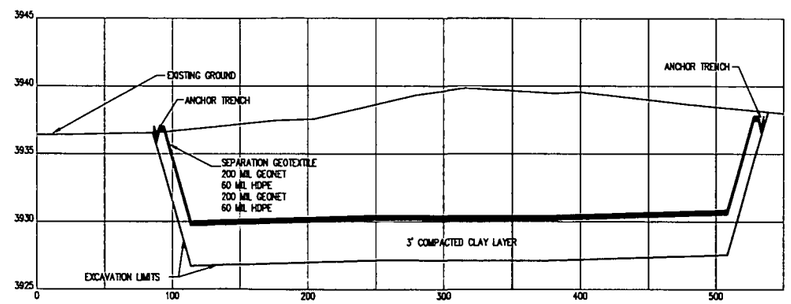
DETAIL (1 / –) RIPRAP WALL
SCALE: 3/8"=1'-0"



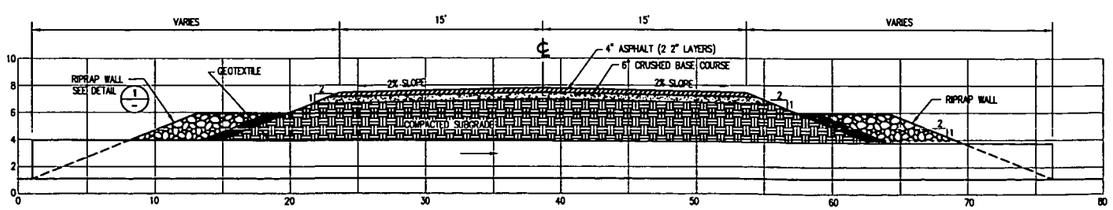
SECTION (D / 9973) SOUTHEAST ACCESS ROAD
SCALE: (H & V) 1"=5



DETAIL (2 / –) PIPE BEDDING
SCALE: 1/2"=1'



SECTION (E / 9973) TYPICAL POTENTIAL RAMP SECTION
SCALE: (H) 1"=50 (V) 1"=5'



NORTHWEST CULVERT: DESIGN Q_{100}=44 CFS, S=0.0010 FT/FT, L=58'
SOUTHEAST CULVERT: DESIGN Q_{100}=58 CFS, S=0.0015 FT/FT, L=66'

SECTION (B / 9973) TYPICAL CULVERT PROFILE
SCALE: 1"=5'-0"

NOTE:
LENGTH VARIES BASED ON HEIGHT OF ACCESS ROAD.
PIPE BEDDING NOT SHOWN FOR CLARITY SEE DETAIL 2

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SCALE	AS-NOTED	
DRAWN BY	0072	9/1/00
CHECKED BY	SMY	10/11/00
APPROVED		10/12/00

MONTANA MICHAEL A. OELRICH 9735EP PROFESSIONAL ENGINEER

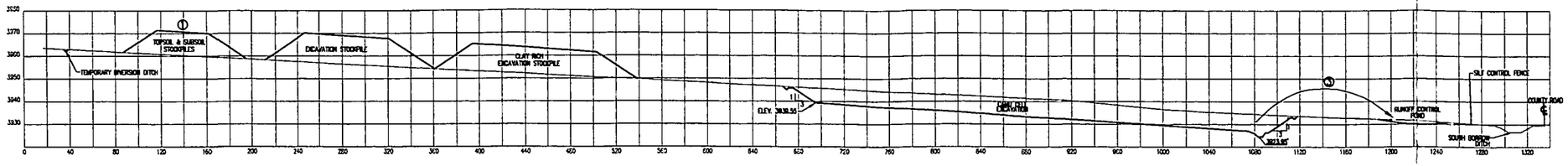
ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA 59635

ASARCO INCORPORATED-EAST HELENA PLANT
CAMU (RCRA LANDFILL) - PHASE I CELL
ACCESS ROAD SECTIONS AND DETAILS
FINAL AS-BUILT DRAWING

U.T. APPROP. NO.	PLANT NO.

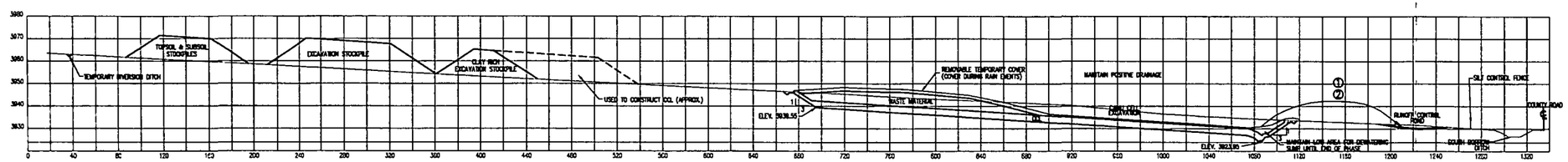
ASARCO

DRAWING NUMBER	REV.
08-1-9974	0



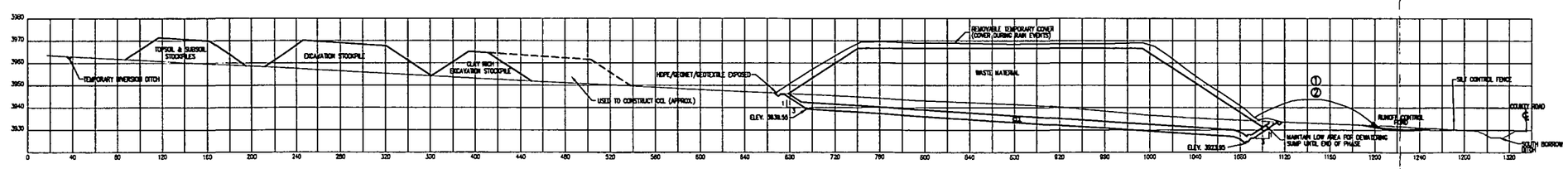
① EXCAVATE AND STOCKPILE TOPSOIL AND SUBSOIL BEFORE EXCAVATING CELL.
② DIRECT CLEAN WATER AROUND DISTURBED AREAS TO BORROW DITCH.
③ WATER THAT CONTACTS DISTURBED AREAS IS ROUTED TO RUNOFF CONTROL POND.

SECTION (A/–) EXCAVATION PHASE
SCALE: (H) 1"=50' (V) 1"=25'



① DIRECT CLEAN WATER AROUND DISTURBED AREAS TO BORROW DITCH. WATER PONDING ON TEMPORARY COVER WILL BE PUMPED TO RUNOFF CONTROL POND.
② WATER THAT CONTACTS DISTURBED AREAS IS ROUTED TO RUNOFF CONTROL POND. MAINTAINED LOW AREA SUMP.

SECTION (A/–) DURING INTERMEDIATE WASTE MATERIAL PLACEMENT PHASE
SCALE: (H) 1"=50' (V) 1"=25'



① DIRECT CLEAN WATER AROUND DISTURBED AREAS TO BORROW DITCH. WATER PONDING ON TEMPORARY COVER WILL BE PUMPED TO RUNOFF CONTROL POND.
② WATER THAT CONTACTS DISTURBED AREAS IS ROUTED TO RUNOFF CONTROL POND. MAINTAINED LOW AREA SUMP.

SECTION (A/–) FINAL WASTE MATERIAL PLACEMENT PHASE
SCALE: (H) 1"=50' (V) 1"=25'

NOTE:
THIS DRAWING IS FOR EROSION CONTROL PLAN ONLY. ELEVATIONS & DIMENSIONS WILL VARY. REFER TO OTHER PLAN DRAWINGS FOR ACTUAL ELEVATIONS.

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Consulting Scientists, Engineers, and Contractors

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DATE	

SCALE	AS-NOTED	
DRAWN BY	0249	8/25/00
CHECKED BY	SMY	10/12/00
APPROVED		04/12/01

MICHAEL J. OELRICH 9276SE MONTANA PROFESSIONAL ENGINEER

ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA 59635

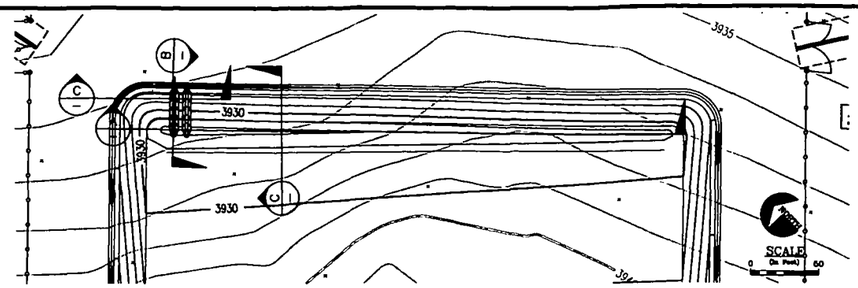
ASARCO INCORPORATED - EAST HELENA PLANT
CAMU (RCRA LANDFILL) - PHASE I CELL
EROSION CONTROL PLAN - WASTE PLACEMENT PHASE
FINAL AS-BUILT DRAWING

H.Y. APPROP. NO.	PLANT NO.

ASARCO

DRAWING NUMBER	REV.
08-1-9975	1

UPDATE TIME: 6:19PM

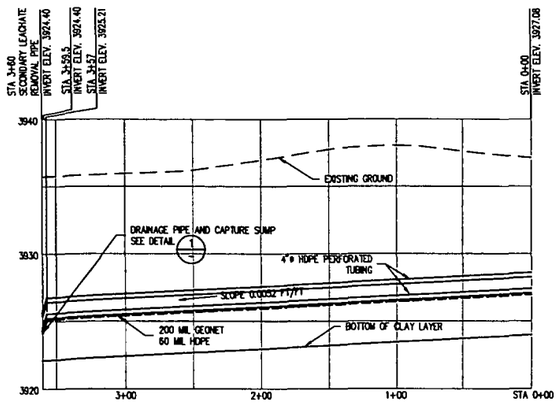


PLAN VIEW WITH CROSS SECTION LOCATIONS

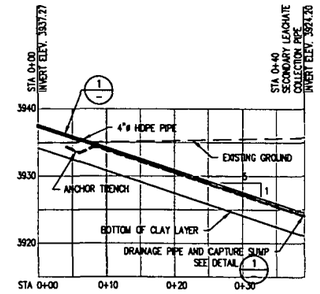
SCALE: 1"=50'

LEGEND

- LOCAL ACCESS ROAD
- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- GRADE BREAK
- ROAD CULVERT
- PROPOSED GRAVEL ACCESS ROAD

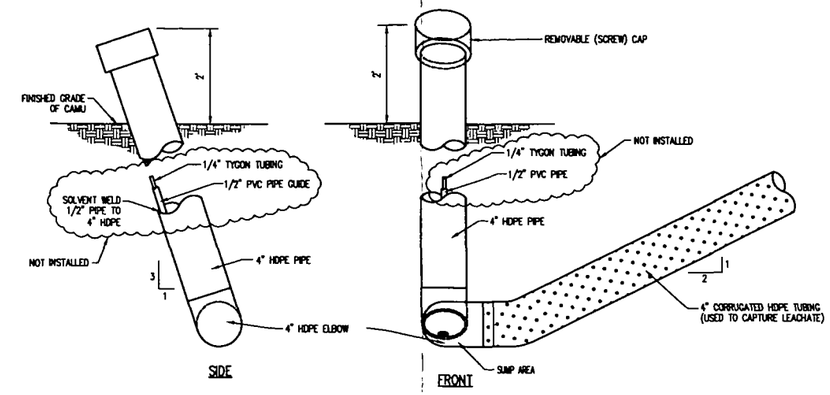


SECTION A
SCALE: (H)1"=50' (V)1"=5'
LEACHATE COLLECTION PIPE PROFILE



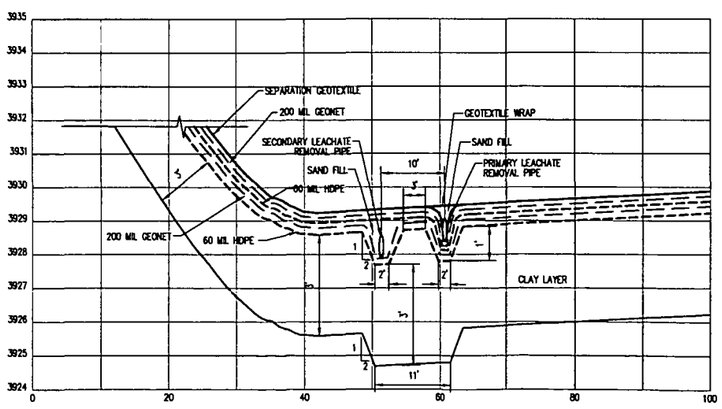
SECTION B
SCALE: (H)1"=10' (V)1"=10'
LEACHATE REMOVAL PIPE

NOTE:
FORM TUBING CHANNEL PRIOR TO HDPE AND GEONET PLACEMENT



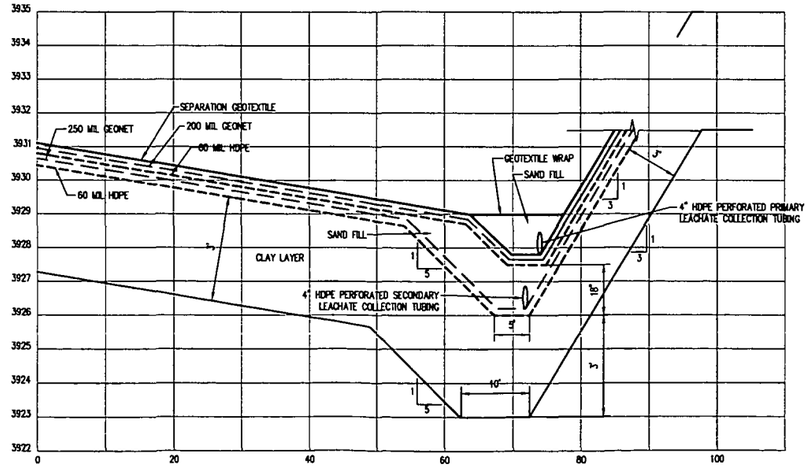
DETAIL 1
SCALE: 1"=6'
DRAINAGE PIPE, CAPTURE SUMP AND STAND PIPE

NOTE:
TUBING AND PIPE GUIDE EXTENDED FROM SUMP ELBOW TO CAP.
SEE ALSO LINER PENETRATION DETAILS 2 9981 3 9981 4 9981 5 9981 6 9981 7 9981



SECTION C
SCALE: (H)1"=10' (V)1"=2'
LEACHATE REMOVAL PIPE TROUGH WITH LINERS

NOTE:
LINER, GEONET AND GEOTEXTILE NOT SHOWN TO SCALE



SECTION D
SCALE: (H)1"=10' (V)1"=2'
LEACHATE COLLECTION SYSTEM WITH LINERS

NOTES:
1. FORM TUBING CHANNEL PRIOR TO HDPE AND GEONET PLACEMENT.
2. LINER, GEONET AND GEOTEXTILE NOT SHOWN TO SCALE.
3. COMPACTED CLAY LINE 3.0' MEASURED PERPENDICULAR TO THE SLOPE.

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SCALE	AS-NOTED	
DRAWN BY	0072	9/19
CHECKED BY	SMY	10/11/00
APPROVED		04/12/01

MICHAEL J. DEUROCH 27356 PROFESSIONAL ENGINEER

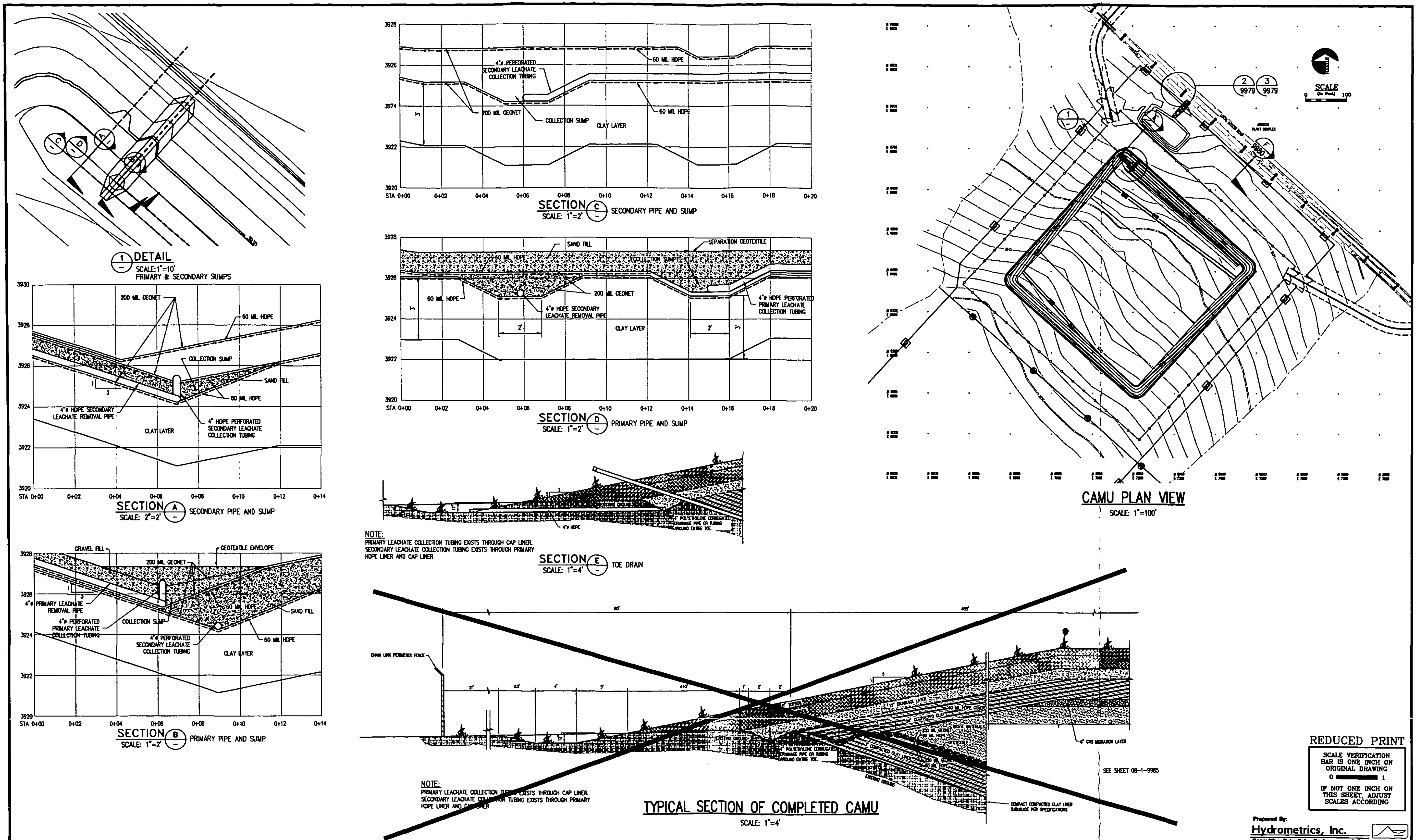
ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, USACS

ASARCO INCORPORATED-EAST HELENA PLANT
CAMU (RCRA LANDFILL) - PHASE I CELL LEACHATE DETECTION, COLLECTION, AND REMOVAL SYSTEM SECTIONS AND DETAILS
FINAL AS-BUILT DRAWING

E.Y. APPROP. NO. | PLANT NO.

