UCRL-CR-128748
PO#B 337380
GCS DOCUMENT NO. 977-5116

Construction Quality Assurance for Pit 6 Landfill Closure

Lawrence Livermore National Laboratory
Site 300

October 1997

Prepared For

Environmental Restoration Program and Division
University of California
7000 East Avenue
Livermore, CA 94550

By

GCS
Golder Construction Services, Inc.
198 Cirby Way, Suite 105
Roseville, California 95678

Work performed under the auspices of the U. S. Department of Enegry by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

Golder Construction Services, Inc.
Quality Assurance and Construction Management

UCRL-CR-128748
PO B337380
GCS DOCUMENT NO. 977-5116.440

CONSTRUCTION QUALITY ASSURANCE REPORT FOR CLOSURE OF THE PIT 6 LANDFILL LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

Prepared for:

Environmental Restoration Program and Division
University of California
7000 East Avenue
Livermore, CA 94550

Prepared By:

Golder Construction Services, Inc.
198 Cirby Way, Suite 105
Roseville, California 95678

DISTRIBUTION:

17 Copies - Lawrence Livermore National Laboratory
2 Copies - Golder Construction Services, Inc. (Roseville)
1 Copy - Golder Associates, Inc. (Oakland)

October 30, 1997

Our Ref: 977-5116

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1.0 Introduction

1.1 Overview

Golder Construction Services, Inc. (GCS), under contract to the Regents of the University of California, Lawrence Livermore National Laboratory (LLNL), provided the construction quality assurance (CQA) observation and testing during the construction of the Site 300, Pit 6 landfill closure cover. The cap construction was performed as a CERCLA non-time-critical removal action from June 2 to August 29, 1997. The project site is located 18 miles east of Livermore on Tesla Road and approximately 10 miles southwest of Tracy on Corral Hollow Road in San Joaquin County, California. (see Figure 1).

This report certifies that the LLNL, Site 300, Pit 6, Landfill Closure was constructed in accordance with the construction specifications and design drawings.

This report documents construction activities and CQA monitoring and testing for construction of the Pit 6 Landfill Closure. Golder Associates Inc. (Golder), of Oakland, California was the design engineering firm responsible for preparation of the drawings and specifications. CQA services were provided by GCS, of Roseville, California, under supervision of a California registered civil Engineer.

1.2 Project Description

The Pit 6 Landfill Closure at Site 300 comprises approximately 2.5 acres. Additionally, the borrow area utilized for the closure project covers approximately 6 acres. The closure consisted of constructing a cover system over three buried trenches and six pits containing potentially hazardous materials. Materials placed in the trenches were assumed to be hollow and uncompacted in nature and present a high possibility of caving at the ground surface. Heavy equipment were excluded from working within 20 feet of the trenches until the area was stabilized. The components of the closure cover system consisted of the following, from the bottom upward:

- Subgrade
- Uniaxial geogrid
- 6-inches compacted general fill (85% of ASTM D-1557)
- Uniaxial geogrid
- 6-inches compacted general fill (90% of ASTM D-1557)
- Uniaxial geogrid (limited area)
- 12-inches compacted general fill (90% of ASTM D-1557)
- GundSeal® 60-mil textured HDPE geomembrane/clay liner (GCL)
- Double sided geocomposite drainage layer
- 8-oz/sy geotextile filter in the perimeter subdrains
- Drainage rock and 4-inch HDPE pipe within the perimeter subdrains
- shotcrete and rip-rap lined drainage ditches and associated culverts
- 2-feet vegetative cover soil hydroseeded with native grass species

Construction of LLNL, Pit 6 Landfill Closure was performed by Envirocon Inc. (Envirocon), of Missoula Montana, which acted as the prime contractor. The installation subcontractor for the

geosynthetic liner system was GSE™ Lining Technology, Inc. (GSE™) of Houston, Texas. Johnson Western Gunite, Inc. (Johnson Western) from San Leandro, California subcontracted the shotcrete work and Fastest Grass in the West, Inc. from Roseville, California provided hydroseeding services. Professional surveying services were provided by LLNL with review and input provided by GCS.

1.3 Construction Quality Assurance

GCS provided CQA monitoring and testing services for the Pit 6 project which consisted of testing, documentation, and observation of the construction activities in order to verify compliance with the construction drawings, specifications and CQA plan. These services included: 1) review of manufacturer's submittals; 2) sampling and shipping of geosynthetic material for conformance testing; 3) review of conformance testing results; 4) pre-construction testing of borrow soils; 5) construction testing of soils used for general fill; 6) construction testing of soils used for the vegetative cover; 7) observation of all phases of geosynthetics installation; 8) testing of HDPE geomembrane trial seams, field seams and destructive samples; 9) observation of drainage system construction; and 10) review of surveys.

GCS provided an on-site CQA technician from June 4 to August 27, 1997. Project CQA activities were reviewed and supervised by GCS's Project Manager, Rick Kiel, P.E.. Primary CQA activities were conducted by Nancy Evans, GCS's Resident CQA Monitor. Inspection and testing for the shotcrete placement in the lined drainage ditches was performed by Inspection Consultants, Inc. under separate contract to LLNL. The reports provided by Inspection Consultants, Inc. were reviewed by GCS and are included in this report. Photographs documenting key components and activities of the construction process were taken on a regular basis. Select photographs are included in this report as Appendix A. A complete set of project photographs are on file at LLNL.

Envirocon mobilized to the site on June 2, 1997 and began demolition of the existing rifle range on June 4, 1997. Construction progress of the Pit 6 cover system is outlined in the construction schedule located in Appendix B. Envirocon completed construction of the Pit 6 closure cover on August 29, 1997. Daily reports were prepared throughout the construction sequence in order to document the key elements of construction and the CQA activities which transpired. Copies of the daily reports were submitted to LLNL's Construction Manager, Mr. Harry Benstead and to the GCS Project Manager. Weekly reports were also prepared and submitted at each weekly construction meeting. Copies of the weekly progress reports are included in Appendix C.

1.4 Project Documents

All construction work for Pit 6 landfill closure was performed according to the construction drawings, specifications, and CQA plan which are presented in the following documents:

- " Specifications OCS-0070, Site 300, Pit 6 Closure Cover, Lawrence Livermore National Laboratory", prepared by Golder Associates Inc., dated January 24, 1997.

- " Construction Drawings, Pit 6 Landfill Closure, Lawrence Livermore National Laboratory, Site 300", prepared by Golder Associates, Inc., dated January 1997.

- " Construction Quality Assurance and Inspection Plan, Lawrence Livermore National Laboratory, Site 300, Pit 6 Closure Cover, Livermore, California", prepared by Golder Associates, Inc., dated December, 1996.

1.5 Surveying and Preparation of As-Built Drawings

As-Built topographic surveys for the project were performed by LLNL under direction of a licensed California surveyor. The topographic surveys were performed on an approximate 50-foot grid with all perimeter limits of the closure defined. GCS reviewed the surveys for compliance to the project specifications and drawings. In addition, as the project progressed, GCS and the construction team from LLNL and Envirocon prepared red line drawings of specific construction details which varied from the design drawings or where features were constructed at a different location than shown on the drawings. These field-fit details are indicated on the As-Built drawings with changes "clouded" to note any deviation or addition from the original drawings.

The topographic survey data and the red-line drawings prepared during construction were submitted to the design engineer from Golder for review and were incorporated into the project drawings. These As-Built Drawings are presented in Appendix D.

Two drawings were added to those included in the original design drawings. These included a topographic sheet of the final site topography which represents the surface of the vegetative layer as well as the site surface drainage features; and a second drawing which presents the GundSeal® geomembrane panel locations as drawn in the field by GCS. The final site topo was prepared by LLNL surveyors. The GundSeal® panel drawing was prepared by GCS with locations determined by field measurements (surveyors wheel, with spot survey points provided by LLNL surveyors). Survey points for the panel drawing were taken at the as-built limit of the GundSeal® liner. Additionally, panel numbers, repair numbers and destructive test locations were identified.

1.6 Construction Specification/Design Changes

When the implementation of design and/or specification changes were warranted due to the site or construction specific conditions, the changes were implemented only when approved by the Design Engineer and/or Design Engineer sub-consultant from Golder and LLNL. Design changes and modifications were addressed at weekly progress meetings, in Addendum's, and through Requests For Information (RFI's) submitted by the contractor. Copies of all Addendum's and RFI's are included in Appendix E.

2.0 Earthwork

2.1 Demolition

Demolition activities for the project consisted of demolishing the existing Pit 6 area rifle range station. Demolition debris was sorted in piles for disposal and hauled off site to the Altamont Landfill. The asphalt strip running northwest to southeast was less than 2-inches thick and was too thin to be removed, therefore after discussion with Ken Obenauf, the design engineer from Golder, and with Harry Benstead, the construction manager with LLNL, it was agreed that the asphalt could be crumbled and used as subgrade fill. Initially, the steel plates that were within the walls of the rifle range station were to be salvaged and used as part of the next rifle range station. The steel plates were 3/16-inch and were not 1/2-inch thick as noted in the drawings. During demolition the steel plates were damaged beyond repair and subsequently were disposed of at LLNL's request.

2.2 Subgrade Preparation

Prior to Envirocon's arrival on site, LLNL conducted a controlled burning of the landfill area and borrow area. After demolition was complete, Envirocon cleared and grubbed approximately 2-inches of topsoil from the Pit 6 landfill area. This material was taken to the west end of the borrow and stockpiled to be used later as vegetative cover soil. The three protective soil berms that were located directly adjacent to the former rifle range station were pushed into depressions within the limits of the landfill area. The soil from these berms was moisture conditioned while it was placed to prevent particulate dust. Only equipment with less than 5 psi ground pressure was allowed within the exclusion zone. An Envirocon employee was present 100 percent of the time during this operation to watch for any signs of subsidence or collapse of the trenches. No signs of subsidence was observed. The soil berm to the north of the landfill adjacent to the perimeter drainage ditch was uncompacted in it's native state, and was pushed into the limits of the landfill as subgrade fill. Envirocon smoothed and backbladed the surface of the subgrade in preparation for the geogrid.

No testing of the subgrade was required by the specifications, however, a topographic survey was performed on June 26 and June 27, 1997 by LLNL's surveyors. This survey was conducted on an approximate 50-foot grid to establish the baseline for the compacted general fill layer. Approximately 5,400 cubic yards of subgrade fill obtained from within the landfill area was placed by Envirocon from June 9 to June 25, 1997.

2.3 Borrow Evaluation and Recommendation

The borrow area was cleared and grubbed to a depth of approximately 10-inches. Envirocon prepared the topsoil by ripping, moisture conditioning, windrowing and pushing the topsoil into piles with dozers. The topsoil was then loaded into haul trucks and stockpiled to the west of the borrow area for use as the landfill's vegetative cover soil. The area initially identified on Drawing Number 2 as the Staging Area was also utilized as a borrow area by Envirocon with approval from LLNL. As a result of obtaining borrow soils from a larger area, the depth of cut over the entire borrow area was shallower than initially anticipated. This resulted in lower overall moisture contents and the need to add additional water during placement of borrow soils as fill material.

Soil types encountered within the borrow areas investigated consisted of sandy clays with varying degree of gravel. The borrow soils were typically dry, with measured in-situ moisture contents ranging from 4.3 to 8.4 percent. Pre-construction testing of general fill soils was conducted prior to construction. The specifications called for one series of tests per 5,000 cubic yards. It was anticipated that approximately 12,000 cubic yards of general fill would be placed, therefore, three samples were taken; one from the west end, one from the middle, and one from the east end. In general, the amount of gravel increased and the percent of moisture decreased from the west to the east. The samples were taken at an approximate depth of 1.5-feet. Each sample was tested by GCS in the on-site laboratory for Moisture Content (ASTM D2216), Moisture-Density (Proctor) Relationships (ASTM D1557), Atterberg Limits (ASTM D4318), and Particle-Size Analysis (ASTM D1140/D422). Individual test results can be found in Appendices F-1.1, F-1.2, and F-1.3. The following table summarizes the results of the general fill pre-construction testing.

TABLE 1
Pre-Construction
General Fill Laboratory Test Summary

Sample No.	Proctor ASTM D-1557		Atterberg Limits ASTM D-4318			Moisture ASTM D-2216	Particle-Size ASTM D-1140/422	
	opt. moist.	max. density	LL	PL	PI	(%)	< #10 (%)	< #200 (%)
PF-1	16.8 %	112.7 pcf	40	20	20	8.4	96.9	55.0
PF-2	14.0 %	119.5 pcf	28	16	12	4.3	90.6	49.0
PF-3	11.5 %	124.0 pcf	22	18	4	6.6	85.4	36.8

The soil used for the general fill was prepared by ripping, moisture conditioning and blending the soil with two dozers. The conditioned soil was then pushed into stockpiles in the middle of the borrow area to be loaded into trucks and hauled to the landfill. Areas that contained large rocks over 2-inches were avoided.

Pre-construction testing was also conducted on the stockpile of topsoil to be used as vegetative cover soil. The specification required that one series of tests be performed per 5,000 cubic yards. It was anticipated that 8,500 cubic yards of vegetative cover would be placed over the landfill. Two samples were collected and tested for Moisture Content (ASTM D2216), Atterberg Limits (ASTM D4318), and Particle-Size Analysis (ASTM D1140/D422). Individual test results can be found in Appendices F-2.1 and F-2.2. The following table summarizes the results of pre-construction vegetative cover soil testing.

TABLE 2
Pre-Construction
Vegetative Cover Laboratory Test Summary

Sample No.	Proctor ASTM D-1557		Atterberg Limits ASTM D-4318			Moisture ASTM D-2216	Particle-Size ASTM D-1140/422	
	opt. moist.	max. density	LL	PL	PI	(%)	< #10 (%)	< #200 (%)
PVC-1	---	---	28	18	10	6.1	86.3	42.2
PVC-2	---	---	28	18	10	14.7	94.3	42.2

2.4 General Fill Placement and Compaction

Before placement of general fill began, a layer of uniaxial geogrid running north-south and generally perpendicular to the buried trenches was deployed over the prepared subgrade. The limits of the geogrid were defined in the project drawings and established by the on-site surveyors. On top of the geogrid, 8-inches of loose general fill was placed and compacted to 85% of the modified ASTM D1557 Proctor value. The specifications required that only equipment with less than 5 psi ground pressure could be used in determining the limits of restricted heavy equipment as defined by the drawings. This requirement limited Envirocon to using a John Deere 650LGP dozer. This specification was modified during Construction Progress Meeting No. 1 on June 12, 1997 (see Appendix C), to include the John Deere 750C dozer with a ground pressure of 7.1 psi after a field performance review of the operations indicated no evidence of subsidence.

As the general fill was placed, additional water was added as needed. Both the John Deere 650LGP and 750C dozers were used to compact the fill by track walking the surface of the lift approximately six times to achieve the required compaction. During placement of the first lift a spotter from Envirocon was present continually to monitor for subsidence. A grade checker was also present to establish lift height and to ensure that the geogrid did not form any excessive wrinkles or fold over on top of itself. After the first lift of general fill was placed and the surface smoothed by backblading, a second layer of uniaxial geogrid was installed generally perpendicular to the trenches. The limits of this layer remained the same as the limits of the previous layer of geogrid. Another 8-inch loose, 6-inch compacted lift of general fill was placed and compacted by track walking the dozers over the surface, using 4 passes of the Ingersoll Rand Compactor and by making use of truck traffic. The use of heavier equipment was acceptable due to the second layer of geogrid which provided reinforcement over the trenches. Once again a grade checker was present to establish lift height of general fill and to trap geogrid wrinkles. The required compaction for the second lift was 90% of the modified ASTM D1557 Proctor value.

The last layer of uniaxial geogrid was installed in a smaller area where the future rifle range cover would be built. The limits of this area were relocated prior to installation as discussed in Addendum No. 1 (see Appendix E) by LLNL surveyors. It too was installed in a north-south and generally perpendicular direction to the trenches. Two additional 8-inch loose and 6-inch compacts lifts of general fill were placed over the entire landfill cover and compacted in the same manner as the previous lift. The required compaction for both of these lifts was 90% of the modified ASTM

D1557 Proctor value. Approximately 14,000 cubic yards of general fill material was used to bring this layer to the design topography required for the subgrade for Pit 6. Placement of the general fill began on June 27, 1997 and was complete by July 11, 1997.

Laboratory testing of the General Fill material consisted of Moisture/Density Relationship (ASTM D1557), Atterberg Limits (ASTM D4318), Moisture Content (ASTM D2216), and Particle-Size Analysis (ASTM D1140/D422). Pre-construction testing had been performed as part of the borrow source evaluation and additional testing was performed as the material was delivered to the landfill. Copies of all general fill soils testing conducted during construction are presented in Appendices G-1, G-2, G-3. The general fill material consisted of brown, sandy clays with gravel (CL) delivered from the borrow area located to the west of the landfill cover. The maximum dry densities ranged from 116.5 to 124.5 pounds per cubic foot with optimum moisture contents ranging from 12.0 to 14.5 percent. The following table summarizes all laboratory construction testing of the general fill soil.

TABLE 3
Construction
General Fill Laboratory Test Summary

Sample No.	Proctor ASTM D-1557		Atterberg Limits ASTM D-4318			Moisture ASTM D-2216	Particle-Size ASTM D-1140/422	
	opt. moist.	max. density	LL	PL	PI	(%)	< #10 (%)	< #200 (%)
CF-1	12.0 %	124.5 pcf	20	15	5	9.2	84.0	33.5
CF-2	12.5 %	120.5 pcf	24	11	13	9.8	85.4	44.9
CF-3	14.5 %	116.5 pcf	28	17	11	10.6	93.5	43.2

CQA procedures for testing of general fill materials consisted of monitoring placement, moisture conditioning, and determination of compaction using a CPN nuclear density gauge (ASTM D2922 and D3017). Locations of tests were identified using a Brunton compass and design control points as reference locations. In conjunction with the nuclear density gage, all locations were sampled and tested for moisture content by oven methods (ASTM D2216). A summary of moisture and in-situ nuclear gauge density testing are presented in Appendices G-4 and G-5 respectively. On average, for the first lift, the soils were placed to 88 percent compaction at a moisture content of 12.4 percent. Subsequent lifts were placed on average at 93.6 percent compaction and 13.4 percent moisture. The project specifications required compaction to a minimum of 85 percent for the first lift and all subsequent lifts thereafter, 90 percent of the modified Proctor value. The general fill moisture content was placed at or near the required water content to achieve compaction. The test results indicated that all general fill materials were placed and compacted in accordance with the project specifications and in accordance with testing frequencies as presented in the following table.

TABLE 4
General Fill
CQA Testing Frequencies

Parameter	Test Method	Minimum Specified Frequency	Number of Tests	Actual Testing Frequency
Modified Proctor	ASTM D-1557	1 test per 5,000 cy	3	1 per 4,758 cy
Nuclear Moisture-Density Test	ASTM D-2922/3017	1 test per 250 cy	58	1 per 246 cy
Atterberg Limits	ASTM D-4318	1 test per 5,000 cy	3	1 per 4,758 cy
Particle-Size Analysis	ASTM D-1140/422	1 test per 5,000 cy	3	1 per 4,758 cy
Moisture Content (Oven)	ASTM D-2216	1 test per 1,000 cy	61	1 per 234 cy

NOTE: The actual testing frequencies reported in Table 4 are based on an approximate quantity of 14,273 cubic yards of General Fill. This figure was calculated by load counts with a truck capacity at 16 cubic yards each and a compaction shrinkage rate of 20 percent.

The top of the general fill layer was surveyed on July 10, 1997 by LLNL surveyors. Results of the survey indicated areas that were low and high. The project Engineer for Golder was consulted and it was determined that the low areas needed to be addressed by adding additional fill. Envirocon placed and compacted additional fill in low areas, and performed additional grading of the top of the general fill layer. Placement of additional fill was completed on July 11, 1997. The surveyors provided a re-survey on July 18, 1997. The re-survey of the general fill was reviewed by Golder and the surface topography found to be in compliance with the general design topography.

2.5 Vegetative Cover Placement

Following placement of the geocomposite layer, vegetative cover soil was placed on top of the geocomposite. Approximately 11,204 cubic yards of vegetative cover soil were placed from July 25 through August 3, 1997. The vegetative cover soil which had been previously stockpiled in the borrow area was loaded into trucks and dumped at the north end of the landfill. The vegetative cover soil was pushed over the geocomposite in 1-foot lifts with a Caterpillar 650GLGP dozer. Envirocon placed 3-feet of cover soil over the entire top of the closure cover so haul trucks could run over it for more efficient placement. The height of the cover was then thinned to approximately 2-feet and the excess used for the side slopes around the closure. A grade checker was present throughout the vegetative cover placement to maintain soil height and to ensure that the geotextile component of the geocomposite covered the geonet entirely.

During placement of the select soil, samples were obtained by GCS and tested for; Atterberg Limits (ASTM D4318), Moisture Content (ASTM D2216), and Particle-Size Analysis (ASTM D1140/D422). Pre-construction testing had been performed as part of the borrow source evaluation. Copies of all vegetative cover soils testing conducted during construction are presented in Appendices H-1 and H-2. The vegetative cover material consisted of brown, sandy clays (CL) delivered from the borrow area located to the west of the landfill cover. The following table summarizes the laboratory construction testing of the vegetative cover soil.

TABLE 5
Construction
Vegetative Cover Laboratory Test Summary

Sample No.	Atterberg Limits ASTM D-4318			Moisture Content ASTM D-2216	Particle-Size ASTM D-1140/422	
	LL	PL	PI	(%)	< #10 (%)	< #200 (%)
VC-1	29	18	11	5.0	85.6	42.0
VC-2	33	19	14	10.1	93.8	48.6
VC-3	30	18	12	5.6	92.4	45.2
VC-4	30	18	12	11.0	89.1	42.2
VC-5	30	17	13	4.7	90.4	46.1
VC-6	27	19	8	10.4	92.2	41.0
VC-7	31	19	12	7.4	94.1	45.5
VC-8	30	19	11	10.2	89.3	47.1
VC-9	30	18	12	13.2	91.2	49.2
VC-10	32	19	13	9.3	92.0	44.6
VC-11	28	17	11	11.6	87.4	44.4
VC-12	28	18	10	10.1	87.7	44.8
VC-13	28	19	9	10.7	88.2	43.4
VC-14	29	18	11	9.5	89.6	46.9
VC-15	29	18	11	9.3	89.8	45.4
VC-16	30	19	11	10.3	95.6	55.1
VC-17	28	19	9	10.6	98.6	60.1
VC-18	29	19	10	12.3	98.1	52.7
VC-19	29	19	10	17.6	98.0	59.1
VC-20	31	20	11	10.3	97.0	51.1
VC-21	30	19	11	9.7	97.6	54.6
VC-22	30	20	10	9.7	98.0	53.3
VC-23	30	20	10	11.8	96.8	53.4

NOTE: The quantities in Table 5 are based on an approximate quantity of 11,204 cubic yards of vegetative cover.

The following table shows the individual testing frequencies for the vegetative cover.

TABLE 6
Vegetative Cover
CQA Testing Frequencies

Parameter	Test Method	Minimum Specified Frequency	Number of Tests	Testing Frequency
Atterberg Limits	ASTM D-4318	1 test per 500 cy	23	1 per 487 cy
Particle-Size Analysis	ASTM D-1140/422	1 test per 500 cy	23	1 per 487 cy
Moisture Content (Oven)	ASTM D-2216	0	23	1 per 487 cy

Surveying of the top elevation of the vegetative cover was conducted on August 13, 1997. Results of the survey were reviewed on August 19, 1997 by GCS. The topographic survey indicated that the top of finish grade was low in a few areas. Golder's design engineer was contacted to review the surveys. After review of the survey, it was determined that three locations to the east of the landfill cover were low. Envirocon was advised to fill these areas. The areas were filled with approximately 150 cubic yards of additional soil. After final completion of the Pit 6 closure, the areas of concern were resurveyed to verify thickness. The survey indicated that the top elevation of the vegetative cover was in general compliance with the design topography.

3.0 Drainage System Installation

3.1 Subdrains

The subdrains were installed in the anchor trenches around the perimeter of the landfill except for the north anchor trench. The ditches were 2-feet deep and lined with 8-oz geotextile. The bottom of the ditch was then covered with at least 3-inches of bedding pea gravel and a 4-inch perforated SDR-17 HDPE pipe was placed on top and fusion welded together. A change in the pipe specification was approved by Golder's design engineer in response to RFI No. 8 with authorized the use of SDR-17 HDPE pipe, which is a superior pipe to SDR-26 pipe (see appendix E). Additional drainage gravel was placed to cover the perforated pipe and then the geotextile was folded over the drainage gravel with a 2-foot overlap. Clean outs risers and stubouts to shotcrete lined ditches were installed per the project drawings and specifications.

3.2 Shotcrete Lined Ditches

Approximately 1150 lineal feet of drainage V-ditches and 250 feet of trapezoidal ditches were installed around the perimeter of the landfill except for the north end according to the revised Golder Associated drawings dated July 7, 1997. The ditches were excavated using a specially made trackhoe bucket designed to accommodate the ditch dimensions. Culverts were installed in 6 locations as indicated on the final survey. The ditches were constructed with 6-inch wire mesh, limited form work, shotcrete and expansion joints in addition to twelve inlet and outlet formed headwalls constructed by Johnson Western Gunite.

3.3 North Diversion Ditch

The native soil underlying the north side of the north diversion ditch was initially too unstable to cut to the required dimensions. Therefore, Envirocon excavated the north side of the ditch, moisture conditioned the soil while placing and compacting soil. The trapezoidal ditch was then cut to a 2:1 (horizontal:vertical) slope, lined with 8-oz geotextile, and covered with riprap. A plunge pool was also installed at the outflow end of the diversion ditch. The pool was also lined with geotextile and riprap.

4.0 Geosynthetic Components

4.1 Geogrid

4.1.1 Geogrid Conformance Testing

On June 16, 1997, 188 rolls of Tensar uniaxal geogrid were delivered to Pit 6. The rolls were approximately 200-feet long by 4.26-feet wide. Envirocon unloaded the rolls on pallets by a forklift and GCS inventoried them, noting that 160,176 square feet of geogrid was delivered to the site. Submittal information required by the specifications were provided by Tensar for review. The submittal was accepted by GCS except for modifications covered under RFI's No. 1 and No. 7 in Appendix E. Quality control certification was provided for review and is included in Appendix I-2.1. GCS sampled four rolls of geogrid for conformance test. A summary of the geogrid inventory is provided in Appendix I-1.1. This covered the testing frequency of 1 per 50,000 square feet of geogrid. The samples were sent to GCS's accredited geosynthetics laboratory in Atlanta, Georgia for conformance testing. The geogrid was tested for Carbon Black Content (ASTM D1603), Wide Width Tensile Strength (ASTM D4595) and Spacing between Strands by Caliper Method. Sample number 15347-49 failed the Wide Width Tensile Strength test by only 45 lbs/ft, so it was retested by the manufacturer's preferred method GRI-GG1 which was approved through Golder in their letter dated May 29, 1997 covered under RFI No. 1 (see Appendix E). Results of the retest indicated that the strength value exceeded the minimum requirement for tensile strength, therefore the material was accepted for installation. Results of the uniaxial geogrid conformance testing are presented in Appendix I-3.1.

4.1.2 Geogrid Installation

Uniaxial geogrid was installed by Envirocon as a ground stabilization component of the landfill closure to reduce the potential for subsidence into buried waste void spaces. The geogrid was installed in north-south direction, generally perpendicular to the underlain trenches. Three layers of geogrid were installed over the subgrade with 6-inches of general fill separating each layer. The limits of each layer were surveyed by the LLNL surveyors before installation. The panels were tied together with plastic zip ties every 5-feet and butt seams were joined with Bodkin bars approved by Golder through RFI No. 4 found in Appendix E. Approximately 247,396 gross square feet of uniaxial geogrid was installed.

4.2 GundSeal®

4.2.1 GundSeal® Conformance Testing

Forty Three (43) rolls or 125,213 square feet of GundSeal® 60-mil textured geomembrane with a bentonite supported backing were delivered to the site on July 10, 1997. The rolls were approximately 170-feet long by 17.5-feet wide. Two-foot wide, bentonite lined geomembrane strips were also included in the shipment. GCS monitored the stockpiling of the material and inventoried the rolls as they were unloaded. A summary of the GundSeal® inventory is presented in Appendix I-1.2. GSE™, the manufacturer of the GundSeal® material, provided quality control certification and submittal information for review. The quality control certification is included in Appendix I-2.2. The specifications were originally written for a two part system of a geosynthetic

clay liner and a 60-mil geomembrane, but were changed to an all in one bentonite supported geomembrane. With the change in material it was necessary to modify the quality control and the conformance testing requirements. The modifications were addressed in a letter from Golder dated June 30, 1997 covered under RFI No. 4 in Appendix E.

GSE™ installers sampled 3 rolls of GundSeal® for conformance testing under GCS supervision. The samples were packaged and sent to the GCS geosynthetics laboratory in Atlanta, Georgia. The geomembrane samples were tested for Thickness (ASTM D5994), Density (ASTM D1505), Carbon Black Content (ASTM D1603), Carbon Black Dispersion (ASTM D3015), Puncture Resistance (ASTM D4833), Strength and Elongation at Yield (ASTM D638), and Strength and Elongation at Break (ASTM D638).

The clay liner portion of the GundSeal® was tested for Bentonite Content (ASTM D5993), and for Free Swell (ASTM D5890). The results of the above mentioned conformance tests can be found in Appendix I-3.2.

4.2.2 GundSeal® Deployment

Prior to deployment of the GundSeal® 60-mil HDPE textured geomembrane supported geosynthetic clay liner, GCS and the installer observed the subgrade for conformance with the project specifications. A subgrade acceptance certificate was issued and signed by the installer for each area where GundSeal® was to be deployed. Copies of these subgrade acceptance certificates are presented in Appendix I-4.1. The GundSeal® was deployed with the bentonite side down using a front end loader with a spreader bar attachment without dragging the panels across the soil surface. During deployment, GCS documented the as-built locations of the actual panels deployed. The panel layout is presented as Drawing 16 of the As-Built Drawings in Appendix D. The panels were carefully aligned to provide the required amount of overlap. Accessory GundSeal® strips two-feet wide were placed under the seam edge with the geomembrane side down and the bentonite side up to ensure total bentonite coverage of the closure area. A summary of the deployment is presented in Appendix I-4.2. GSE™ Lining Technologies started deployment of the GundSeal® on July 15, 1997 and completed installation and detailing by July 22, 1997. Approximately 118,975 gross square feet of GundSeal® geomembrane was installed.

4.2.3 GundSeal® Trial Seam Evaluation

Testing of the geomembrane trial seams were performed by GSE™ under GCS observation. Trial seam tests were conducted at the beginning of each shift or when field conditions changed in order to monitor the adequacy of the seaming apparatus and the operator's procedures. Trial seams were made by each welding apparatus to be used and by each welding technician who was going to operate a welding apparatus. Each trial seam was sampled and tested for peel adhesion (peel) and bonded seam strength (shear). The trial seaming procedures were observed and documented by GCS personnel. Archive samples were collected from each trial seam for LLNL. A copy of the trial seam summary is presented in Appendix I-4.3.

4.2.4 GundSeal® Seaming

In general, dual hot-wedge fusion seaming of the HDPE liner proceeded concurrently with deployment. The welding was observed and recorded by GCS personnel. The wedges ran at a slower rate of approximately 5-feet per minute to ensure seam bonding. All seaming areas were checked for the appropriate overlap and were cleaned thoroughly before welding. The entire length of all seams was observed either during or shortly after completion for quality of seaming. Then each portion of the fusion welded seam was non-destructively tested.

The extrusion seaming process was utilized for butt seams and tie-in seams. The leading 6-inches of bentonite was removed from the overlapping panel by scraping with a putty knife and/or by grinding it off with an electric grinder. Two-foot wide strips of bentonite/HDPE geomembrane were placed bentonite side up under seams that did not have a complete 2-feet of overlap. After the appropriate measures were taken to ensure bentonite coverage, GSE™ then heat sealed the leading edge down with an electric hot air device known as a Leister. The seaming areas were beveled and ground with a grinder. Then a hand held extrusion apparatus welded the seams. After the seams had cooled, they were non-destructively tested for seaming integrity. GCS observed and documented these procedures. A summary of the fusion and extrusion seaming is presented in Appendix I-4.4.

4.2.5 GundSeal® Repairs

During installation of the GundSeal® liner, many locations required extrusion welded patches to seal "defects" in the liner. The defects in the liner system resulted from destructive sampling, cuts placed in the liner to perform pressure testing, construction damage, and leaks found during vacuum testing. The majority of the defects were due to the normal course of geomembrane installation. GCS observed and documented the GundSeal® repairs and subsequent non-destructive testing. An alpha-numeric code marking system which uniquely identified each area requiring repair was used by GCS. These defects were repaired and then subsequently non-destructively tested to verify the integrity of the weld. A summary of the repairs is located in Appendix I-4.5. Additionally, the locations of the repairs with respect to the individual GundSeal® panels are shown on Drawing 16.

4.2.6 GundSeal® Seam Non-Destructive Testing

All non-destructive seam continuity testing was performed by GSE™ and Envirocon personnel and observed by GCS personnel. 100% of all seams were tested for continuity by non-destructive methods. The majority of the seams were created by fusion welding methods and these seams were tested by the air pressure method. Of the total length of all field seaming, approximately 5,894 feet (86%) of the seams were seamed by fusion welding procedures and approximately 957 feet (14%) of the seams were seamed by extrusion welding procedures.

Two methods of non-destructive testing were used for this project:

- Vacuum box testing on extrusion welds; and
- Air pressure testing on dual hot-wedge fusion welds.

A vacuum box is a rigid-wall box with a clear Plexiglas top and a neoprene gasket around the bottom of the box forming a seal between the box and the HDPE liner. Vacuum box testing procedures consisted of the following:

1) Applying a soapy water solution to the seam;
2) Applying a vacuum of approximately 10 inches of mercury (5 psi) to the inside of the box for 15 seconds;
3) Observing the seam for bubbles, which would indicate a discontinuity in the seam.

Air pressure testing procedures consisted of the following:

1) Sealing off the air channel between the inside and outside tracks of the fusion weld;
2) Inserting a needle with an attached pressure gauge into the air channel;
3) Inflating the air channel to between 25 and 30 psi using a small electric air pump;
4) Observing the pressure gauge over a five minute period. A pressure drop of more than 2 psi during this period would indicate a possible discontinuity in the seam.
5) Puncturing the end opposite of the gauge after completion of testing to prove continuity of the seam.

Any leaks or discontinuities detected in the seams were marked and subsequently repaired in accordance with the specifications. As repairs were made to the geomembrane, GCS documented the location and verified that all repairs were vacuum box tested. Documentation summarizing the observation of the pressure testing and vacuum box continuity testing, and the actual repairs is presented on the repair logs in Appendix I-4.6.

4.2.7 GundSeal® Seam Destructive Testing

Destructive test samples were obtained from the seams of the HDPE liner at a minimum frequency of approximately one sample per 500 lineal feet of weld. A total of 12 destructive test samples from the HDPE liner fusion seams and 3 from the extrusion welded seams were marked and tested on site by GCS personnel with a calibrated tensiometer. The test locations were selected by GCS personnel based either on the completion of approximately 500 feet of welded seam or by field observation of the welded seam. Before GCS tested the destructive sample, GSE™ tested two coupons from each end for peel adhesion. From each destructive test sample, ten one-inch wide test coupons were cut. Five coupons were tested for adhesion (peel test mode, both inside and outside track for fusion seams) and five coupons were tested for bonded seam strength (shear test mode) in accordance with ASTM D4437. Test results indicated that all destructive samples passed destructive testing. An archive sample of each destructive sample was saved for LLNL along with all the tested destructive coupons. A summary of the fusion and extrusion destructive test results is presented in Appendices I-4.7.

4.3 Geocomposite

4.3.1 Geocomposite Conformance Testing

Samples of the geocomposite to be used at the site were obtained by GCS from the GSE™ plant in Houston, Texas prior to shipment. The samples were sent to the Atlanta, Georgia geosynthetics laboratory for testing. Three samples of geocomposite were tested for Adhesion Strength (ASTM F904) and Transmissivity (ASTM D4716). The average peel strength requirement for the geocomposite was lowered from 2-ppi to 1-ppi as addressed in RFI No. 6 in appendix E. Test number 1007-1842 initially failed Adhesion Strength by a minimal amount and was retested. The retest indicated that the peel strength was above the required minimum value. Appendix I-3.3 summarizes the conformance tests performed on the geocomposite samples.

The geocomposite arrived on site on July 15, and July 18, 1997. The rolls were 200-feet long by 14-feet wide. 44 rolls were delivered totaling 124,600 square feet of geocomposite. It was unloaded by Envirocon and inventoried by GCS. A summary of the geocomposite inventory is provided in Appendix I-1.3. Submittal information was later provided by GSE™ and reviewed by GCS. GSE™,s geocomposite quality control certification is presented in Appendix I-2.3.

4.3.2 Geocomposite Installation

Before installation of the geocomposite, GCS performed a final inspection of the GundSeal® liner, by walking down all areas of the geomembrane and reviewing the geosynthetics data. GCS identified and inspected completion of any required additional repairs and testing performed by GSE™. After final acceptance was determined by GCS, GSE™ began installation of the geocomposite. GSE™ began installation of the geocomposite on July 22, 1997 and finished installation on July 25, 1997. The area of installation was the same as that for the GundSeal® except that the north edge of the geocomposite terminated at the crest of the closure slope. The geocomposite drainage material was deployed in a north-south direction. The geonet portion of the geocomposite was overlapped approximately 4-inches and tied with plastic zip ties every 5-feet along the side seams. The butt seams were overlapped 2-feet and tied in 2 rows, every 6-inches staggered. The outer geotextile was overlapped to insure that all geonet was covered and in selected areas it was sewn. GCS monitored installation of the geocomposite and ensured that all phases of installation were performed in accordance with the specifications. Approximately 124,000 gross square feet of geocomposite was installed by GSE™ Lining Technologies.

4.4 Geotextile

4.4.1 Geotextile Conformance Testing

Due to the application of the geotextile for use only in the drainage ditches, Golder modified the quality control testing and conformance testing requirements. These modifications limited the required testing to include Mass Per Unit Area (ASTM D5261) and Apparent Opening Size (ASTM D4751). Tensar's submittal for the 8-oz Evergreen Technologies geotextile was reviewed by Golder and approved for installation. The quality control documentation for the geotextile is presented in Appendix I-2.4. Upon arrival at Pit 6, the geotextile was inventoried (see Appendix I-1.4) and sampled for conformance testing by GCS. 6 rolls totaling 27,000 square feet of geotextile

arrived on site. The geotextile was delivered in three shipments due to the contractor under estimating the quantity of material that needed to be installed. The rolls were 300-feet long by 15-feet wide. Three conformance samples were shipped to the geosynthetics laboratory for testing. The results of the above mentioned tests indicated that the material was acceptable for installation. Conformance test results are presented in Appendix I-3-4.

4.4.2 Geotextile Installation

Approximately 21,000 gross square feet of 8-oz/sy geotextile was installed as cushion layers and filter layers below and around the subdrain system in the perimeter anchor trench. As specified the geotextile was overlapped 2-feet. It was also used in the north diversion ditch as a filter layer below the riprap. Panels of geotextile were overlapped 2-feet. GCS verified that overlap was maintained and observed the general condition of the geotextile.

5.0 Hydroseeding

On August 25 and 26, 1997, Fastest Grass in the West, Inc. was on site hydroseeding the borrow area, the landfill cover, and all exposed slopes and surfaces caused by construction activities. Approximately 12 acres of exposed topography were hydroseeded. The hydroseed mix consisted of seed, fertilizer, mulch, tackifier materials and water. This seed mix was modified by replacing Bromus rubers with Bromus hordeceous. The other varieties of seeds used for the mix included, Zorro fescue, Hydon rose clover, and Poa scabrella. After application of the mix, the surface was not allowed to be watered.

6.0 Shotcrete

The project specifications were initially written for structural concrete placement within drainage control ditches. At the option of LLNL and request by Envirocon, the project specifications were modified to accommodate the use of shotcrete for this application. The specifications were modified by the design engineer from Golder to meet Caltrans specifications for sidewalks and ditches. Discussion on this issue was covered in Weekly Construction Progress Meetings No. 2, 3, 4, and 5, located in appendix C. Envirocon received the revised specifications on July 7, 1997. In addition to the revised specifications additional detail drawings, headwalls and culverts were prepared by the design engineer from Golder. The additional items can be found in Appendix E, under RFI No. 9. The shotcrete exceeded class II concrete strength and the only difference in the application was that the wing wall used a 3/8-inch minus aggregate instead of a 3/4-inch minus aggregate.

Inspection Consultants Inc., were on site August 25, 26, 27, 1997 to monitor the shotcrete application in the drainage ditches and to take samples for testing. One test sample was taken for each day and they were left on site until the next week for curing. These samples were later picked up and delivered to the laboratory for testing. The samples were cored and tested to determine the compressive strength. The results of the strength at 28-days indicate compliance with the project specifications. Daily reports and results of break strength by Inspection Consultants, Inc. are presented in Appendix J.

7.0 Summary and Conclusions

GCS was retained by LLNL to provide CQA and testing services during construction of the Pit 6 landfill closure in San Joaquin County, California. Construction of the landfill closure took place from June 2, 1997 to August 29, 1997.

The CQA services provided with this work consisted of testing, documentation, and observation of the construction activities in order to verify compliance with the project design plans and specifications. Based on the daily communications with GCS's on site CQA, on observations made during site visits, and on review of the laboratory and field test results and documentation provided and certified by others, GCS hereby states that in our professional opinion, the Pit 6 Landfill Closure was constructed in accordance with the project plans, specifications, and specification modifications presented in this report.

Respectfully Submitted,

GOLDER CONSTRUCTION SERVICES, INC.

B Carpio

for: Nancy Evans,
Staff Geologist/CQA

Rick Kiel

Rick Kiel, P.E.
Senior Engineer

FIGURES

NOT TO SCALE

FIGURE **1**

SITE LOCATION MAP

LLNL/PIT 6 CQA/CA

DWG ID: \9637108\001\002\5213 DATE 10-28-97 16:38 DRAWN DVR

Golder Construction Services

APPENDIX A

Select Photographs

Photo 1: Pit 6 after controlled bum and before construction

Photo 2: Preparing subgrade by pushing soil berms into landfill with CAT 650LGP.

FIGURE **A-l**

SITE PHOTOGRAPHS

LLNL SITE 300, PIT 6 CLOSURE

Golder Construction Services

OJECT NO: 977-5117 DWG. NO. A0-10 SITE PHOTO DRAWN BY: PJM CHECK BY: REK DATE:9/11/97

Photo 3: Installing Bodkin Bars at butt seams of geogrid.

Photo 4: Installing geogrid, tying panel together with plastic zip ties every 5 feet.

FIGURE **A-2**

SITE PHOTOGRAPHS

LLNL SITE 300, PIT 6 CLOSURE

Photo 5: Deployment of GundSeal® over prepared general till.

Photo 6: Fusion welding of GundSeal® panels with a wedge welder.

FIGURE **A-3**

SITE PHOTOGRAPHS

LLNL SITE 300, PIT 6 CLOSURE

PROJECT NO: 977-5117 DWG NO. A0-10 SITE PHOTO DRAWN BY: PJM CHECK BY: REK DATE: 9/11/97

Golder Construction Services

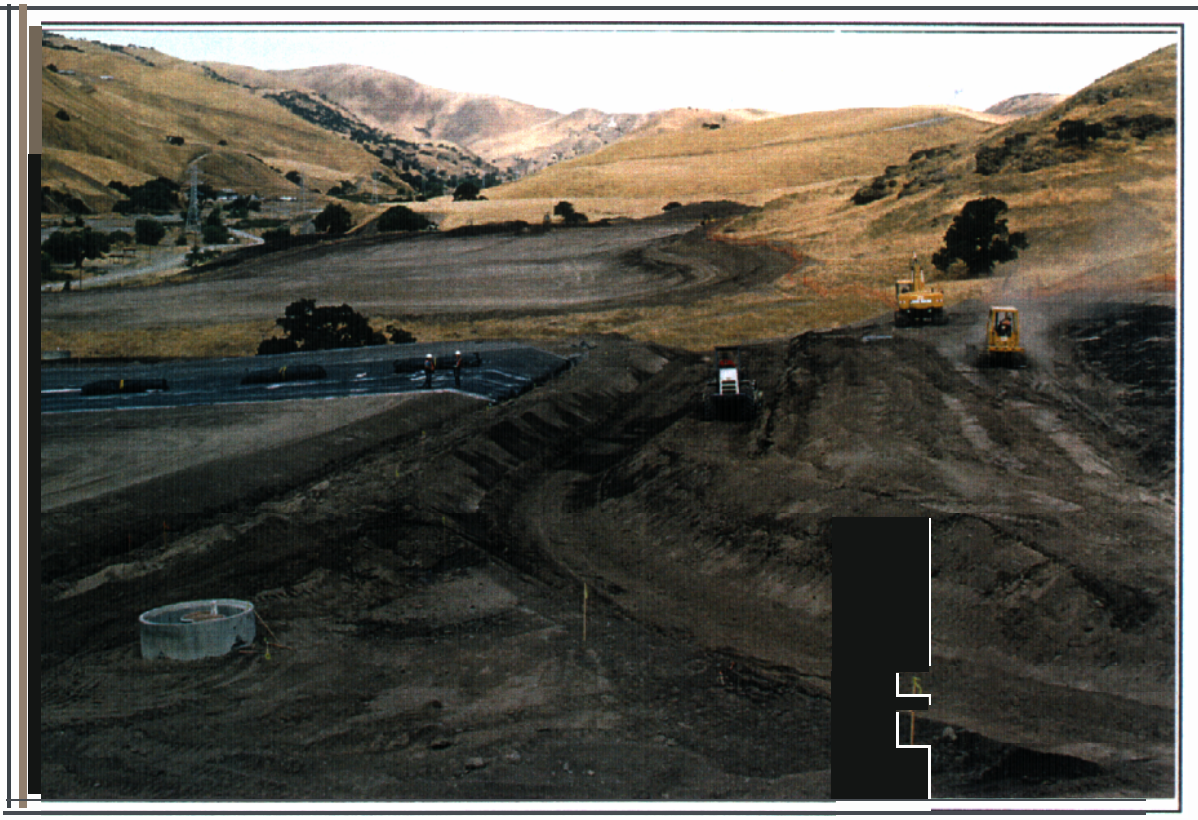


Photo 7: Replacement and compaction of north berm fill.

Photo 8: Deployment of GundSeal® over general fill. Working on north diversion ditch.

FIGURE **A-4**

SITE PHOTOGRAPHS

LLNL SITE 300, PIT 6 CLOSURE

PROJECT NO 977-5117 DWG. NO A0-10SITE PHOTO DRAWN BY PJM CHECK BY REK DATE 9/11/97

Golder Construction Services

Photo 9: Air-pressure testing of fusion seams. Technician writing results on liner.

Photo 10: Non-destructively testing extrusion weld with a vacuum box.

FIGURE **A-S**

SITE PHOTOGRAPHS

LLNL SITE 300, PIT 6 CLOSURE

PROJECT NO: 977-5117 DWG. NO. A0-10 SITE PHOTO DRAWN BY: PJM CHECK BY: REK DATE:9/11/97

Golder Construction Services

Photo 11: Tying geocomposite at but seams, two rows at 6-inches staggered.

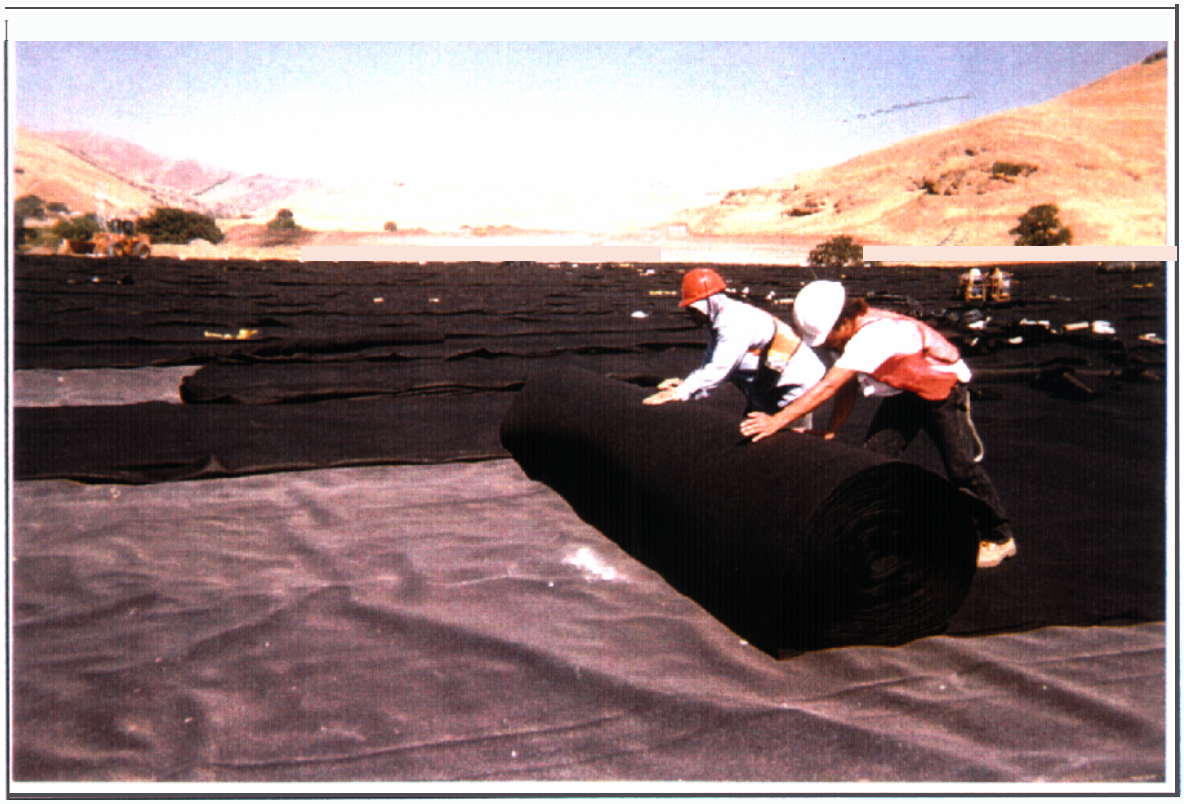


Photo 12: Deploying goecomposite over GundSeal by man-power.

FIGURE **A-6**

SITE PHOTOGRAPHS

LLNL SITE 300, PIT 6 CLOSURE

PROJECT NO 977-5117 DWG NO. A0-10 SITE PHOTO DRAWN BY PJM CHECK BY: REK DATE 9/11/97

Golder Construction Services

Photo 13: Grade checker assisting with placement of vegetative cover over geocomposite.

Photo 14: Cutting concrete lined V-ditch with a specially made bucket.

FIGURE **A-7**

SITE PHOTOGRAPHS

LLNL SITE 300, PIT 6 CLOSURE

PROJECT NO:977-5117 DWG NO A0-10 SITE PHOTO DRAWN BY:PJM CHECK BY:REK DATE:9/11/97

Golder Construction Services

Photo 15: Welding 4-inch SDR-17 HDPE pipe in drainage ditches over drainage rock

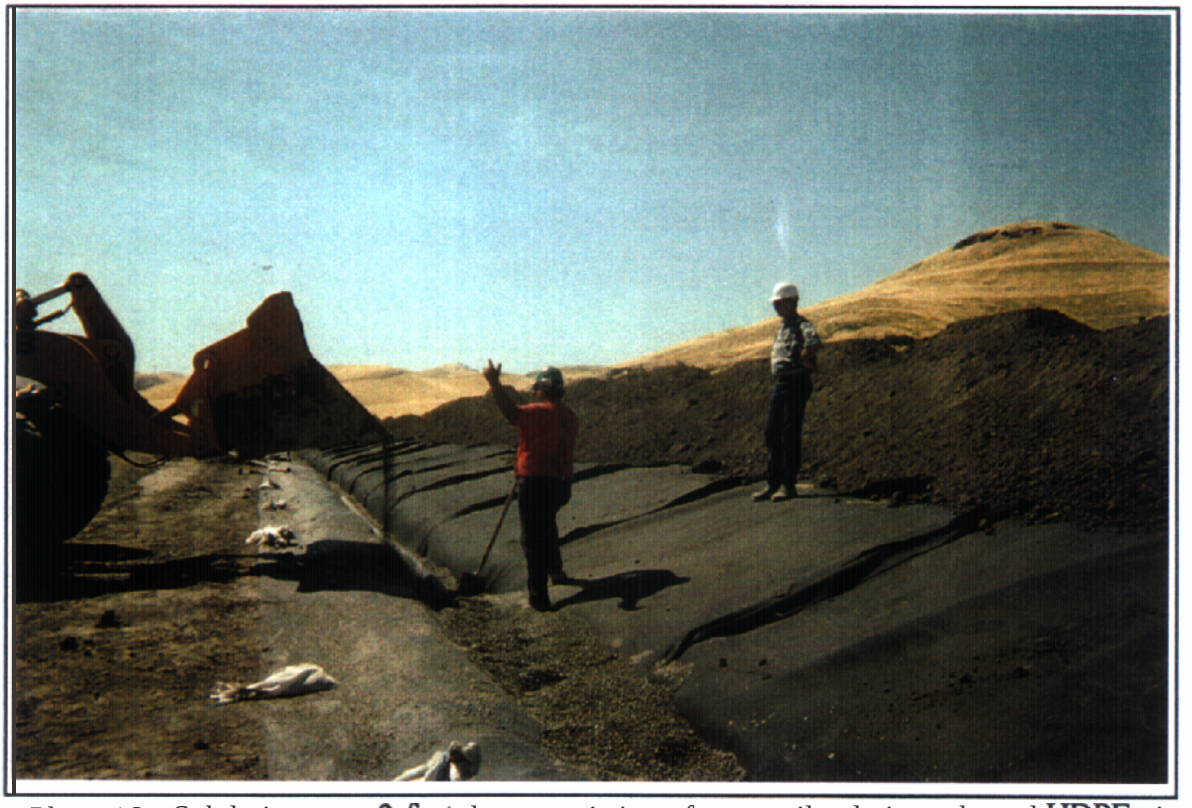


Photo 16: Subdrains were 2-feet deep consisting of geotextile, drain rock, and HDPE pipe.

FIGURE **A-8**

SITE PHOTOGRAPHS

LLNL SITE 300, PIT 6 CLOSURE

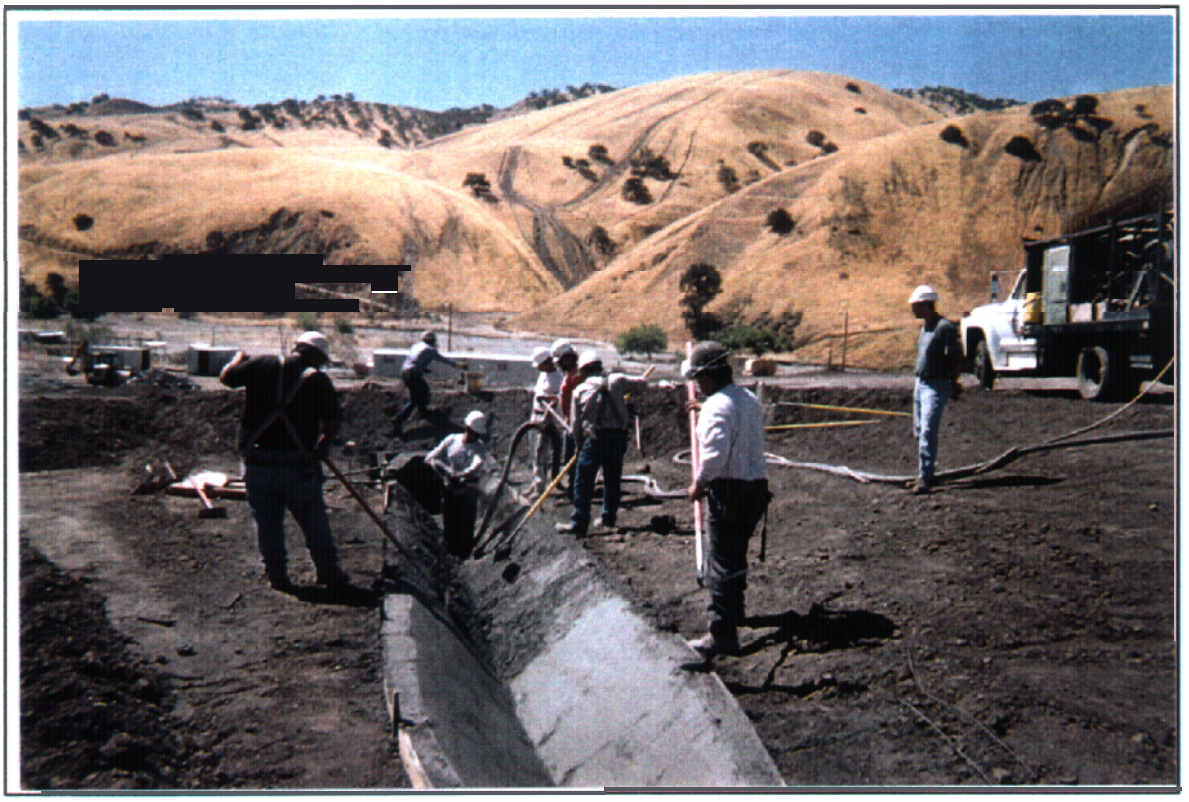


Photo 17: Shooting and finishing of shotcrete lined V-ditches.

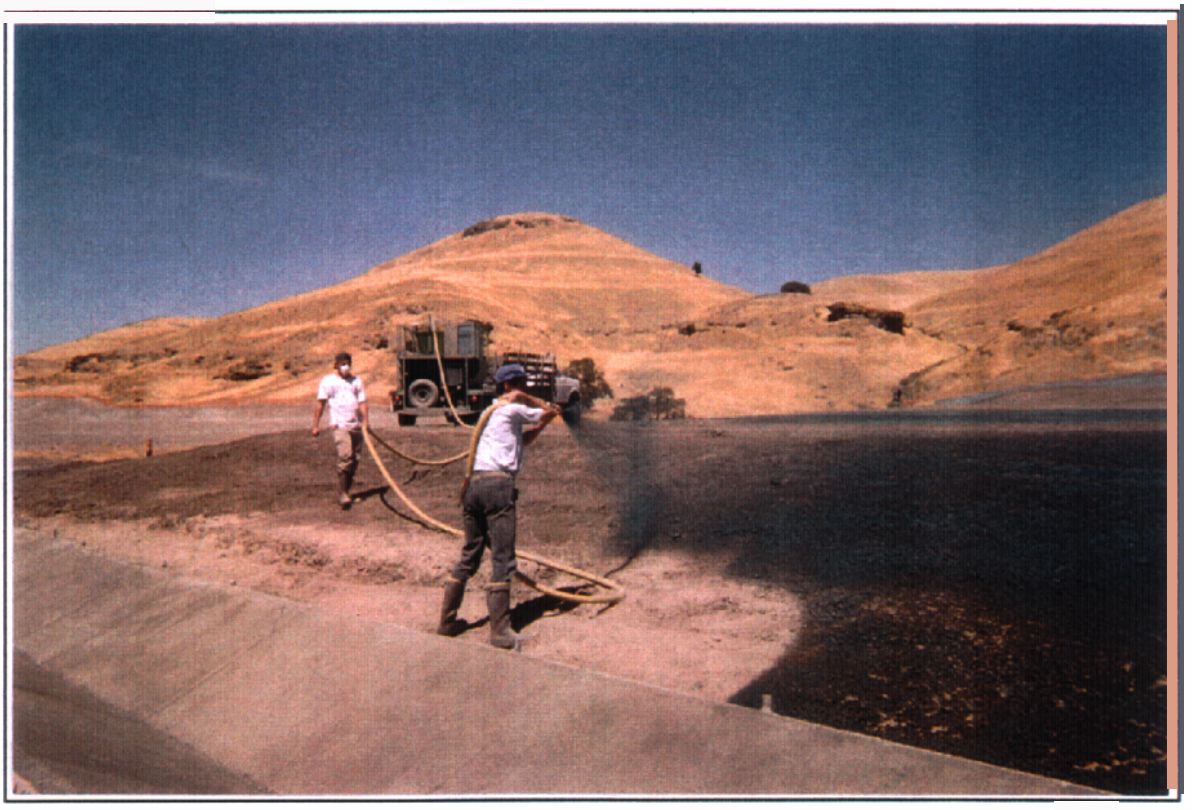


Photo 18: Spray application of hydroseed over landfill area.

FIGURE **A-9**

SITE PHOTOGRAPHS

LLNL SITE 300, PIT 6 CLOSURE

Photo 19: Pit 6 after completion of vegetative cover soil placement

Photo 20: Hydroseeding on soil borrow area

FIGURE **A-10**

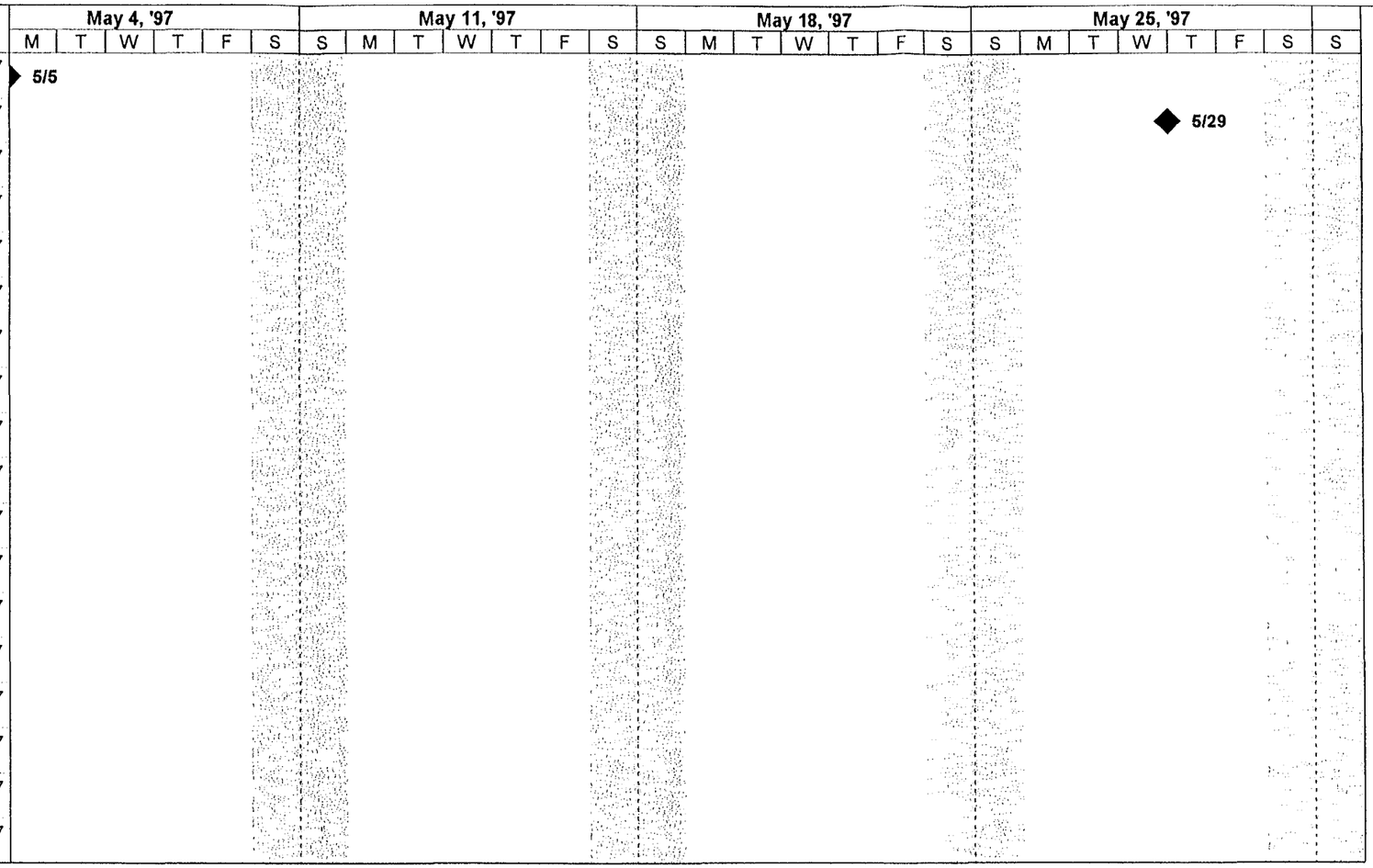
SITE PHOTOGRAPHS

LLNL SITE 300, PIT 6 CLOSURE

APPENDIX B

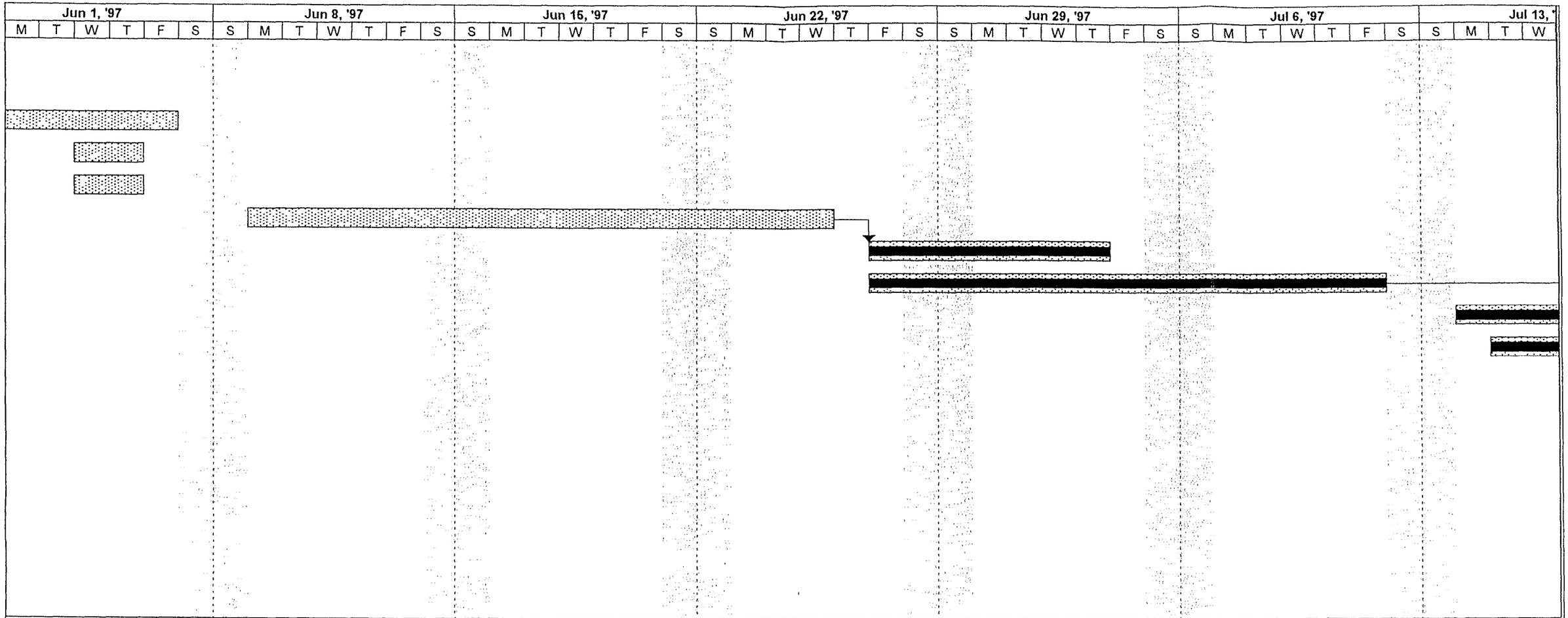
Construction Schedules

ID	Task Name	Duration	Start	Finish
1	NOTICE TO PROCEED #1	0d	5/5/97	5/5/97
2	NOTICE TO PROCEED #2	0d	5/29/97	5/29/97
3	SITE MOBILIZATION & SETUP	5d	6/2/97	6/6/97
4	DEMOLITION	2d	6/4/97	6/5/97
5	CLEARING & GRUBBING	2d	6/4/97	6/5/97
6	SUBGRADE PREPARATION	13d	6/9/97	6/25/97
7	INSTALL GEOGRID	5d	6/27/97	7/3/97
8	INSTALL GENERAL FILL	11d	6/27/97	7/11/97
9	INSTALL DIVERSION DITCH	29d	7/14/97	8/21/97
10	INSTALL GUNDSEAL	6d	7/15/97	7/22/97
11	INSTALL GEOCOMPOSIT	4d	7/22/97	7/25/97
12	INSTALL VEGETATIVE COVER	14d	7/25/97	8/13/97
13	INSTALL HDPE SUBDRAINS	2d	8/6/97	8/7/97
14	INSTALL SHOTCRETE DITCHES	11d	8/13/97	8/27/97
15	INSTALL CULVERTS	4d	8/15/97	8/20/97
16	INSTALL AGGREGRATE BASE ROADS	5d	8/25/97	8/29/97
17	HYDRO SEED SITE	2d	8/25/97	8/26/97
18	DEMOBILIZE	0d	8/29/97	8/29/97