ASARCO

DRAWING NUMBER: 08-1-9976
REV. 6



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CHECKED BY	SMY	10/11/00
APPROVED		10/12/00

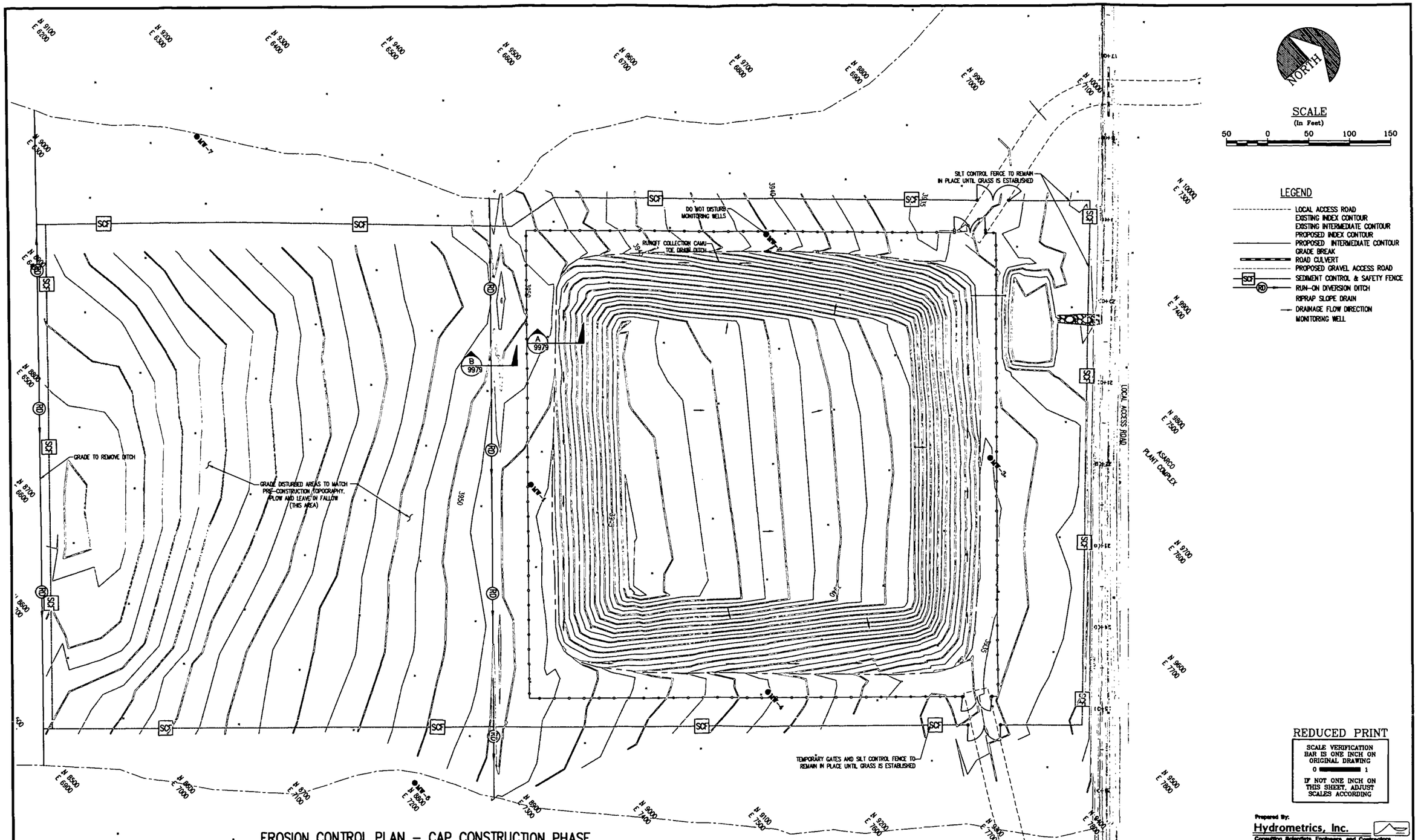
MICHAEL J. OELRICH 9785PE MONTANA PROFESSIONAL ENGINEER

ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, 59635

ASARCO INCORPORATED–EAST HELENA PLANT
CAMU (RCRA LANDFILL) – PHASE I CELL
PRIMARY AND SECONDARY SUMP DETAILS
FINAL AS-BUILT DRAWING

ASARCO

DRAWING NUMBER: 08-1-9977
REV. 1



EROSION CONTROL PLAN – CAP CONSTRUCTION PHASE

SCALE: 1"=50'

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MICHEAL J. OELRICH 9785PE PROFESSIONAL ENGINEER

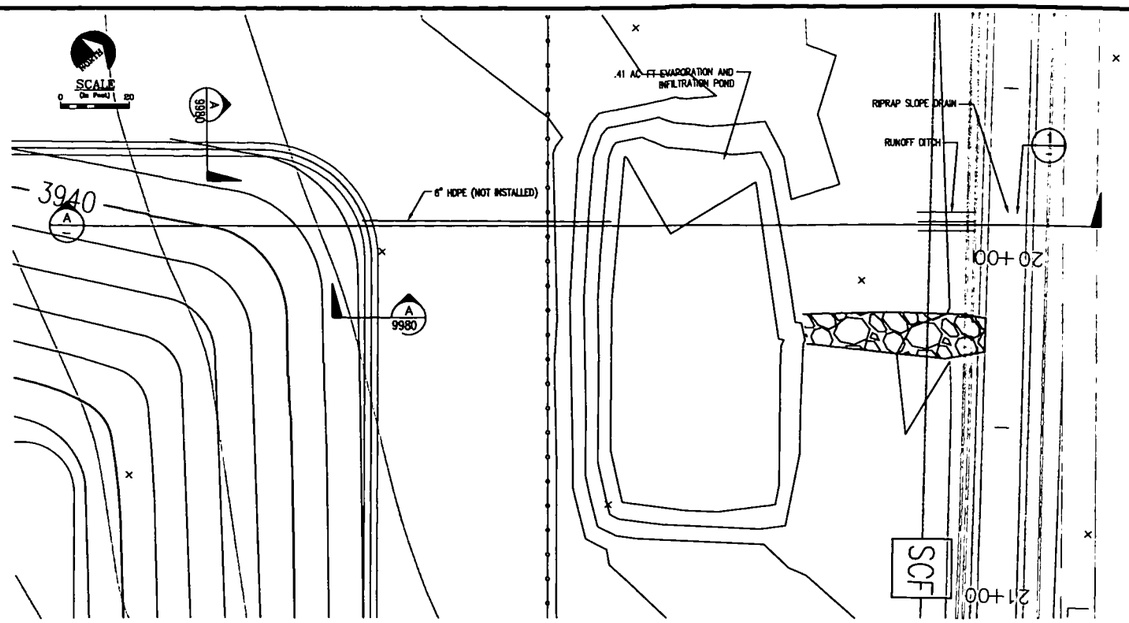
ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, 59635

ASARCO INCORPORATED–EAST HELENA PLANT
CAMU (RCRA LANDFILL) – PHASE I CELL
EROSION CONTROL PLAN – CAP CONSTRUCTION PHASE
FINAL AS-BUILT DRAWING

B.Y. APPROP. NO.	PLANT NO.

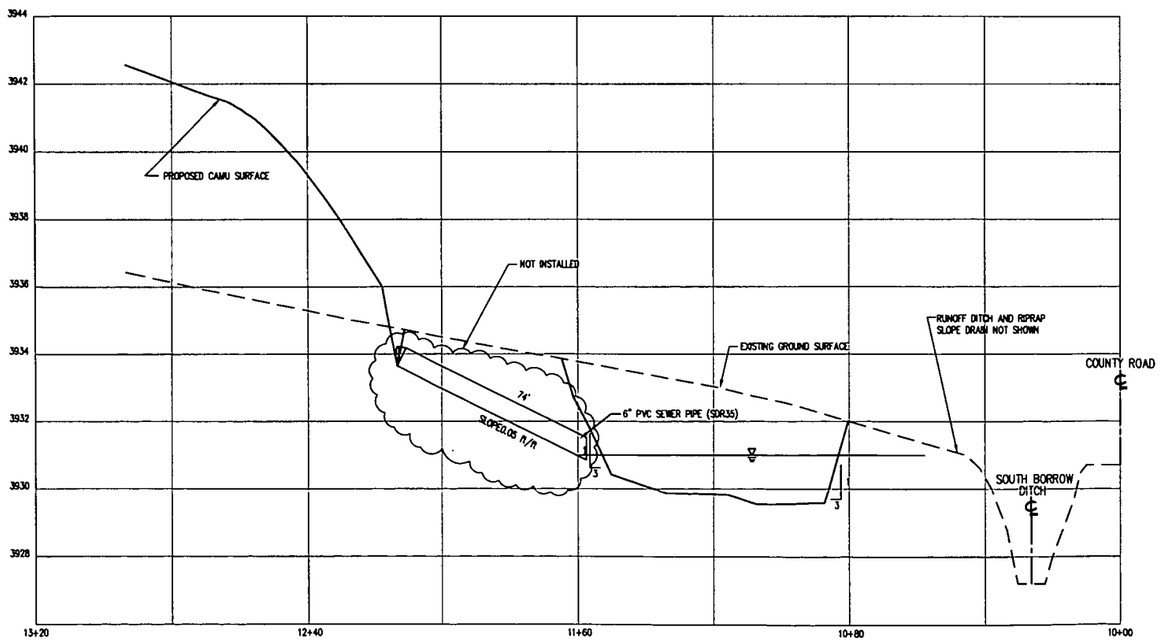
ASARCO

DRAWING NUMBER	REV.
08-1-9978	1



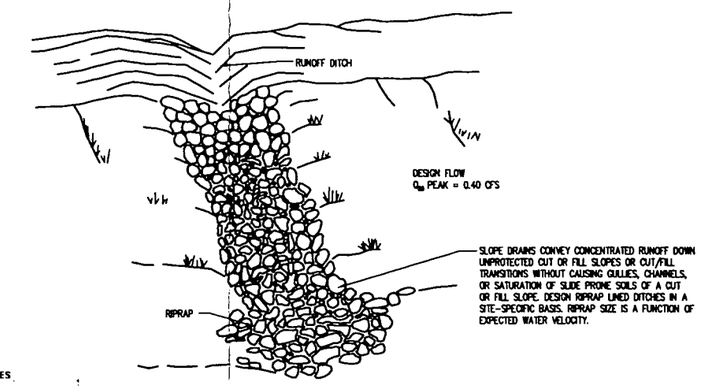
RUNOFF CONTROL POND PLAN VIEW

SCALE: 1"=20'



SECTION (A) RUNOFF CONTROL POND

SCALE: (H) 1"=20 (V) 1"=2'

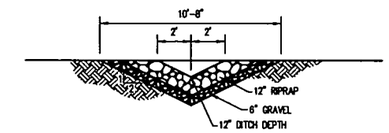


DETAIL (1) RIPRAP SLOPE DRAIN

SCALE: NTS

ITEMIZED QUANTITIES FOR CONSTRUCTION ACTIVITIES
(Rough Quantities for Bidding Only)

Remove Top Soil =	Al x 2foot / 27 cf/cy = 207,025 x 2' / 27 Top 8" 5,112 cy Next 16" 10,223 cy	=	15,335 cy
Excavate Cell =	Vb / 27 cf/cy - Top Soil = 1,815,250 /27-	15,335 =	51,896 cy
		Total excavation	67,231 cy
Grade Bottom & Compact Subgrade=	Aa x 0.5' / 27 cf/cy = 209,784 sf x 0.5' / 27cf/cy =		3,885 cy 23,309 sy
Clay Liner =	Aa x 3 feet / 27 cf/cy = 209,784 x 3 / 27	=	23,309 cy
FML 2ndary =	Aa = 192,005 /9	=	21,334 sy
LCS Geogrid =	Aa = 192,005 /9	=	21,334 sy
FML primary=	Aa = 192,005 /9	=	21,334 sy
LCS Geogrid=	Aa = 192,005 /9	=	21,334 sy
		Both liners =	42,668 sy
		Both geogrids=	42,668 sy
Leachate Collection	2 pipelines @450 ft = 900 ft includes standpipes	gravel 68 vol = sand 68 vol =	215 cy 145 cy
Gas Migration Layer =	Act x 0.5 feet / 27 cf/cy 84,100 x 0.5 / 27	=	1,557 cy
Clay Liner cap =	Ac x 2 feet / 27 cf/cy 210,815 x 2 / 27	=	15,616 cy
40 mil FML cap	= Ac 210,815 /9	=	23,424 sy
Drain Gravel cap =	Ac x 1 feet / 27 cf/cy 220,409 x 1 / 27	=	8,163 cy
Cover Soil	= Ac x 2 foot / 27 cf/cy 240,232 x 2 / 27	=	17,795 cy
Geotextile	= Separation + Drainage = (192,005 + (395*30) +	220,409) / 9 =	47,140 sy
Off-Plant Revegetation			
Seed & Fertilize	CAMU above permanent diversion	370,500 sf	8.51 acre
Seed, Fertilize & Mulch	CAMU below permanent diversion	500,700 sf	11.49 acre
		Total Disturbed Areas =	20.00 acre
Chain Link Fence	=4*(455+2*60)	=	2,380 ft
Area inside fence	= (570)^2	=	324,900 sf 7.46 acre
Access Roads			
North	600 ft x	30 ft / 9	2,000 sy
South	600 ft x	30 ft / 9	2,000 sy
			4,000 sy
Total Landfill Volume Required			
Lower Lake Sediments (ROD)			27,000 cy
Area Between Upper & Lower Lake			17,000 cy
Lower Ore Storage Area			24,000 cy
Shew Ridge Soils			35,000 cy
Other			10,000 cy
		Total	113,000 cy



NOTE:
BANK PROTECTION TO BE TYPE 3.
USE CLASS I RIPRAP.

DETAIL (2) RIPRAP SLOPE DRAIN TYPICAL SECTION

SCALE: NTS

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MICHAEL J. GEURSCH 97ASEP REGISTERED PROFESSIONAL ENGINEER

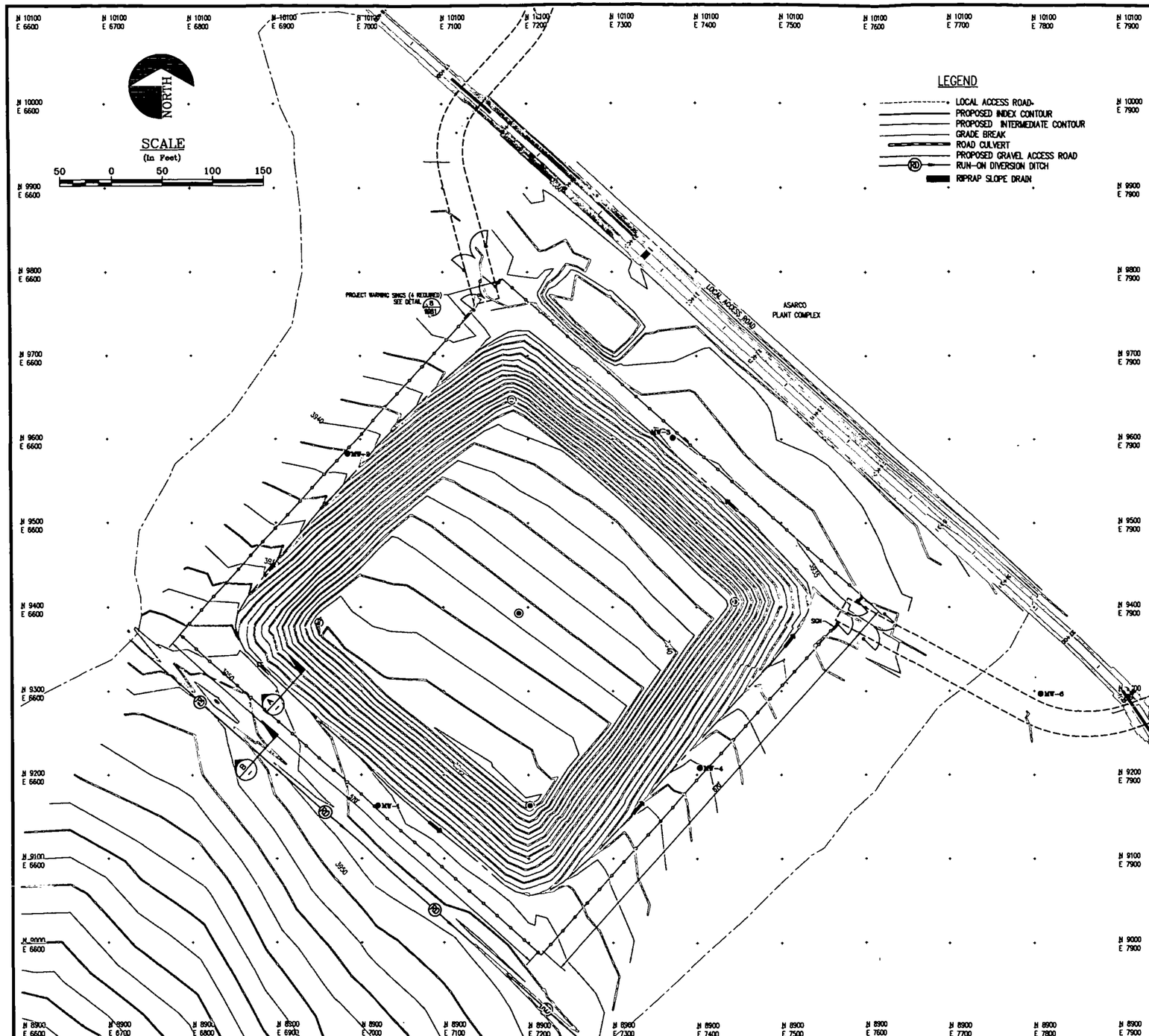
ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, 59635

ASARCO INCORPORATED–EAST HELENA PLANT
CAMU (RCRA LANDFILL) – PHASE I CELL RUNOFF CONTROL POND
PLAN AND RIPRAP SLOPE DRAIN DETAILS
FINAL AS-BUILT DRAWING

E.T. APPROP. NO. | PLANT NO.

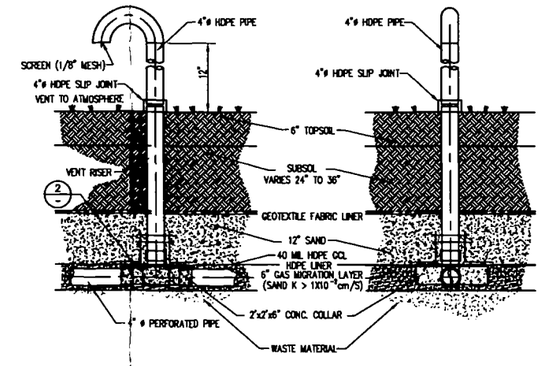
ASARCO

DRAWING NUMBER: 08-1-9979
REV. 5

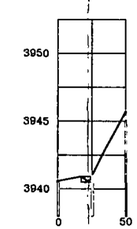


FINISHED GRADE PLAN WITH GAS VENT LOCATIONS

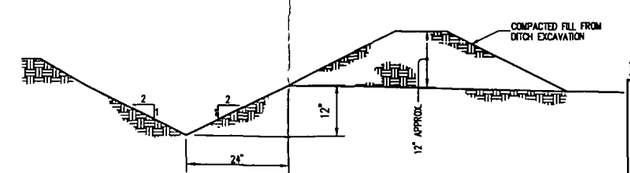
SCALE: 1"=50'



DETAIL 1 VENT PIPE SECTION
SCALE: NTS



SECTION A CAMU TOE DRAIN DETAIL
SCALE: (H) 1"=50' (V) 1"=5'



SECTION B DIVERSION DITCH
SCALE: 3/4"=1'

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MICHAEL J. GEURICH STRAIGHT PROFESSIONAL ENGINEER

ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, 59635

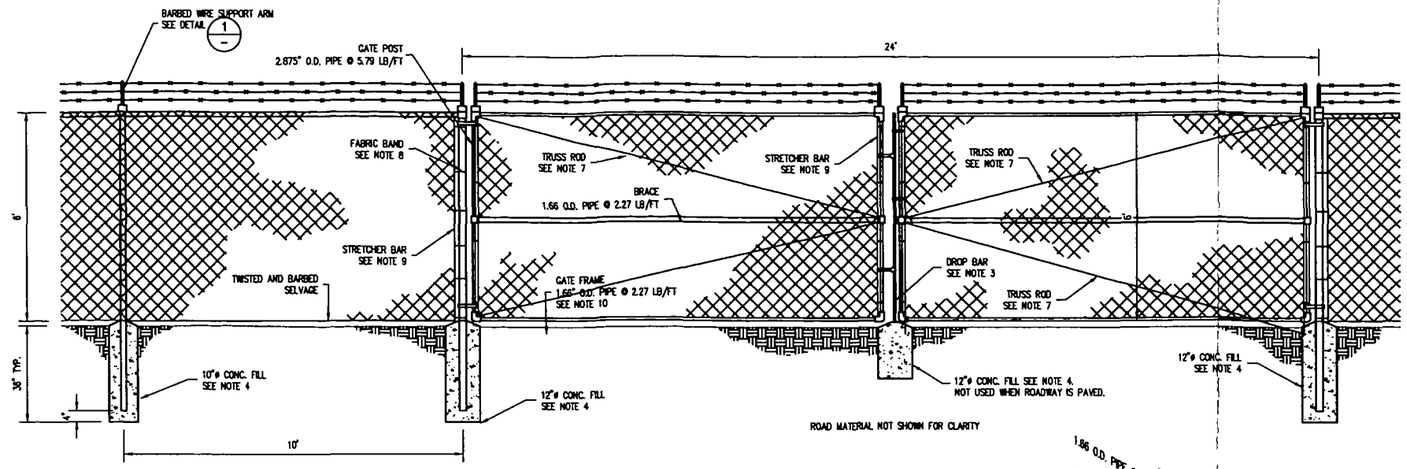
ASARCO INCORPORATED—EAST HELENA PLANT
CAMU (RCRA LANDFILL) – PHASE I CELL
FINISHED GRADE PLAN WITH GAS VENT LOCATIONS AND DETAILS
FINAL AS-BUILT DRAWING

B.V. APPROP. NO. | PLANT NO.