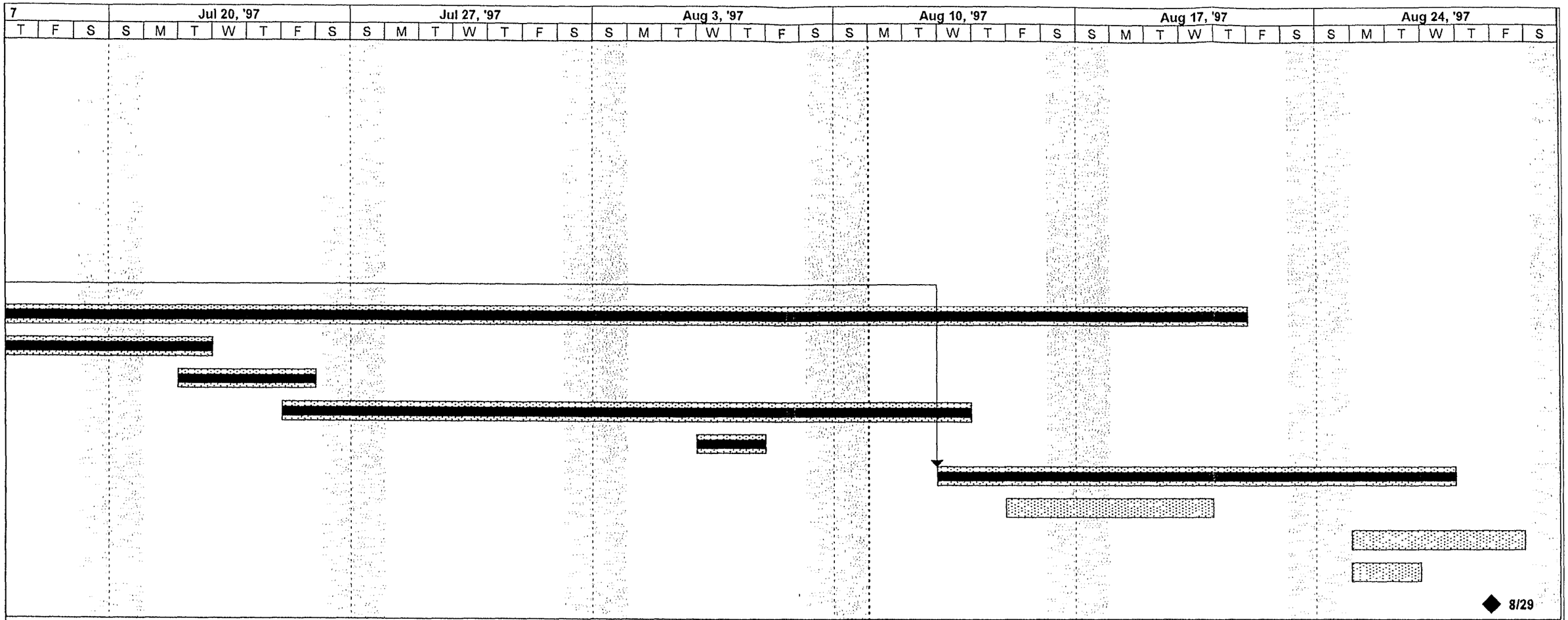
Project:
Date: 8/11/97

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress



Project:
Date: 8/11/97

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress



Project:
Date: 8/11/97

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

Appendix C

Weekly Meeting Minutes

MINUTES OF PROGRESS MEETING NO. 1
LLNL SITE 300 - PIT 6 LANDFILL CLOSURE

Date: June 12, 1997

Time: 9:00 a.m. to 10:30 a.m.

Location: LLNL, Site 300, Pit 6 Construction Trailer

Purpose: Discuss progress to date and resolve any problems with regard to construction schedule, safety, quality assurance, and contractual issues related to construction of the landfill closure.

Attendees:

Harry Benstead	LLNL
Ken Obenauf	Golder Associates
Jeffery Brown	Envirocon
Kevin Braun	Earth Safety Dynamics
Gennie McPeak	LLNL
Nancy Evans	GCS
Rick Kiel	GCS
Tom Berry	Weiss
Mike Davis	Envirocon
Cal Dibble	LLNL
Sue Miller	LLNL
Mike Ramsey	LLNL

AGENDA: The following agenda was followed during Progress Meeting No. 1

1. Review and approval of minutes of previous meeting
2. Review of work progress since previous meeting
3. Field observations, problems, conflicts, which impede work progress or access
4. Review requests for information
5. Review proposed changes
6. Status of submittals
7. Safety observations
8. Inspections in connection with work and coordination
9. Scheduled work for the next three weeks
10. Other business

CONSTRUCTION PROGRESS MEETING NO. 1
LLNL Site 300 - Pit 6 Landfill Closure
9:00 a.m. - June 12, 1997

---

1. **REVIEW AND APPROVAL OF MINUTES OF PREVIOUS MEETING:** - None

2. **REVIEW OF WORK PROGRESS SINCE PREVIOUS MEETING:**

2.1. Demolition
Jeff Brown summarized the progress for the construction period June 4 through June 12. He stated that the firing range had been demolished and the debris was stockpiled for disposal. Harry Benstead added that the demolished waste had been approved for removal and disposal by LLNL. This includes the 3/16" steel plates that were deemed unusable for the use in rebuilding the range cover. Cal Dibble stated that 1/2" steel plates had been approved for use and that Envirocon could possibly send the 3/16" steel plates to salvage.

2.2 Clearing and grubbing
Jeff Brown stated that the clearing and grubbing of the landfill proper is complete. Envirocon will start on the clearing and grubbing of the borrow area as soon as Monday.

2.3 Subgrade
The subgrade should be completed by Friday. Jeff Brown stated that he will have to bring in some borrow material to bring the subgrade up to grade.

2.4 Erosion control
Envirocon has installed silt fence to the south of the landfill. An erosion control ditch and two retention basins were cut to the south of the borrow area. They have also installed silt fence, hay bails and a temporary culvert in the ravine.

3. **FIELD OBSERVATIONS, PROBLEMS, CONFLICTS, WHICH IMPEDE WORK PROGRESS OR ACCESS:**

3.1 5 psi requirement for dozer
Mike Davis and Jeff Brown discussed the slow progress being made with the restricted use of equipment with in the landfill trench zones. Only equipment of less than 5 psi can be used for the subgrade. Envirocon is currently using a John Deere LGP 650 dozer with a bearing of approximately 4.7 psi. Jeff stated that Envirocon has already placed between 3 and 4 feet of subgrade fill and that no subsidence was noted so far. Envirocon would like to be able to use larger pieces of equipment over areas that have placed fill. He would like to use a John Deere 750C dozer with a ground load of 7.1 psi. However they would not use the heavier equipment on virgin soil. Ken Obenauf stated that structurally this would create a better cover, but the issue that needed to be addressed is safety. It was discussed if there would be any subsidence. There is a designated employee of Envirocon monitoring subsidence and to date, there has been no subsidence noted. Tom Berry also brought up the issue of greater pressure on the waste within the trench that may cause subsidence, rupture and leakage. This would be a problem and he asked that all subsidence must be noted. It was again stated that there is 3 to 4 feet of subgrade fill already placed over the trenches and that subsidence is monitored continually. Jeff Brown also stated that the subgrade fill is not being placed parallel to trenches, it is being pushed at an oblique angle. It was approved that Envirocon can use the John Deere 750C dozer within the landfill so long as there is 2 to 3 feet of cover over the base. Mike also asked if it would be possible to use dump trucks running on a prepared ramp to move the material closer to the dozers. This was approved so long as the truck did not go over any area of the trenches.

3.1 Other

Envirocon will have more personnel on site Monday along with more equipment. This should increase production.

4. REVIEW REQUESTS FOR INFORMATION:

4.1 Vegetative layer clarification

There has been a clarification of the vegetative layer. The entire 2-foot layer is vegetative cover which is the same soil type used for the fill, but it will be placed in 12-inch thick lifts and trackwalked. No compaction specification is required.

4.2 Concrete rebar

The plans call for the rebar to be placed 12-ft on center; this was a typo and should be 12-inches on center.

4.3 Other

The plans call for rebar at 6-inches on center. This should be a 6" grid wire mesh.

Ken Obenauf asked where correspondence should be sent. It was agreed upon that it should be faxed to the site during working hours (7:30 a.m. to 4:00 p.m.), followed by a hard copy mailed to Harry Benstead at LLNL.

5. REVIEW PROPOSED CHANGES:

5.1 Limits of borrow area

The limits of the borrow area have increased to include the staging area to the west of the proposed borrow area. It was asked if the finial grading of the borrow area would have to be reworked. Ken Obenauf stated that it didn't and that what would be required is positive drainage. Harry Benstead presented that at the end of the borrow excavation there should be a meeting between the relevant parties to come to an agreement upon the final grading plan.

5.2 Testing of concrete

Due to contractual issues, Harry Benstead said that he will talk to Kenny Lane to arrange for CEL to test concrete. LLNL already has a contract with CEL and this may be a conflict of interest if GCS uses them directly. In addition, the concrete specification section is unclear and Jeff Brown and Harry Benstead will review the specifications and determine what may need to be changed. Changes may reflect if the concrete is pumped or not which is determined by accessibility. Testing will be at a frequency of 1/150 yards. Three cylinders will be taken and will be tested at 7 and 28 days with an additional archive cylinder. Slump is specified at 4-inches.

6. STATUS OF SUBMITTALS:

6.1 Site Safety Plan - Approved

6.2 SWPPP - Not Approved.

Sandy Matthews of LLNL has asked that is be resubmitted. However, on June 9, 1997, Harry Benstead had approved Envirocon to begin work in the borrow area.

6.3 Geogrid - Approved

6.4 **Geotextile** - Received and being reviewed

6.5 **Other** - GSE technical submittals should be arriving any day

7. SAFETY OBSERVATIONS:

7.1 Badging

Temporary badges will be expiring by the end of the week. Kevin Braun stated that he will schedule with Carlene in badging a time for new badges to be picked up.

7.2. Dust control

Kevin Braun stated that dust has been a problem, but that his tests indicate that levels have not exceeded action levels. He also stated that the methods to control dust have improved and consequently the test levels of dust have decreased.

7.3 Caving

So far, no caving of trenches have been noticed.

7.4 Sign in sheet

Everyone who arrives on site must sign in at the office and must wear the correct personal protection.

7.5 Access - barricade

The barricade currently has a hand written sign on it. Cal Dibble stated that he will assist with increase barricade control if it is needed.

7.6 Attendance of Safety Meetings

Kevin Braun stated that it is strongly urged that everyone who is going to be on site should attend the daily 7:30 a.m. Safety meetings. These meetings last 15 to 20 minutes and address hazards of the site. Cal Dibble also informed Kevin that there are badgers. There is a badger hole to the north of the borrow area that will be taped off to avoid any accidents.

8. INSPECTIONS IN CONNECTION WITH WORK AND COORDINATION:

8.1 Preconstruction soils testing

Nancy Evans stated that she is currently doing soils preconstruction testing and should have results Monday.

8.2 Air quality testing

Kevin Braun is currently testing the air quality. So far everything has come up non-dect for metals and the dust has been below the action level, but voluntary use of dust masks is approved.

8.3 Surveying of subgrade

Cal Dibble stated that the LLNL in-house surveyors would like a couple days notice to do any work on site. He also stated that the well heads are within a hundredth and that these wells can be used to establish survey points. Surveying needs to be scheduled through Harry Benstead. Jeff Brown thought he would need the surveyors for Monday for the subgrade.

9. SCHEDULED WORK FOR THE NEXT THREE WEEKS:

9.1. **Prepare subgrade** - Should be finished June 16
9.2 **Clearing and grubbing of borrow** - Start June 16
9.3 **Excavation of borrow and placement of fill** - Start June 16
9.4 **Geogrid installation** - Start next week approx. June 18

9.5 **Geosynthetics** - Approx. start date July 1

9.6 **Update schedule** - Harry Benstead and Jeff Brown will review schedule and update it. Cal Dibble reminded Jeff that Envirocon was held to a 90 day performance criteria.

10. **OTHER BUSINESS:**

Next week's meeting and all other weekly progress meetings are scheduled for Wednesdays at 9:00 a.m..

Ken Obenauf, the design Engineer will be going on vacation, Barry MacDonnell will be covering for him. He also stated that Rick Kiel or Nancy Evans may be able to answer any questions.

MINUTES OF PROGRESS MEETING NO. 2
LLNL SITE 300 - PIT 6 LANDFILL CLOSURE

Date: June 18, 1997

Time: 9:00 a.m. to 10:00 a.m.

Location: LLNL, Site 300, Pit 6 Construction Trailer

Purpose: Discuss progress to date and resolve any problems with regard to construction schedule, safety, quality assurance, and contractual issues related to construction of the landfill closure.

Attendees:

Harry Benstead	LLNL
Jeffery Brown	Envirocon
Kevin Braun	Earth Safety Dynamics
Gennie McPeak	LLNL
Nancy Evans	GCS
Rick Kiel	GCS
Tom Berry	Weiss

AGENDA: The following agenda was followed during Progress Meeting No. 2

1. Review and approval of minutes of previous meeting
2. Review of work progress since previous meeting
3. Field observations, problems, conflicts, which impede work progress or access
4. Review requests for information
5. Review proposed changes
6. Status of submittals
7. Safety observations
8. Inspections in connection with work and coordination
9. Scheduled work for the next three weeks
10. Other business

CONSTRUCTION PROGRESS MEETING NO. 2
LLNL Site 300 - Pit 6 Landfill Closure
9:00 a.m. - June 18, 1997

---

1. **REVIEW AND APPROVAL OF MINUTES OF PREVIOUS MEETING:** - Approved

2. **REVIEW OF WORK PROGRESS SINCE PREVIOUS MEETING:**

2.1. Subgrade
Jeff Brown summarized the progress for the construction period June 13 through June 18. He stated that Envirocon is working on pushing in the north berm for subgrade fill of the landfill. He hopes that there is a soils balance and that it won't be necessary to import from the borrow area. Envirocon will have a grade checker on site either Thursday or Friday to check the subgrade. Jeff Brown noted that if Envirocon has to import subgrade fill from the borrow area this could effect the schedule and present some cost issues. There has been some confusion as to what the grading plan of the subgrade is. No elevations on the subgrade grading plan were given except for 12 points. On Tuesday Jeff Brown, Harry Benstead, Dan Nelson, Cal Dibble and Nancy Evans met to discuss the subgrade grading plan and it was determined that the compacted fill elevations, minus 2-feet would be used to figure subgrade grading elevations. Dan Nelson figured these elevations for Envirocon to work from.

2.2 Clearing and grubbing of borrow
Jeff Brown stated that the clearing and grubbing of the borrow area is dry, windy and dusty. A system of watering the topsoil in the morning then ripping it, followed directly behind by watering again has helped the dust problem.

2.3 Arrival of Geogrid
188 rolls of geogrid arrived on site June 16, 1997 and were unloaded. Conformance samples were taken and sent out for testing. Results of conformance testing could be available as soon as this afternoon. The driver of the truck that delivered the geogrid, hit the entrance fence. It has been replaced.

2.4 Erosion control
Envirocon has resubmitted the SWPPP after Sandy Matthews came out to the site Monday to discuss the changes she would like to see. One addition to the plan is the placement of hay bails to the south of the stockpiles. The other changes were minor.

3. **FIELD OBSERVATIONS, PROBLEMS, CONFLICTS, WHICH IMPEDE WORK PROGRESS OR ACCESS:**

3.1 Dust
Due to the dry conditions in the borrow area, progress is slow. Envirocon has been coming in early to water the surface of the borrow area. Other measures have been inplemented to control dust. The dust at one point had gotten to bad that, Fred Cone of LLNL Site 200 came to the site during the week and commented on the amount of dust. The problem had increased during that short period due to a water truck breaking down.

4. REVIEW REQUESTS FOR INFORMATION:

4.1 Subgrade grading plan
Control points were established during yesterday's meeting with the LLNL surveyors.

4.2 Geotextile
The GSE geocomposite does not meet QC performance specifications, neither does the geotextile supplied by Tensar for the drainage ditches. Jeff Brown would like to give the Design Engineer the supplier's QC information to evaluate whether it is an acceptable product for the application it is to be used for.

4.3 Concrete
Coleman Concrete, Envirocon's subcontractor for the concrete called and said that they couldn't do the job. They were the only company that bid on the job. Harry Benstead will assist Jeff Brown in finding a subcontractor for the concrete work.

4.3 Other
After the meeting Jeff Brown, Harry Benstead, Rick Kiel, Tom Berry and Nancy Evans will meet and go over RFI's for concrete details, vegetative cover drainage, and geotextile testing criteria.

5. REVIEW PROPOSED CHANGES: No RFI's were submitted last week.

6. STATUS OF SUBMITTALS:

6.1 SWPPP - Resubmitted
Sandy Matthews of LLNL met with Jeff Brown and Harry Benstead to discuss the changes that she would like. Jeff Brown made the corrections and resubmitted the plan.

6.2 Geotextile - Received and being reviewed

7. SAFETY OBSERVATIONS:

7.1 Dust Control
Kevin Braun stated that the dust situation is under control. For their own protection, some of operators are wearing masks, but it is not required due to the amount of dust being below the action limit.

7.2 Attendance of Safety Meetings
Kevin Braun stated that it is strongly urged that everyone who is going to be on site should attend the daily 7:30 a.m. Safety meetings. These meetings last 15 to 20 minutes and address hazards of the site. He suggested that the archeologist should attend these meetings to work out a schedule with the operators.

7.3 Subsidence
It was noted that there has been no observable subsidence of the trenches.

8. INSPECTIONS IN CONNECTION WITH WORK AND COORDINATION:

8.1 Preconstruction soils testing
Nancy Evans stated that she is currently doing soils preconstruction testing. The moisture content in the borrow soil ranges from 4 to 8 percent; optimum moisture for moisture/density relationship is approximately 17 percent. This means that Envirocon must add quite a bit of water to bring the soil up to

a range which will compact to the 85% and 90% compaction of the modified Proctor. Jeff Brown stated that he was concerned if he over worked the soil that it would pump. He also stated that he would like a performance standard of how many passes is needed to achieve compaction. GCS will work with Envirocon to worked out a performance standard.

8.2 Air quality testing

Kevin Braun is currently testing the air quality. So far everything has come up non-dect for metals and the dust has been below the action level, but voluntary use of dust masks is approved. Fungal spores for Valley Fever are Kevin's main concern.

8.3 Surveying of subgrade

Tom Berry asked if the geogrid would be surveyed. He would like to see the perimeter of the geogrid surveyed especially the extent of the third layer.

9. SCHEDULED WORK FOR THE NEXT THREE WEEKS:

9.1. **Prepare subgrade** - Should be finished by the end of the week, June 20

9.2 **Clearing and grubbing of borrow** - Approximately 1/2 done. Should be done by the end of the week, June 20.

9.3 **Geogrid installation** - This is scheduled to start after subgrade is prepared and conformance testing is complete.

9.4 **Compacted fill** - Start approximately by the end of next week, June 27

9.5 **Other** - GSE on site July 1.
Approximately 1 week behind schedule.

10. OTHER BUSINESS:

The demolition debris has been approved for disposal by LLNL. The debris will be taken to the Altamont Landfill once LLNL submits a waste profile to the landfill. Envirocon plans to recycle the steel plates.

MINUTES OF PROGRESS MEETING NO. 3
LLNL SITE 300 - PIT 6 LANDFILL CLOSURE

Date: June 25, 1997

Time: 9:00 a.m. to 9:50 a.m.

Location: LLNL, Site 300, Pit 6 Construction Trailer

Purpose: Discuss progress to date and resolve any problems with regard to construction schedule, safety, quality assurance, and contractual issues related to construction of the landfill closure.

Attendees:

Harry Benstead	LLNL
Jeffery Brown	Envirocon
Kevin Braun	Earth Safety Dynamics
Gennie McPeak	LLNL
Nancy Evans	GCS
Ken Obenauf	Golder Associates
Tom Berry	Weiss Associates
Dave Littlefield	LLNL
Valerie Dibley	LLNL

AGENDA: The following agenda was followed during Progress Meeting No. 3

1. Review and approval of minutes of previous meeting
2. Review of work progress since previous meeting
3. Field observations, problems, conflicts, which impede work progress or access
4. Review requests for information
5. Review proposed changes
6. Status of submittals
7. Safety observations
8. Inspections in connection with work and coordination
9. Scheduled work for the next three weeks
10. Other business

CONSTRUCTION PROGRESS MEETING NO. 3
LLNL Site 300 - Pit 6 Landfill Closure
9:00 a.m. - June 25, 1997

---

1. REVIEW AND APPROVAL OF MINUTES OF PREVIOUS MEETING: - Approved

2. REVIEW OF WORK PROGRESS SINCE PREVIOUS MEETING:

2.1. Subgrade
Jeff Brown summarized the progress for the construction period June 19 through June 25. He stated that the subgrade finish grade did not have to be a mirror finish of the finial landfill grade. Envirocon will finish the subgrade by today.

2.2 Clearing and grubbing of borrow
Jeff Brown stated that the clearing and grubbing of the borrow area is on going and should be finished by the end of the week.

2.3 Aggregate base course
Envirocon is placing approximately 100 ton of aggregate base on the roads due to the characteristics of the native soil. The native material turns to powder when dry and when watered becomes very slick and difficult to drive on.

3. FIELD OBSERVATIONS, PROBLEMS, CONFLICTS, WHICH IMPEDE WORK PROGRESS OR ACCESS:

3.1 Historical finds
There was some concern raised that historical items and the flags used to mark the items were being buried or moved. Harry Benstead stated that he had a conversation with the archeologist and the parties involved and that the problem had been resolved. A saw had been moved to contractor's truck bed so that it wouldn't be run over or buried. The archeologist will continue to spot check the site as construction progresses.

4. REVIEW REQUESTS FOR INFORMATION:

4.1 Geogrid - installation
An RFI has been submitted to Golder to remove the specification that limits joining of geogrid to the area outside the restriction zone. Envirocon would like Golder to re-evaluate this specification based on a technical letter supplied by Tensar that states that the proposed Bodkin bar joint is stronger than the material. The geogrid rolls are also only 200 feet long and holding to this specification would pose a more difficult layout plan, create more but seam joints and waste more geogrid. The but joints would be staggered from the north end to the south end, every other panel. Tom Berry mentioned that the void spaces in the trenches were more predominant in the south trench and perhaps all butt seams should be located at the north end of the landfill. Ken Obenauf, the design Engineer stated that he would have to run this by Ken Haskel and that he would hopefully have an answer by the end of the day. Jeff Brown stated that this was a priority issue since Envirocon plans on installing geogrid by the end of the day.

4.2 Geotextile
The geotextile used for the ditches does not meet the testing specifications. The test requirements are being reviewed and the material accepted as supplied.

4.3 Geocomposite
GSE geocomposite does not meet QC performance specifications, the testing requirements are being reviewed and the testing table revised. Items noted by Ken Obenauf include using Grab Elongation test method ASTM 4632 and changing Elongation at break requirement from 500 to 50. This was assumed to be a typo.

4.4 HDPE/Gundseal
The geosynthetic closure system changed from a geosynthetic clay layer, geomembrane system to a Gundseal product. The change in the product created some questions as to whether or not the tests requirements were applicable. The test requirements are being reviewed and amended by the design Engineer.

4.5 Concrete
The specifications as they are written are creating problems in obtaining a subcontractor for concrete. Harry Benstead, Dave Littlefield and Jeff Brown would like to meet with Ken Obenauf after the progress meeting to discuss revisions to the specifications.

5. REVIEW PROPOSED CHANGES: None to review.

6. STATUS OF SUBMITTALS:

6.1 Geotextile - Rick has and is reviewing.
6.2 SWPPP - This has been resubmitted with the inclusion of a run off coefficient
6.3 Other - Envirocon will submit in the near future GSE Gundseal material and HDPE pipe

7. SAFETY OBSERVATIONS:

7.1 Dust Control
Dust was at it worst, last week due to the water truck being down. The personnel from the adjacent rifle range even complained. Jeff Brown stated that the addition of the aggregate base on the roads should minimize some of the dust. He also stated that both water trucks have been operating fine this past week and that the dust problems seem under control

8. INSPECTIONS IN CONNECTION WITH WORK AND COORDINATION:

8.1 Preconstruction soils testing
Nancy Evans stated that the preconstruction testing of the borrow soil indicate low moisture results between 4 and 8 percent and that the soil compacts well at approximately 115 to 120 pcf. She will work with Jeff Brown to establish nuclear density testing. Her preference is to conduct testing when equipment is not running.

8.2 Air quality testing
Kevin Braun stated that there was one sample that has come in above the action limit, but the operator in those conditions was voluntarily wearing a NIOSH approved mask. The time this limit was reach was during the period the water truck was down.

8.3 **Surveying of subgrade**
Harry Benstead said that he would look into having the surveyors on site today or as soon as possible to shoot the subgrade.

9. SCHEDULED WORK FOR THE NEXT THREE WEEKS:

9.1. **Geogrid installation** - Start tomorrow, June 26, 1997. Approximately 2 days per layer.
9.2 **Compacted fill** - Running concurrently with geogrid installation.
9.3 **Clearing of borrow** - Should be finished by end of week, June 27, 1997.
9.4 **Excavation of borrow** - Started ripping borrow area today, excavating tomorrow.
9.5 **Gundseal installation** - Scheduled for the week of July 7, 1997.
9.6 **Anchor trench** - Install prior to Gundseal installation of the week of July 7, 1997
9.7 **Other** - Approximately 1 week behind schedule. Work schedule has increased to 10 hour days and more personnel will added to assist with geogrid installation

10. OTHER BUSINESS:

The schedule will be revised by Jeff Brown and Harry Benstead. Tom Berry stated that he would like a copy of the revised schedule by Monday and that he would also like a copy of the meeting minutes prior to the next meeting so he can review them.

Jeff Brown stated that Hertz rental will be hosting a BBQ July 2, 1997 after work and everyone present is welcome to attend.

MINUTES OF PROGRESS MEETING NO. 4
LLNL SITE 300 - PIT 6 LANDFILL CLOSURE

Date: July 2, 1997

Time: 9:00 a.m. to 9:40 a.m.

Location: LLNL, Site 300, Pit 6 Construction Trailer

Purpose: Discuss progress to date and resolve any problems with regard to construction schedule, safety, quality assurance, and contractual issues related to construction of the landfill closure.

Attendees:

Harry Benstead	LLNL
Jeffery Brown	Envirocon
Kevin Braun	Earth Safety Dynamics
Gennie McPeak	LLNL
Nancy Evans	GCS
Ken Obenauf	Golder Associates
Tom Berry	Weiss Associates

AGENDA: The following agenda was followed during Progress Meeting No. 4

1. Review and approval of minutes of previous meeting
2. Review of work progress since previous meeting
3. Field observations, problems, conflicts, which impede work progress or access
4. Review requests for information
5. Review proposed changes
6. Status of submittals
7. Safety observations
8. Inspections in connection with work and coordination
9. Scheduled work for the next three weeks
10. Other business

CONSTRUCTION PROGRESS MEETING NO. 4
LLNL Site 300 - Pit 6 Landfill Closure
9:00 a.m. - July 2, 1997

---

1. REVIEW AND APPROVAL OF MINUTES OF PREVIOUS MEETING: - Approved

2. REVIEW OF WORK PROGRESS SINCE PREVIOUS MEETING:

2.1. Subgrade
Jeff Brown summarized the progress for the construction period June 26 through July 2,1997. He stated that the subgrade was finished and that it had been CQA surveyed by the in house LLNL surveyors.

2.2 Clearing and grubbing of borrow
Jeff Brown stated that the clearing and grubbing of the borrow area had been completed on Thursday, June 26.

2.3 Fill
General fill is being placed and compacted within the landfill and on the north berm. Jeff Brown anticipates that this operation may be complete as soon as Monday, July 7, 1997.

2.4 Geogrid
Envirocon is currently placing the second layer of geogrid and the third layer should be completed by July 3, 1997. Harry Benstead stated that he has left a message for the LLNL surveyor to survey the limits of the third layer.

3. FIELD OBSERVATIONS, PROBLEMS, CONFLICTS, WHICH IMPEDE WORK PROGRESS OR ACCESS:

3.1 Concrete Plans and Specifications
Harry Benstead asked when Golder would have the revised plans and specifications completed so that they would be available to Envirocon's potential subcontractors. Envirocon had asked Golder to revise the concrete specifications so that they would be more applicable to ditch concrete work and not structural concrete. Ken Obenauf stated that the sections that would be reviewed would be sections 3100, 3200, 3300. The specifications would written to model the Caltrans specifications for sidewalks, gutters and ditches. Ken Obenauf stated that he would try to get the revised specification approved through Golder by today. Jeff Brown stated that Chalmers and Strange (a contractor which has worked and is currently working at site 200) would not bid the project due to the specifications. Gennie McPeak offered to look up the names of other concrete contractors who have work at site 300 for Jeff Brown's information.

Jeff Brown asked when the detail drawings for the two additional transition ditches and culvert would be finished. Ken Obenauf stated that he would press Barry MacDonell to get these completed as soon as possible. Jeff Brown stated that for the purpose of hiring a subcontractor for the concrete work, these drawings are very important and he needs them as soon as possible.

4. REVIEW REQUESTS FOR INFORMATION:

4.1 RFI's 4, 5, 6, 7

Answers to RFI's 4, 5, 6, 7 were addressed in a letter from Golder Associates to Harry Benstead dated June 30, 1997. (see attached letter) Ken Obenauf also stated that item 6B was incorrect and that the direct shear test should be run on the Gundseal/Geocomposite interface and not the Gundseal/soil interface.

5. REVIEW PROPOSED CHANGES: None to review.

6. STATUS OF SUBMITTALS:

6.1 Geotextile -

The textile to be used for the drainage system and not that used for the landfill cover is being reviewed by Golder. Ken Obenauf commented that the Evergreen Technologies' submittal indicated that the thickness of their material would meet 85 mils, however the specification require 95 mils. This should not be an issue since the proposed rolls that will be delivered were QC tested and the results were well above the required minimum, 129 mils. Ken also stated that the more important test for this material was the apparent opening size. In conclusion, he stated that he would get a letter out by today to accept the material, as is, but it should be noted that the delivered rolls will be conformance tested.

6.2 SWPPP -

This has been resubmitted with the inclusion of a run off coefficient. Envirocon is waiting for the approval by LLNL.

6.3 Other -

Envirocon will submit as soon as Monday, the GSE Gundseal material. Jeff Brown stated that the Gundseal material would be shipped Monday and should be here Friday. Rick Kiel asked if the material had to be shipped to another location to have the bentonite applied. Jeff stated that he didn't know, but that he would call GSE after the meeting to find out. If it doesn't have to be shipped somewhere else, Rick Kiel stated that GCS has an office in Houston that could do the conformance sampling before it's shipped. This would eliminate waiting for conformance test results after the material arrives on site. If this isn't possible, the approximate turn around time for conformance test results is two days.

7. SAFETY OBSERVATIONS:

7.1 Dust Control

Kevin Braun of Earth Safety Dynamics stated that he is testing for respirable dust. Test results indicated that levels of dust have been within tolerance. Envirocon will continue to monitor dust levels with mini rams.

7.2 Health and Safety Plan

It was noted that there have been some revisions of the plan and that copies of the Health and Safety Plan must be obtained through Harry Benstead. In addition to the Health and Safety Plan, Tom Berry requested a copy of the notes of a typical morning Safety Meeting. Kevin Braun stated that he could give him a copy. Tom Berry also stated that there would be a safety audit in early September.

8. INSPECTIONS IN CONNECTION WITH WORK AND COORDINATION:

8.1 Soils testing

Nancy Evans stated that all nuclear density testing of the in place general fill has met or exceed the minimum requirements for compaction. Tom Berry asked when testing was being conducted. Nancy stated that she prefers to conduct testing when machinery is not running in the area, but that this is not always be possible.

9. SCHEDULED WORK FOR THE NEXT THREE WEEKS:

9.1. **Geogrid installation** - Finish by July 3, 1997.
9.2 **Compacted fill** - Finish by July 7, 1997.
9.3 **Clearing of borrow** - Should be finished by end of week, June 27, 1997.
9.4 **Gundseal installation** - Scheduled to start July 14, 1997. 10 days to install.
9.5 **Anchor trench** - Install approximately July 9, 1997.
9.6 **Other** - Approximately 1 week behind schedule. Work schedule has increased to 10 hour days

10. OTHER BUSINESS:

The schedule was revised by Jeff Brown and Harry Benstead. Tom Berry stated that he didn't have a copy of the revised. Harry Benstead stated that he had faxed him a copy yesterday.

Tom Berry asked Ken Obenauf if he had looked any further into changing the hydroseed mix . Ken stated that he hadn't, but he would investigate this further.

MINUTES OF PROGRESS MEETING NO. 5
LLNL SITE 300 - PIT 6 LANDFILL CLOSURE

Date: July 9, 1997

Time: 9:00 a.m. to 9:45 a.m.

Location: LLNL, Site 300, Pit 6 Construction Trailer

Purpose: Discuss progress to date and resolve any problems with regard to construction schedule, safety, quality assurance, and contractual issues related to construction of the landfill closure.

Attendees:

Harry Benstead	LLNL
Jeffery Brown	Envirocon
Kevin Braun	Earth Safety Dynamics
Gennie McPeak	LLNL
Nancy Evans	GCS
Ken Haskell	Golder Associates
Tom Berry	Weiss Associates
Cal Dibble	LLNL

AGENDA: The following agenda was followed during Progress Meeting No. 5

1. Review and approval of minutes of previous meeting
2. Review of work progress since previous meeting
3. Field observations, problems, conflicts, which impede work progress or access
4. Review requests for information
5. Review proposed changes
6. Status of submittals
7. Safety observations
8. Inspections in connection with work and coordination
9. Scheduled work for the next three weeks
10. Other business

CONSTRUCTION PROGRESS MEETING NO. 5

LLNL Site 300 - Pit 6 Landfill Closure
9:00 a.m. - July 9, 1997

---

1. **REVIEW AND APPROVAL OF MINUTES OF PREVIOUS MEETING:** - Approved

2. **REVIEW OF WORK PROGRESS SINCE PREVIOUS MEETING:**

2.1. Geogrid

Jeff Brown summarized the progress for the construction period July 3 through July 9,1997. He stated that the geogrid installation was finished on July 3, 1997 and that it had been CQA surveyed by the in house LLNL surveyors.

2.2 General Fill

Jeff Brown stated that by the end of the day, the general fill placement should be finished.

2.3 Geotextile

The geotextile used for the subdrains arrived at LLNL receiving yesterday and will have to be brought up to the site. General fill is being placed and compacted within the landfill and on the north berm. Jeff Brown anticipates that this operation may be complete as soon as Monday, July 7, 1997.

2.4 GundSeal

GSE shipped the GundSeal material on July 8, 1997 from South Dakota. Three truck loads should be here July 10. GSE stated that their personnel would be on site Thursday. It was noted by Harry Benstead that their superintendent had been here on Monday and that he was not a U.S. citizen, so therefore he would not be able to work on the site. GSE has also not presented their submittals including QC certification of the rolls shipped.

3. **FIELD OBSERVATIONS, PROBLEMS, CONFLICTS, WHICH IMPEDE WORK PROGRESS OR ACCESS:** None

4. **REVIEW REQUESTS FOR INFORMATION:**

Harry Benstead stated that RFI's 1 through 7 have been received and answered.

5. **REVIEW PROPOSED CHANGES:**

5.1 Concrete Specifications and Detail drawings

Envirocon received the revised specification and detail drawings on July 7, 1997. The specifications were modeled by Golder Associates towards Caltrans specifications. Jeff Brown stated that he has received one bid that was excessively high, but he was optimistic that others would bid with the new revised specifications.

6. **STATUS OF SUBMITTALS:**

6.1 Geotextile submittal #6

The Evergreen 8 once geotextile submitted by Tensar was approved by Golder.

6.2 GundSeal

Envirocon is waiting for a submittal from GSE. It has been promised by tomorrow July 10, 1997. Jeff Brown stated that if GSE choose to install the GundSeal material, it will be at their risk and cost if the material does not meet the specifications. He will have GSE sign a letter to this effect.

6.3 Geocomposite

Envirocon is waiting on a submittal from GSE.

6.4 HDPE pipe and CMP

Jeff Brown stated that he would follow though with ordering and getting submittals for the pipe.

6.5 SWPPP

This has been resubmitted, Envirocon is waiting for the approval by LLNL.

7. SAFETY OBSERVATIONS:

Harry Benstead commented that Bob Jenkins, LLNL's safety representative was on site and noted that the stairs to the construction trailer were placed too low to the bottom of the door. Jeff Brown stated that he would have this fixed as soon as possible. Kevin Braun of Earth Safety Dynamics stated that respirable dust seems to be under control. He stated that this would be his final day on site and that he might be out occasionally to make spot checks. He also stated that he would have his site safety report out by the end of the week. Jeff Brown stated that in Kevin's absence, he would assume the responsibility of the Health and Safety officer.

8. INSPECTIONS IN CONNECTION WITH WORK AND COORDINATION:

8.1 Survey of General Fill

Harry Benstead stated that he would contact the LLNL on site surveyors today to conduct the CQA survey of the landfill general fill cover.

8.2 Nuclear Density Testing

Nancy Evans stated that all nuclear density testing of the in place general fill has met or exceed the minimum requirements for compaction. The first and second lifts are complete. The third and fourth lifts are in progress.

9. SCHEDULED WORK FOR THE NEXT THREE WEEKS:

9.1. **General Fill** - Finish by July 9, 1997.

9.2 **Compacted fill** - Finish by July 7, 1997.

9.4 **GundSeal installation** - Scheduled to be complete by the end of next week depending on size of crew and wind.

9.5 **Subdrains** - Start excavation July 8, 1997 and install approximately July 23, 1997.

9.6 **Concrete** - Envirocon is working on obtaining a subcontractor. Excavating and regrading of areas will begin July 10, 1997.

9.7 **Vegetative Cover** - When GSE is complete with installation of the geocomposite.

9.8 **Other** - Jeff Brown anticipates that Envirocon should complete the project 3 weeks early.

10. **OTHER BUSINESS:**

Harry Benstead asked Ken Haskell if Golder has had a chance to look at the hydroseeding specifications and to determine if the mix and conditions warrant any changes. After a bit of discussion, Cal Dibble stated that Envirocon need not worry about whether or not the hydroseeding would blow away or if it would die. He stated that further construction in the area would be taking place and it would be disturbed. The area would have to be re-hydroseeded after the next phase. He also noted that the soil has a tendency to re-seed itself within a year and that is the reason why LLNL is constantly doing controlled burning.

Tom Berry stated that DTSC will be visiting the site July 17, 1997 at 9:30 a.m.. He also stated that DOE was invited to visit the site and that they are anticipated to accept the invitation. Harry Benstead noted that LLNL site management will be visiting the site July 11, 1997 at 10:30 a.m..

Tom Berry stated that Contained Firing Facility has begun at the main area of site 300 and that the water trucks should be careful with the additional traffic. He also noted that a drill rig will be at the Pit 6 area during the week of the 23rd.

Cal Dibble stated that the site 300 fire station is pleased with the use of the water, because it flushes out the lines which have a tendency to sit for long periods of time and become unpalatable.

MINUTES OF PROGRESS MEETING NO. 6
LLNL SITE 300 - PIT 6 LANDFILL CLOSURE

Date: July 16, 1997

Time: 9:00 a.m. to 9:30 a.m.

Location: LLNL, Site 300, Pit 6 Construction Trailer

Purpose: Discuss progress to date and resolve any problems with regard to construction schedule, safety, quality assurance, and contractual issues related to construction of the landfill closure.

Attendees:

Harry Benstead	LLNL
Jeffery Brown	Envirocon
Kevin Braun	Earth Safety Dynamics
Gennie McPeak	LLNL
Nancy Evans	GCS
Rick Kiel	GCS
Ken Haskell	Golder Associates
Tom Berry	Weiss Associates
Cal Dibble	LLNL
Sue Miller	LLNL
Dave Littlefield	LLNL

AGENDA: The following agenda was followed during Progress Meeting No. 6

1. Review of work progress since previous meeting
2. Field observations, problems, conflicts, which impede work progress or access
3. Review requests for information
4. Review proposed changes
5. Status of submittals
6. Safety observations
7. Inspections in connection with work and coordination
8. Scheduled work for the next three weeks
9. Other business

CONSTRUCTION PROGRESS MEETING NO. 6
LLNL Site 300 - Pit 6 Landfill Closure
9:00 a.m. - July 16, 1997

---

1. REVIEW OF WORK PROGRESS SINCE PREVIOUS MEETING:

1.1. General Fill
Jeff Brown summarized the progress for the construction period July 10 through July 16, 1997. The landfill cover general fill is complete. Envirocon proceeded at their own risk without confirmation of a re-survey of the general fill.

1.2 Diversion Ditch
Jeff Brown stated that the area soil to the north of the landfill was too soft when putting in the ditch, so Envirocon reworked and compacted the soil. The soil portion of the ditch will be complete today.

1.3 Anchor Trench
Envirocon completed the excavation of the anchor trench except for the southeast corner.

1.4 Stockpiling of Vegetative Cover
Envirocon completed the stockpiling of the vegetative cover in the borrow area and are in the process of regrading the borrow area.

1.5 GundSeal
GSE began installation of the GundSeal material on July 15, 1997 without confirmation of conformance testing. Approximately 30,000 square feet were installed yesterday.

1.6 Geocomposite
The geocomposite arrived on site July 15, 1997.

2. FIELD OBSERVATIONS, PROBLEMS, CONFLICTS, WHICH IMPEDE WORK PROGRESS OR ACCESS:

2.1 GundSeal Submittal
Portions of GSE's submittal have not been received. A list of items that are still required for a complete submittal were given to GSE.

2.2 GundSeal Conformance Testing
Conformance tests are in progress for the GSE GundSeal material. Carbon Black Dispersion failed for one conformance test. The specifications called for an A1 or A2, however, sample #1106 was A3. The testing lab is running a retest. Results should be available today.

3. REVIEW REQUESTS FOR INFORMATION: - None

4. REVIEW PROPOSED CHANGES:
There have not been any changes, but Jeff Brown is currently writing one for the additional concrete work. Jeff Brown stated he is still having problems finding a subcontractor for the concrete work.

5. STATUS OF SUBMITTALS:

5.1 GundSeal
The submittal for the GundSeal material is being held until further information is provided by GSE.

5.2 Geocomposite
Envirocon received the geocomposite submittal from GSE. It is currently being reviewed.

5.3 HDPE pipe and CMP
Jeff Brown stated that he still didn't have any submittals for the HDPE pipe or the CMP. He will try to get these materials approved as soon as possible.

6. SAFETY OBSERVATIONS:

Jeff Brown stated that there have been no incidents and no one has been hurt. Bob Jenkins, LLNL's safety representative noted that the stairs to the construction trailer had been fixed.

7. INSPECTIONS IN CONNECTION WITH WORK AND COORDINATION:

7.1 CQA Re-survey of General Fill
Harry Benstead stated that he had been trying to get the LLNL surveyors on site since July 11, 1997 to re-survey the corrected compacted fill of the landfill cover. Cal Dibble said that he could contact them if necessary and put priority on this project.

7.2 Conformance Testing
Conformance testing for the GundSeal is in progress. Final results should be available today. The geotextile and geocomposite conformance testing is in progress. Results should be available in a day or two.

7.3 Destructive Samples
Destructive samples of the HDPE welding are being marked approximately every 500 feet and will be tested on site.

8. SCHEDULED WORK FOR THE NEXT THREE WEEKS:

8.1. Diversion ditch - This should be complete by July 18, or July 21, 1997.
8.2 GundSeal installation - Estimate completion on July 18, 1997.
8.3 Geocomposite installation - Should be complete by July 22, 1997.
8.4 Subdrains - Start approximately July 23, 1997, after geocomposite installation.
8.5 Vegetative cover - Envirocon has this stockpiled in the borrow.
8.6 Concrete - Jeff Brown stated that this would be done on schedule

9. OTHER BUSINESS:

Tom Berry stated that there would be several tours of Pit 6, Site 300 in the next week or two. He stated that DTSC and DOE would be on site July 17, 1997 between 9:00 and 11:00 to see the construction progress. Tom Berry also noted that DOE would be on site again July 25, 1997.

MINUTES OF PROGRESS MEETING NO. 7
LLNL SITE 300 - PIT 6 LANDFILL CLOSURE

Date: July 23, 1997

Time: 9:00 a.m. to 9:45 a.m.

Location: LLNL, Site 300, Pit 6 Construction Trailer

Purpose: Discuss progress to date and resolve any problems with regard to construction schedule, safety, quality assurance, and contractual issues related to construction of the landfill closure.

Attendees:

Harry Benstead	LLNL
Jeffery Brown	Envirocon
Nancy Evans	GCS
Rick Kiel	GCS
Ken Haskell	Golder Associates
Cal Dibble	LLNL
Dave Littlefield	LLNL
Mel Villegas	LLNL
Howard Myers	GSE

AGENDA: The following agenda was followed during Progress Meeting No. 7

1. Review of work progress since previous meeting
2. Field observations, problems, conflicts, which impede work progress or access
3. Review requests for information
4. Review proposed changes
5. Status of submittals
6. Safety observations
7. Inspections in connection with work and coordination
8. Scheduled work for the next three weeks
9. Other business

CONSTRUCTION PROGRESS MEETING NO. 7
LLNL Site 300 - Pit 6 Landfill Closure
9:00 a.m. - July 23, 1997

---

1. REVIEW OF WORK PROGRESS SINCE PREVIOUS MEETING:

1.1 Diversion Ditch
Jeff Brown stated that the diversion ditch is two thirds complete and the plunge pool has been excavated. Envirocon is waiting on additional geotextile to be delivered.

1.2 GundSeal Installation
Howard Meyers of GSE summarized the progress. He stated that the GundSeal installation was completed on July 22, 1997.

1.3 Geocomposite Installation
Howard Meyers stated that GSE is currently installing the geocomposite over the GundSeal and that this operation should be complete by July 24, 1997.

1.4 Other
Envirocon is placing the remainder of the fill in the north anchor trench and the north berm.

2. FIELD OBSERVATIONS, PROBLEMS, CONFLICTS, WHICH IMPEDE WORK PROGRESS OR ACCESS:

2.1 Trapezoidal ditch
Jeff Brown stated that he thought that the intent of the trapezoidal ditch to the south of the landfill was to run along the toe of the slope, but when it was laid out it was approximately 12 feet from the toe of the slope. Jeff stated that he would like to get together with Ken Haskell of Golder after the meeting to find a resolution to this problem.

2.2 Surveying
Cal Dibble apologized on behalf of the surveyors for not getting back to Harry Benstead for over a week. The LLNL surveyors were at a convention.

3. REVIEW REQUESTS FOR INFORMATION: - None

4. REVIEW PROPOSED CHANGES: - None

5. STATUS OF SUBMITTALS:

5.1 GundSeal
The submittal for the GundSeal material is being held until further information is provided by GSE.

5.2 Geocomposite
The submittal for the Geocomposite material is being held until further information is provided by GSE.

5.3 HDPE pipe and CMP

Jeff Brown stated that he asked Ken Haskell if it would be acceptable to use SDR 17 HDPE pipe instead of SDR 26 pipe. Ken had approved this request due to the SDR 17 HDPE pipe being a better pipe. Envirocon is currently working on getting a submittal for the HDPE pipe and the CMP.

6. SAFETY OBSERVATIONS:

Jeff Brown stated that there have been no incidents and no one has been hurt.

7. INSPECTIONS IN CONNECTION WITH WORK AND COORDINATION:

7.1 CQA Re-survey of General Fill

Harry Benstead stated that the re-survey is complete and that it is being colorized. Jeff Brown asked if the survey could be reviewed without waiting for it to be colorized. Harry stated that he would get these copies.

7.2 Conformance Testing

Conformance is complete except for a geocomposite peel adhesion test. Nancy Evans stated that a retest was ordered and that this result should be available by the end of the day.

7.3 Destructive Samples

Nancy Evans stated that 13 fusion welded destructive samples and 3 of the extrusion welded samples were tested for peel and shear. All samples passed. Seams were also air pressure tested and vacuum tested. All testing of the GundSeal is complete.

8. SCHEDULED WORK FOR THE NEXT THREE WEEKS:

8.1. **Diversion ditch** - Waiting on geotextile to finish, should be here by July 29, 1997.

8.2 **Geocomposite installation** - Complete by July 24, or first thing July 25, 1997.

8.3 **Subdrains** - The HDPE pipe will be here July 24, 1997. It required custom drilling. Cal Dibble asked why the pipe required custom drilling. Jeff Brown stated that his supplier was Harrington Plastics and this was not a common perforation on stock. Ken Haskell stated that the holes were set and machined drilled and that it shouldn't require any additional time to manufacture. Jeff commented that he had used corrugated pipe that had come pre-fabbed with a textile sock. Cal stated that he would look into this for further projects.

8.4 **Roads** - The surveyors will be out tomorrow between 7:30 and 8:00 a.m. to establish control for the roads.

8.5 **Vegetative cover** - Envirocon will place after GSE is finished installing the geocomposite.

8.6 **Concrete** - Jeff Brown stated he is still in the process of finding a subcontractor.

9. OTHER BUSINESS:

Cal Dibble stated that Tom Berry would like to see monuments installed at the corners of the landfill. The as-built GundSeal drawings will establish the limits of the geosynthetic liner system. Cal Dibble also told GCS that Tom Berry would be looking for the red line surveys and the finial surveys as soon as possible.

Cal Dibble also asked if the site had a security visit today. Harry Benstead stated that the security team had been on site first thing this morning. Cal noted that anyone caught with alcohol or any unpermitted item on site would be fired, no excuses.

MINUTES OF PROGRESS MEETING NO. 8
LLNL SITE 300 - PIT 6 LANDFILL CLOSURE

Date: July 30, 1997

Time: 9:00 a.m. to 9:30 a.m.

Location: LLNL, Site 300, Pit 6 Construction Trailer

Purpose: Discuss progress to date and resolve any problems with regard to construction schedule, safety, quality assurance, and contractual issues related to construction of the landfill closure.

Attendees:

Harry Benstead	LLNL
Jeffery Brown	Envirocon
Nancy Evans	GCS
Ken Haskell	Golder Associates
Cal Dibble	LLNL
Gennie McPeak	LLNL
Tom Berry	Weiss Associates

AGENDA: The following agenda was followed during Progress Meeting No. 8

1. Review of work progress since previous meeting
2. Field observations, problems, conflicts, which impede work progress or access
3. Review requests for information
4. Review proposed changes
5. Status of submittals
6. Safety observations
7. Inspections in connection with work and coordination
8. Scheduled work for the next three weeks
9. Other business

CONSTRUCTION PROGRESS MEETING NO. 8
LLNL Site 300 - Pit 6 Landfill Closure
9:00 a.m. - July 30, 1997

---

1. REVIEW OF WORK PROGRESS SINCE PREVIOUS MEETING:

1.1 Geocomposite Installation
Harry Benstead noted that this was completed the morning of July 25, 1997.

1.2 Vegetative Cover
It was incorrectly stated at the meeting that the vegetative cover placement started on July 29, 1997. The actual start date of this operation was July 25, 1997.

2. FIELD OBSERVATIONS, PROBLEMS, CONFLICTS, WHICH IMPEDE WORK PROGRESS OR ACCESS:

2.1 Concrete
Jeff Brown stated that Envirocon is in that process of hiring a subcontractor for concrete. He also stated that they are proposing to use shotcrete instead of concrete. The difference between shotcrete and concrete is mainly in the application. Shotcrete is sprayed on, where as concrete is cased. Shotcrete exceeds class II concrete strength which is called for in the specifications. Another difference is that the specification for the wing walls use course aggregate (3/4") and shotcrete uses 3/8" aggregate. Jeff Brown noted that in addition to expansion joints placed every 20 feet there will also be tooled crack control joints placed at intervals of 10 feet between the expansion joints. Cal Dibble asked what the warranty of the shotcrete would be. Jeff Brown stated that it would be the same as what is called for with the concrete, which is 1 year. Cal Dibble asked if this would be an adequate amount of time to determine if the shotcrete job was done correctly and if it would stand up to the site conditions. Ken Haskell stated that a period of a year, which would cover a seasonal cycle of drying and hydration would be sufficient to see if the shotcrete would stand up to cracking and degradation. Cal Dibble asked if there would be any impact on schedule. Jeff Brown stated that there wouldn't be any effect on the schedule.

2.2 Geotextile
Envirocon is currently waiting for additional geotextile to arrive on site,so that they can finish the diversion ditch and they can start the subdrains. Tensar promised that the additional geotexile would be delivered by July 29, 1997 and it still isn't here.

3. REVIEW REQUESTS FOR INFORMATION: - None

4. REVIEW PROPOSED CHANGES:
Jeff Brown stated that he is currently working on two changes; one for the additional concrete changes and one for additional hydration of site soils for placement. Tom Berry asked when he would see a copy of the proposed changes. Harry Benstead stated that it would be after all the paperwork was finished and after it went through the proper channels to see if it was a valid claim. Jeff Brown stated that no change order has been submitted yet, but one will be in the works for the additional CMP and the two headwalls. It was noted that the hydration of the soils would be an additional claim and not a change order item.

5. STATUS OF SUBMITTALS:

5.1 GundSeal

The submittal for the GundSeal material is being held until further information is provided by GSE. Nancy Evans stated that she gave Jeff Brown a punch list of items that are still required. He is working on getting these items from GSE.

5.2 Geocomposite

The submittal for the Geocomposite material is being held until further information is provided by GSE. Jeff Brown is working on getting this information.

5.3 HDPE pipe and CMP

Jeff Brown stated that he is working on getting these submittals and should have them in the next day or two.

6. SAFETY OBSERVATIONS:

Harry Benstead stated that there have been no incidents and no one has been hurt. Cal Dibble stated the dust complaint has subsided from the next door rifle range.

7. INSPECTIONS IN CONNECTION WITH WORK AND COORDINATION:

7.1 Survey

Harry Benstead stated that the surveyor were on site July 24 and July 25, 1997. Cal Dibble asked if the surveyors were responding to our requests in a timely manner. Harry Benstead stated that there has been no further problem with getting them out on site.

7.2 Atterberg and sieve testing of vegetative cover

Nancy Evans is currently testing the vegetative cover soil for sieve and Atterberg analysis. Cal Dibble asked if GCS had followed up by writing a letter to LLNL to transfer budget expenses from one task number to another. This request was based on conducting soil testing on site by GCS instead of subcontracting the work. Nancy Evans stated that Rick Kiel would be the person to ask with regard to this question. Jennie McPeak stated that it had been done and that she had seen the paperwork.

8. SCHEDULED WORK FOR THE NEXT THREE WEEKS:

8.1. **Diversion ditch** - Complete by early next week.

8.2 **Subdrains** - The HDPE Wyes will be here July 31, 1997. Envirocon will start welding pipe tomorrow.

8.3 **Roads** - Jeff Brown stated that this would be the last item done for the project.

8.4 **Vegetative cover** - Envirocon anticipates this done by Friday, August 1, 1997.

8.5 **Concrete** - This will be done on schedule.

8.6 **Hydroseeding** - This will also be an item that will be done at the end of the job. Envirocon is in the process of finalizing a subcontractor.

9. OTHER BUSINESS:

Cal Dibble stated that DOE was extremely pleased with this project. Cal had asked that this praise be put in writing.

MINUTES OF PROGRESS MEETING NO. 9
LLNL SITE 300 - PIT 6 LANDFILL CLOSURE

Date: August 6, 1997

Time: 9:00 a.m. to 9:30 a.m.

Location: LLNL, Site 300, Pit 6 Construction Trailer

Purpose: Discuss progress to date and resolve any problems with regard to construction schedule, safety, quality assurance, and contractual issues related to construction of the landfill closure.

Attendees:

Harry Benstead	LLNL
Jeffery Brown	Envirocon
Nancy Evans	GCS
Ken Haskell	Golder Associates
Cal Dibble	LLNL
Tom Berry	Weiss Associates

AGENDA: The following agenda was followed during Progress Meeting No. 9

1. Review of work progress since previous meeting
2. Field observations, problems, conflicts, which impede work progress or access
3. Review requests for information
4. Review proposed changes
5. Status of submittals
6. Safety observations
7. Inspections in connection with work and coordination
8. Scheduled work for the next three weeks
9. Other business

CONSTRUCTION PROGRESS MEETING NO. 9
LLNL Site 300 - Pit 6 Landfill Closure
9:00 a.m. - August 6, 1997

---

1. REVIEW OF WORK PROGRESS SINCE PREVIOUS MEETING:

1.1 Vegetative Cover
Jeff Brown stated that the vegetative cover was complete except for the side slopes, which will be pushed in once the subdrains are installed.

1.2 Subdrains
The subdrains are currently being installed. This operation should be done in the next day or two according to Jeff Brown.

1.3 Concrete/Shotcrete
The shotcrete drainage ditches will be dug next week by the August 18, 1997.

2. FIELD OBSERVATIONS, PROBLEMS, CONFLICTS, WHICH IMPEDE WORK PROGRESS OR ACCESS:

2.1 Geotextile
Jeff Brown stated that even with the additional two rolls of geotextile that arrived last Friday, Envirocon came out 3,000 square feet shy of the estimated quantity of geotextile needed to complete the drainage ditches. Jeff is trying to get the geotextile locally so that the schedule won't be delayed due to shipping. The geotextile previously used was Evergreen geotextile supplied by Tensar. This last bit of geotextile will be produced by Synthetic Industries which is the same product used for the geocomposite. Cal Dibble asked if this was acceptable to Golder. Ken Haskell responded that this would not pose a problem and that this product was one of the acceptable geotextiles listed in the specifications.

3. REVIEW REQUESTS FOR INFORMATION: - None

4. REVIEW PROPOSED CHANGES:
Jeff Brown stated that he is currently working on two changes; one for the additional concrete changes and one for additional hydration of site soils for placement. Harry Benstead noted that he still has not seen any paperwork from Envirocon.

Ken Haskell asked what had been done about the approval of shotcrete for concrete. Harry Benstead stated that he had answered and approved the RFI submitted by Envirocon.

5. STATUS OF SUBMITTALS:

5.1 GundSeal
The submittal for the GundSeal material is being held until GSE provides friction angle test results and Envirocon provides the remainder of the warranty which GSE didn't provide. GSE provided a 1 year

warranty on the installation and 5 years on the materials. Envirocon will have to provide a 5 year warranty for installation and a 20 year warranty for materials as per the specifications.

5.2 Geocomposite

The submittal for the Geocomposite material is being held until further information is provided by GSE and Envirocon. This is the same information that is required for the GundSeal.

5.3 HDPE pipe and CMP

Harry Benstead faxed the CMP submittal to Barry MacDonnell and he approved it. Harry also handed the submittal of the HDPE pipe to Ken Haskell at the progress meeting. By the end of the meeting, Ken approved the submittal with the exception that Envirocon could use a thicker pipe than specified as requested by Envirocon. The contractor will use an SDR 17 pipe instead of an SDR 26 pipe.

6. SAFETY OBSERVATIONS:

Jeff Brown stated that there have been no incidents and no one has been hurt.

7. INSPECTIONS IN CONNECTION WITH WORK AND COORDINATION:

7.1 Survey

Nancy Evans previously gave Harry Benstead a list of survey prints that she needs for the final report. Harry Benstead stated that he was unable to contact the surveyors, but that he would get these to her as soon as possible.

7.2 Testing of Vegetative Cover Soil

Nancy Evans is continuing to test the vegetative cover soil as it is being placed for sieve and Atterberg analysis.

7.3 Conformance Testing of Geotextile

Nancy Evans stated that she had sent out a conformance sample of geotextile on August 4, 1997. Results should be available soon. The apparent open size test requires more time and may cause some delay.

8. SCHEDULED WORK FOR THE NEXT THREE WEEKS:

8.1. **Vegetative cover** - Complete except for side slopes which will be complete by the end of the week.

8.2 **Diversion ditch** - Will be complete once additional geotextile arrives on site.

8.3 **Subdrains** - Will be covered by August 8, 1997

8.4 **Shotcrete** - Jeff Brown stated that this may be delayed to August 18, 1997.

8.5 **Roads** - This will be the last item done.

8.6 **Hydroseeding** - Jeff Brown stated that Fast Grass would be their subcontactor and that they are in the process of finalizing their contract.

8.7 **Borrow** - Finishing grading of borrow area to drain

8.8 **V - ditch** - Start August 11, 1997.

9. **OTHER BUSINESS:**

Tom Berry asked Cal Dibble if he wanted Envirocon to stockpile soil for the next phase of construction. Cal stated that he didn't and that would be covered in the next phase of construction.

MINUTES OF PROGRESS MEETING NO. 10
LLNL SITE 300 - PIT 6 LANDFILL CLOSURE

Date: August 13, 1997

Time: 9:00 a.m. to 9:20 a.m.

Location: LLNL, Site 300, Pit 6 Construction Trailer

Purpose: Discuss progress to date and resolve any problems with regard to construction schedule, safety, quality assurance, and contractual issues related to construction of the landfill closure.

Attendees:

Harry Benstead	LLNL
Jeffery Brown	Envirocon
Nancy Evans	GCS
Rick Kiel	GCS
Ken Haskell	Golder Associates
Cal Dibble	LLNL
Tom Berry	Weiss Associates
Dave Littlefield	LLNL
Gennie McPeak	LLNL

AGENDA: The following agenda was followed during Progress Meeting No. 10

1. Review of work progress since previous meeting
2. Field observations, problems, conflicts, which impede work progress or access
3. Review requests for information
4. Review proposed changes
5. Status of submittals
6. Safety observations
7. Inspections in connection with work and coordination
8. Scheduled work for the next three weeks
9. Other business

CONSTRUCTION PROGRESS MEETING NO. 10
LLNL Site 300 - Pit 6 Landfill Closure
9:00 a.m. - August 13, 1997

---

1. REVIEW OF WORK PROGRESS SINCE PREVIOUS MEETING:

1.1 Vegetative Cover
Jeff Brown stated that the vegetative cover had been completed.

1.2 Subdrains
The subdrains are complete. Envirocon will start to dig the shotcrete lined drainage ditches today, August 13, 1997.