ASARCO

DRAWING NUMBER: 08-1-9980 | REV. 6

UPDATE TIME: 3:21 PM



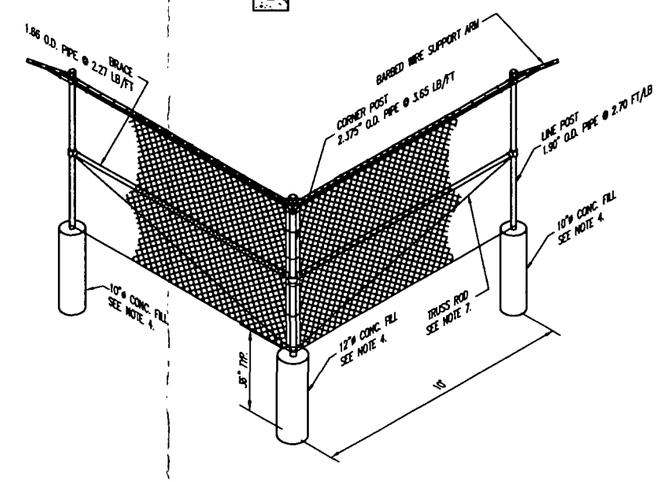
1 DETAIL
NTS
BARBED WIRE SUPPORT ARM

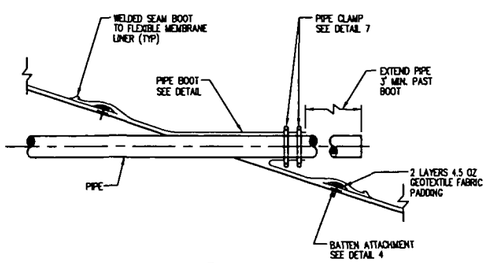
NOTES:

1. DO NOT INSTALL DOUBLE PANELS MORE THAN 300' APART.
2. PULL POST BRACING IS THE SAME AS IN THE CORNER.
3. A DROP BAR LOCKING DEVICE IS REQUIRED FOR ALL DOUBLE GATE INSTALLATIONS. THE DROP BAR MUST BE ABLE TO BE INSERTED INTO THE CONCRETE BLOCK AT LEAST 6".
4. ALL CONCRETE IS CLASS "F" OR BETTER.
5. USE 2-POINT 12-1/2 OR 13-1/2 GAUGE BARB WIRE MEETING ASTM A 121 REQUIREMENTS. SPACE BARBS A NOMINAL 4" OR A NOMINAL 5". ZINC COATING MUST BE CLASS 1 FOR 12-1/2 AND 13-1/2 GAUGE WIRE. PROVIDE THE PROJECT MANAGER CERTIFICATION THAT THE WIRE MEETS ASTM A 121 REQUIREMENTS.
6. FENCE FABRIC MUST HAVE 2" OPENINGS AND MEET AASHTO M 181 REQUIREMENTS. USE 9-GAUGE WIRE FOR FABRIC.
7. FURNISH 3/8" GALVANIZED TRUSS RODS WITH DROP-FORGED TURNBUCKLES OR 3/8" ALUMINUM TRUSS RODS WITH CAST ALUMINUM TURNBUCKLES
8. STEEL BANDS MUST BE A MINIMUM OF 1/8" THICK BY 3/4" WIDE ALUMINUM BANDS MUST BE A MINIMUM OF 1/8" THICK BY 7/8" WIDE.
9. STEEL OR ALUMINUM STRETCHER BARS MUST BE AT LEAST 1/4" THICK BY 3/4" WIDE AND AT LEAST 2" SHORTER THAN THE FABRIC WIDTH USED.
10. THE GATE FRAME CORNERS MAY BE WELDED OR FASTENED AND REINFORCED WITH GALVANIZED MALLEABLE-IRON FITTINGS DESIGNED FOR THIS USE.

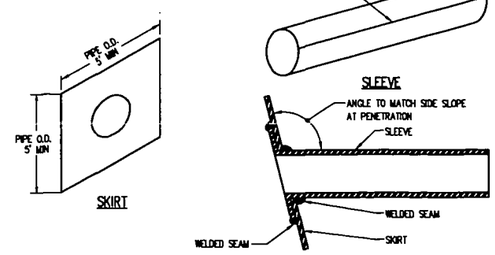
6-FOOT CHAIN LINK FENCE

NTS

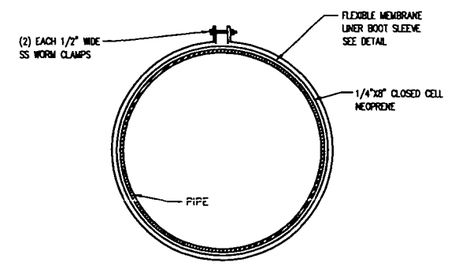




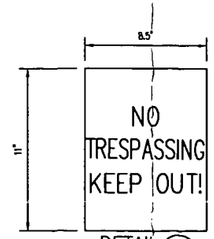
DETAIL 5 LINER PIPE PENETRATION
SCALE: NTS



DETAIL 6 TYPICAL PIPE BOOT
SCALE: NTS



DETAIL 7 TYPICAL PIPE CLAMP
SCALE: NTS



DETAIL 8
SCALE: NTS

NOTE:
SIGNS SHALL BE MADE FROM ALUMINUM SHEET AS DESCRIBED IN THE SPECIFICATIONS. LETTERS SHALL BE 2" HIGH (MIN.) TYPE A ACRYLIC REFLECTORS. BACKGROUND PAINT SHALL BE RED. A BORDER SIMILAR IN COLOR WILL ALSO BE SUPPLIED.

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SCALE	AS NOTED	
DRAWN BY	0072	10/10/00
CHECKED BY		
APPROVED		

MONTANA MICHAEL J. DELRICH 9795PE REGISTERED PROFESSIONAL ENGINEER

ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, 59635

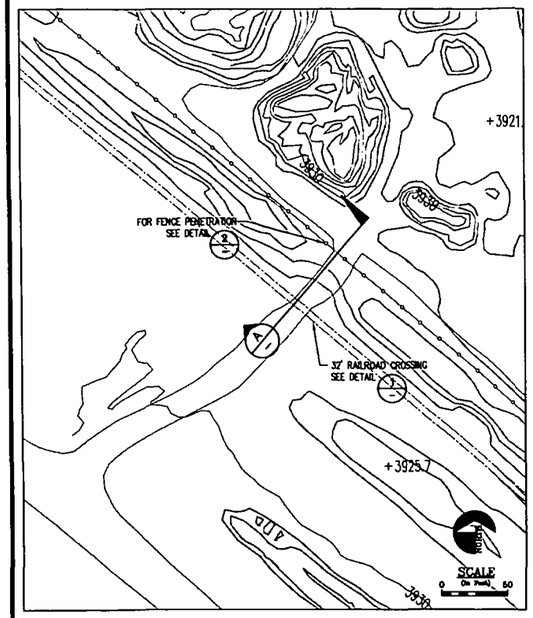
ASARCO INCORPORATED-EAST HELENA PLANT
CAMU (RCRA LANDFILL) - PHASE I CELL
MISCELLANEOUS DETAILS
FINAL AS-BUILT DRAWING

B.T. APPROP. NO. | PLANT NO.

ASARCO

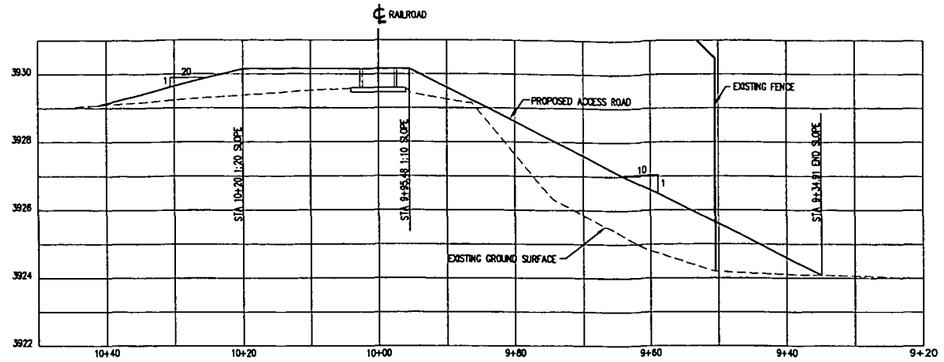
DRAWING NUMBER: 08-1-9981
REV. 1

UPDATE TIME: 4:46PM



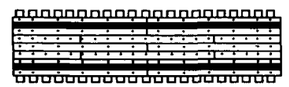
NORTHWEST CROSSING PLAN VIEW

SCALE: 1"=50'

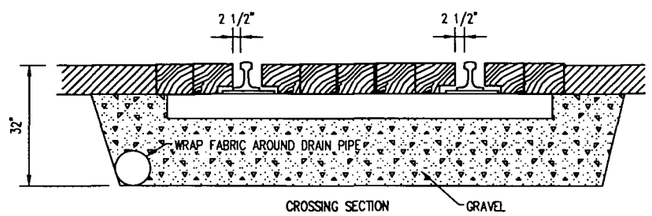


SECTION A

SCALE: (H) 1"=10'
(V) 1"=1'



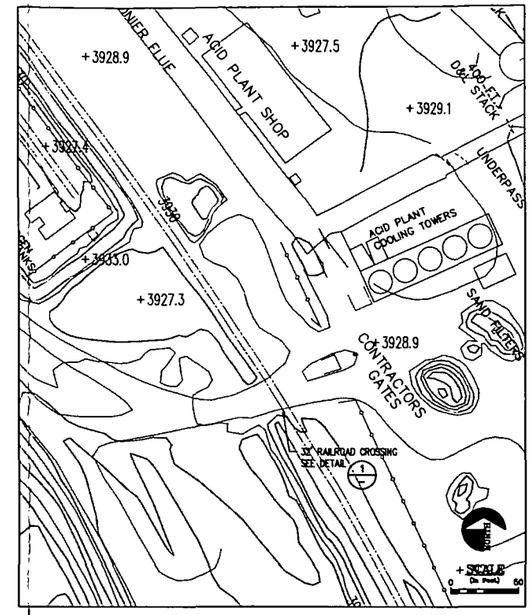
32' CROSSING PLAN VIEW



NOTE:
CROSSINGS TO BE INSTALLED BY MONTANA RAIL LINK

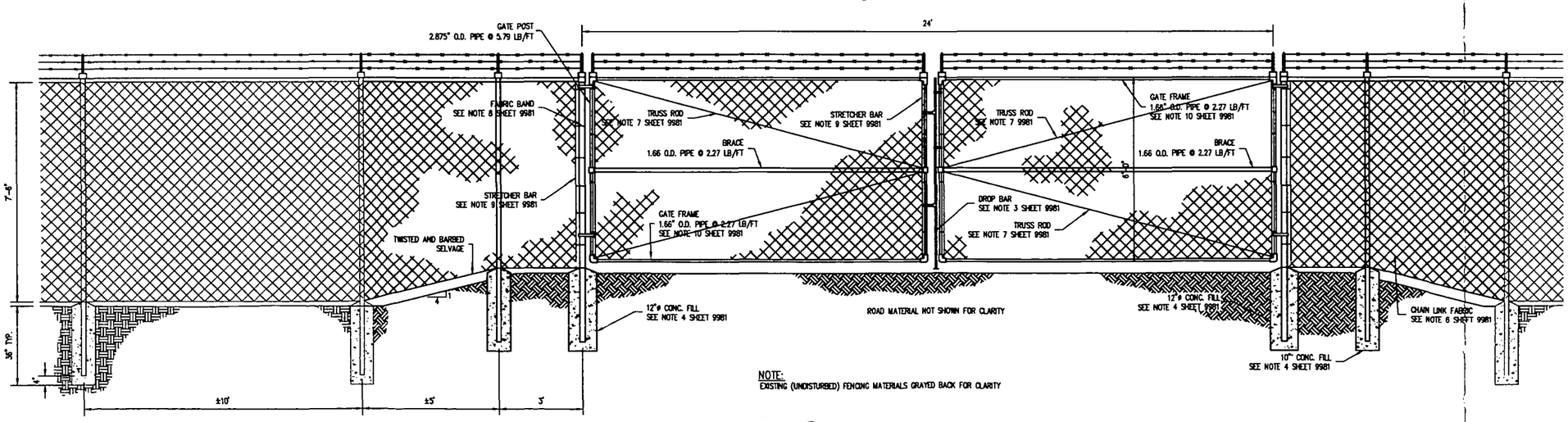
DETAIL 1
NTS

RAILROAD CROSSING



SOUTHEAST CROSSING PLAN VIEW

SCALE: 1"=50'



NOTE:
EXISTING (UNDISTURBED) FENCING MATERIALS GRAYED BACK FOR CLARITY

DETAIL 2
NTS

TEMPORARY FENCE & GATE ADJUSTMENTS AT NORTHWEST ACCESS ROAD EXISTING FENCE PENETRATION

REDUCED PRINT

SCALE VERIFICATION BAR IS ONE INCH ON ORIGINAL DRAWING
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Prepared By:
Hydrometrics, Inc.
Consulting Scientists, Engineers, and Contractors

REFERENCES DWG. NO.	TITLE
9970	DRAWING REFERENCE LIST

REFERENCES DWG. NO.	TITLE

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4			
5			
6	0072	12/11/01	AS-BUILT

PRELIMINARY
REVISED-DESTROY PREVIOUS ISSUE
RELEASED FOR CONSTRUCTION
ISSUED BY
DATE

SCALE	AS-NOTED	
DRAWN BY	0072	8/25/00
CHECKED BY	SMY	8/28/00
APPROVED		8/31/00

MICHAEL J. OELRICH 9785PE REGISTERED PROFESSIONAL ENGINEER

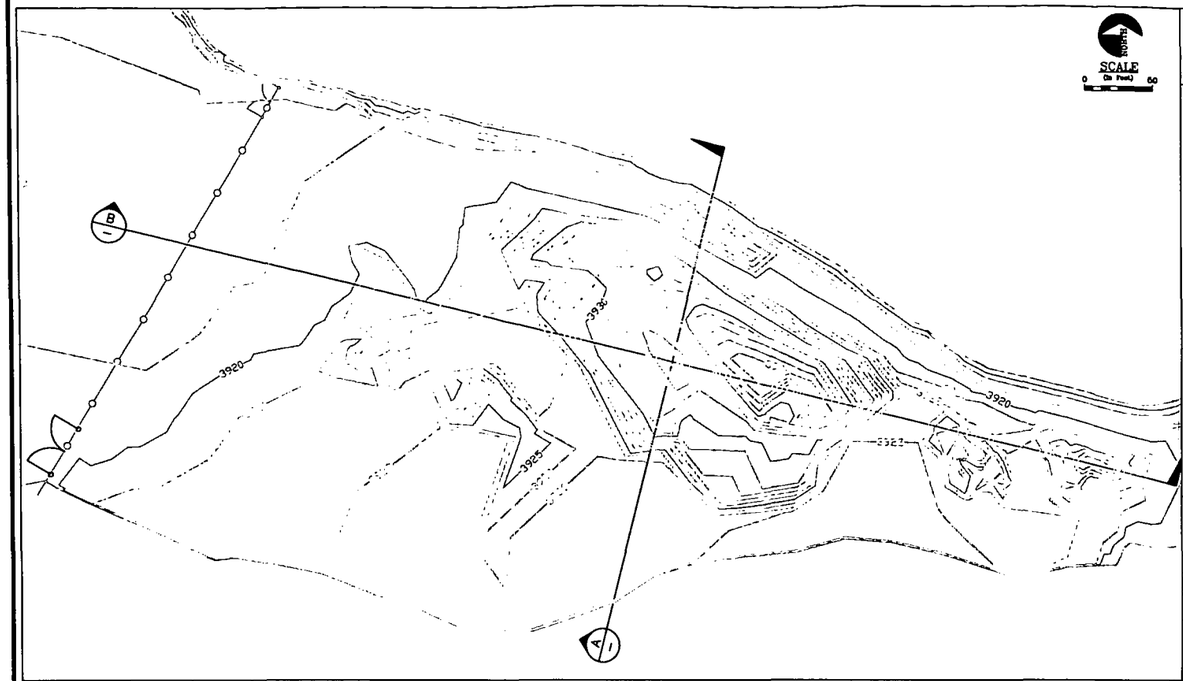
ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA 59635

ASARCO INCORPORATED - EAST HELENA PLANT
CAMU (RCRA LANDFILL) - PHASE I CELL
RAILROAD CROSSING AND FENCE PENETRATION DETAILS
FINAL AS-BUILT DRAWING

U.T. APPROP. NO.
PLANT NO.