1.3 Borrow Area
Envirocon started regrading the borrow area today.

2. FIELD OBSERVATIONS, PROBLEMS, CONFLICTS, WHICH IMPEDE WORK PROGRESS OR ACCESS:

2.1 Geotextile
Jeff Brown stated that he is still waiting for the additional rolls of geotextile. The rolls have been shipped and should be on site any day.

3. REVIEW REQUESTS FOR INFORMATION: - None

4. REVIEW PROPOSED CHANGES:
Harry Benstead stated that he had received the official paperwork from Envirocon for their claim of additional hydration of site soils for placement. Envirocon's claim has been sent out to the appropriate LLNL personnel for review.

5. STATUS OF SUBMITTALS:

5.1 GundSeal/Geocomposite
The submittal for the GundSeal material is being held until GSE provides friction angle test results and Envirocon provides the remainder of the warranty which GSE didn't provide. GSE provided a 1 year warranty on the installation and 5 years on the materials. Envirocon will have to provide a 5 year warranty for installation and a 20 year warranty for materials as per the specifications. Jeff Brown stated that he had talked with GSE and they would be faxing the friction angle test results. Jeff also noted that he would write the extended geosynthetic materials and installation warranties for Envirocon.

5.2 Hydroseeding
Envirocon received submittal information from their subcontractor, Fast Grass today. This information will be submitted for review.

6. SAFETY OBSERVATIONS:

Jeff Brown stated that there have been no incidents and no one has been hurt.

7. INSPECTIONS IN CONNECTION WITH WORK AND COORDINATION:

7.1 Surveys

Harry Benstead noted that LLNL's survey crew are on site today to survey the final grade of the vegetative cover layer. Cal Dibble asked if the final survey would match the design grading plan for the vegetative cover. Jeff Brown stated that it would be close. Ken Haskell said that he would have to hold comment until he saw the final survey. Cal Dibble stated that the calculations for the next phase of construction would be off if the survey wasn't in substantial compliance with the design grading plan. It was also noted by Jeff Brown that he had asked for the completed survey data as soon as possible from the surveyors.

7.2 Testing of Vegetative Cover Soil

Nancy Evans stated that she would be finished testing the vegetative cover soil for sieve and Atterberg analysis by the end of the week.

8. SCHEDULED WORK FOR THE NEXT THREE WEEKS:

8.1. **Drainage system** - Complete by the end of the, August 15, 1997

8.2 **Shotcrete** - Subcontractor will begin setting forms next week. The subcontractor (Johnson Western Gunite) is currently working on another project for LLNL. This other project (801) has priority over this job as noted by Cal Dibble.

8.3 **Roads** - Envirocon will start on them early next week.

8.4 **Hydroseeding** - Jeff Brown stated that Fast Grass has been scheduled to start hydroseeding on Monday, August 18, 1997.

9. OTHER BUSINESS:

Concrete rings - Cal Dibble stated that LLNL's Plant would like the concrete rings. Some of the rings will remain on site.

Ribbon cutting ceremony - Cal Dibble stated their has been no further word on this.

SWPPP - Sandy Mathews has still not signed off on this submittal. Tom Berry will follow through with this by contacting Sandy and seeing what further items she needs.

Preliminary walk through of the site - scheduled for August 21, 1997 at 9:00 a.m.

Cal Dibble mentioned that he is still trying to get a letter from DOE, putting in writing the praise that Jim Davison gave to this project during his visit to the site.

MINUTES OF PROGRESS MEETING NO. 11
LLNL SITE 300 - PIT 6 LANDFILL CLOSURE

Date: August 20, 1997

Time: 9:00 a.m. to 9:30 a.m.

Location: LLNL, Site 300, Pit 6 Construction Trailer

Purpose: Discuss progress to date and resolve any problems with regard to construction schedule, safety, quality assurance, and contractual issues related to construction of the landfill closure.

Attendees:

Harry Benstead	LLNL
Jeffery Brown	Envirocon
Nancy Evans	GCS
Ken Haskell	Golder Associates
Cal Dibble	LLNL

AGENDA: The following agenda was followed during Progress Meeting No. 11

1. Review of work progress since previous meeting
2. Field observations, problems, conflicts, which impede work progress or access
3. Review requests for information
4. Review proposed changes
5. Status of submittals
6. Safety observations
7. Inspections in connection with work and coordination
8. Scheduled work for the next three weeks
9. Other business

CONSTRUCTION PROGRESS MEETING NO. 11
LLNL Site 300 - Pit 6 Landfill Closure
9:00 a.m. - August 20, 1997

---

1. REVIEW OF WORK PROGRESS SINCE PREVIOUS MEETING:

1.1 Drainage Ditches
Jeff Brown stated that this is on going.

1.2 Culverts
Envirocon has three more culverts to install and two more to dig.

1.3 Access Ramp
Envirocon should be done with this by noon today.

1.4 Roads
Jeff Brown stated that the road aggregate will be placed next week.

1.5 Other
Johnson Western Gunnite was on site August 19, 1997. One and one half headwalls formed. Additional rip rap arrived on site for plunge pools at north diversion ditch.

2. FIELD OBSERVATIONS, PROBLEMS, CONFLICTS, WHICH IMPEDE WORK PROGRESS OR ACCESS: - None

3. REVIEW REQUESTS FOR INFORMATION: - None

4. REVIEW PROPOSED CHANGES: - None

5. STATUS OF SUBMITTALS:

5.1 GundSeal/Geocomposite
Both submittals have been approved. Envirocon will still provide an extended materials and installation warranty as required by the specifications.

5.2 Hydroseeding
Pacific Coast Seed sent a letter to Envirocon which stated that they would use Bromus in their hydroseed mix instead of Bromyus hordeceous (also known as Blando Bromegrass). Ken Haskell reviewed the letter and approved the submittal verbally.

5.3 Shotcrete
Harry Benstead stated that he had approved this submittal.

6. SAFETY OBSERVATIONS:

Jeff Brown stated that there have been no incidents and no one has been hurt.

7. INSPECTIONS IN CONNECTION WITH WORK AND COORDINATION:

7.1 Surveys

Harry Benstead noted that the vegetative cover survey had been received on August 19, 1997. Nancy Evans stated that she had looked it over and noticed some possible high and low spots. Cal Dibble stated that Harry Benstead had made him aware of this. Nancy also stated that this may be a plotting problem caused from the cross hairs of the surveys not matching up. The surveys were provided to GCS in disk form and will be checked at the office by Golder Associates. Cal Dibble asked that Golder keeps him informed.

7.2 Shotcrete

Nancy Evans asked if there were any stipulations with acquiring CEL to come in and take cylinders of the shotcrete. Harry Benstead stated that since CEL already is a subcontractor of LLNL,they would only need a days notice.

7.3 Preliminary Walk Down

This has been scheduled for tomorrow, August 21, 1997 at 9:00 a.m. Harry Benstead stated that he would try to get in touch with Sandy Mathews to include her in the walk down.

8. SCHEDULED WORK FOR THE NEXT THREE WEEKS: - Complete by August 29, 1997

8.1. Drainage system - On going.

8.2 Shotcrete - Will begin shooting on Monday or Tuesday depending on when the form work gets done.

8.3 Roads - Envirocon will start on them on Monday, August 25, 1997.

8.4 Hydroseeding - Jeff Brown stated that Fast Grass has been rescheduled for Monday, August 25, 1997.

9. OTHER BUSINESS:

Final Walk Down - A final walk down will be scheduled sometime after the shotcrete is done. Most likely the end of next week. Cal Dibble stated that this would just be a formality and that he didn't anticipate any problems.

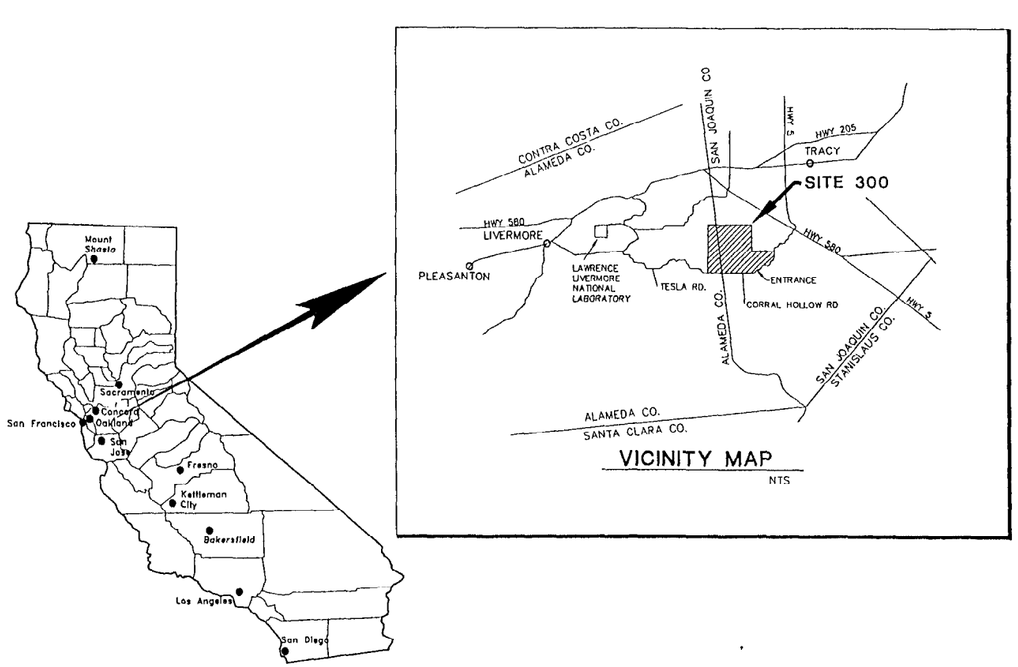
Ribbon cutting ceremony - There will be no ribbon cutting ceremony, but Jim Davison is preparing a complimentary letter covering his visit to Pit 6. Cal Dibble stated that he would get copies to everyone involved.

Appendix D

As-Built Drawings

PIT 6 LANDFILL CLOSURE

LAWRENCE LIVERMORE NATIONAL LABORATORY
SITE 300



VICINITY MAP
NTS

LOCATION MAP

DRAWING NO.	TITLE
1	COVER SHEET
2	OVERALL LAYOUT PLAN
3	EXISTING TOPOGRAPHY
4	FIRING RANGE DEMOLITION PLAN
5	SUBGRADE GRADING PLAN
6	GEOGRID LAYOUT PLAN
7	GENERAL FILL GRADING PLAN
8	VEGETATIVE COVER GRADING PLAN
9	TYPICAL CROSS SECTIONS
10	MISCELLANEOUS DETAILS
11	COVER DETAILS AND NOTES
12	SURFACE WATER CONTROL PLAN
13	SUBDRAIN CONTROL PLAN
14A	SURFACE WATER CONTROL DETAILS
14B	SURFACE WATER CONTROL DETAILS
14C	SURFACE WATER CONTROL DETAILS
14D	SURFACE WATER CONTROL DETAILS
15	BORROW AREA 1 GRADING PLAN AND SECTION
16	AS-BUILT HDPE PANEL LAYOUT
17	FINAL SURVEY

LLNL DRAWING ID: PBZ 97-300-0170

AS-BUILT ISSUE	DATE OCTOBER 30, 1997	DRAWING NO.	1
PE/A	D. LITTLEFIELD	DATE	1/10/97
SL/GL	D. LING	DATE	1/17/97
SECURITY	P. BAKER	DATE	1/14/97
M/O	L. PAUKERT	DATE	1/22/97
H.C.	J. FORTE	DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.	
DES BY	BAM		
DR BY	DVR		
CHK BY	KGH		
RVW BY	KBO		
SCALE:	AS SHOWN		

Golder Associates

PROJECT NO.: 903-7108 TASK NO.: 411

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: COVER SHEET

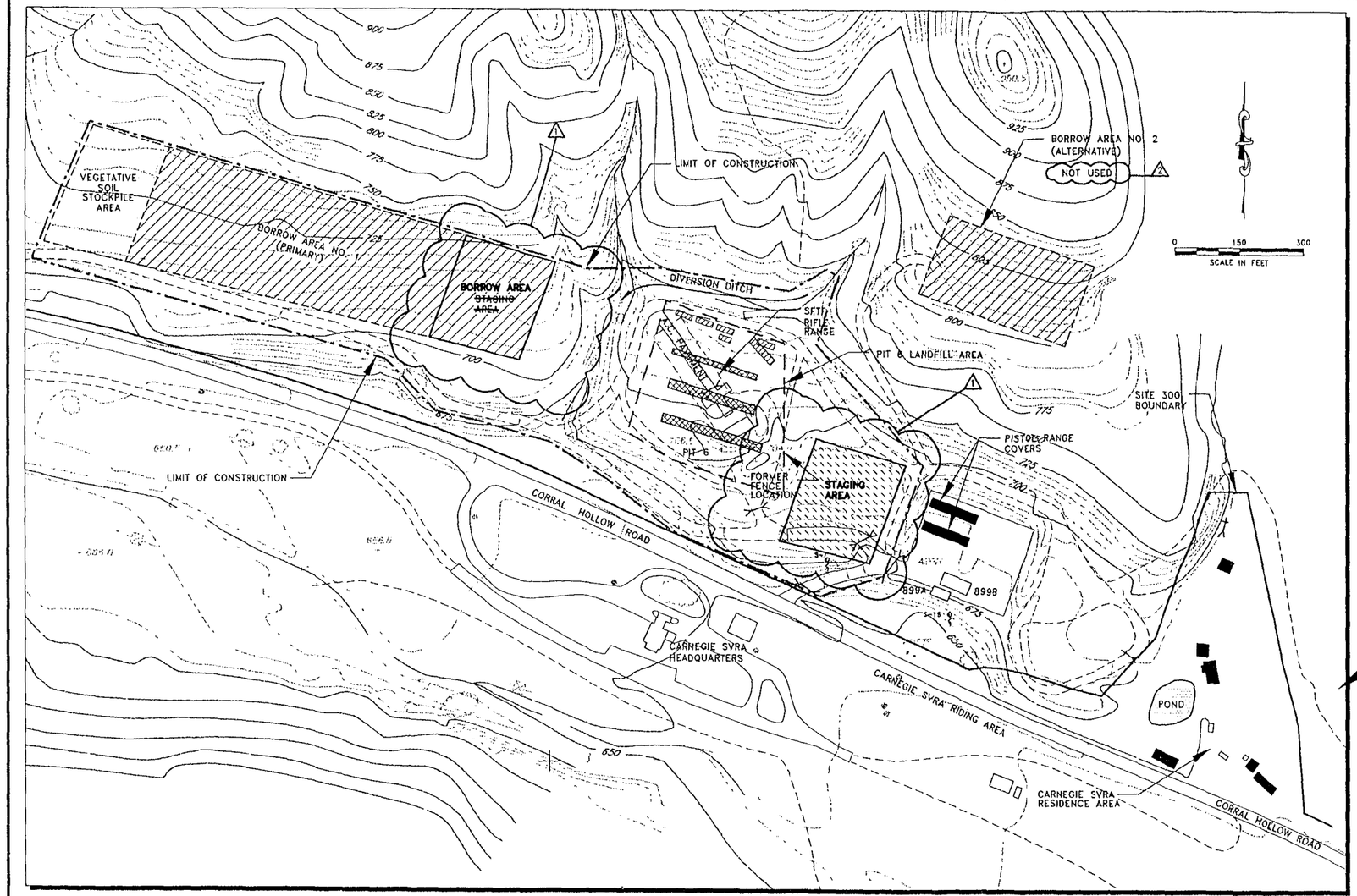
LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

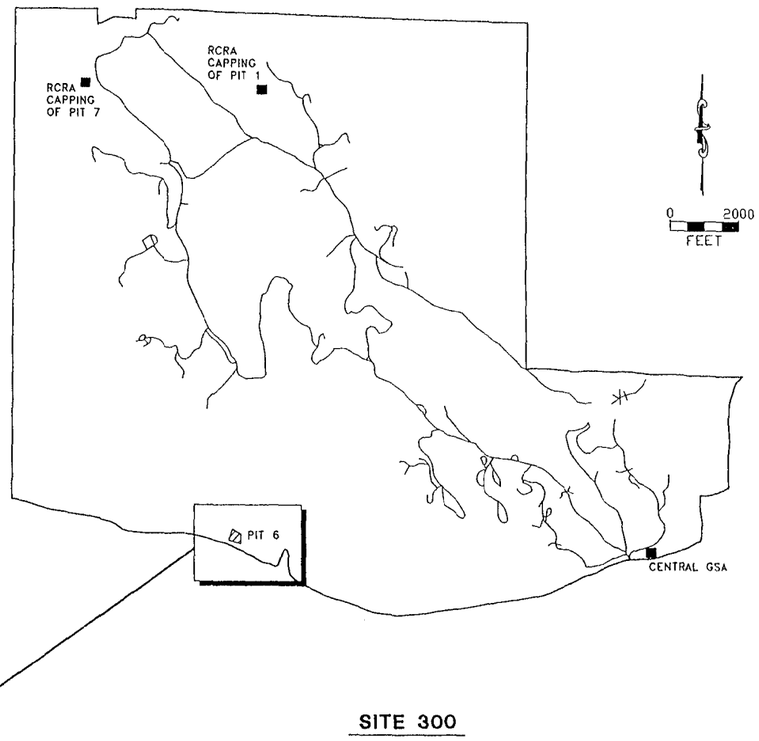
SHEET: 1 OF 20

DRAWING NO. 1

PLOT SCALE 1:200

PLOT ID: 1443-7108\002\5143 10-28-97 10:24





SITE 300

LEGEND:

- S-15 — INTERMITTENT SPRING
- BUILDING
- TRAILER OR CANOPY
- PAVED ROAD
- UNPAVED ROAD
- CULVERT
- ADIT, INACCESSIBLE
- APPROXIMATE LOCATIONS OF SOLID WASTE DISPOSAL TRENCHES
- APPROXIMATE LOCATIONS OF ANIMAL BURIAL PITS
- BORROW AREAS
- VEGETATIVE SOIL STOCKPILE AREA
- CONTRACTOR STAGING AREA
- LIMIT OF CONSTRUCTION

NOTES:

1) FINAL GRADE OF THE BORROW AREA SHALL HAVE A MINIMUM OF 3% SLOPE ON THE FLOOR FOR POSITIVE DRAINAGE AND A MAXIMUM OF 3:1 SIDE SLOPE.
2) ALL DISTURBED AREAS TO BE RE-VEGETATED.

AS-BUILT NOTES:

1 BORROW AREA AND STAGING AREA LOCATIONS MODIFIED AS SHOWN.
2 BORROW AREA NO. 2 NOT USED.

REGISTERED PROFESSIONAL ENGINEER RICHARD E. KITTLER No. 047477 CIVIL STATE OF CALIFORNIA

LLNL DRAWING ID: PSZ 97-300-018D

AS-BUILT ISSUE	DATE: OCTOBER 30, 1997	DRAWING NO.	2
PE/A	D. LITTLEFIELD	DATE	1/18/97
SL/GL	D. LING	DATE	1/17/97
SECURITY	P. BAKER	DATE	1/14/97
W/O	L. PAUKERT	DATE	1/22/97
H.C.	J. FORTE	DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.	
DES BY	BAM		
DR BY	DVR		
CHK BY	KGH		
RVW BY	KSO		
SCALE:	AS SHOWN		

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

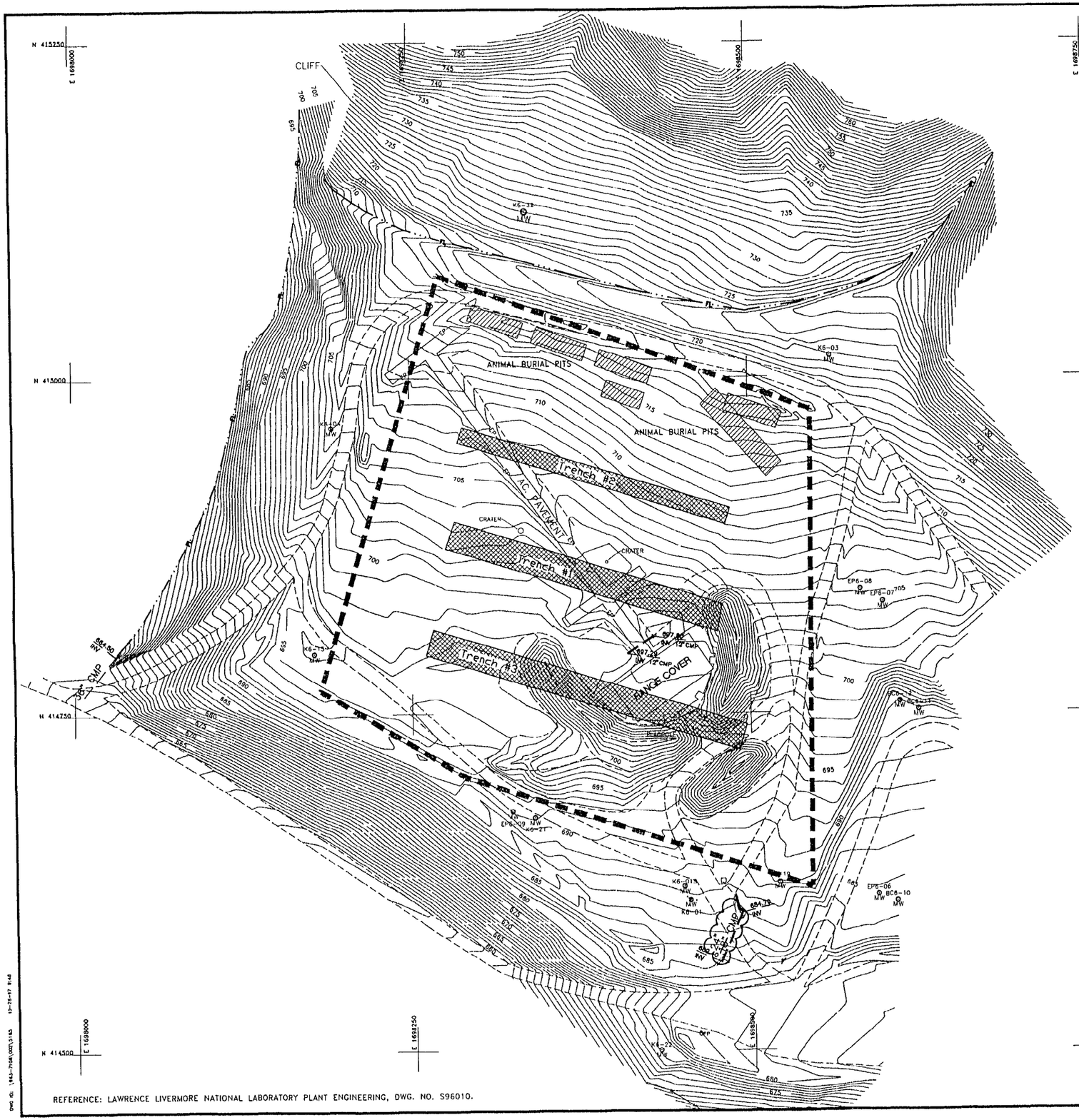
PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: OVERALL LAYOUT PLAN

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 2 OF 20	
DRAWING NO.	REV.
2	0

DWG ID: \963-7108\002\5164 10-28-97 9:11



LEGEND:

- APPROXIMATE LOCATION OF ANIMAL BURIAL PITS
- APPROXIMATE LOCATION OF SOLID WASTE DISPOSAL TRENCHES
- 705 — GROUND ELEVATION CONTOURS IN FEET, MSL
- FORMER FENCE LINE
- EXISTING DRAINAGE
- EXISTING DIRT ROAD
- BC6-10 MW — EXISTING MONITORING WELLS

NOTES:

1) TOPOGRAPHY SUPPLIED BY LAWRENCE LIVERMORE NATIONAL LABORATORY. DRAWING NO. S96010. COORDINATES ARE BASED ON SITE 300-SPECIFIC GRID SYSTEM.
2) LOCATION OF MW K6-32 IS APPROXIMATE.

0 40 80
SCALE IN FEET

REFERENCE: LAWRENCE LIVERMORE NATIONAL LABORATORY PLANT ENGINEERING, DWG. NO. S96010.

DWG ID: \163-7108\002\5163 12-26-97 R=8

LLNL DRAWING ID: PSZ 97-300-0190

AS-BUILT ISSUE	DATE	OCTOBER 30, 1997		DRAWING NO.	3
PE/A	D. LITTLEFIELD			DATE	1/18/97
SL/GL	D. LING			DATE	1/17/97
SECURITY	P. BAKER			DATE	1/14/97
M/O	L. PAUKERT			DATE	1/22/97
H.C.	J. FORTE			DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.			
DES BY	BAM				
DR BY	DVR				
CHK BY	KGH				
RVW BY	KSO				
SCALE:	AS SHOWN				

REGISTERED PROFESSIONAL ENGINEER RICHARD E. KYLE 47471 CIVIL STATE OF CALIFORNIA

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

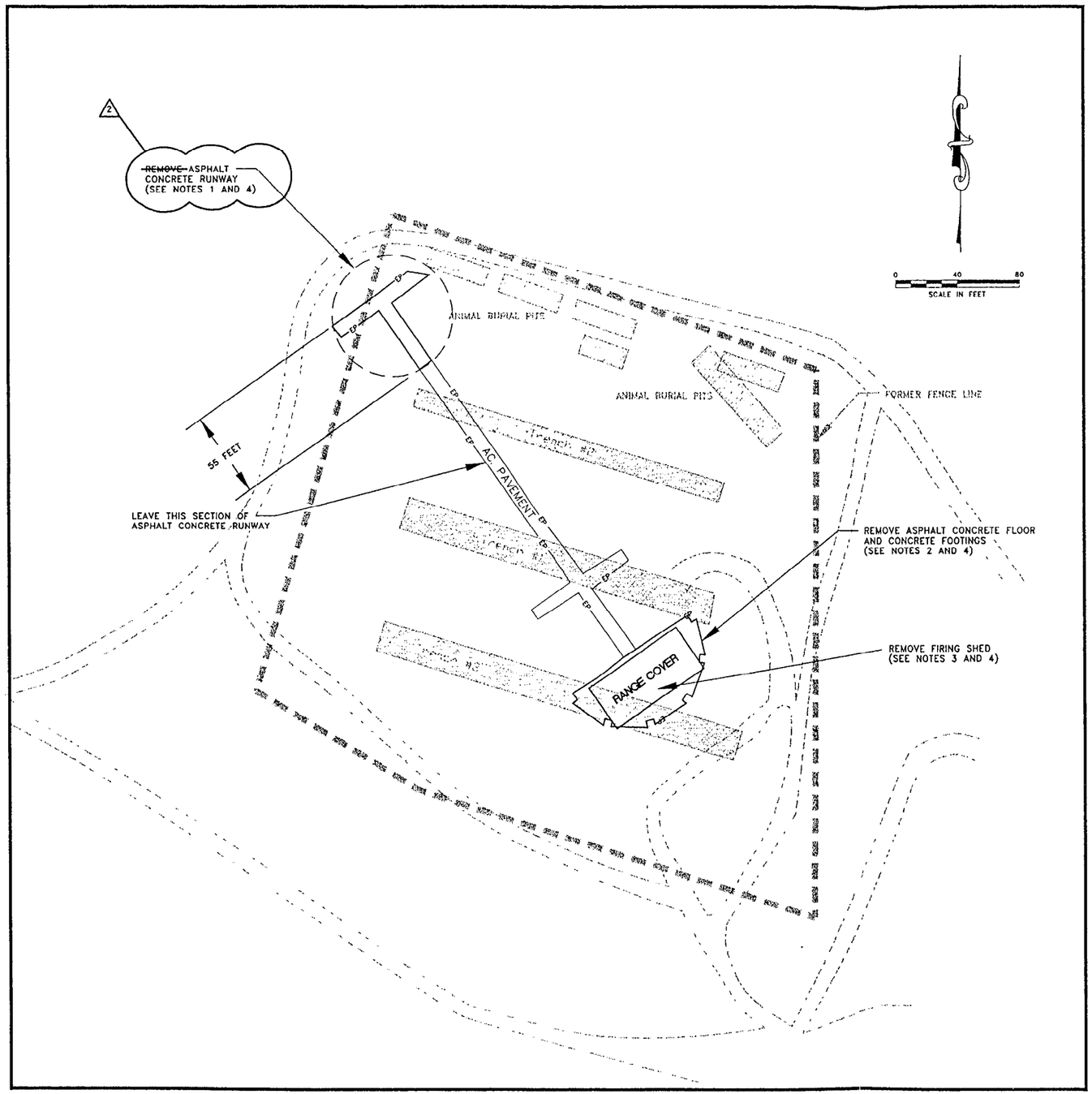
SHEET TITLE: EXISTING TOPOGRAPHY

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 3 OF 20

DRAWING NO. 3

REV 0



LEGEND:

- APPROXIMATE LOCATION OF ANIMAL BURIAL PITS
- APPROXIMATE LOCATION OF SOLID WASTE DISPOSAL TRENCHES
- FORMER FENCE LINE
- EXISTING DIRT ROAD

NOTES:

1) THE EXISTING ASPHALT CONCRETE RUNWAY IS ESTIMATED TO BE 2 to 4 INCHES THICK.
2) THE EXISTING CONCRETE SLAB IS ESTIMATED TO BE 2 TO 6 INCHES THICK. EXISTING CONCRETE IS REINFORCED WITH STEEL REBAR.
3) THERE ARE APPROXIMATELY 20 CONCRETE PIERS ESTIMATED TO BE 12 TO 14 INCHES IN DIAMETER AND 2 FEET DEEP
4) THERE ARE APPROXIMATELY 5 CONCRETE FOOTINGS ESTIMATED TO BE 15 FEET LONG BY 18 INCHES WIDE BY 2 FEET DEEP
5) ~~THE EXISTING STEEL PLATES BETWEEN THE PLYWOOD WALLS SHALL BE SALVAGED FOR LATER REUSE ON THE NEW RANGE COVER. THE STEEL PLATES ARE ESTIMATED TO BE 3/8 INCH THICK AND WEIGH BETWEEN 500 TO 600 LBS. EACH.~~ 1
6) ALL DEMOLITION DEBRIS ~~EXCEPT STEEL PLATES~~ SHALL BE HAULED OFF-SITE.
7) AUTHORIZATION MUST BE RECEIVED FROM LLNL HAZARDS CONTROL PRIOR TO HAULING ANY DEMOLITION DEBRIS OFF-SITE.

AS-BUILT NOTES:

1. STEEL PLATES NOT SALVAGEABLE.
2. ASPHALT CONCRETE LAYER ON RUNWAY WAS TOO THIN TO PICK UP

REFERENCE: LAWRENCE LIVERMORE NATIONAL LABORATORY PLANT ENGINEERING, DWG. NO. S96010.

LLNL DRAWING ID: PSZ 97-300-0200

AS-BUILT ISSUE	DATE	OCTOBER 30, 1997		DRAWING NO.	4
PE/A	D. LITTLEFIELD			DATE	1/18/97
SL/GL	D. LING			DATE	1/17/97
SECURITY	P. BAKER			DATE	1/14/97
M/O	L. PAUKERT			DATE	1/22/97
H.C.	J. FORTE			DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.			
DES BY	BAM				
DR BY	DVR/BAM				
CHK BY	KGH				
RVW BY	KSO				
SCALE: AS SHOWN					

Golder Associates

PROJECT NO.: 963-7108 | TASK NO.: 411

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: FIRING RANGE DEMOLITION PLAN

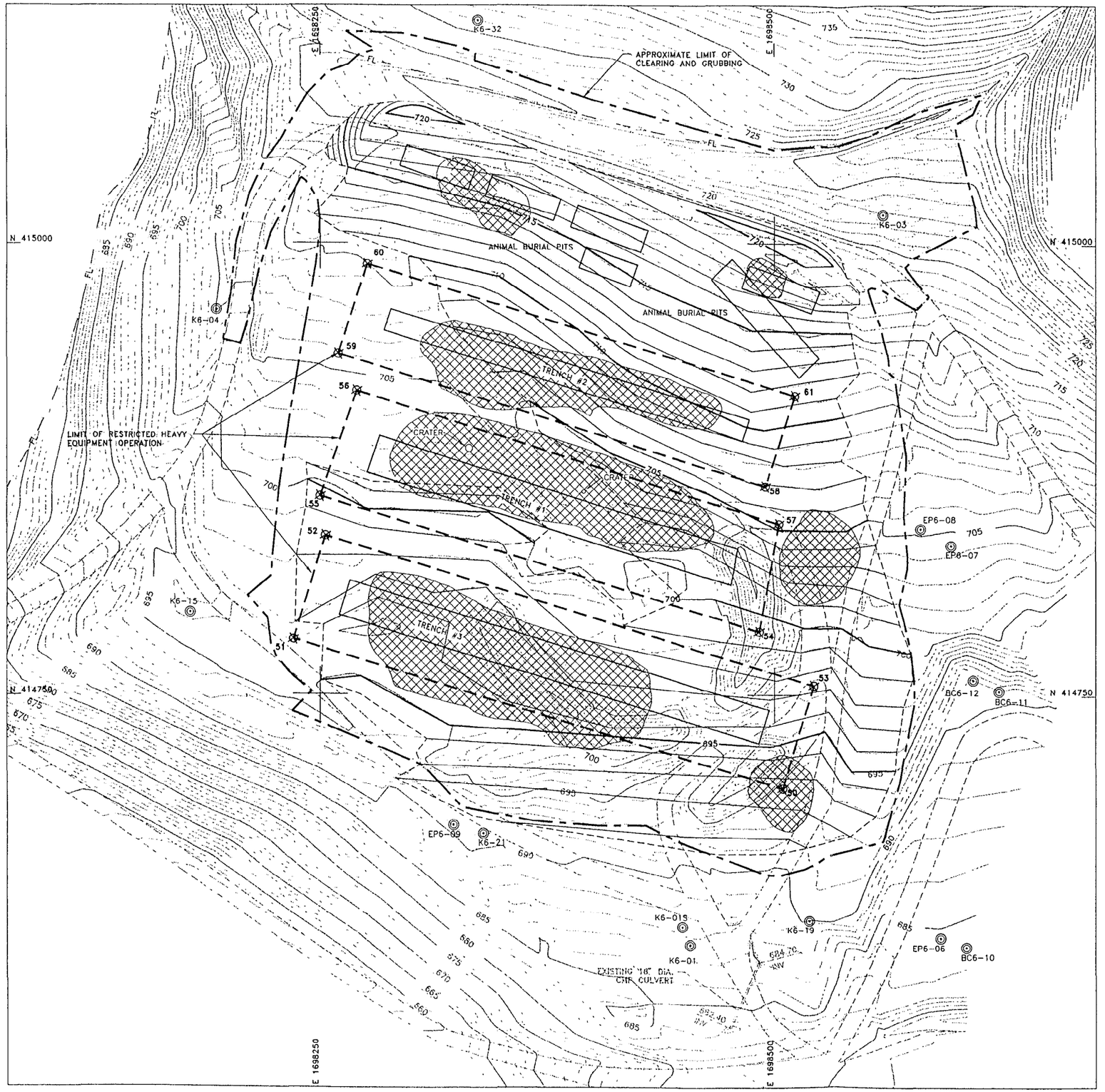
REGISTERED PROFESSIONAL ENGINEER RICHARD E. KIEL 61411 CIVIL STATE OF CALIFORNIA

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 4 OF 20

DRAWING NO.	REV.
4	0

DWG ID: 1963-7108\DGT\3184 10-28-97 10:30



LEGEND:

	EXISTING DITCH FLOWLINE
710	EXISTING GROUND SURFACE ELEVATION CONTOURS (FT., MSL)
715	SUBGRADE CONTOURS AND ELEVATION (FT., MSL)
	GRADE BREAK
K6-01	EXISTING MONITORING WELL AND NUMBER
58	CONTROL POINT AND NUMBER
	EXISTING DIRT ROAD
	APPROXIMATE LIMIT OF CLEARING AND GRUBBING
	LIMIT OF RESTRICTED HEAVY EQUIPMENT OPERATION
	AREAS WITH EXISTING UNCOMPACTED FILL TO BE REMOVED AND REPLACED
	LIMITS OF MAGNETIC ANOMALY

NOTES:

1) TOPOGRAPHY SUPPLIED BY LAWRENCE LIVERMORE NATIONAL LABORATORY. DRAWING NO. S96010. COORDINATES ARE BASED ON SITE 300-SPECIFIC GRID SYSTEM.
2) GRADE EXISTING TOPOGRAPHY TO REMOVE SOIL SOUND BERMS AND HIGH TOPOGRAPHIC AREAS.
3) GRADING TOLERANCE +/- 0.25 FEET. (1)
4) WELLS K6-03, K6-04, K6-21, K6-32, EP6-07, EP6-08 AND EP6-09 SHALL BE PROTECTED BY PLACEMENT OF A 5 FT. DIA. CONCRETE PIPE SECTION AROUND WELLS DURING CONSTRUCTION. CONCRETE PIPE IS TO BE REMOVED AFTER CONSTRUCTION IS COMPLETED. (2)
5) NO SOIL SHALL BE HAULED OFF-SITE. CONTRACTOR WILL VERIFY WITH CQA ENGINEER THAT THE SOIL BERMS AND OTHER CUT MATERIALS ARE ACCEPTABLE FOR GENERAL FILL.

AS-BUILT NOTES:

(1) GRADING TOLERANCES MODIFIED TO ACCEPT AS-BUILT GRADES SHOWN.

(2) SELECTED PIPE SECTIONS TO BE LEFT IN PLACE AS DIRECTED BY LLNL. CONCRETE PIPE AROUND WELL K6-32 LEFT IN-PLACE WITH TOP APPROXIMATELY LEVEL WITH NEW GRADE.

CONTROL POINTS:

POINT NO.	NORTHING (FEET)	EASTING (FEET)
50	414697.94	1698504.41
51	414780.55	1698235.27
52	414837.76	1698252.88
53	414754.93	1698521.90
54	414784.90	1698491.42
55	414859.80	1698249.93
56	414918.12	1698269.80
57	414844.58	1698502.49
58	414865.44	1698494.94
59	414938.51	1698259.77
60	414988.23	1698275.65
61	414915.62	1698511.25

0 30 60
SCALE IN FEET

LLNL DRAWING ID: PSZ 97-300-021D

AS-BUILT ISSUE	DATE OCTOBER 30, 1997	DRAWING NO.	5
PE/A	D. LITTLEFIELD	DATE	1/18/97
SL/GL	D. LING	DATE	1/17/97
SECURITY	P. BAKER	DATE	1/14/97
M/O	L. PAUKERT	DATE	1/22/97
H.C.	J. FORTE	DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.	
DES BY	---		
DR BY	PEB/BAM		
CHK BY	KGH		
RVW BY	KSO		
SCALE:	AS SHOWN		

Golder Associates

PROJECT NO.: 983-7108 TASK NO.: 411

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

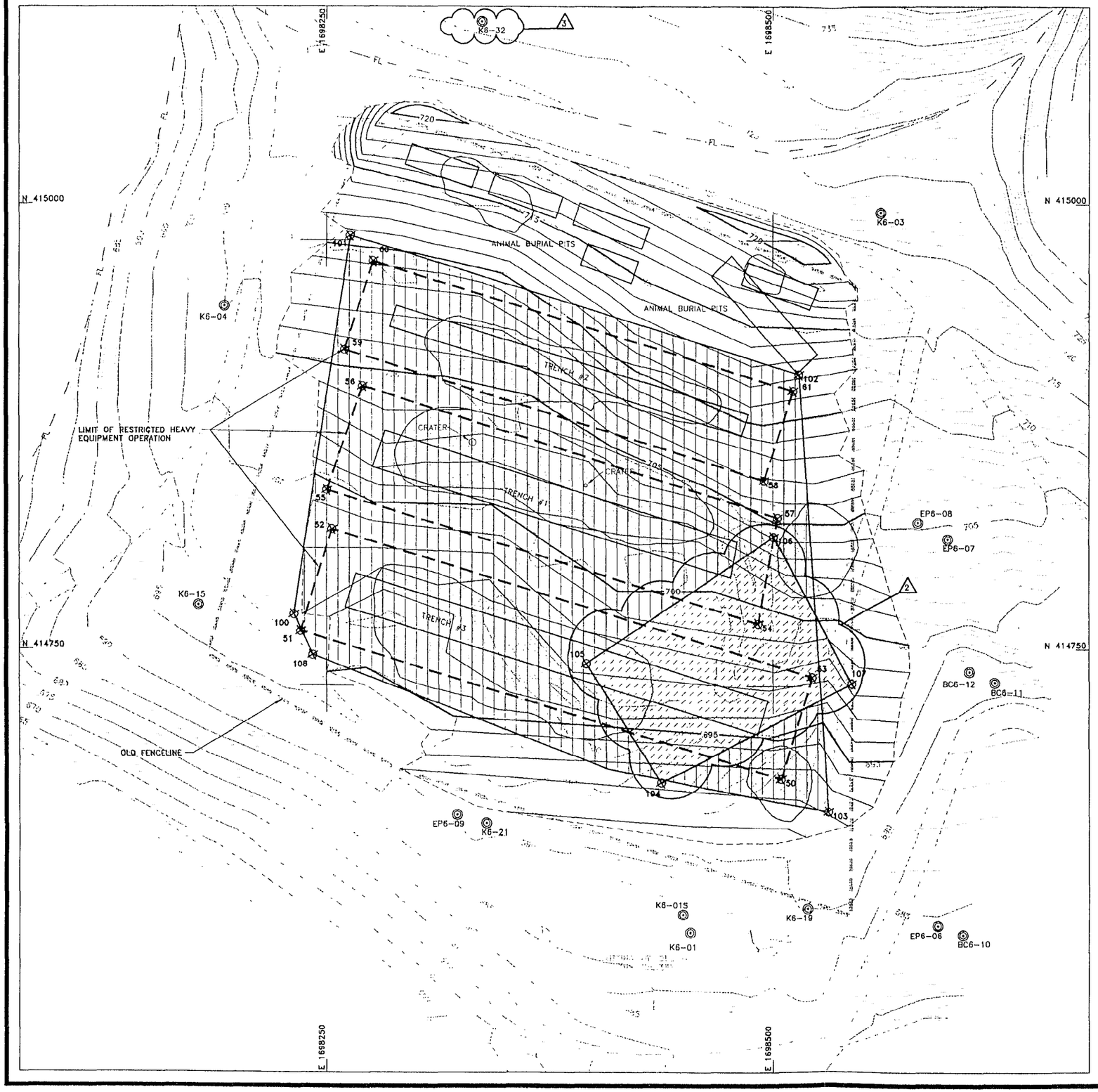
SHEET TITLE: SUBGRADE GRADING PLAN

REGISTERED PROFESSIONAL ENGINEER RICHARD E. KLEIN No. 047477 CIVIL STATE OF CALIFORNIA

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 5 OF 20	
DRAWING NO.	REV.
5	0

DWG ID: \983-7108\002\5197 10-24-97 10:58



LEGEND:

- PREVIOUSLY EXISTING FENCELINE
- EXISTING DITCH FLOWLINE
- EXISTING GROUND SURFACE ELEVATION CONTOURS (FT., MSL)
- 715 — SUBGRADE CONTOURS AND ELEVATION (FT., MSL)
- GRADE BREAK
- K6-01 EXISTING MONITORING WELL AND NUMBER
- 50 CONTROL POINT AND NUMBER
- EXISTING DIRT ROAD
- LIMIT OF RESTRICTED HEAVY EQUIPMENT OPERATION
- LIMITS OF MAGNETIC ANOMALY
- AREAS WITH TWO GEOGRID LAYERS SPACED AT A MIN. OF 6 IN. APART IN THE VERTICAL DIRECTION
- AREAS WITH THREE GEOGRID LAYERS SPACED AT A MIN. OF 6 IN. APART IN THE VERTICAL DIRECTION

NOTES:

1) TOPOGRAPHY SUPPLIED BY LAWRENCE LIVERMORE NATIONAL LABORATORY. DRAWING NO. S96010. COORDINATES ARE BASED ON SITE 300-SPECIFIC GRID SYSTEM.
2) WELLS K6-03, K6-04, K6-21, K6-32, EP6-07, EP6-08 AND EP6-09 SHALL BE PROTECTED BY PLACEMENT OF A 5 FT. DIA. CONCRETE PIPE SECTION AROUND WELLS DURING CONSTRUCTION. CONCRETE PIPE IS TO BE REMOVED AFTER CONSTRUCTION IS COMPLETED.

AS-BUILT NOTES:

⚠1 THE FOLLOWING SURVEY POINTS CHANGED:

CONTROL POINTS:

POINT NO.	NORTHING (FEET)	EASTING (FEET)
104	414696.86	1698440.20
105	414762.14	1698395.94
106	414833.97	1698501.70
107	414768.68	1698548.04

⚠2 REVISED AREA OF GEOGRID REINFORCEMENT.

⚠3 CONCRETE PIPE AROUND WELL K6-32 LEFT IN-PLACE WITH TOP APPROXIMATELY LEVEL WITH NEW GRADE.

CONTROL POINTS:

POINT NO.	NORTHING (FEET)	EASTING (FEET)
50	414697.94	1698504.41
51	414780.55	1698235.27
52	414837.76	1698252.88
53	414754.93	1698521.90
54	414784.90	1698491.42
55	414859.80	1698249.93
56	414918.12	1698269.80
57	414844.58	1698502.49
58	414865.44	1698494.94
59	414938.51	1698259.77
60	414988.23	1698275.65
61	414915.62	1698511.25
100	414789.86	1698231.62
101	415002.63	1698262.90
102	414925.09	1698514.48
103	414879.24	1698531.24
~~104~~	~~414703.24~~	~~1698407.31~~
~~105~~	~~414768.53~~	~~1698362.97~~
~~106~~	~~414840.36~~	~~1698468.74~~
~~107~~	~~414775.06~~	~~1698613.07~~
108	414786.94	1698242.12

0 30 60
SCALE IN FEET

REGISTERED PROFESSIONAL ENGINEER
RICHARD E. NOE
No. 047477
CIVIL
STATE OF CALIFORNIA
Exp. 12/31/98

LLNL DRAWING ID: PSZ 97-300-0220

AS-BUILT ISSUE	DATE OCTOBER 30, 1997	DRAWING NO.	6
PE/A	D. LITTLEFIELD	DATE	1/18/97
SL/GL	D. LING	DATE	1/17/97
SECURITY	P. BAKER	DATE	1/14/97
W/O	L. PAUKERT	DATE	1/22/97
H.C.	J. FORTE	DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.	
DES BY	PEB/DAM		
DR BY	PEB		
CHK BY	KGH		
RVW BY	KSO		
SCALE: AS SHOWN			

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: GEOGRID LAYOUT PLAN

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 6 OF 20

DRAWING NO. 6

REV. 0

DWG D: \963-7108 002-3149 10-OCT-97 8:32

LEGEND:

- LIMIT OF LANDFILL COVER
- EXISTING DITCH FLOWLINE
- EXISTING GROUND SURFACE ELEVATION CONTOURS (FT., MSL)
- 710 — GENERAL FILL CONTOURS AND ELEVATION (FT., MSL)
- GRADE BREAK
- LIMIT OF COVER
- K6-01 EXISTING MONITORING WELL AND NUMBER
- 200 CONTROL POINT AND NUMBER
- EXISTING DIRT ROAD
- LIMITS OF MAGNETIC ANOMALY
- AREAS WITH EXISTING UNCOMPACTED FILL TO BE REMOVED AND REPLACED

NOTES:

1) TOPOGRAPHY SUPPLIED BY LAWRENCE LIVERMORE NATIONAL LABORATORY. DRAWING NO. S96010. COORDINATES ARE BASED ON SITE 300-SPECIFIC GRID SYSTEM.
2) WELLS K6-03, K6-04, K6-21, K6-32, EP6-07, EP6-08 AND EP6-09 SHALL BE PROTECTED BY PLACEMENT OF A 5 FT. DIA. CONCRETE PIPE SECTION AROUND WELLS DURING CONSTRUCTION. CONCRETE PIPE IS TO BE REMOVED AFTER CONSTRUCTION IS COMPLETED.
3) SEE DRAWING NO. 12 FOR SURFACE WATER CONTROL PLAN.

AS-BUILT NOTES:

1. AREAS WITH EXISTING UNCOMPACTED FILL TO BE REMOVED AND REPLACED WAS EXTENDED AS SHOWN.
2. PIPE AROUND WELL K6-32 LEFT IN-PLACE WITH TOP OF PIPE APPROXIMATELY LEVEL WITH NEW GRADE.

CONTROL POINTS:

POINT NO.	NORTHING (FEET)	EASTING (FEET)	ELEV. (FT MSL)
200	415048.52	1698269.97	719.05
201	415072.34	1698309.94	722.53
202	415049.21	1698373.32	720.81
203	414998.72	1698511.66	722.77
204	414995.99	1698517.83	722.82
205	414957.02	1698544.24	719.16
206	414819.48	1698556.47	706.74
207	414788.59	1698550.19	704.00
208	414743.44	1698541.01	700.00
209	414687.15	1698529.56	695.01
210	414668.62	1698496.57	693.55
211	414679.37	1698466.82	694.69
212	414681.74	1698460.27	694.62
213	414751.68	1698266.79	696.78
214	414805.98	1698234.32	699.25
215	414990.35	1698261.42	712.00
216	414984.01	1698307.97	712.00
217	414797.87	1698404.31	700.00
218	414741.48	1698511.68	700.00

0 30 60
SCALE IN FEET

LLNL DRAWING ID: PSZ 97-300-0230

AS-BUILT ISSUE	DATE	OCTOBER 30, 1997	DRAWING NO.	7
PE/A	D. LITTLEFIELD		DATE	1/16/97
SL/GL	D. LING		DATE	1/17/97
SECURITY	P. BAKER		DATE	1/14/97
M/O	L. PAUKERT		DATE	1/22/97
H.C.	J. FORTE		DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.		

DES BY	DAM	
DR BY	PEB	
CHK BY	KGH	
RVW BY	KSO	
SCALE:	AS SHOWN	

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

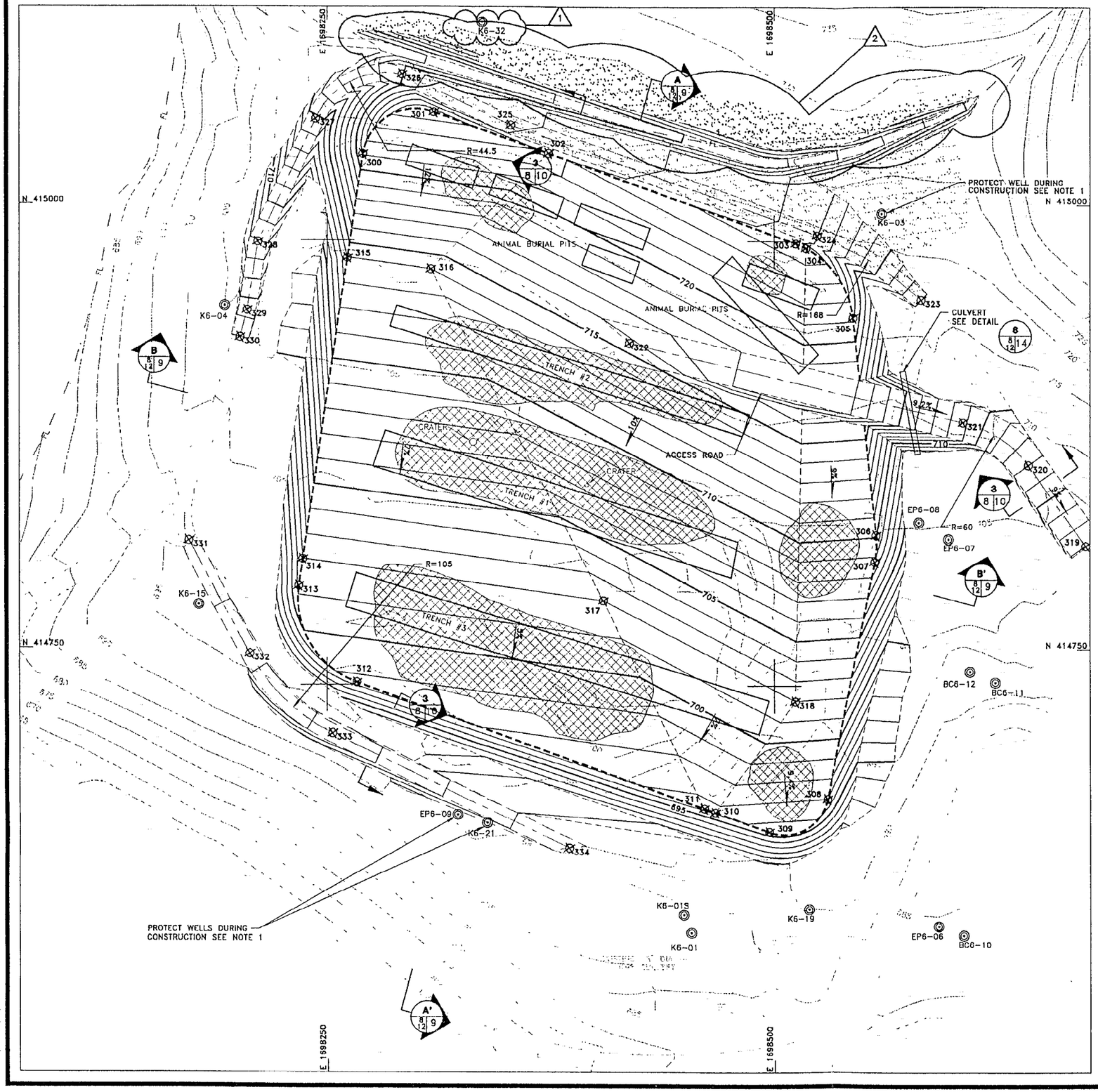
SHEET TITLE: GENERAL FILL GRADING PLAN

REGISTERED PROFESSIONAL ENGINEER RICHARD E. KITZ EXP. 12/31/98 NO. 047477 CIVIL STATE OF CALIFORNIA

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 7 OF 20	
DRAWING NO.	REV.
7	0

DWG ID: 963-7108 SHT 3140 10-30-97 8:49



LEGEND:

- LIMIT OF LANDFILL COVER
- EXISTING DITCH FLOWLINE
- 710 EXISTING GROUND SURFACE ELEVATION CONTOURS (FT., MSL)
- 710 FINAL COVER CONTOURS AND ELEVATION (FT., MSL)
- GRADE BREAK
- K6-01 EXISTING MONITORING WELL AND NUMBER
- 300 CONTROL POINT AND NUMBER
- EXISTING DIRT ROAD
- ACCESS ROAD
- LIMITS OF MAGNETIC ANOMALY
- AREAS WITH EXISTING UNCOMPACTED FILL TO BE REMOVED AND REPLACED

A 4 5 — DETAIL/SECTION DESIGNATION; DRAWING WHERE SECTION/DETAIL IS LOCATED; DRAWING WHERE SECTION/DETAIL IS REFERENCED

NOTES:

1) TOPOGRAPHY SUPPLIED BY LAWRENCE LIVERMORE NATIONAL LABORATORY. DRAWING NO. S96010. COORDINATES ARE BASED ON SITE 300-SPECIFIC GRID SYSTEM.
2) WELLS K6-03, K6-04, K6-21, K6-32, EP6-07, EP6-08 AND EP6-09 SHALL BE PROTECTED BY PLACEMENT OF A 5 FT. DIA. CONCRETE PIPE SECTION AROUND WELLS DURING CONSTRUCTION. CONCRETE PIPE IS TO BE REMOVED AFTER CONSTRUCTION IS COMPLETED.
3) SEE DRAWING NO. 12 FOR SURFACE WATER CONTROL PLAN.

AS-BUILT NOTES:

1. CONCRETE PIPE AROUND WELL K6-32 LEFT IN-PLACE WITH TOP APPROXIMATELY LEVEL WITH NEW GRADE.
2. AREAS WITH EXISTING UNCOMPACTED FILL TO BE REMOVED AND REPLACED WAS EXTENDED AS SHOWN.
3. REFERENCE DRAWING 17 FOR FINAL TOPOGRAPHIC PLAN OF VEGETATIVE COVER.

CONTROL POINTS:

POINT NO.	NORTHING (FEET)	EASTING (FEET)	ELEV. (FT MSL)
300	415048.88	1698269.69	721.12
301	415072.68	1698309.66	724.60
302	415049.31	1698373.71	722.86
303	414998.85	1698511.97	724.82
304	414996.31	1698517.76	724.86
305	414957.14	1698544.55	721.19
306	414834.69	1698557.52	710.11
307	414819.47	1698556.80	708.75
308	414686.67	1698529.80	696.99
309	414668.14	1698496.80	695.52
310	414679.04	1698466.64	696.68
311	414681.29	1698460.41	696.62
312	414751.42	1698266.42	698.78
313	414805.71	1698233.95	701.25
314	414820.55	1698236.13	702.00
315	414990.16	1698261.06	714.00
316	414983.76	1698308.01	714.00
317	414797.62	1698404.35	702.00
318	414741.30	1698511.60	702.00
319	414828.71	1698675.04	702.00
320	414874.05	1698642.93	707.00
321	414898.03	1698606.51	711.22
322	414942.42	1698419.00	715.73
323	414966.82	1698582.91	717.00
324	415003.58	1698524.11	724.02
325	415065.46	1698352.83	721.89
326	415093.99	1698291.70	720.00
327	415068.81	1698243.09	714.83
328	414999.37	1698210.84	707.94
329	414960.63	1698204.95	704.41
330	414945.50	1698200.97	703.00
331	414831.05	1698172.47	695.19
332	414767.48	1698206.44	696.77
333	414723.04	1698252.89	693.68
334	414658.79	1698385.06	690.18

0 30 60
SCALE IN FEET

LLNL DRAWING ID: PSZ 97-300-024D

AS-BUILT ISSUE	DATE	OCTOBER 30, 1997		DRAWING NO.	8
PE/A	D. LITTLEFIELD			DATE	1/18/97
SL/GL	D. LING			DATE	1/17/97
SECURITY	P. BAKER			DATE	1/14/97
M/O	L. PAUKERT			DATE	1/22/97
H.C.	J. FORTE			DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.			

DES BY	PEB	
DR BY	PEB	
CHK BY	KGH	
RVW BY	KSO	
SCALE:	AS SHOWN	

REGISTERED PROFESSIONAL ENGINEER RICHARD E. KLEY EXP. XX/XX/XX NO. 047471 CIVIL STATE OF CALIFORNIA

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

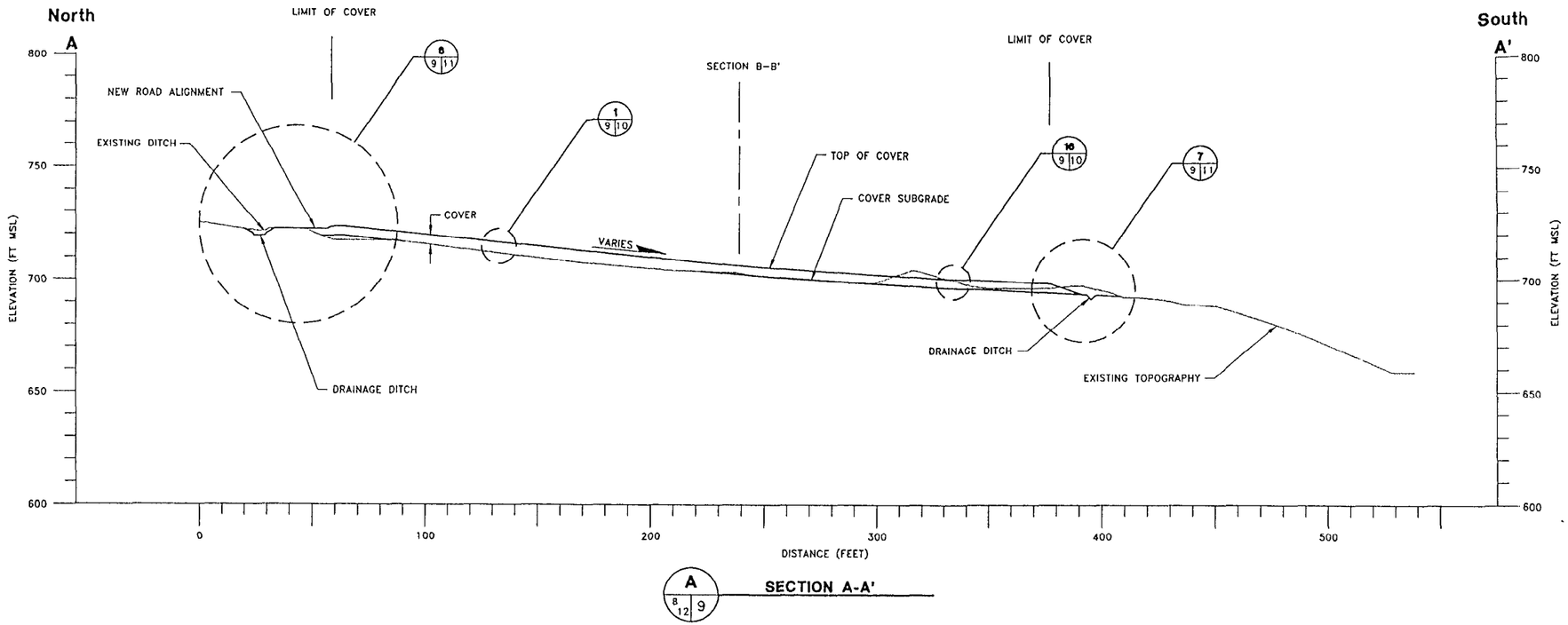
PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

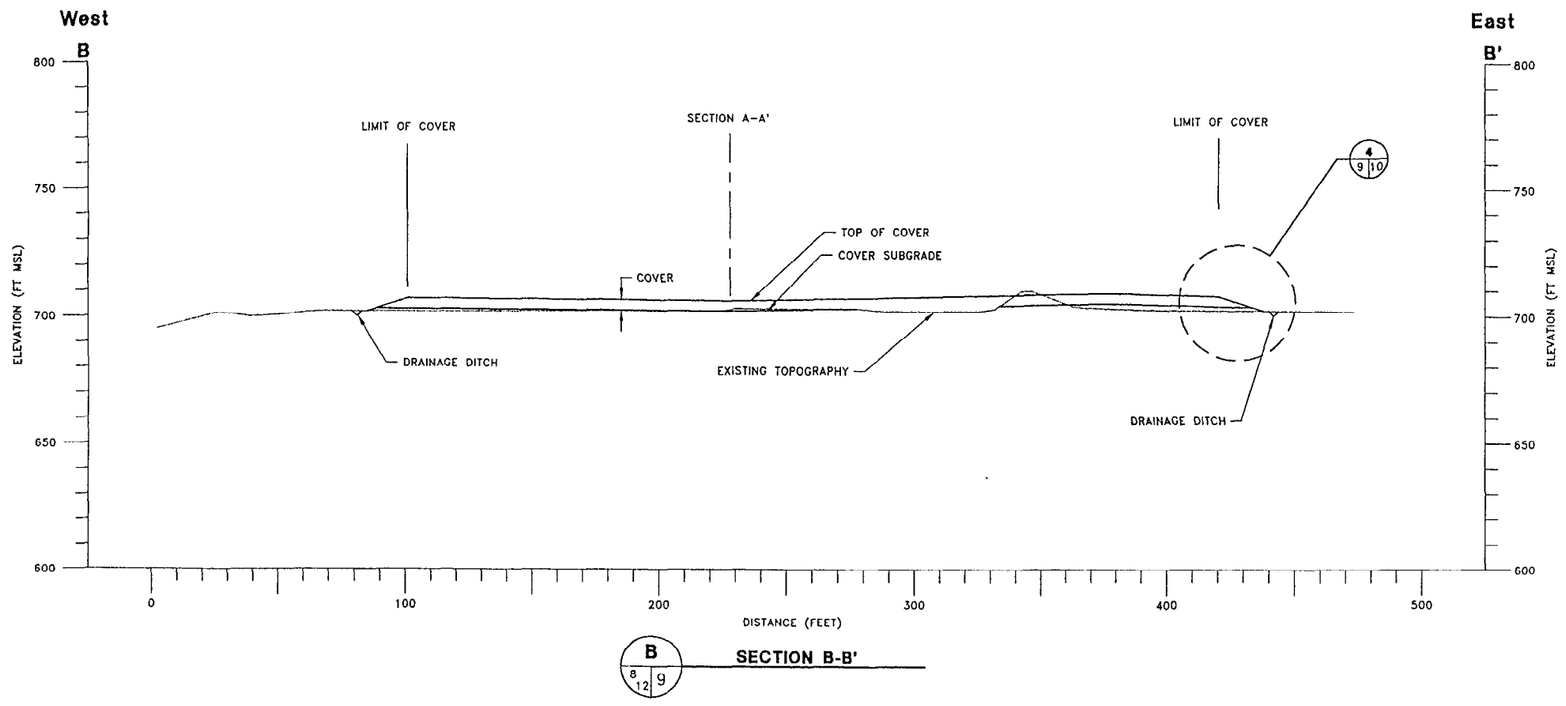
SHEET TITLE: VEGETATIVE COVER GRADING PLAN

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 8 OF 20	
DRAWING NO.	REV.
8	0