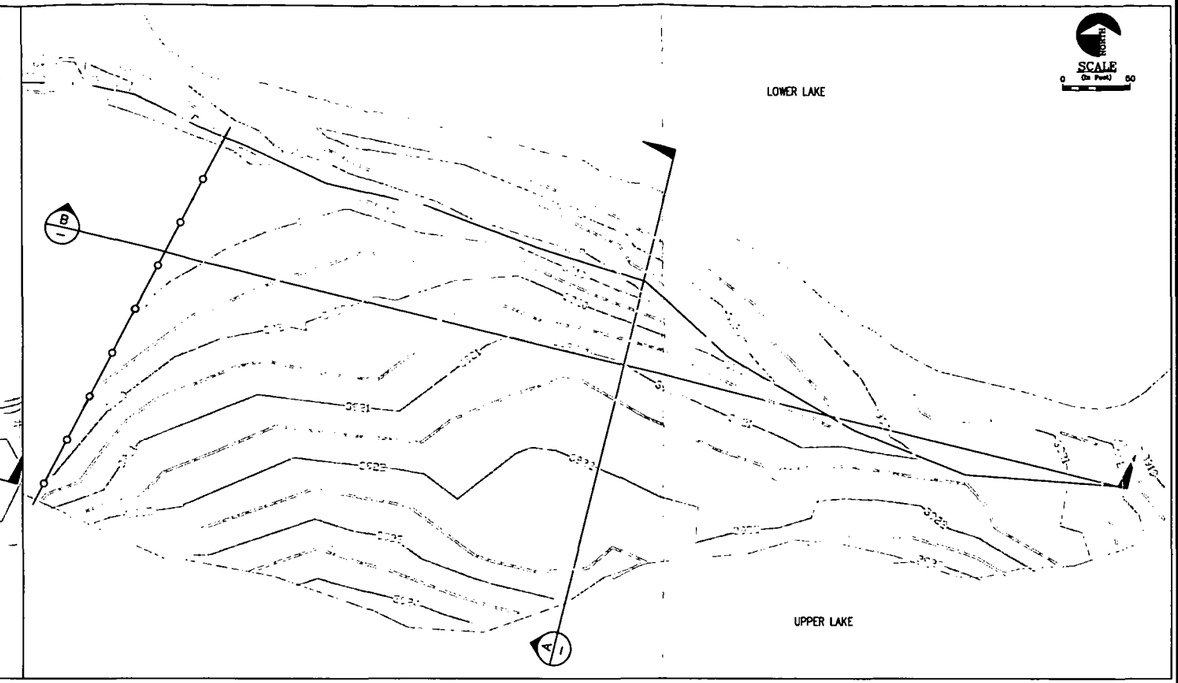
ASARCO

DRAWING NUMBER: 08-1-9982
REV. 4



PREVIOUS SOUTHEAST LOWER LAKE PLAN VIEW

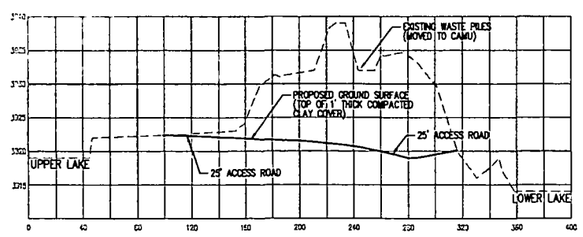
SCALE: 1"=50'



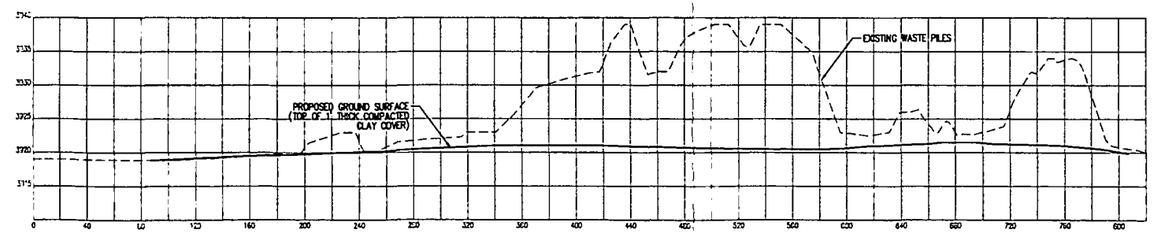
NEW/REVISED SOUTHEAST LOWER LAKE PLAN VIEW

SCALE: 1"=50'

NOTE:
FINAL GRADES TO BE STAKED IN FIELD AFTER EXISTING WASTE PILES REMOVED TO GROUND LEVEL.



SECTION A
SCALE: (H)1"=50' (V)1"=20'



SECTION B
SCALE: (H)1"=20' (V)1"=50'

NOTE:
GRADE AND COMPACT SUBGRADE TO 90% MAX. DRY DENSITY AT DEPTH OF 6" PRIOR TO PLACING CAP MATERIAL

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Consulting Scientists, Engineers, and Contractors

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	9970	DRAWING REFERENCE LIST

REFERENCES	DWG. NO.	TITLE

REVISIONS	NO.	BY	DATE	DESCRIPTION

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	0072		12/11/01	AS-BUILT

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REVISED-DESTROY PREVIOUS ISSUE
RELEASED FOR CONSTRUCTION
ISSUED BY
DATE

SCALE	AS-NOTED	
DRAWN BY	0072	8/25/00
CHECKED BY	SMY	10/16/00
APPROVED		10/16/00

MICHAEL J. DEUBOH 9735PE REGISTERED PROFESSIONAL ENGINEER

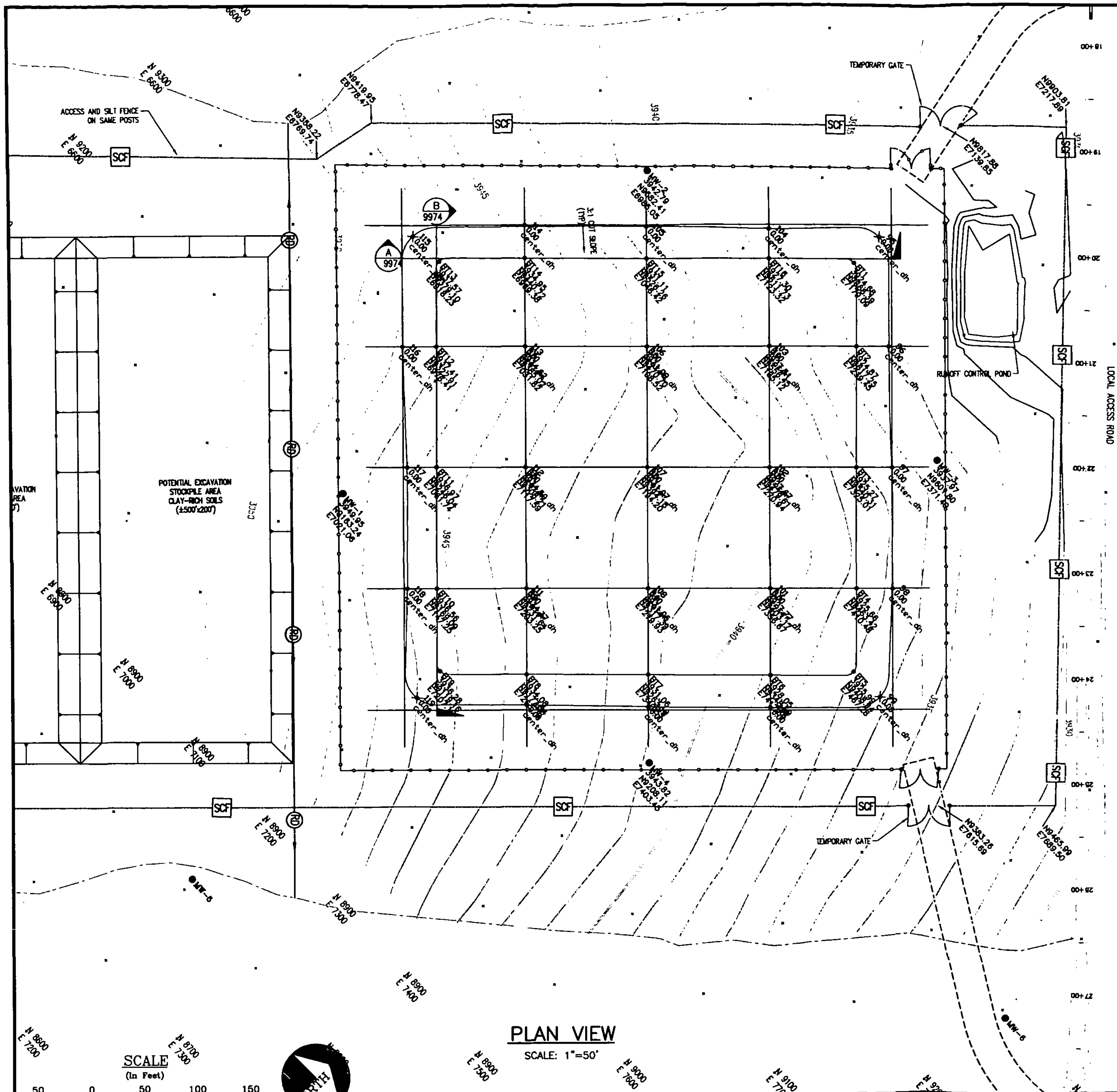
ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, 59635

ASARCO INCORPORATED – EAST HELENA PLANT
CAMU (RCRA LANDFILL) – PHASE I CELL
SOUTHEAST LOWER LAKE AREA GRADING PLAN AND CAP SECTIONS
FINAL AS-BUILT DRAWING

H.Y. APPROP. NO.
PLANT NO.

ASARCO

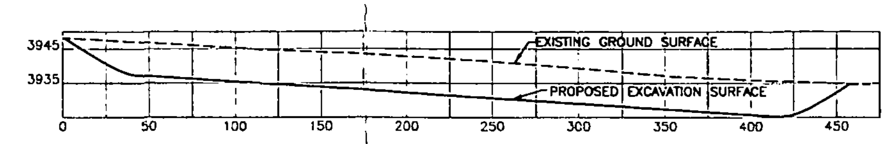
DRAWING NUMBER: 08-1-9983
REV.: 1



PLAN VIEW

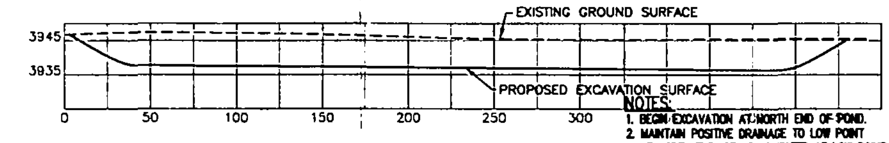
SCALE: 1"=50'

SCALE (In Feet)



SECTION A 9974

SCALE: (H) 1"=50' (V) 1"=25'



SECTION B 9974

SCALE: (H) 1"=50' (V) 1"=25'

NOTES:

1. BEGIN EXCAVATION AT NORTH END OF POND.
2. MAINTAIN POSITIVE DRAINAGE TO LOW POINT AT NORTH END. STANDING WATER AT LOW POINT TO BE PUMPED INTO EROSION CONTROL POND.
3. STOCKPILES SHOWN AT AVERAGE PILE DEPTH OF 10 FEET.
4. DO NOT DISTURB EXISTING MONITORING WELLS.
5. ESTIMATED VOLUMES INCLUDE A 15% SWELL FACTOR.

COORDINATE TABLE — CONTROL POINTS

POINT	NORTH	EASTING	ELEV.	DISC.
MW-1	9163.2307	7021.2342	3950.040	MW ⊙ TOP CEN
MW-2	9582.4666	6985.3961	3942.880	MW ⊙ TOP CEN
MW-3	9601.9559	7371.4954	3938.060	MW ⊙ TOP CEN
MW-4	9207.8749	7403.5084	3943.910	MW ⊙ TOP CEN
RM-7	10553.2763	6833.3942	3929.860	BENCHMARK
BCPNW	9873.0502	7640.4701	3931.930	BERM CP-NW
BCPSE	9477.1059	7989.9466	3931.650	BERM CP-SE

COORDINATE TABLE — EXCAVATION POINTS

POINT	NORTH	EASTING	ELEV.	DISC.
BT1	9668.39	7179.09	3924.68	TOE
BT2	9617.25	7239.45	3924.87	TOE
BT3	9540.31	7325.01	3925.27	TOE
BT4	9483.42	7410.48	3925.66	TOE
BT5	9408.94	7467.28	3925.99	TOE
BT6	9348.59	7417.69	3928.05	TOE
BT7	9263.19	7340.57	3931.06	TOE
BT8	9177.54	7263.79	3934.08	TOE
BT9	9119.16	7207.10	3936.28	TOE
BT10	9169.09	7147.25	3936.56	TOE
BT11	9246.04	7061.74	3936.97	TOE
BT12	9322.91	6976.41	3937.41	TOE
BT13	9379.10	6918.23	3937.57	TOE
BT14	9440.72	6969.38	3934.95	TOE
BT15	9526.26	7046.42	3931.11	TOE
BT10	9611.73	7123.32	3927.30	TOE
B1	9556.45	7185.12	3927.51	BOTTOM
B2	9479.61	7270.94	3927.67	BOTTOM
B3	9403.17	7356.67	3927.77	BOTTOM
B4	9317.39	7279.93	3931.06	BOTTOM
B5	9394.18	7194.20	3931.07	BOTTOM
B6	9470.70	7108.52	3931.09	BOTTOM
B7	9385.02	7031.82	3934.62	BOTTOM
B8	9308.21	7117.69	3934.50	BOTTOM
B9	9231.64	7203.25	3934.37	BOTTOM

COORDINATE TABLE — FENCE CORNERS

POINT	NORTH	EASTING	DISC.
1	9903.81	7217.89	FENCE CORNER
2	9455.9	7689.50	FENCE CORNER
3	9383.26	7615.69	GATE POST
4	8527.74	6852.33	FENCE CORNER
5	8938.52	6388.56	FENCE CORNER
6	9358.22	6789.74	FENCE CORNER
7	9419.95	6778.47	FENCE CORNER
8	9817.88	7139.85	GATE POST
9	9903.81	7217.89	FENCE CORNER

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DATE

SCALE	AS-NOTED	
DRAWN BY	0072	04/19/01
CHECKED BY	SMY	04/20/01
APPROVED		04/20/01

MICHEAL J. OELRICH 9785PE — REGISTERED PROFESSIONAL ENGINEER

ASARCO Incorporated

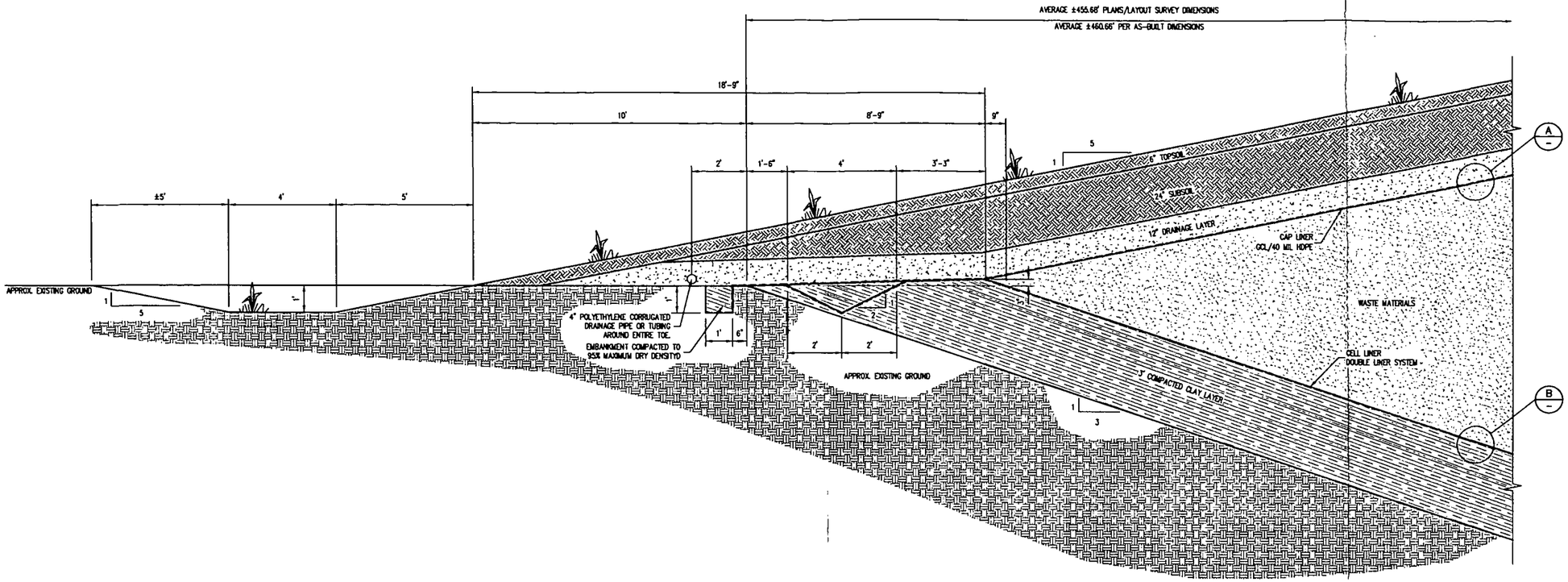
EAST HELENA PLANT

EAST HELENA MONTANA, 59635

ASARCO INCORPORATED-EAST HELENA PLANT
CAMU (RCRA LANDFILL) - PHASE I CELL
CONSTRUCTION LAYOUT PLAN
FINAL AS-BUILT DRAWING

ASARCO

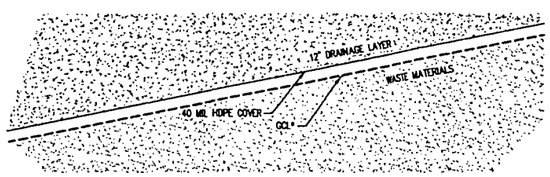
DRAWING NUMBER: 08-1-9984 REV. 1



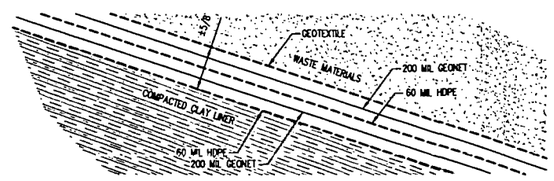
TYPICAL SECTION OF COMPLETED CAMU WITH GCL LINER

SCALE: 1"=2'

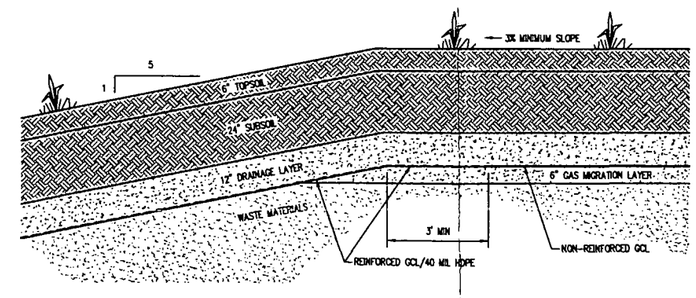
NOTES:
1. USE REINFORCED GCL ON SIDE SLOPES OF CAMU
2. USE NON-REINFORCED GCL ON TOP OF CAMU
3. EXTEND REINFORCED GCL AT LEAST 3 FT BEYOND THE SLOPE ON TO THE TOP OR THE CAMU



A DETAIL
CAP LINER
NOT TO SCALE



B DETAIL
CELL LINER
NOT TO SCALE



C DETAIL
TOP OF SLOPE GCL DETAIL
NOT TO SCALE

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DATE	

SCALE	AS NOTED	
DRAWN BY	0072	8/23/01
CHECKED BY	SMY	8/23/01
APPROVED		

MONTANA MICHAEL J. DELRICH 32292 PROFESSIONAL ENGINEER

ASARCO Incorporated
EAST HELENA PLANT
EAST HELENA MONTANA, 59635

ASARCO INCORPORATED-EAST HELENA PLANT
CAMU (RCRA LANDFILL) - PHASE I CELL
TYPICAL SECTON WITH GCL LINER
FINAL AS-BUILT DRAWING

H.Y. APPROP. NO. | PLANT NO.

ASARCO

DRAWING NUMBER: 08-1-9985
REV.: 1

UPDATE: WED 2:33PM
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APPENDIX F

PHOTO LOG

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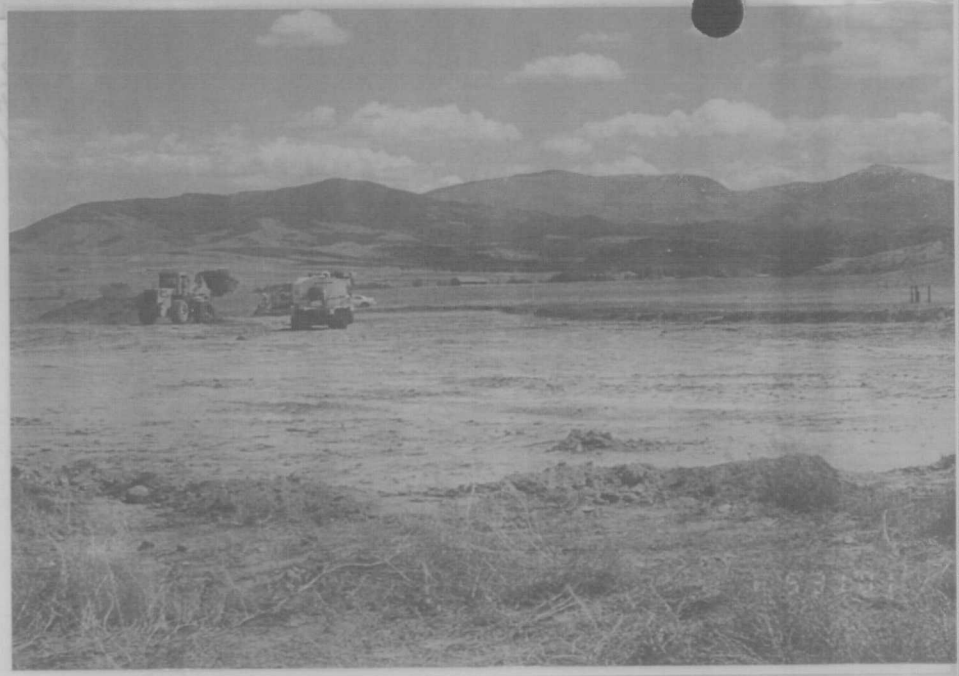

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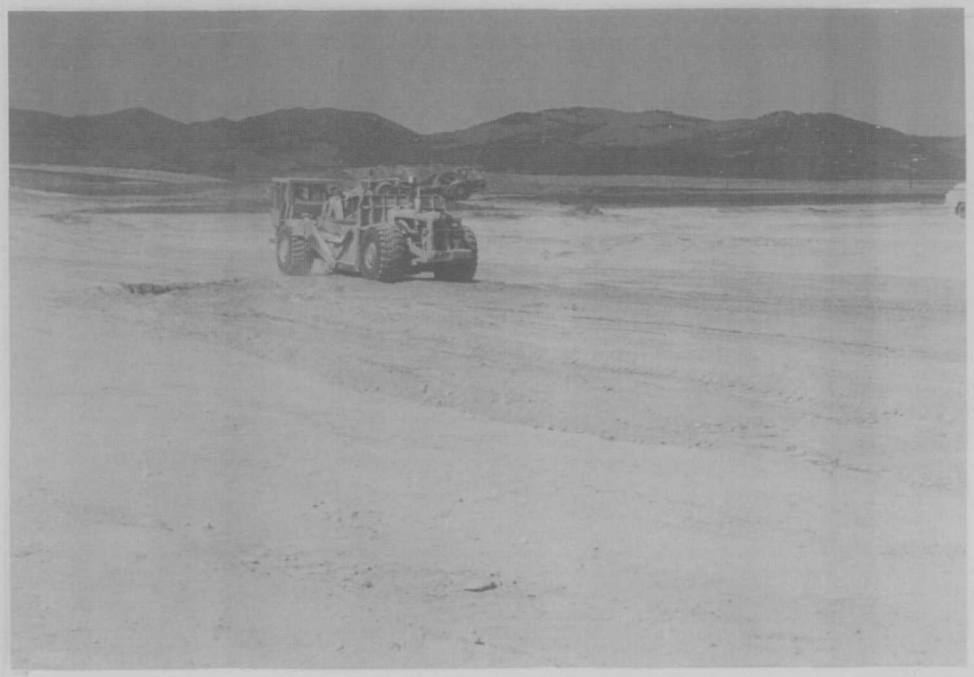

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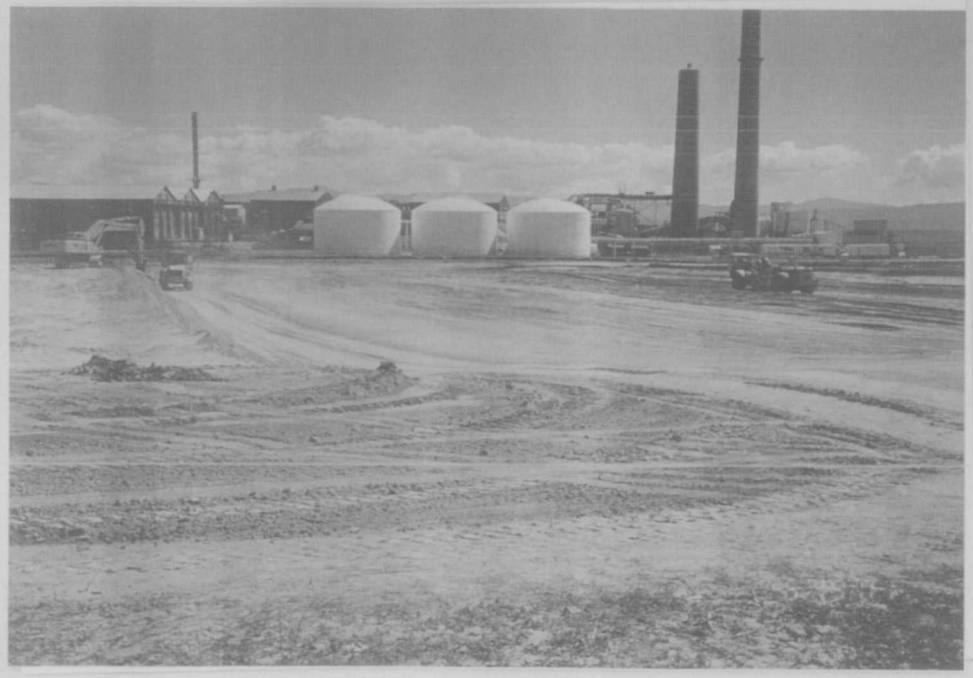

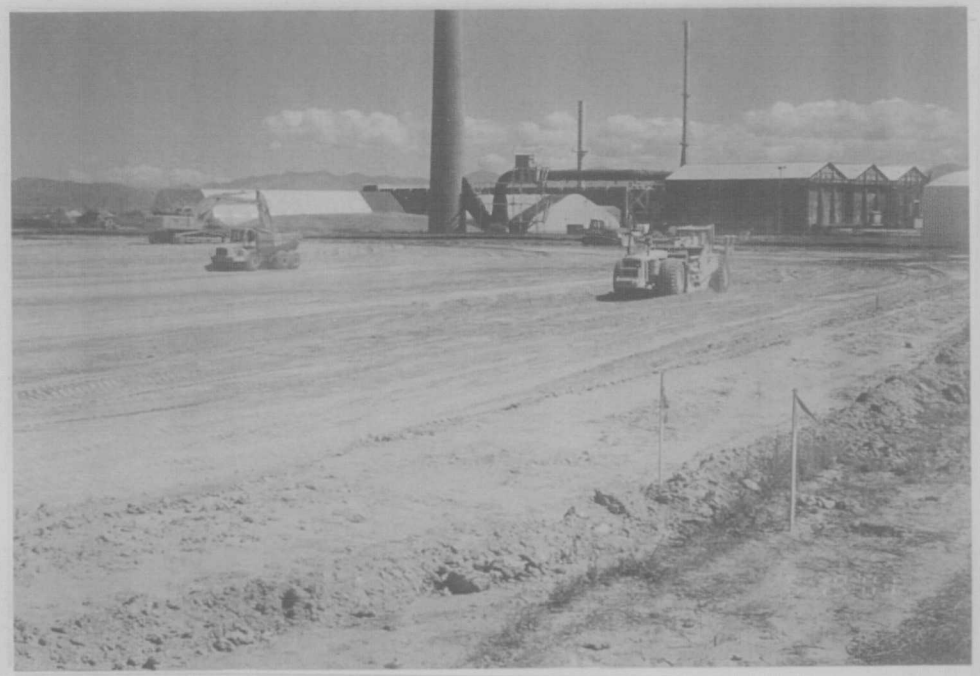

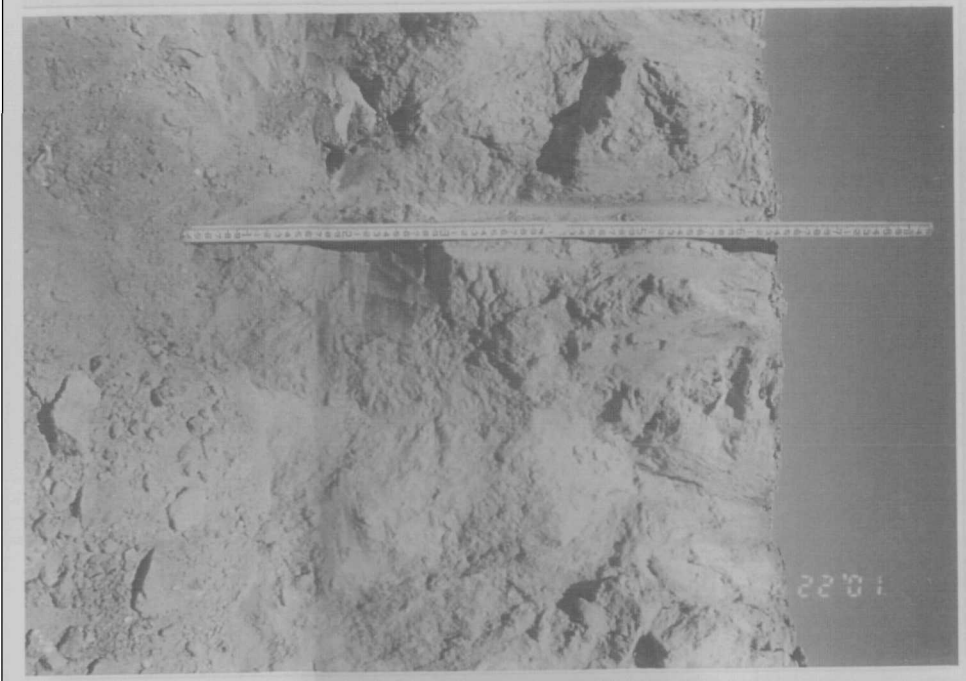

KOMATSU

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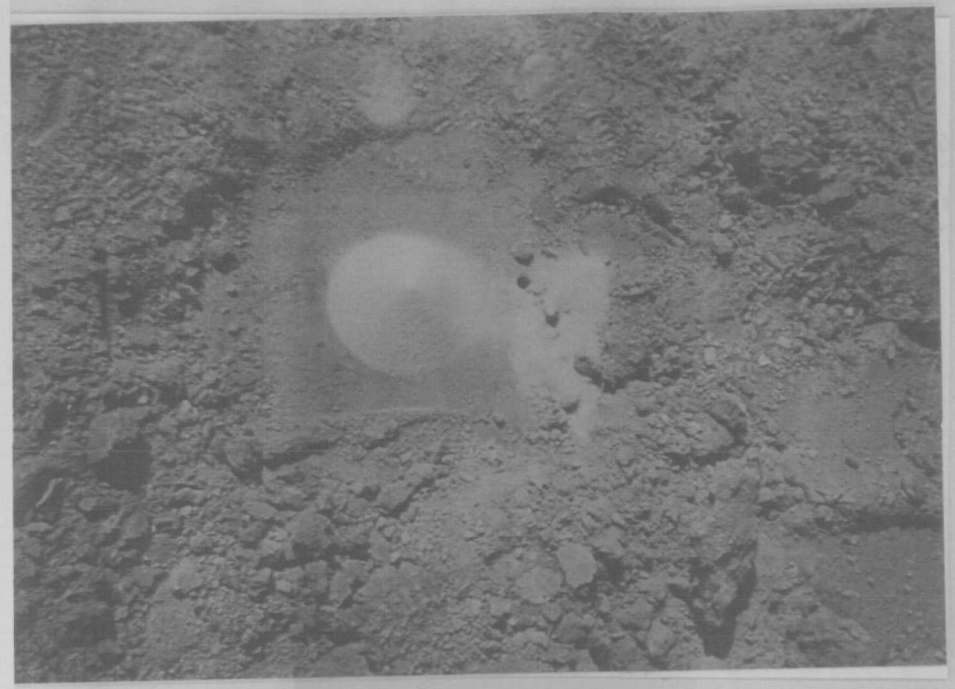

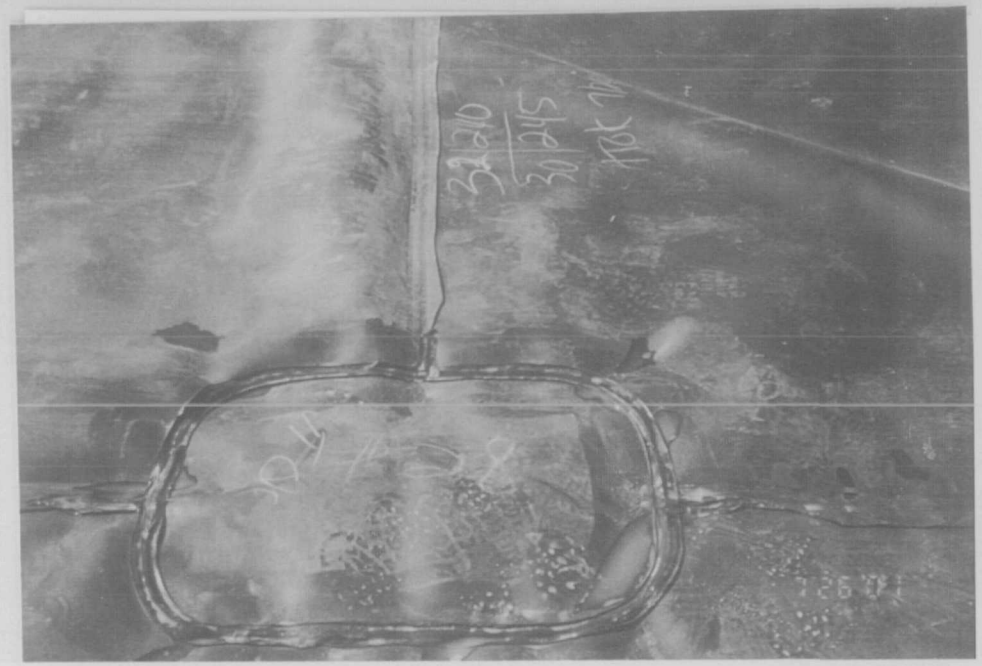

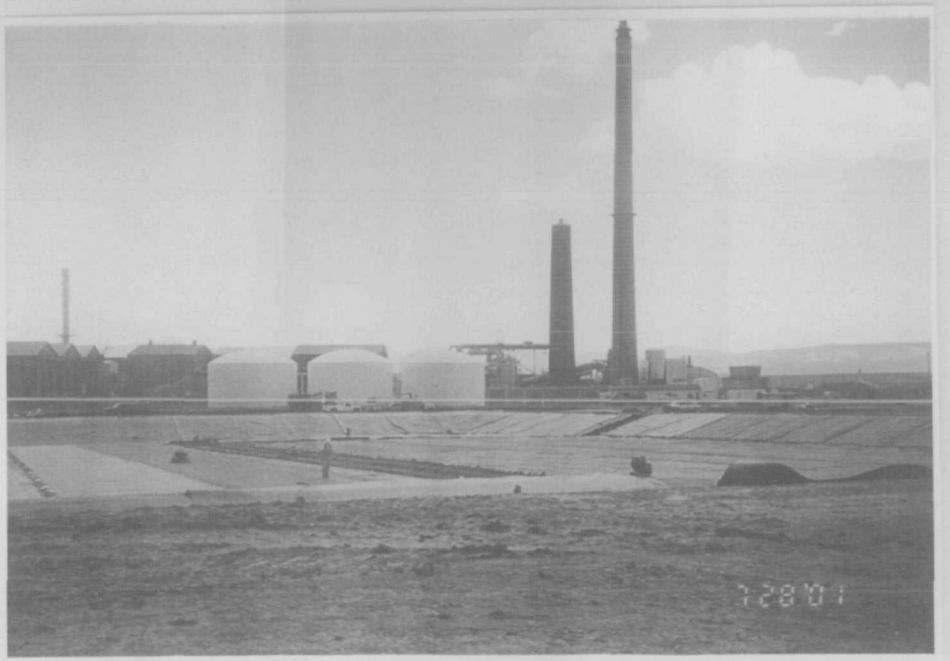

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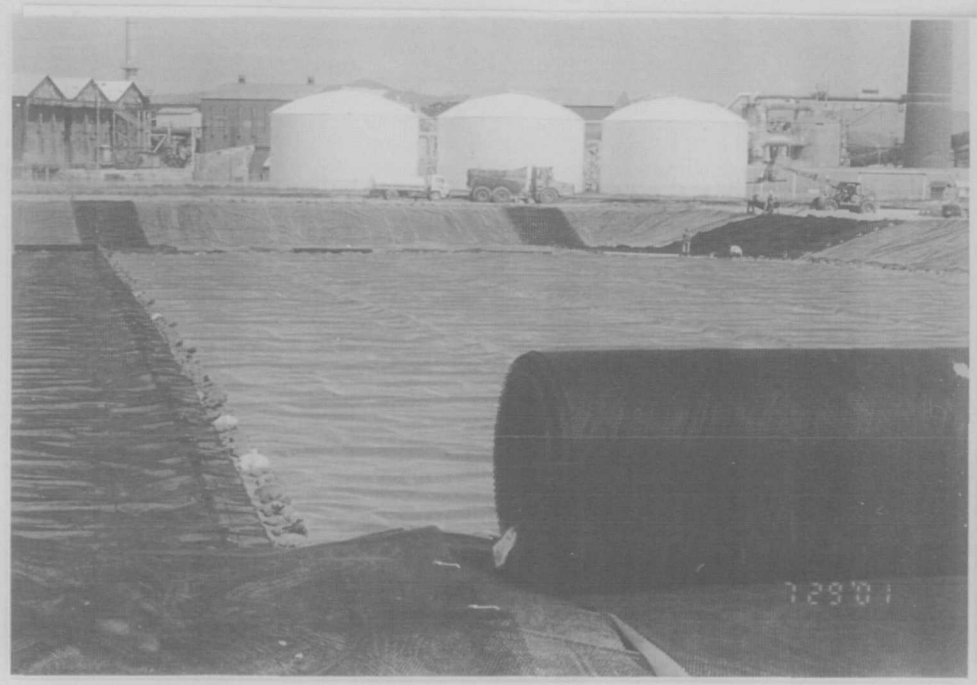
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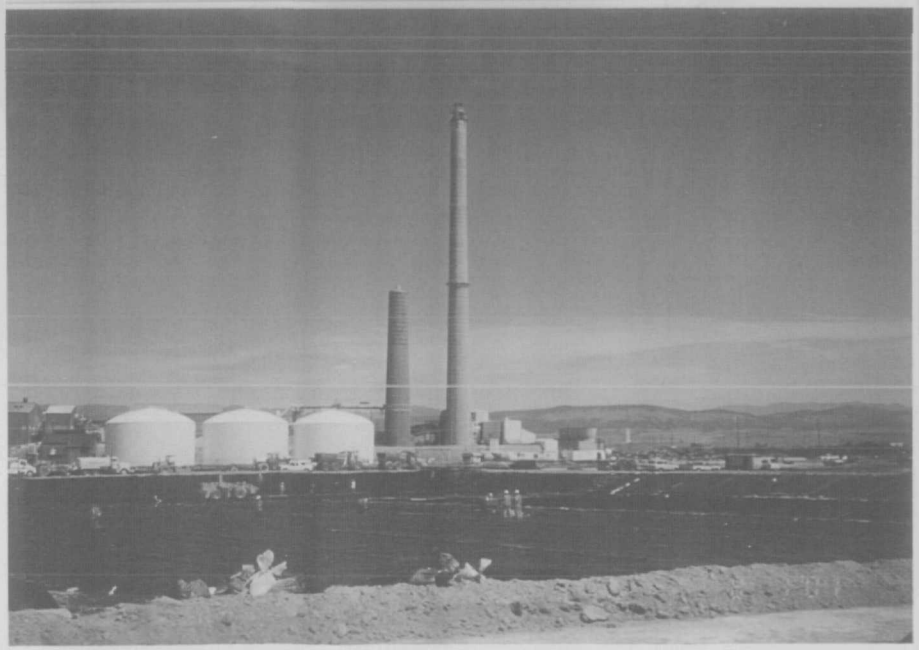