Dwg ID: \963-7108\DWG\8.DWG 10-30-97 8:48





DETAIL/SECTION DESIGNATION

DRAWING WHERE SECTION/DETAIL IS LOCATED

DRAWING WHERE SECTION/DETAIL IS REFERENCED

LLNL DRAWING ID: PSZ 97-300-0250

AS-BUILT ISSUE		DATE	OCTOBER 30, 1997	DRAWING NO.	9
PE/A	D. LITTLEFIELD			DATE	1/18/97
SL/GL	D. LING			DATE	1/17/97
SECURITY	P. BAKER			DATE	1/14/97
M/O	L. PAUKERT			DATE	1/22/97
H.C.	J. FORTE			DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.			
DES BY	BAM/PEB				
DR BY	BAM/PEB				
CHK BY	KGH				
RVW BY	KSO				
SCALE:	AS SHOWN				

REGISTERED PROFESSIONAL ENGINEER RICHARD E. KING EXP. 12/31/98 NO. 047471 CIVIL STATE OF CALIFORNIA

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: TYPICAL CROSS-SECTIONS

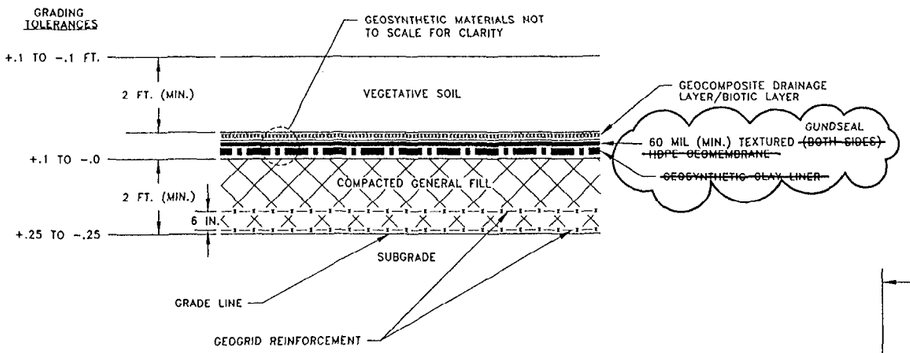
LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 9 OF 20

DRAWING NO. 9

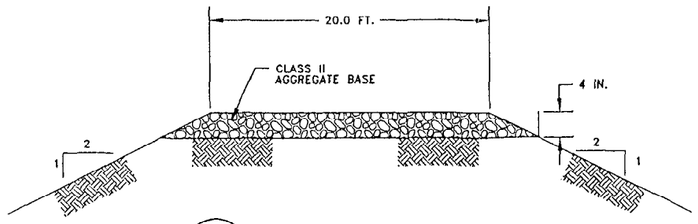
REV. 0

DWG ID: \963-7108\005\3171 10-28-97 11:22



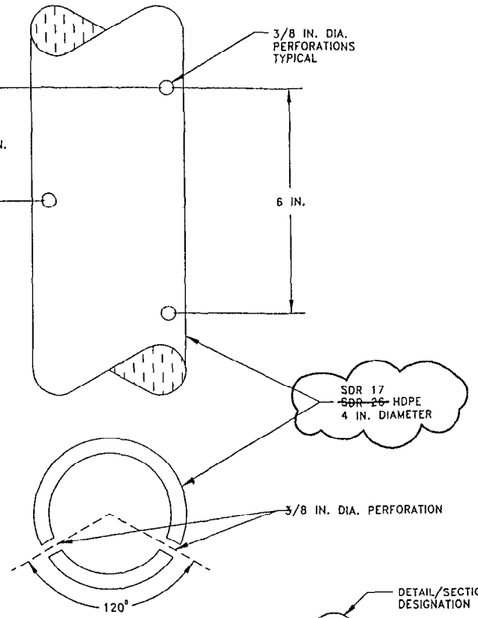
1 / 9 10 — TYPICAL COVER SECTION DETAIL WITH TWO LAYERS OF GEOGRID

SCALE IN FEET 0 2 4



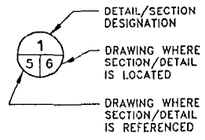
3 / 8 10 — ROAD CROSS-SECTION

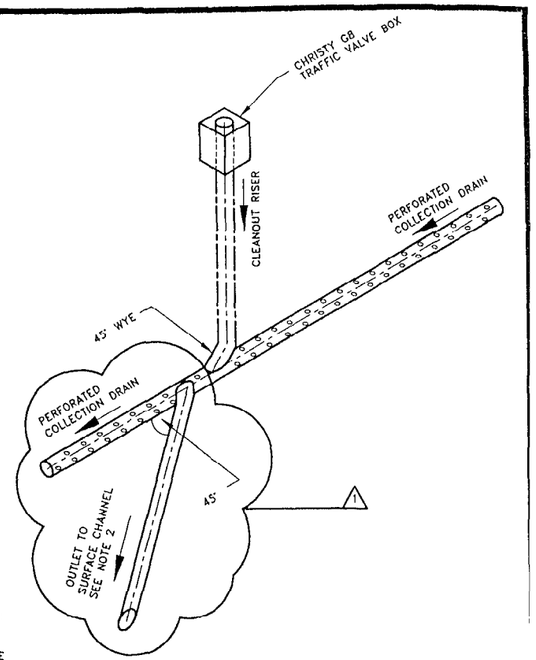
NOT TO SCALE



2 / 10 11 10 — PERFORATION DETAIL

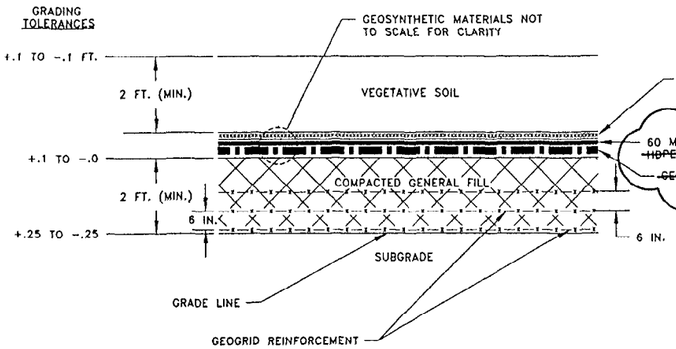
SCALE IN FEET 0 2 4





4 / 13 10 — SUBDRAIN CONNECTIONS DETAIL

SCALE IN FEET 0 2 4

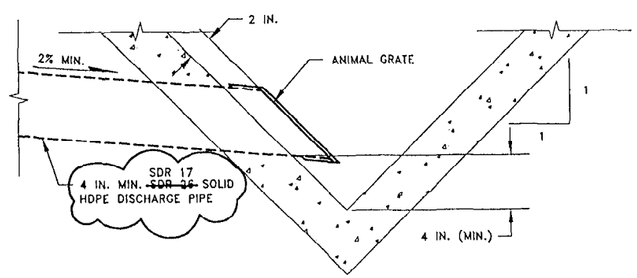


16 / 9 10 — TYPICAL COVER SECTION DETAIL WITH THREE LAYERS OF GEOGRID

SCALE IN FEET 0 2 4

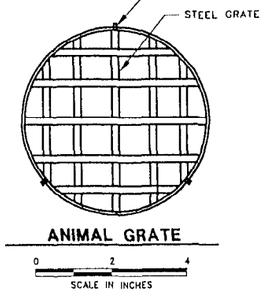
AS-BUILT NOTES:

1. OUTLET LOCATION MOVED AS SHOWN. (REF. DETAIL 4)
2. TOP OF CLEANOUT RISER CAPPED WITH EXPANDABLE WELL CAPS. (REF. DETAIL 5)



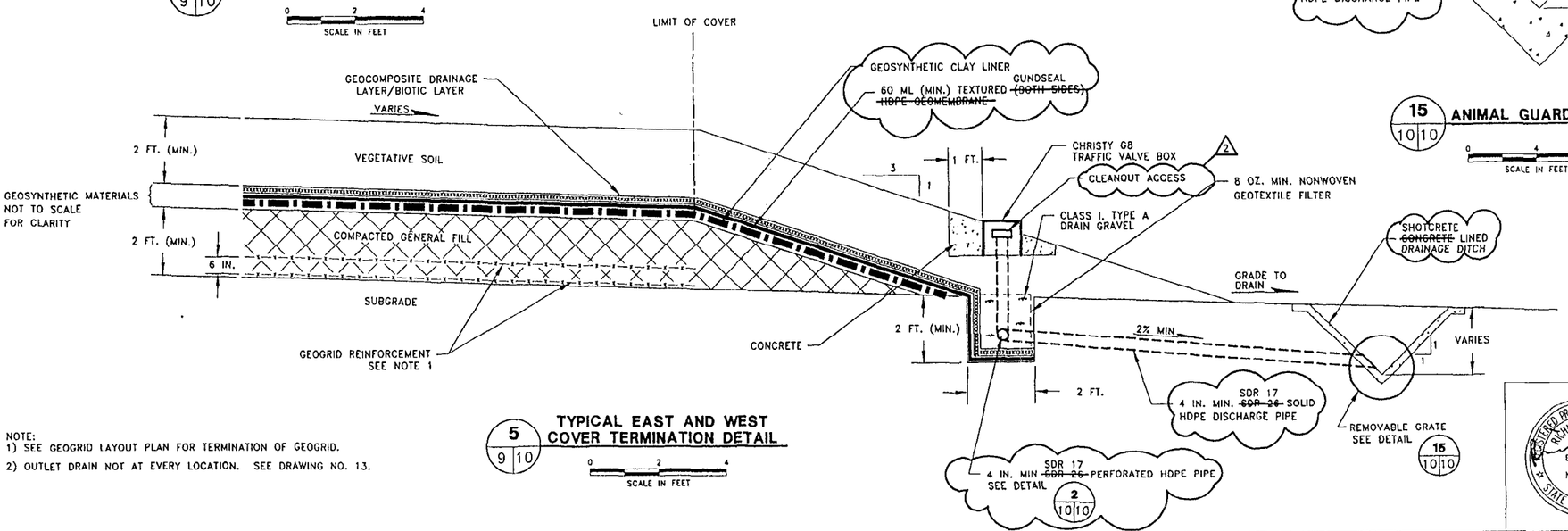
15 / 10 10 — ANIMAL GUARD DETAIL

SCALE IN FEET 0 4 8



ANIMAL GRATE

SCALE IN INCHES 0 2 4



5 / 9 10 — TYPICAL EAST AND WEST COVER TERMINATION DETAIL

SCALE IN FEET 0 2 4

NOTE:
1) SEE GEOGRID LAYOUT PLAN FOR TERMINATION OF GEOGRID.
2) OUTLET DRAIN NOT AT EVERY LOCATION. SEE DRAWING NO. 13.

LLNL DRAWING ID: PSZ 97-300-026D

AS-BUILT ISSUE	DATE	OCTOBER 30, 1997		DRAWING NO.	10
PE/A	D. LITTLEFIELD			DATE	1/18/97
SL/GL	D. LING			DATE	1/17/97
SECURITY	P. BAKER			DATE	1/14/97
M/O	L. PAUKERT			DATE	1/22/97
H.C.	J. FORTE			DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.			
DES BY	BAM				
DR BY	BAM/DVR				
CHK BY	KGH				
RVW BY	KSO				
SCALE:	AS SHOWN				

REGISTERED PROFESSIONAL ENGINEER RICHARD E. KOTT DP 12/31/98 NO. 047477 CIVIL STATE OF CALIFORNIA

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

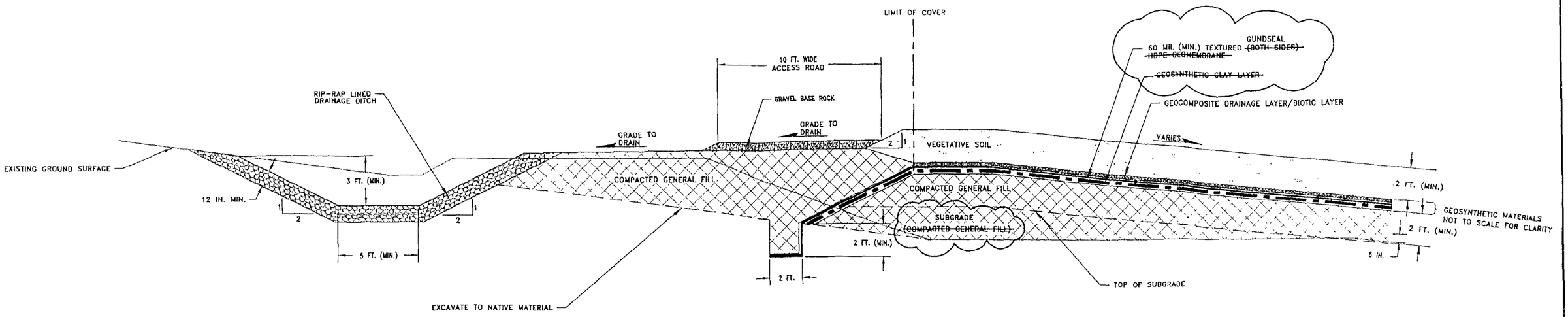
PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: MISCELLANEOUS DETAILS

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 10 OF 20 | DRAWING NO. 10 | REV. 0

DWG ID: \963-7108\005\3172 10-28-97 11:23



6 | 9 | 11 TYPICAL NORTH END COVER TERMINATION DETAIL

0 3 6
SCALE IN FEET

NOTE:
1) SEE GEOGRID LAYOUT PLAN FOR TERMINATION OF GEOGRID.

AS-BUILT NOTES:

⚠ TOP OF CLEANOUT RISER CAPPED WITH EXPANDABLE WELL CAPS (REF. DETAIL 7)

7 | 9 | 11 TYPICAL SOUTH END COVER TERMINATION DETAIL

0 3 6
SCALE IN FEET

1 | 5 | 7 — DETAIL/SECTION DESIGNATION; DRAWING WHERE SECTION/DETAIL IS LOCATED; DRAWING WHERE SECTION/DETAIL IS REFERENCED

REGISTERED PROFESSIONAL ENGINEER RICHARD C. KIEL EXP. 12/31/20 NO. 047477 CIVIL STATE OF CALIFORNIA

LLNL DRAWING ID: PSZ 97-300-0770

AS-BUILT ISSUE	DATE	OCTOBER 30, 1997	DRAWING NO.	11
PE/A	D. LITTLEFIELD		DATE	1/16/97
SL/GL	D. LING		DATE	1/17/97
SECURITY	P. BAKER		DATE	1/14/97
W/O	L. PAUKERT		DATE	1/22/97
H.C.	J. FORTE		DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.		
DES BY	BAM			
DR BY	BAM/DVR			
CHK BY	KGH			
RVW BY	KSD			
SCALE:	AS SHOWN			

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

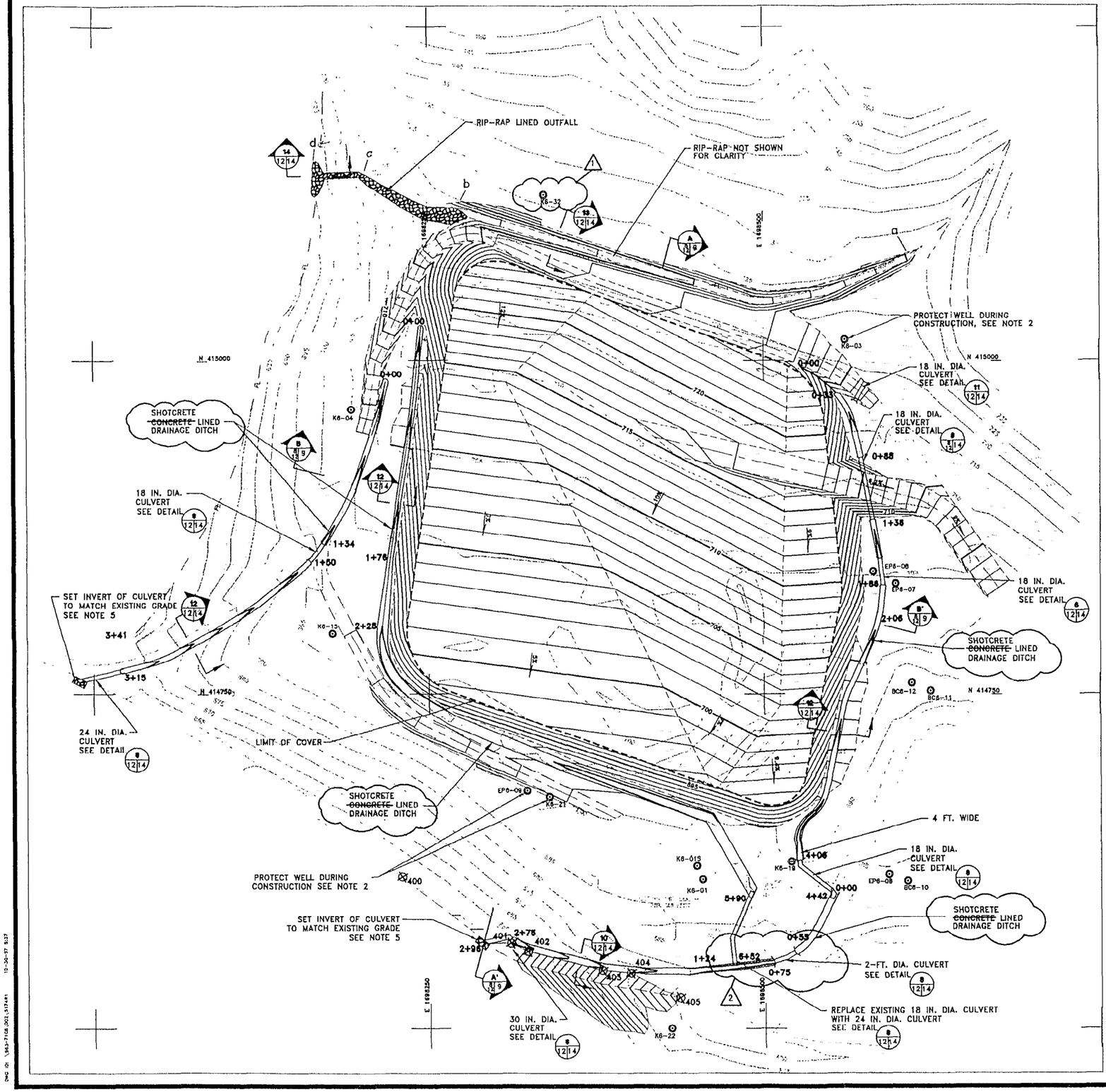
PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: COVER DETAILS AND NOTES

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 11 OF 20

DRAWING NO. 11 REV 0



LEGEND:

- LIMIT OF LANDFILL COVER
- EXISTING DITCH FLOWLINE
- 715 EXISTING GROUND SURFACE ELEVATION CONTOURS (FT., MSL)
- 710 FINAL COVER CONTOURS AND ELEVATION (FT., MSL)
- GRADE BREAK
- EXISTING DIRT ROAD
- 400 CONTROL POINT AND NUMBER
- K6-01 EXISTING MONITORING WELL AND NUMBER
- HELICAL CULVERT
- RIP-RAP

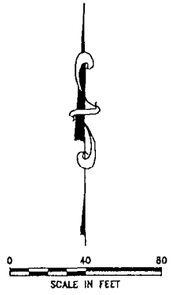
DETAIL/SECTION DESIGNATION (A / 4 | 5) — DRAWING WHERE SECTION/DETAIL IS LOCATED — DRAWING WHERE SECTION/DETAIL IS REFERENCED

NOTES:

1) TOPOGRAPHY SUPPLIED BY LAWRENCE LIVERMORE NATIONAL LABORATORY. DRAWING NO. S96010. COORDINATES ARE BASED ON SITE 300-SPECIFIC GRID SYSTEM.
2) WELLS K6-03, K6-04, K6-21, K6-32, EP6-07, EP6-08 AND EP6-09 SHALL BE PROTECTED BY PLACEMENT OF A 5 FT. DIA. CONCRETE PIPE SECTION AROUND WELLS DURING CONSTRUCTION. CONCRETE PIPE IS TO BE REMOVED AFTER CONSTRUCTION IS COMPLETED.
3) ONE-FOOT DRAINAGE DITCH CONTOURS ARE NOT SHOWN FOR CLARITY.
4) DRAINAGE DITCHES WILL BE FIELD-FIT.
5) RIP-RAP FOR SOUTHWEST CULVERT OUTLETS SHALL BE THE SAME AS FOR THE NORTHERN DITCH AT REACH c-d.

CONTROL POINTS:

POINT NO.	NORTHING (FEET)	EASTING (FEET)	ELEV. (FT MSL)
400	414613.37	1698229.20	657.00
401	414563.71	1698310.42	660.00
402	414557.61	1698323.03	661.36
403	414543.26	1698378.57	672.08
404	414541.22	1698399.82	675.00
405	414522.84	1698436.31	681.00



RIPRAP FOR NORTHERN DITCH

REACH	D_{max}	D_{50}	D_{10}	THICKNESS
a-b	7.5 in.	6 in.	2 in.	12 in.
b-c	7.5 in.	6 in.	2 in.	12 in.
c-d	15 in	12 in.	4 in.	18 in.

AS-BUILT NOTES:

1. PIPE AROUND WELL K6-32 LEFT IN-PLACE AND TOP APPROXIMATELY LEVEL WITH NEW GRADE.
2. CULVERT NOT INSTALLED.
3. REFERENCE DRAWING 17 FOR AS-BUILT LOCATIONS OF ALL SURFACE WATER CONTROL FEATURES.

REGISTERED PROFESSIONAL ENGINEER RICHARD E. KNEZ EXP. 12/31/98 NO. 047477 STATE OF CALIFORNIA

LLNL DRAWING ID: PSZ 97-300-028D

AS-BUILT ISSUE	DATE: OCTOBER 30, 1997	DRAWING NO.	12
PE/A	D. LITTLEFIELD	DATE	1/18/97
SL/GL	D. LING	DATE	1/17/97
SECURITY	P. BAKER	DATE	1/14/97
M/O	L. PAUKERT	DATE	1/22/97
H.C.	J. FORTE	DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.	
DES BY	PEB		
DR BY	PEB		
CHK BY	KGH		
RVW BY	KSO		
SCALE:	AS SHOWN		

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

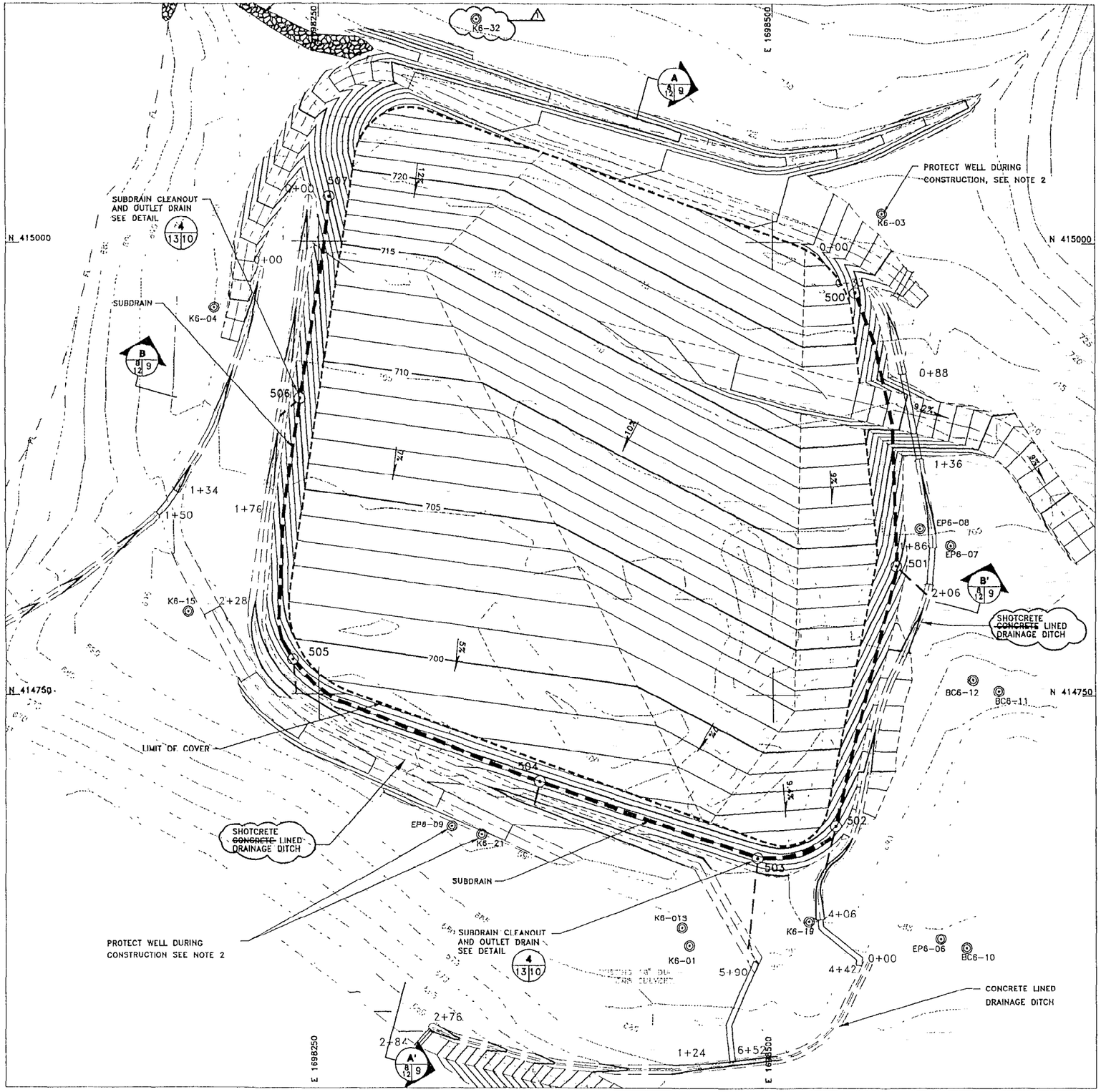
SHEET TITLE: SURFACE WATER CONTROL PLAN

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 12 OF 20

DRAWING NO.	REV.
12	0

DWG ID: \963-7108.002\SHT\411 10-30-97 8:37



LEGEND:

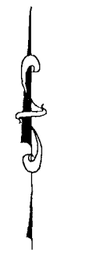
- LIMIT OF LANDFILL COVER
- EXISTING DITCH FLOWLINE
- EXISTING GROUND SURFACE ELEVATION CONTOURS (FT., MSL)
- 703 — FINAL COVER CONTOURS AND ELEVATION (FT., MSL)
- FINAL COVER CONTOURS AND ELEVATION (FT., MSL)
- EXISTING DIRT ROAD
- K6-01 EXISTING MONITORING WELL AND NUMBER
- HELICAL CULVERT
- RIP-RAP
- 501 SUBDRAIN, SUBDRAIN CLEANOUT, AND POINT NUMBER

NOTES:

1) TOPOGRAPHY SUPPLIED BY LAWRENCE LIVERMORE NATIONAL LABORATORY. DRAWING NO. S96010. COORDINATES ARE BASED ON SITE 300-SPECIFIC GRID SYSTEM.
2) WELLS K6-03, K6-04, K6-21, K6-32, EP6-07, EP6-08 AND EP6-09 SHALL BE PROTECTED BY PLACEMENT OF A 5 FT. DIA. CONCRETE PIPE SECTION AROUND WELLS DURING CONSTRUCTION. CONCRETE PIPE IS TO BE REMOVED AFTER CONSTRUCTION IS COMPLETED.
3) ONE-FOOT DRAINAGE DITCH CONTOURS ARE NOT SHOWN FOR CLARITY.

BOTTOM OF CLEANOUT PIPE:

POINT NO.	NORTHING (FEET)	EASTING (FEET)	INVERT (FT MSL)
500	414971.9	1698545.8	717.3
501	414820.8	1698568.5	702.0
502	414677.7	1698534.5	690.6
503	414659.9	1698491.1	689.3
504	414702.1	1698371.3	690.9
505	414769.0	1698235.6	694.2
506	414913.3	1698239.7	701.9
507	415025.2	1698255.4	711.4



0 30 60
SCALE IN FEET

AS-BUILT NOTES:

⚠ CONCRETE PIPE AROUND WELL K6-32 LEFT IN-PLACE AND TOP APPROXIMATELY LEVEL WITH NEW GRADE.