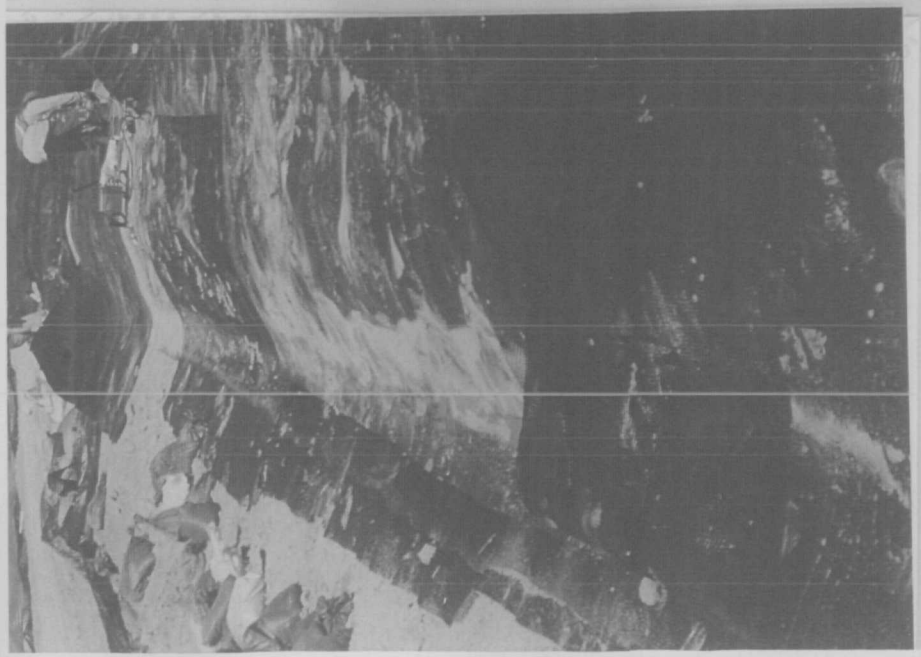

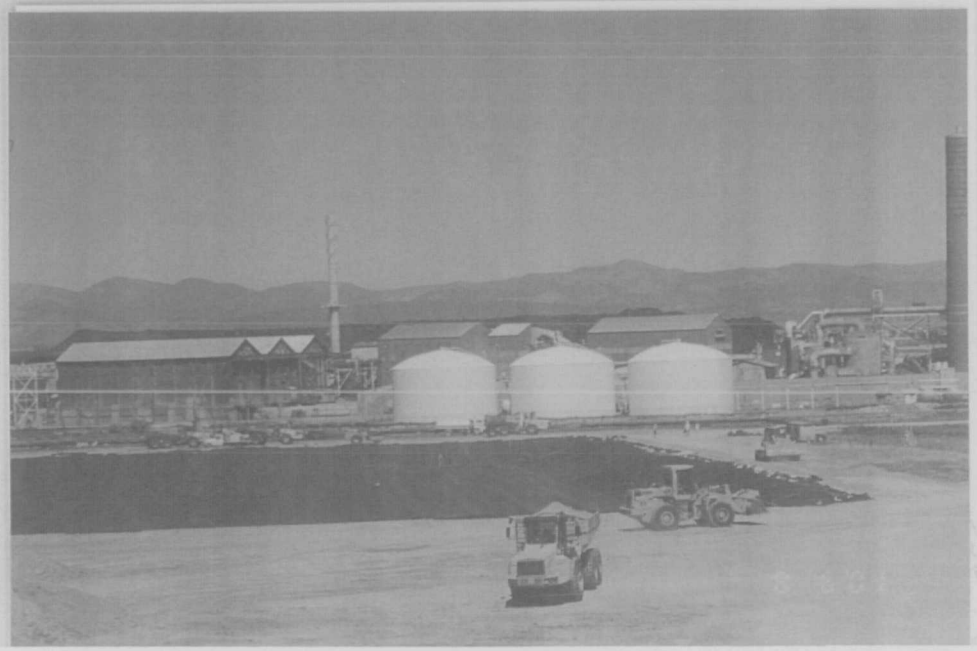

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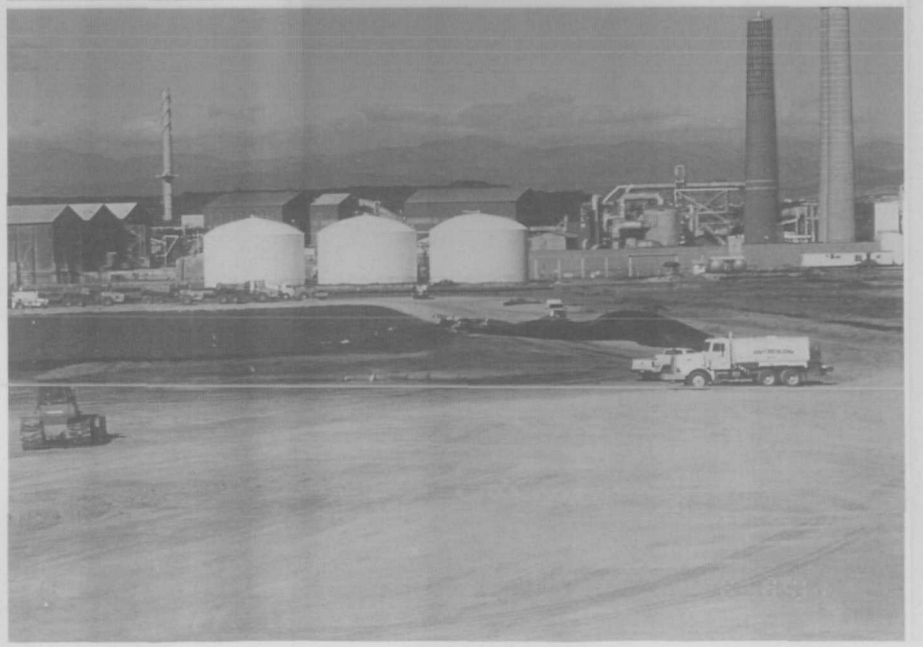

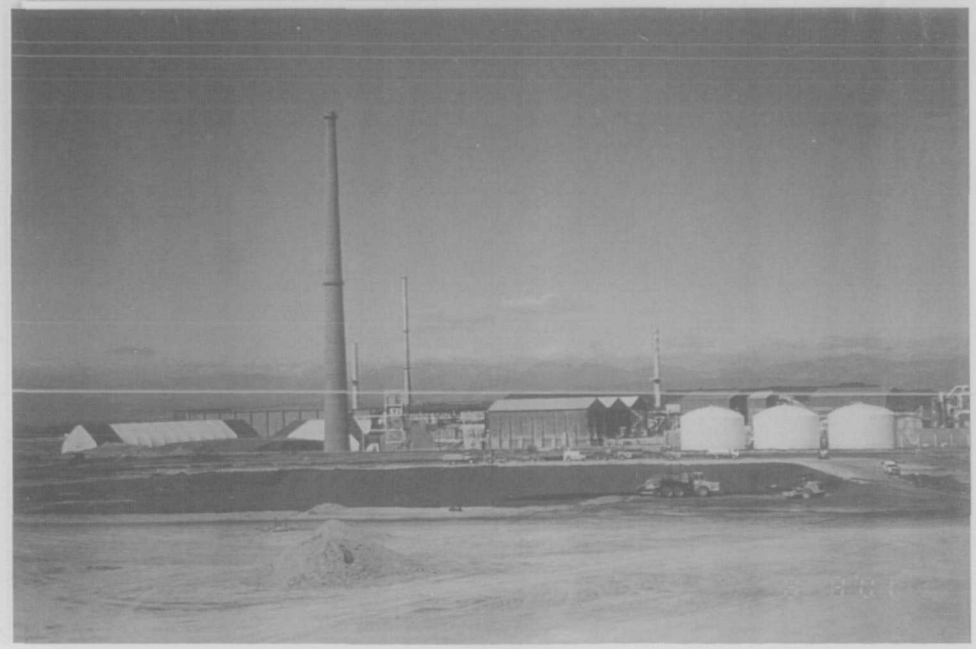

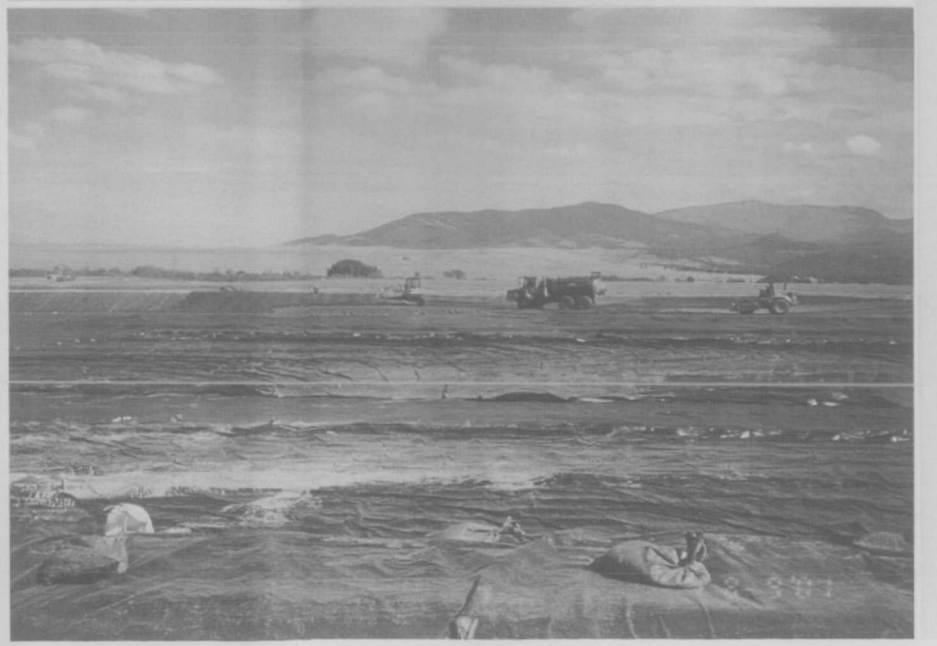

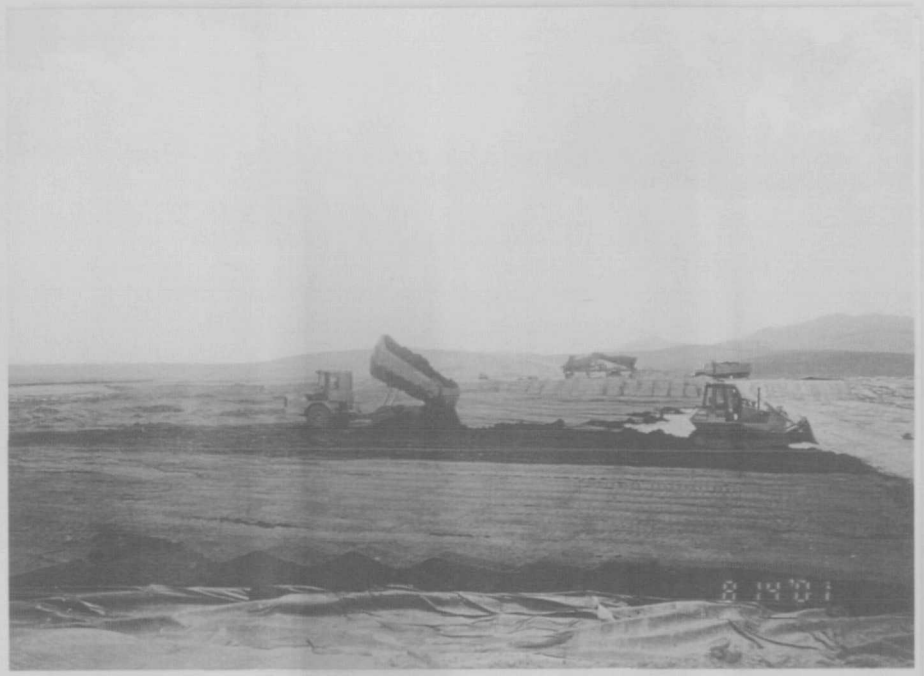

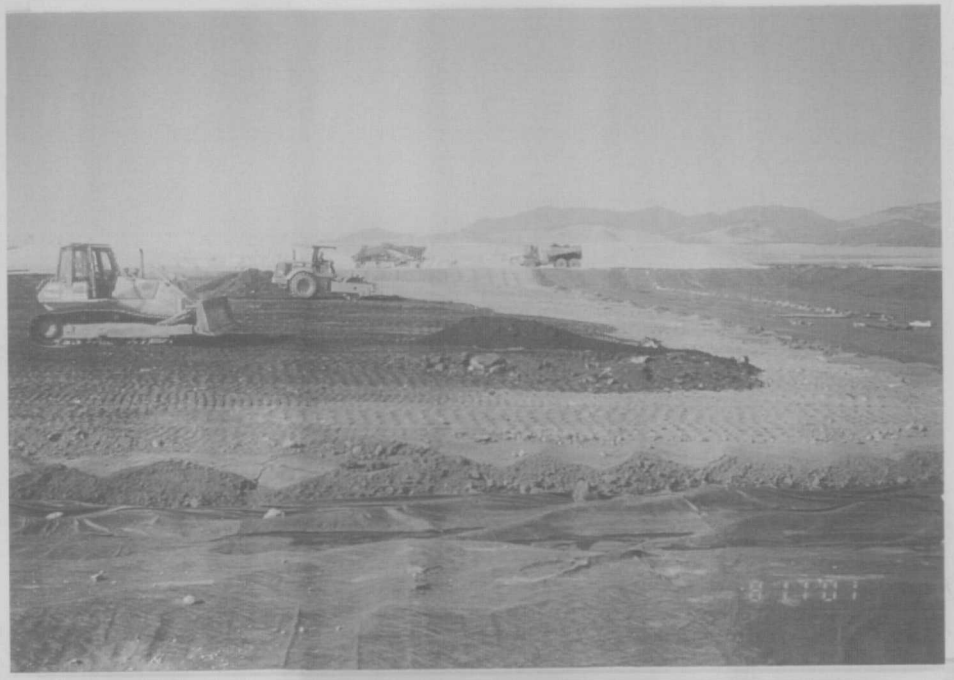

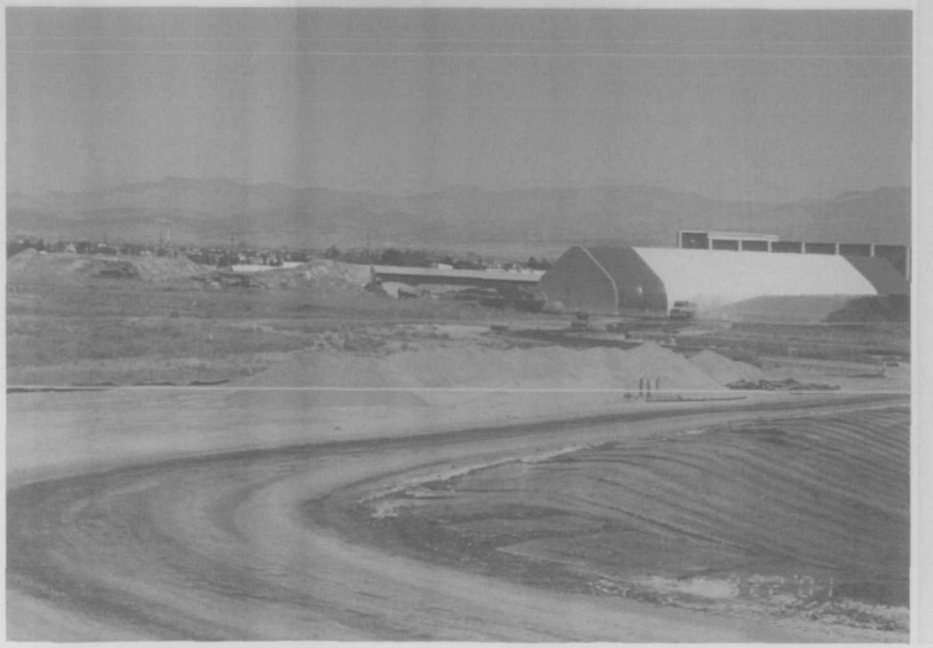

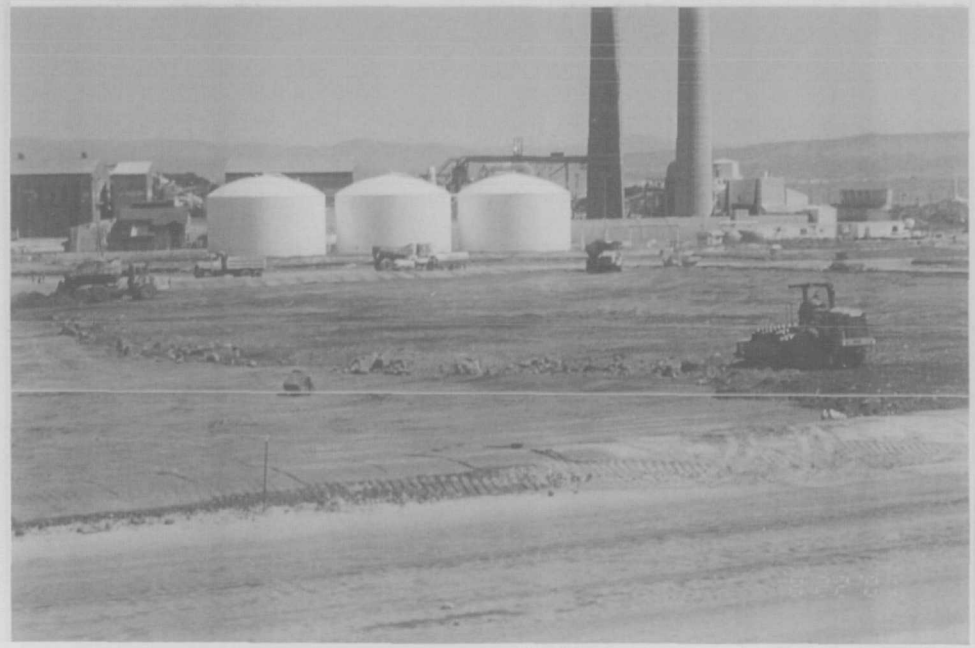

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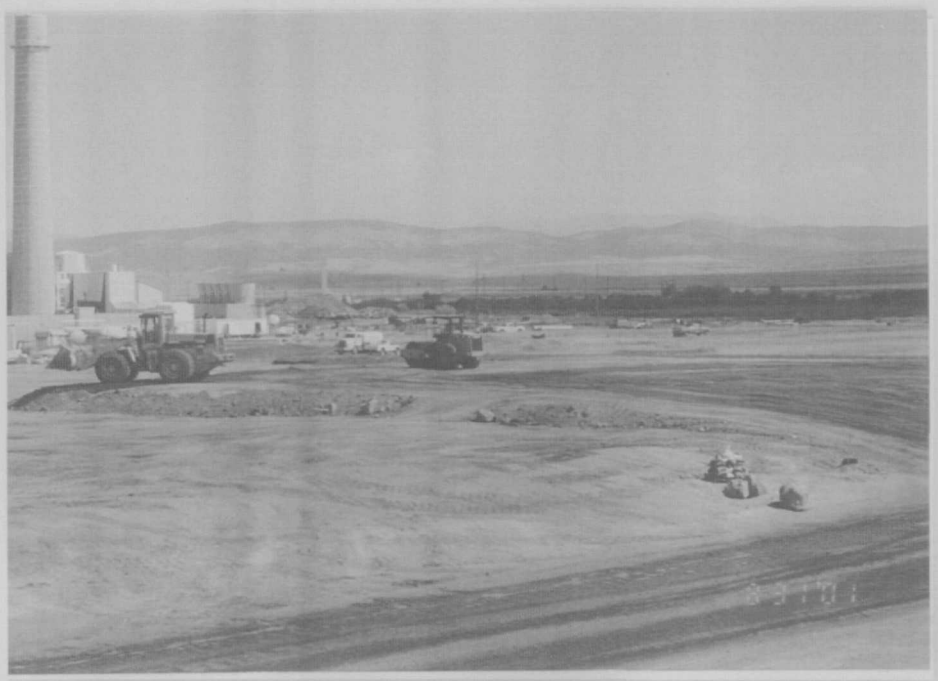

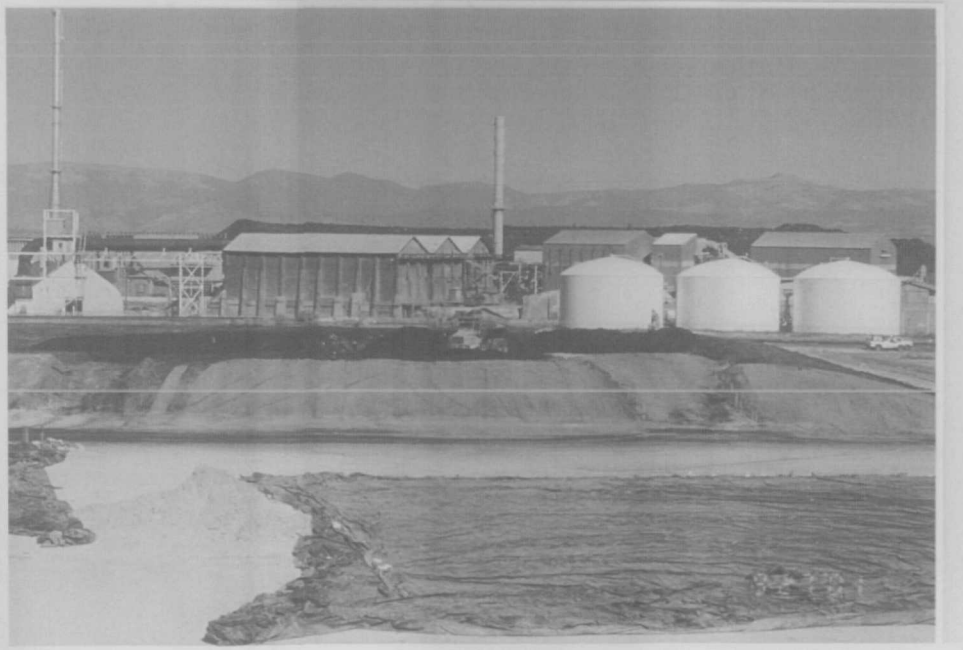

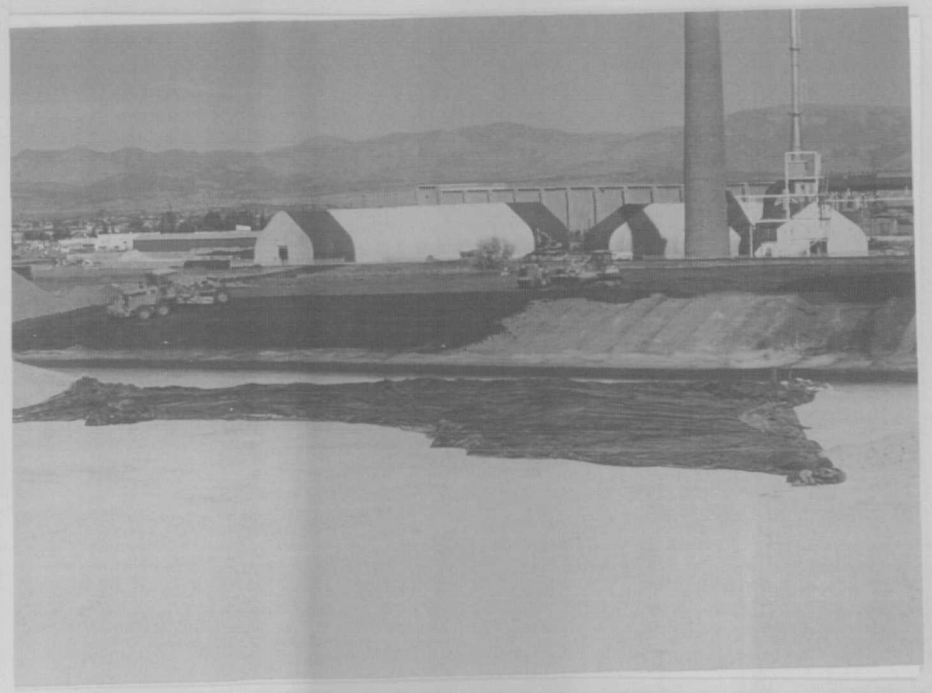

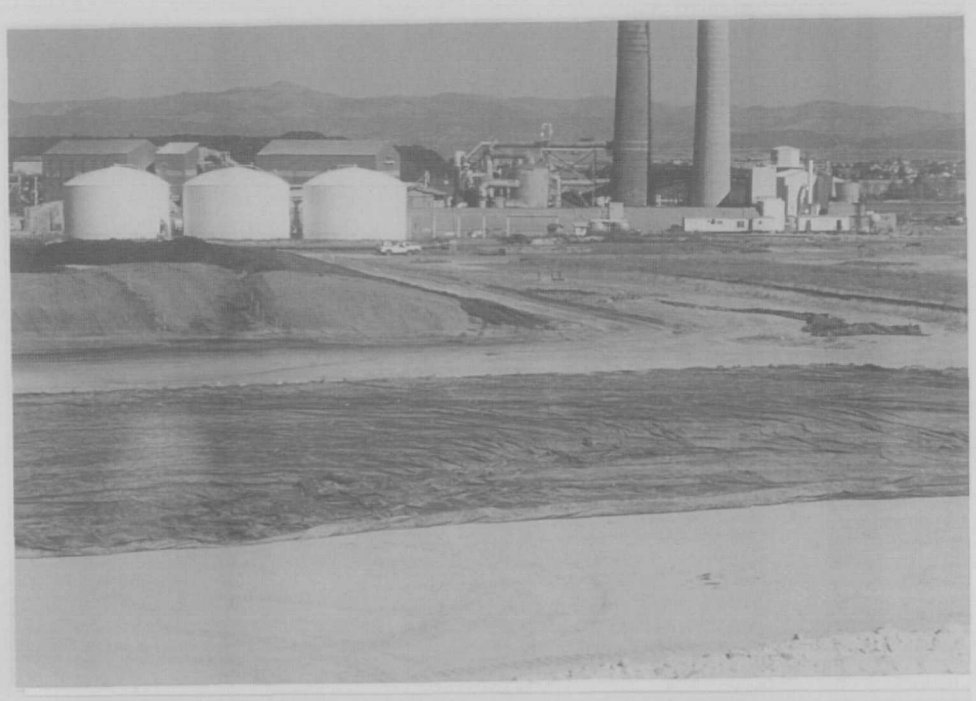

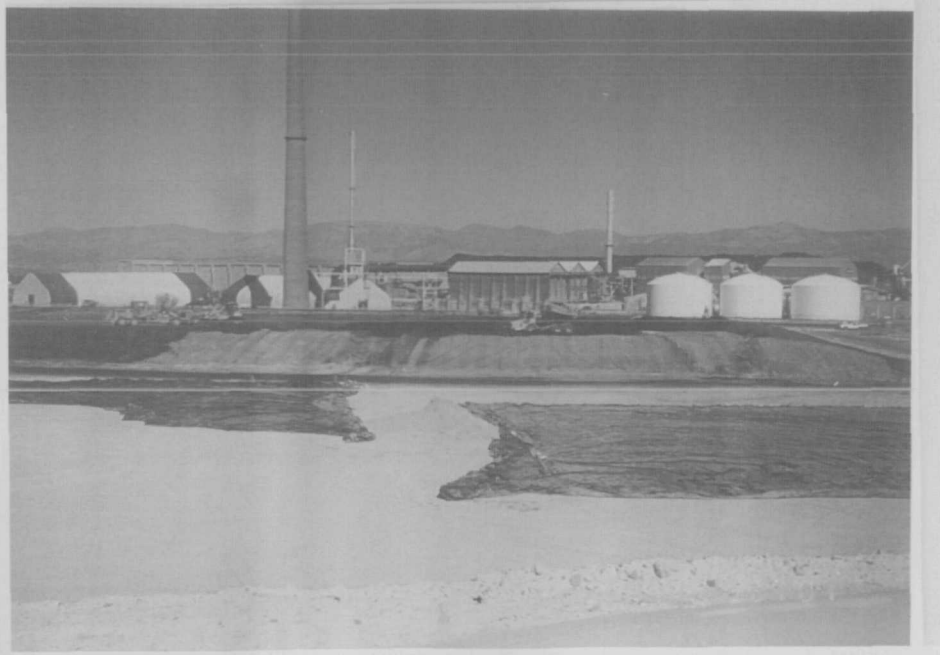

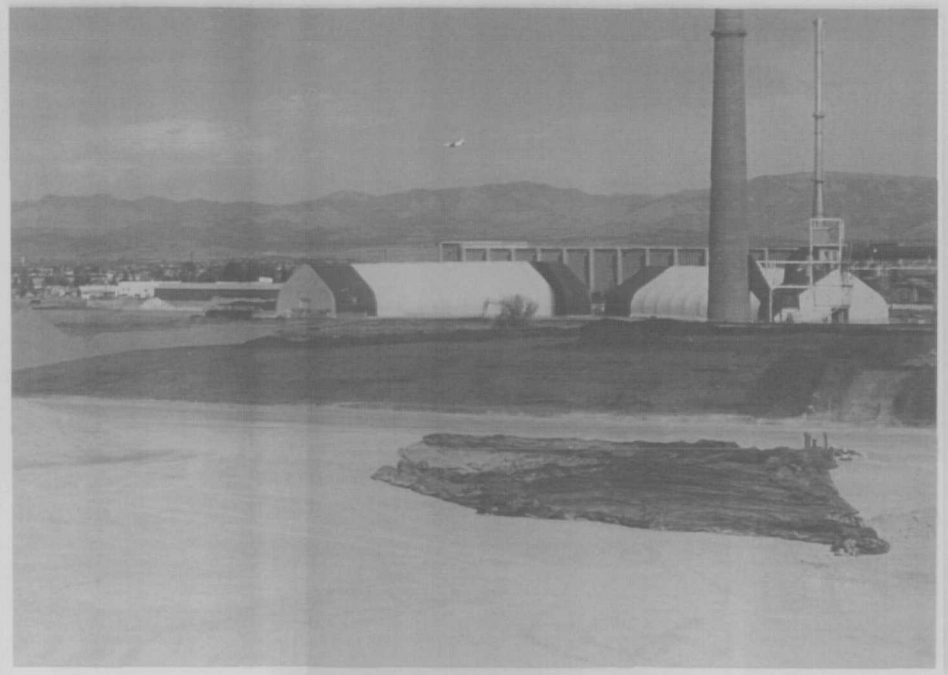

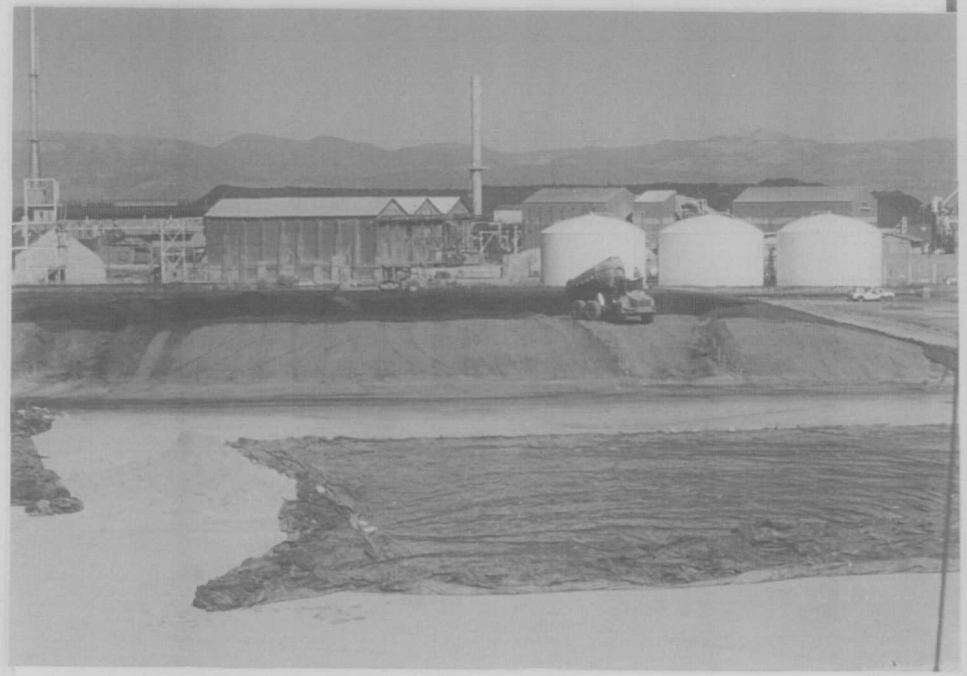

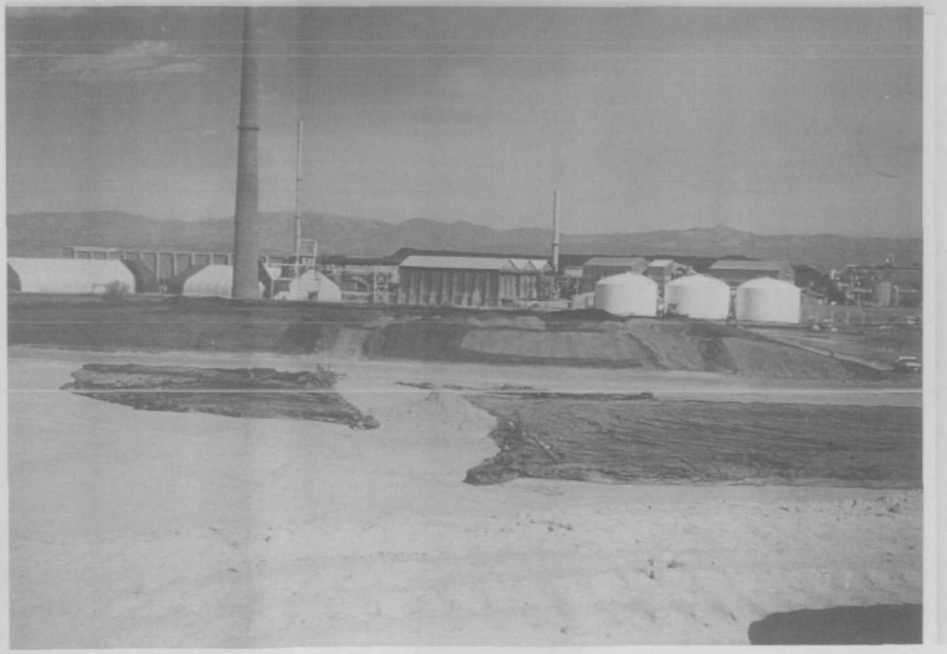

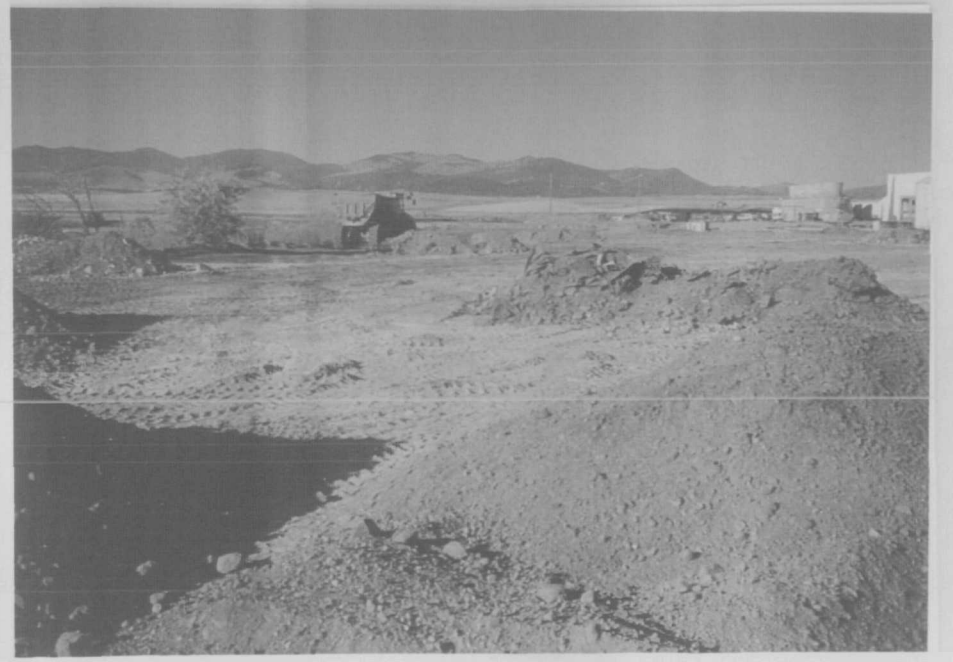

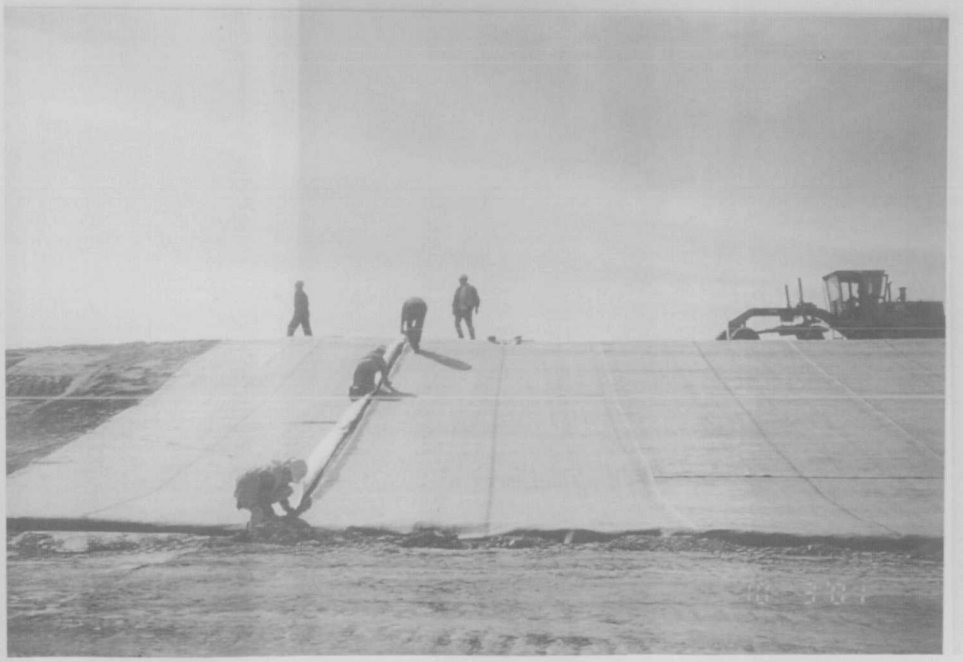

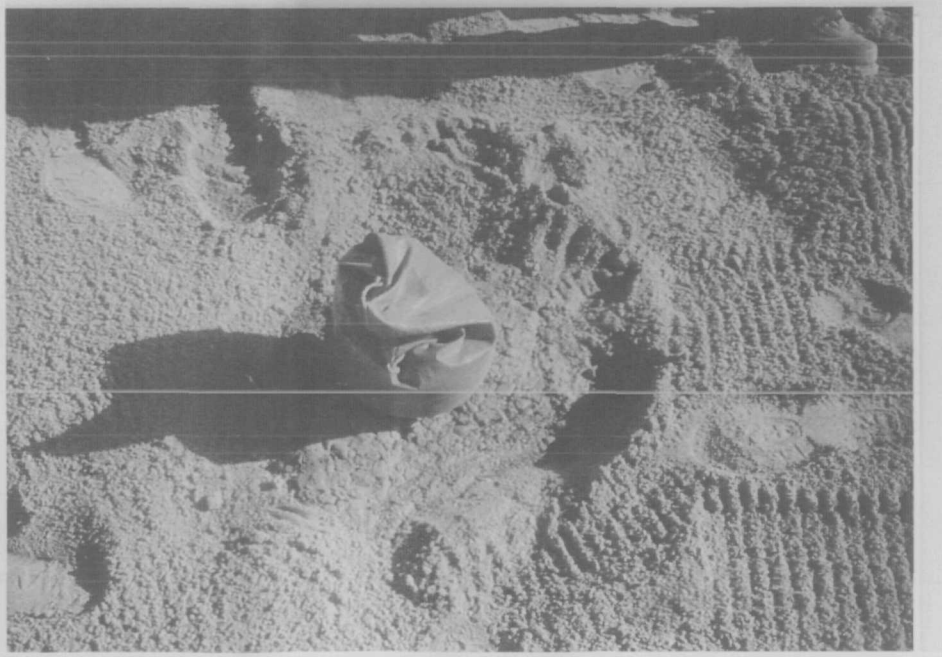

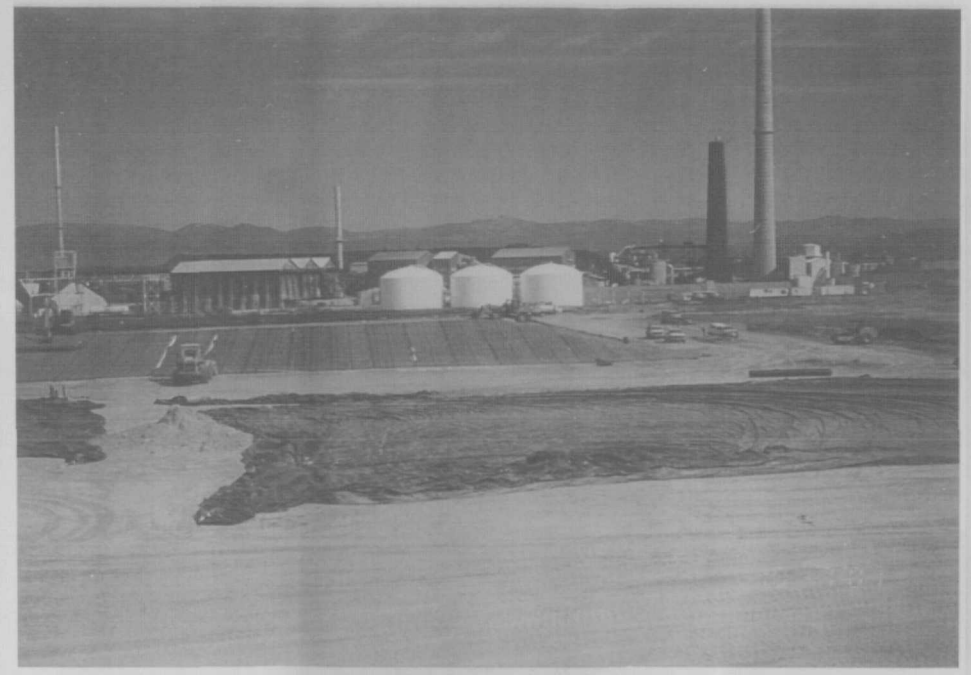

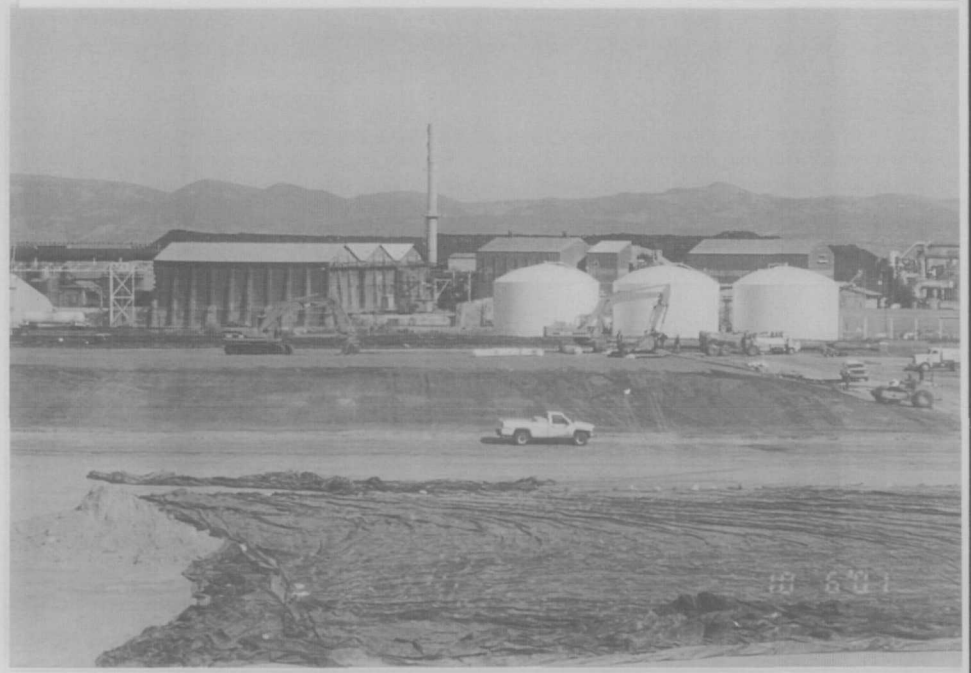

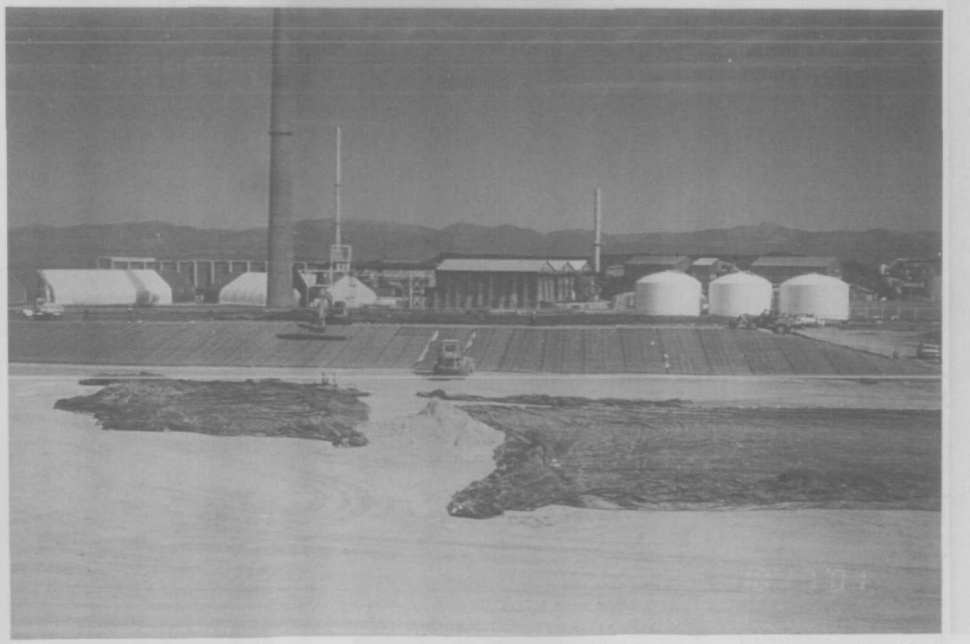

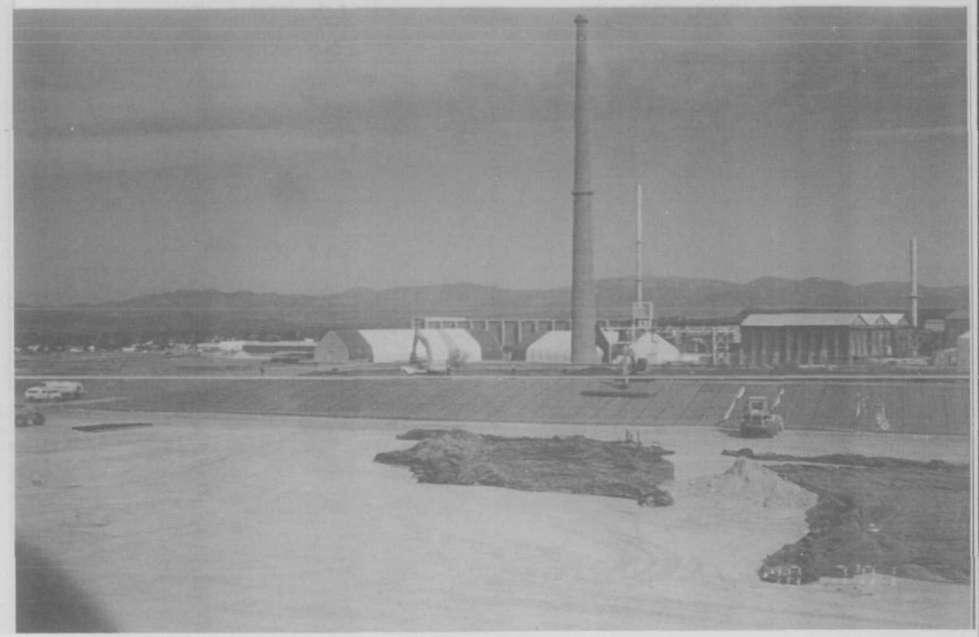

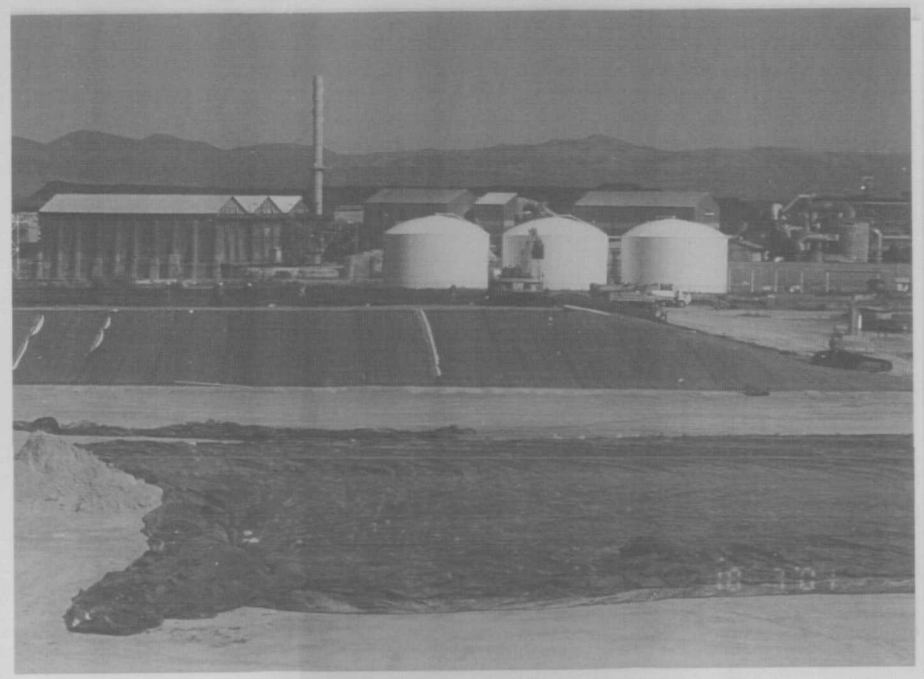

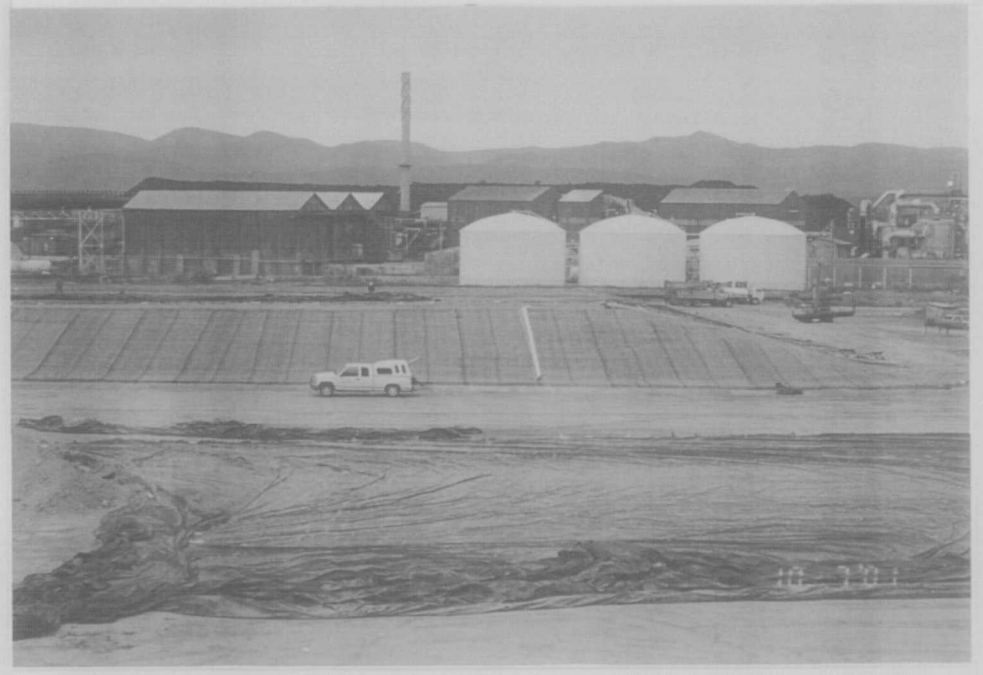

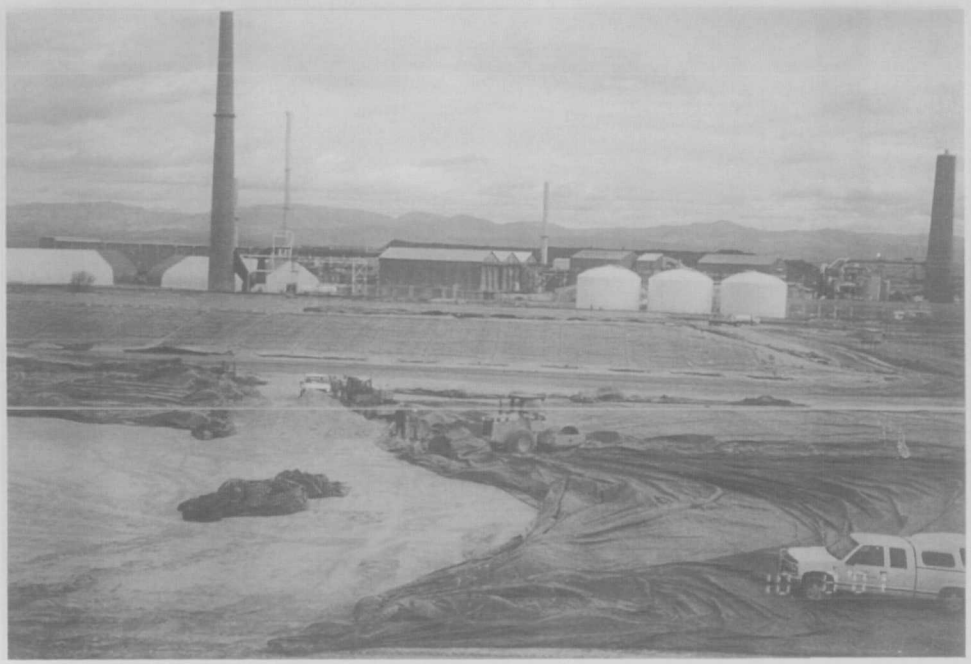

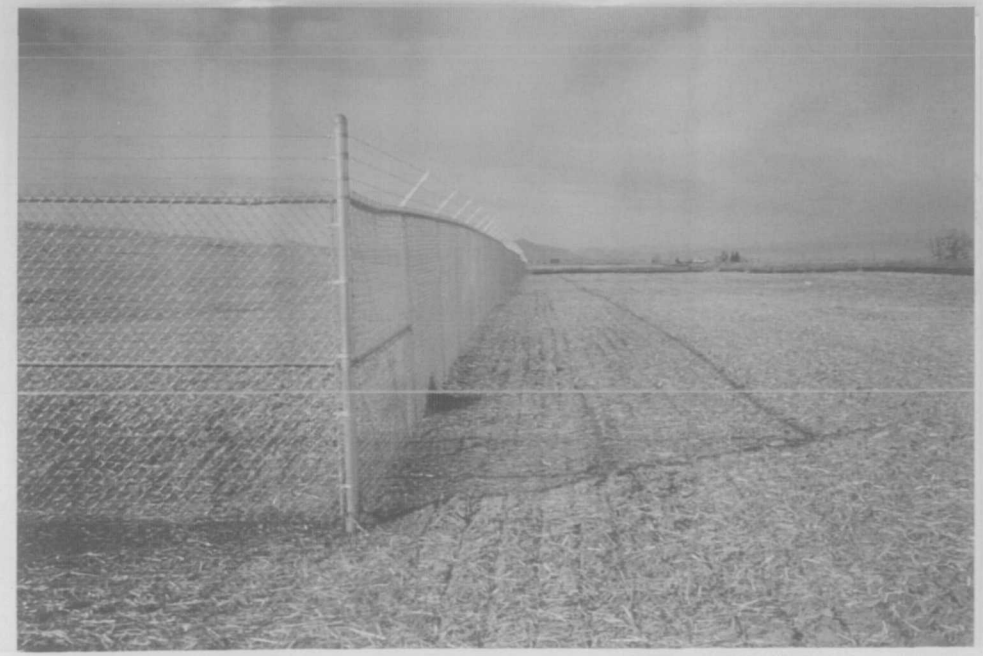

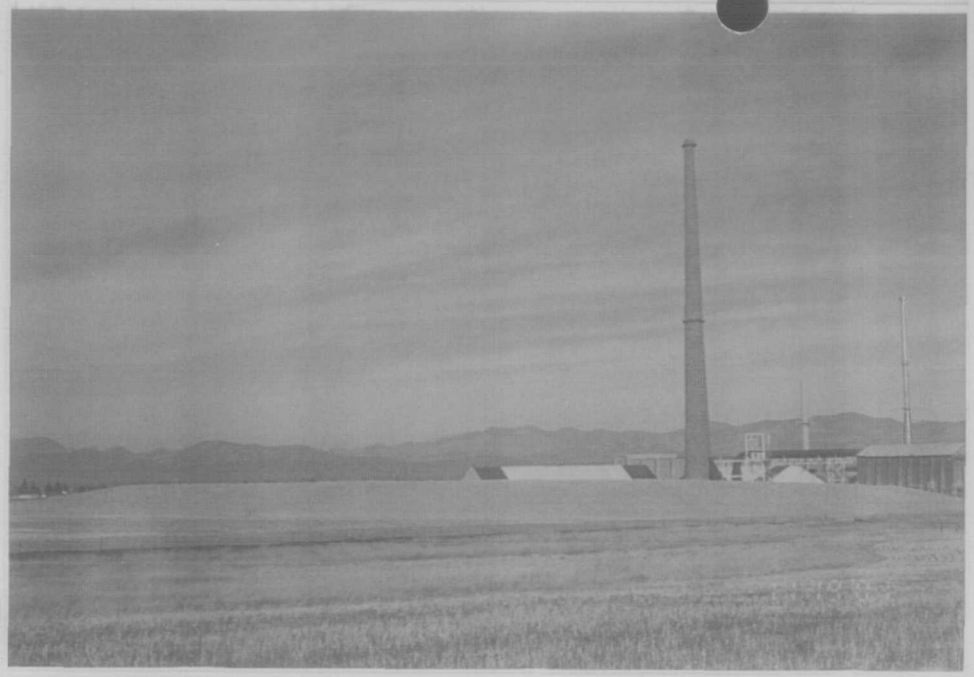

TARGET SHEET

EPA REGION VIII

SUPERFUND DOCUMENT MANAGEMENT SYSTEM

DOCUMENT NUMBER: 2058231

SITE NAME: EAST HELENA NPL (OU2-RV1 RESIDENTIAL)

DOCUMENT DATE: 01/01/2002

DOCUMENT NOT SCANNED

Due to one of the following reasons:

- ☐ PHOTOGRAPHS
- ☐ 3-DIMENSIONAL
- ☑ OVERSIZED
- ☐ AUDIO/VISUAL
- ☐ PERMANENTLY BOUND DOCUMENTS
- ☐ POOR LEGIBILITY
- ☐ OTHER
- ☐ NOT AVAILABLE
- ☐ TYPES OF DOCUMENTS NOT TO BE SCANNED
  (Data Packages, Data Validation, Sampling Data, CBI, Chain of Custody)

DOCUMENT DESCRIPTION:

EXHIBIT 1: CAMU PROJECT CONSTRUCTION SCHEDULE

Contact the Superfund Records Center to view available document.
(303) 312-6473