A 4|5 — DETAIL/SECTION DESIGNATION; DRAWING WHERE SECTION/DETAIL IS LOCATED; DRAWING WHERE SECTION/DETAIL IS REFERENCED

REGISTERED PROFESSIONAL ENGINEER RICHARD E. KILL EXP. 12/31/00 NO. 047477 CIVIL STATE OF CALIFORNIA

LLNL DRAWING ID: PSZ 97-300-0290

AS-BUILT ISSUE	DATE	OCTOBER 30, 1997		DRAWING NO.	13
PE/A	D. LITTLEFIELD			DATE	1/18/97
SL/GL	D. LING			DATE	1/17/97
SECURITY	P. BAKER			DATE	1/14/97
M/O	L. PAUKERT			DATE	1/22/97
M.C.	J. FORTE			DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.			
DES BY	BAM				
DR BY	BAM				
CHK BY	KGH				
RVW BY	KSO				
SCALE: AS SHOWN					

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 41

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

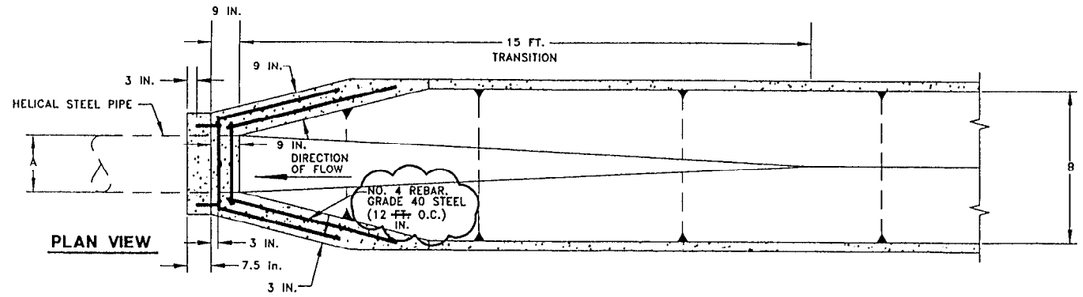
SHEET TITLE: SUBDRAIN CONTROL PLAN

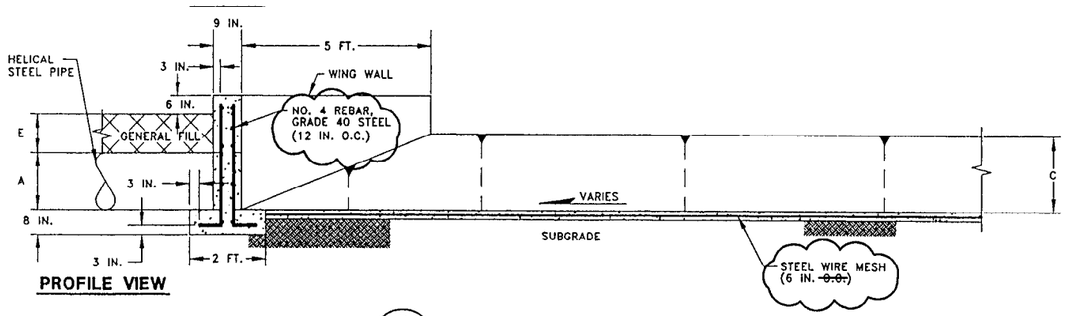
LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 13 OF 20

DRAWING NO.	REV.
13	0

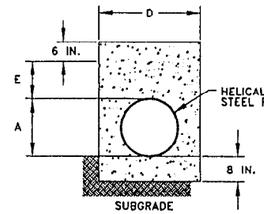
DWG ID: 1963-7108\W01\5173 10-30-97 1:35





8 | 8 12 14 — TYPICAL CULVERT CONCRETE INLET/OUTLET DETAIL

SCALE IN FEET 0 2 4

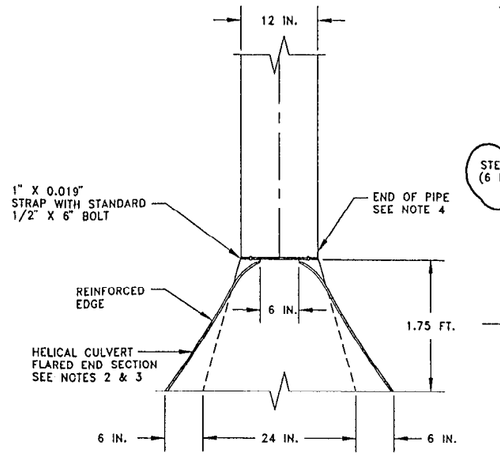


9 | 14 14 — TYPICAL CULVERT INLET DETAIL END VIEW

SCALE IN FEET 0 2 4

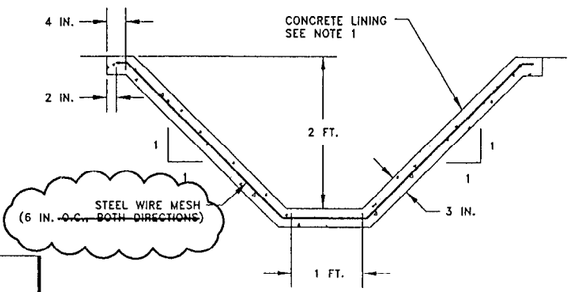
CULVERT INLET/OUTLET DIMENSIONS

BEGINING STATION	ENDING STATION	PIPE A (FEET)	WIDTH B (FEET)	DEPTH C (FEET)	WIDTH D (FEET)	THICKNESS E (FEET)
EAST DITCH						
0+88	1+36	1.5	4.0	2.0	2.75	1.0
1+86	2+06	1.5	4.0	2.0	2.75	1.0
4+06	4+42	1.5	4.0	2.0	2.75	1.0
SOUTHEAST TRAPEZOIDAL DITCH						
2+76	2+88	2.5	6.0	2.0	3.25	1.5
WEST + SOUTH DITCHES						
5+90	6+52	2.0	8.0	2.0	2.75	1.5
WEST ROAD DITCH						
1+34	1+50	1.5	4.0	2.0	2.75	1.0
3+15	3+41	2.0	4.0	2.0	2.75	1.5



11 | 12 12 14 — METAL CULVERT FLARED END SECTION

SCALE IN FEET 0 1 2

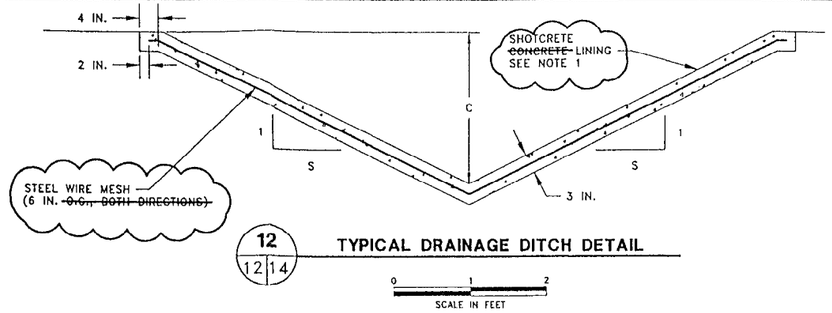


10 | 12 12 14 — CONCRETE TRAPEZOIDAL CHANNEL DETAIL

SCALE IN FEET 0 1 2

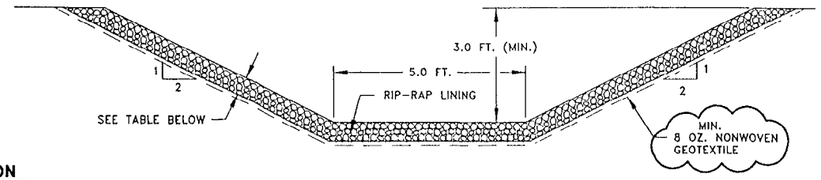
SURFACE WATER CONTROL DITCH DIMENSIONS

BEGINING STATION	ENDING STATION	DITCH DEPTH (D)	SIDESLOPES (S)
EAST DITCH			
0+33	0+88	2.0	1H:1V
1+36	1+86	2.0	1H:1V
2+06	4+06	2.0	1H:1V
SOUTHEAST TRAPEZOIDAL DITCH			
0+00	2+76	2.0	1H:1V
WEST + SOUTH DITCHES			
0+00	1+76	2.0	1H:1V
1+76	2+28	TRANSITION FROM 1H:1V TO 2H:1V	
2+28	5+90	2.0	2H:1V
WEST ROAD DITCH			
0+00	1+34	2.0	1H:1V
1+50	3+15	2.0	1H:1V



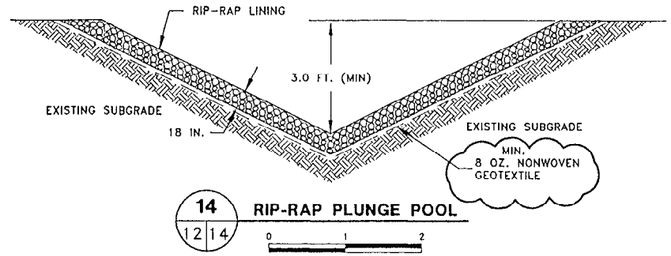
12 | 12 12 14 — TYPICAL DRAINAGE DITCH DETAIL

SCALE IN FEET 0 1 2



13 | 13 12 14 — TYPICAL NORTH TRAPEZOIDAL CHANNEL DETAIL

SCALE IN FEET 0 2 4



14 | 14 12 14 — RIP-RAP PLUNGE POOL

SCALE IN FEET 0 1 2

9 | 13 14 — DETAIL/SECTION DESIGNATION
DRAWING WHERE SECTION/DETAIL IS LOCATED
DRAWING WHERE SECTION/DETAIL IS REFERENCED

NOTES:

1) EXPANSION JOINTS SHALL BE INSTALLED TRANSVERSELY AT 20-FT. INTERVALS. EXPANSION JOINTS SHALL BE FILLED WITH EXPANSION JOINT FILLER 1/2 IN. THICK.
2) HELICAL CULVERT FLARED END SECTION SHALL BE CONSTRUCTED AS PER CALTRANS STANDARD PLAN D94A.
3) ALL 3-PIECE BODIES TO HAVE 0.109 IN. THICK SIDES AND 0.138 IN. THICK CENTER PANELS. WIDTH OF CENTER TO BE GREATER THAN 20% OF THE PIPE PERIPHERY. MULTIPLE PANEL BODIES TO HAVE LAP SEAMS WHICH ARE TO BE TIGHTLY JOINED BY RIVETS OR BOLTS.
4) END OF PIPE TO BE FINISHED WITH ANNULAR CORRUGATIONS TO CONFORM FLARED END SECTION SO THAT MINIMAL LEAKAGE RESULTS FROM THE CONNECTION. OTHER DESIGNS MAY BE USED WITH APPROVAL OF THE ENGINEER.

RIPRAP FOR NORTHERN DITCH

REACH	D_{max}	D_{50}	D_{10}	THICKNESS
a-b	7.5 In.	6 In.	2 In.	12 In.
b-c	7.5 In.	6 In.	2 In.	12 In.
c-d	15 In	12 In.	4 In.	18 In.

REGISTERED PROFESSIONAL ENGINEER
RICHARD L. KYLE
DP 12/31/00
NO. 047477
CIVIL
STATE OF CALIFORNIA

LLNL DRAWING ID: PSZ 97-300-0300

AS-BUILT ISSUE	DATE OCTOBER 30, 1997	DRAWING NO.	14A
PE/A	D. LITTLEFIELD	DATE	1/18/97
SL/GL	D. LING	DATE	1/17/97
SECURITY	P. BAKER	DATE	1/14/97
M/O	L. PAUKERT	DATE	1/22/97
H.C.	J. FORTE	DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.	
DES BY	BAM/KSO		
DR BY	BAM/DVR		
CHK BY	KGH		
RVW BY	KSO		
SCALE:	AS SHOWN		

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

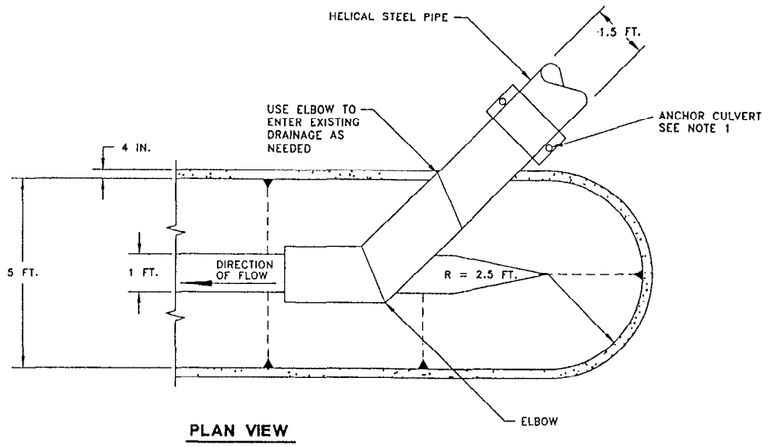
PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: SURFACE WATER CONTROL DETAILS

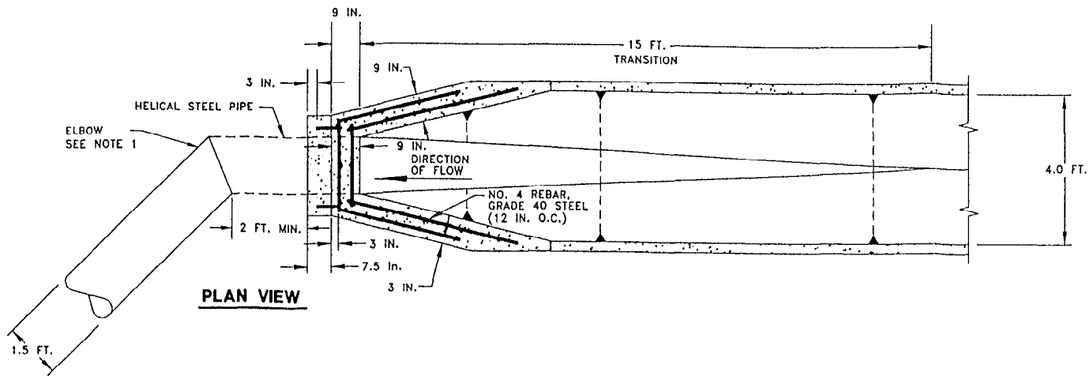
LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 14 OF 20 | DRAWING NO. 14A | REV. 0

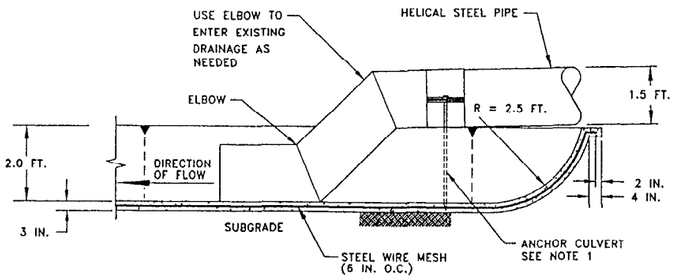
DWG ID: \963-7108\DGN\3178 10-28-97 13:48



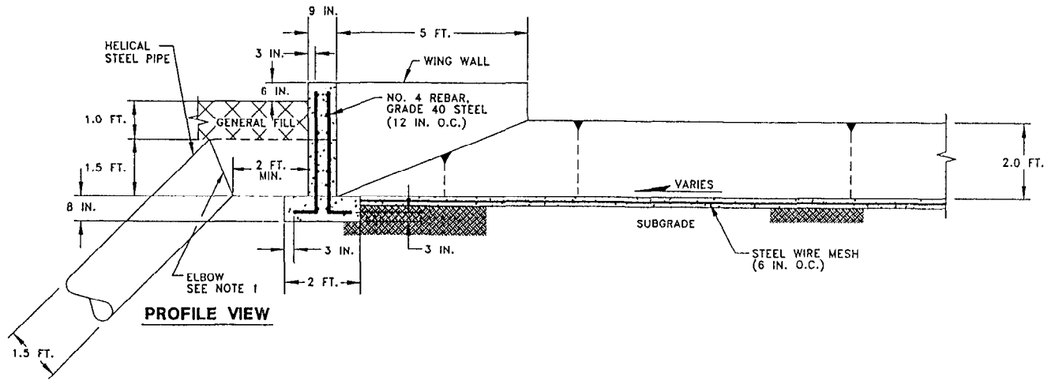
PLAN VIEW



PLAN VIEW



PROFILE VIEW



PROFILE VIEW

4+42 / 12 CULVERT TO CONCRETE TRAPEZOIDAL DITCH DETAIL

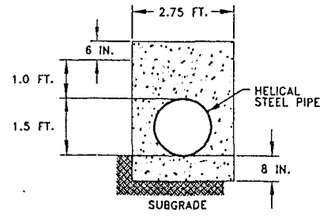
SCALE IN FEET: 0 2 4

NOTES:

1) ANCHOR PIPE USING A MINIMUM 12 IN. X 0.052 IN. GALVANIZED HELICAL COUPLING BAND, AND 1 1/2 IN. DIA. X 6 FOOT LONG GALVANIZED PIPE STAKES PER CALTRANS D87A,B STANDARD PLANS.

4+06 / 12 CULVERT CONCRETE OUTLET DETAIL AT 4+06

SCALE IN FEET: 0 2 4



9 / 1 1 TYPICAL CULVERT INLET DETAIL END VIEW

SCALE IN FEET: 0 2 4

NOTES:

1) PIPE SHALL PROJECT A MINIMUM OF 2 FEET FROM HEADWALL BEFORE BEING BENT AND ENTERING THE EXISTING DRAINAGE.

REGISTERED PROFESSIONAL ENGINEER RICHARD E. KYLE DP. 12/31/00 NO. 047477 CIVIL STATE OF CALIFORNIA

LLNL DRAWING ID: PSZ 97-300-0310

AS-BUILT ISSUE	DATE	OCTOBER 30, 1997		DRAWING NO.	7
PE/A	D. LITTLEFIELD			DATE	1/18/97
SL/GL	D. LING			DATE	1/17/97
SECURITY	P. BAKER			DATE	1/14/97
M/O	L. PAUKERT			DATE	1/22/97
H.C.	J. FORTE			DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.			
DES BY	BAW				
DR BY	PEB				
CHK BY	KGH				
RVW BY	KSO				
SCALE:	AS SHOWN				

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

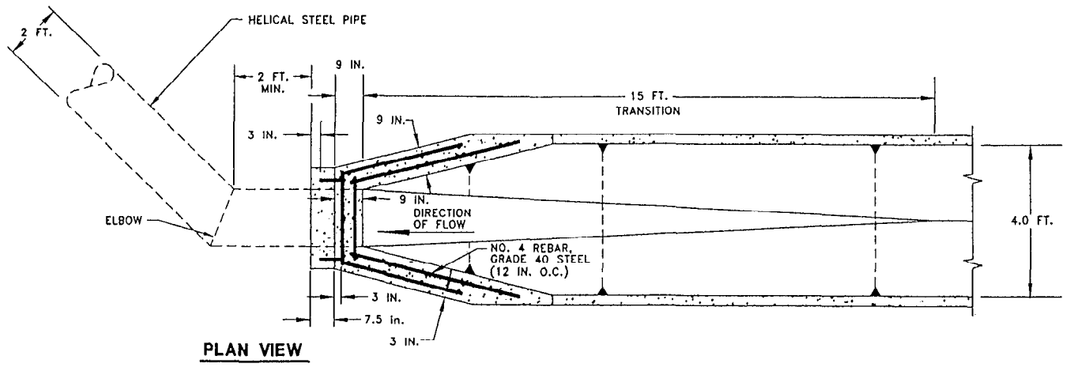
PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: SURFACE WATER CONTROL PLAN - DETAILS

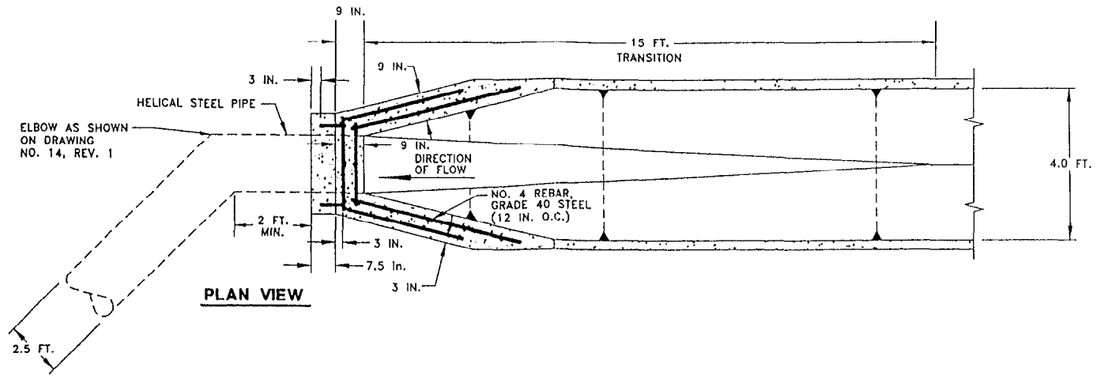
LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 15 OF 20	
DRAWING NO.	REV
14B	0

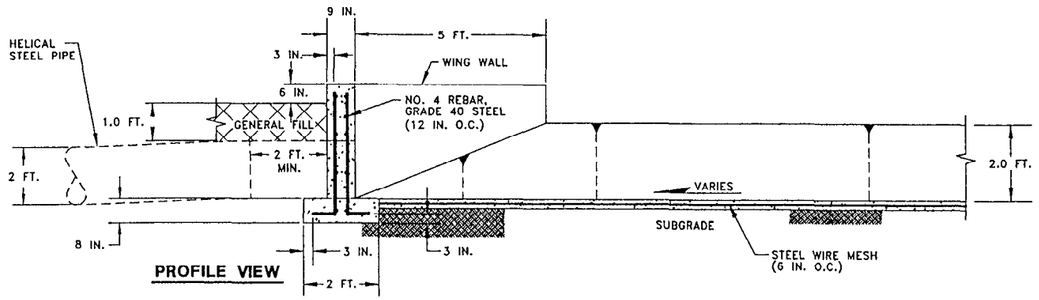
DWG ID: \963-7108\002\379 10-28-97 14:54



PLAN VIEW



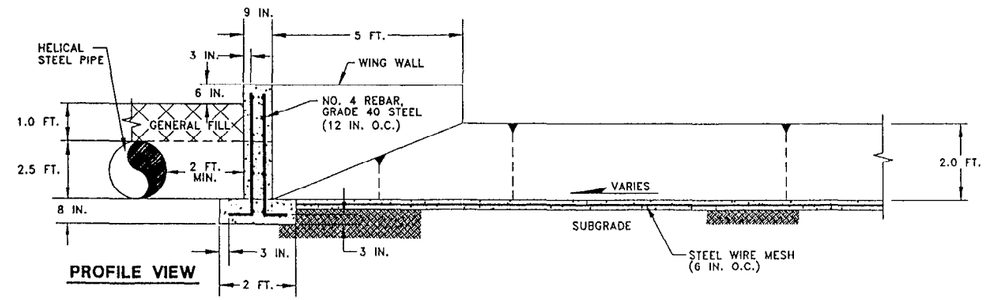
PLAN VIEW



PROFILE VIEW

5+90 / 12 CULVERT CONCRETE INLET DETAIL AT STA 5+90

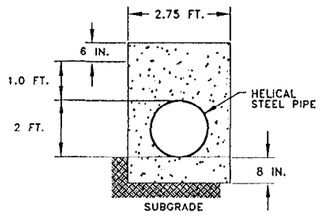
SCALE IN FEET 0 2 4



PROFILE VIEW

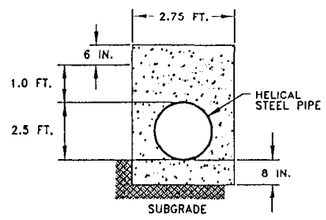
2+76 / 12 CULVERT CONCRETE OUTLET DETAIL AT 2+76

SCALE IN FEET 0 2 4



9 / 3 | 3 TYPICAL CULVERT INLET DETAIL END VIEW

SCALE IN FEET 0 2 4



9 / 5 | 5 TYPICAL CULVERT INLET DETAIL END VIEW

SCALE IN FEET 0 2 4

LLNL DRAWING ID: PSZ 97-300-0320

AS-BUILT ISSUE	DATE	OCTOBER 30, 1997		DRAWING NO.	14C
PE/A	D. LITTLEFIELD			DATE	1/18/97
SL/GL	D. LING			DATE	1/17/97
SECURITY	P. BAKER			DATE	1/14/97
M/O	L. PAUKERT			DATE	1/22/97
H.C.	J. FORTE			DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.			
DES BY	BAM				
DR BY	PEB				
CHK BY	KGH				
RVW BY	KSO				
SCALE:	AS SHOWN				

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: SURFACE WATER CONTROL PLAN - DETAILS

REGISTERED PROFESSIONAL ENGINEER RICHARD E. KILL DP. 12/31/00 NO. 047477 CIVIL STATE OF CALIFORNIA

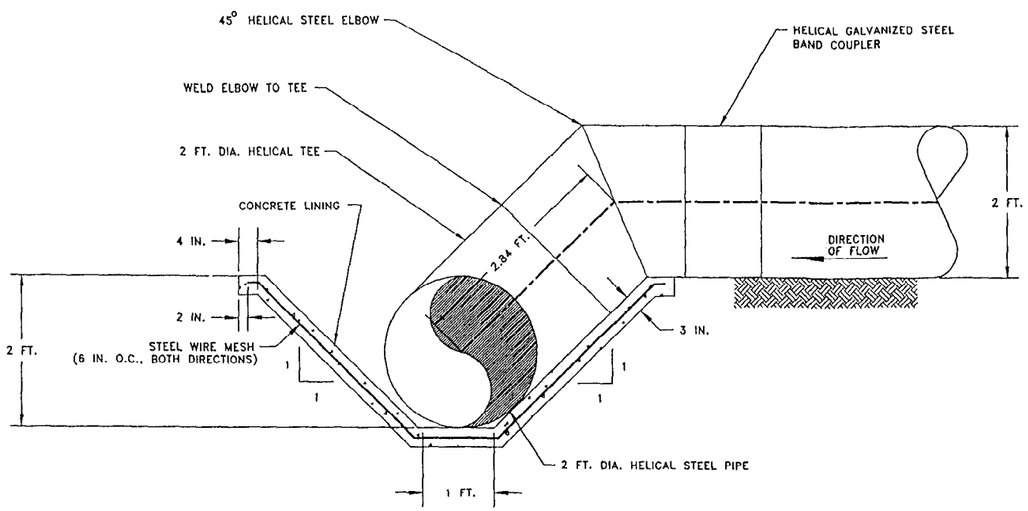
LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 16 OF 20

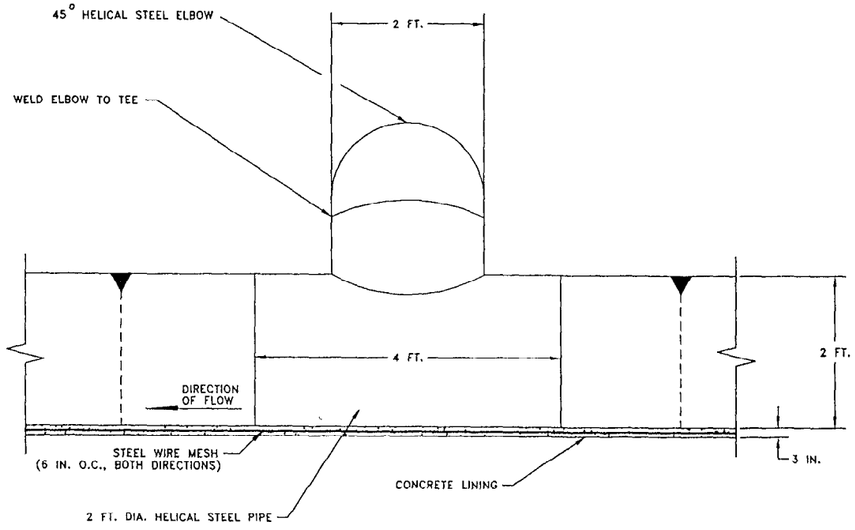
DRAWING NO. 14C

REV. 0

DWG ID: \963-7108\0003\3187 10-28-97 14:39



DOWNSTREAM VIEW



VIEW PERPENDICULAR TO DITCH

6+52
12

CULVERT TO CONCRETE TRAPEZOIDAL DITCH DETAIL AT STA 6+52

0 1 2
SCALE IN FEET

LLNL DRAWING ID: PSZ 97-300-0330

AS-BUILT ISSUE	DATE	OCTOBER 30, 1997		DRAWING NO.	14D
PE/A	D. LITTLEFIELD			DATE	1/16/97
SL/GL	D. LING			DATE	1/17/97
SECURITY	P. BAKER			DATE	1/14/97
M/O	L. PAUKERT			DATE	1/22/97
H.C.	J. FORTE			DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.			
DES BY	BAM				
DR BY	PEB				
CHK BY	KOH				
RVW BY	KSO				
SCALE:	AS SHOWN				

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: SURFACE WATER CONTROL PLAN - DETAIL

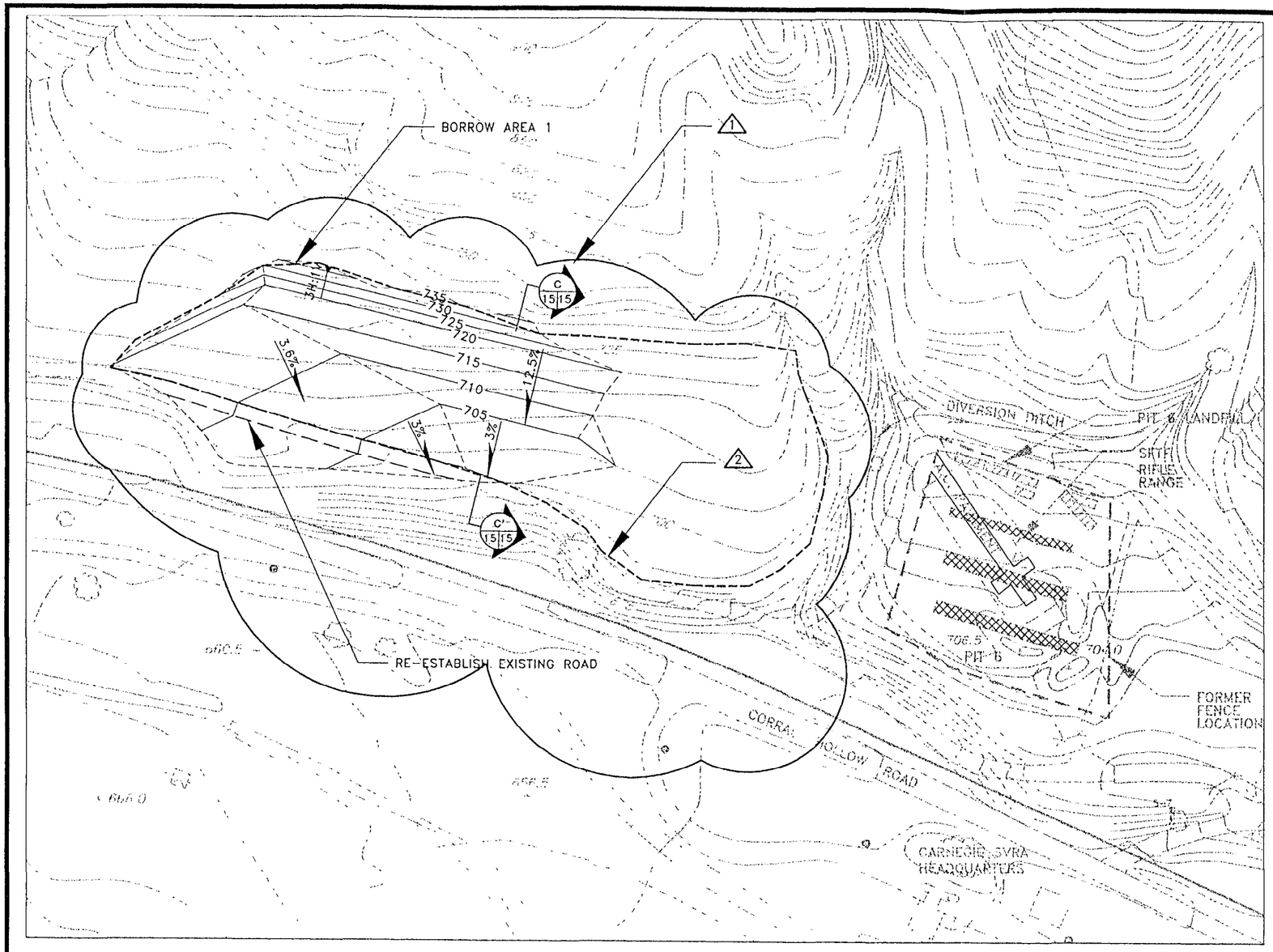
REGISTERED PROFESSIONAL ENGINEER RICHARD E. KIEL EXP. 12/31/00 NO. 047477 CIVIL STATE OF CALIFORNIA

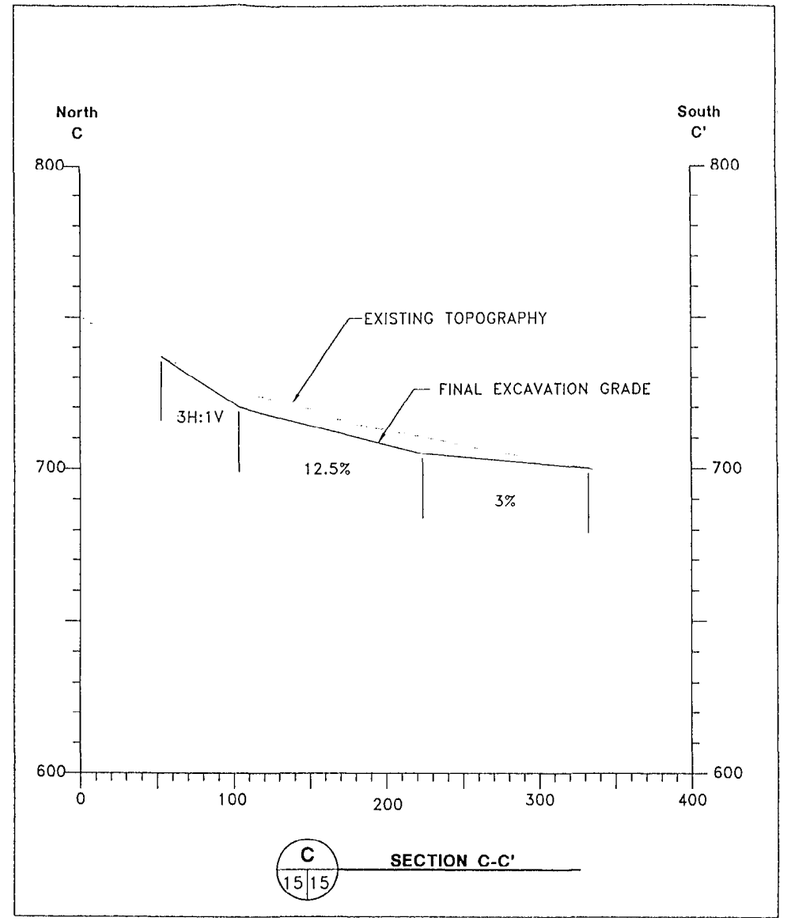
LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 17 OF 20

DRAWING NO. 14D

DWG ID: \963-7108\002\3.MS 10-28-97 14:09





LEGEND:

- EXISTING GROUND SURFACE ELEVATION CONTOURS (FT., MSL)
- 710 FINAL BORROW AREA CONTOURS AND ELEVATION (FT., MSL)
- EXISTING DITCH FLOWLINE
- EXISTING DIRT ROAD
- RE-ESTABLISHED ACCESS ROAD

A / 4 5 — DETAIL/SECTION DESIGNATION; DRAWING WHERE SECTION/DETAIL IS LOCATED; DRAWING WHERE SECTION/DETAIL IS REFERENCED

NOTES:

1) TOPOGRAPHY SUPPLIED BY LAWRENCE LIVERMORE NATIONAL LABORATORY. DRAWING NO. S96010. COORDINATES ARE BASED ON SITE 300-SPECIFIC GRID SYSTEM.
2) GRADING CONTOURS ARE MAY CHANGE DEPENDING ON THE VOLUME OF MATERIAL REQUIRED TO CONSTRUCT THE PIT 6 LANDFILL COVER.
3) CONTRACTOR SHALL ~~PLACE A MINIMUM OF 6 INCHES OF VEGETATIVE SOIL OVER EXCAVATED AREA, AND RESEED.~~ HYDROSEED.

AS-BUILT NOTES:

1. BLADED TO DRAIN. CUT TO CONTOUR.
2. APPROXIMATE LIMITS OF BORROW AREA.

0 100 200
SCALE IN FEET

REGISTERED PROFESSIONAL ENGINEER RICHARD E. KYLE EXP. 12/31/00 NO. 047477 STATE OF CALIFORNIA CIVIL

LLNL DRAWING ID: PSZ 97-300-0340

AS-BUILT ISSUE	DATE	OCTOBER 30, 1997		DRAWING NO.	15
PE/A	D. LITTLEFIELD			DATE	1/18/97
SL/GL	D. LING			DATE	1/17/97
SECURITY	P. BAKER			DATE	1/14/97
M/O	L. PAUKERT			DATE	1/22/97
H.C.	J. FORTE			DATE	1/15/97
PFN	ERD - 96001	LLNL DWG. NO.			
DES BY	BAM				
DR BY	BAM				
CHK BY	KGH				
RVW BY	KSO				
SCALE:	AS SHOWN				

Golder Associates

PROJECT NO.: 963-7108 TASK NO.: 411

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

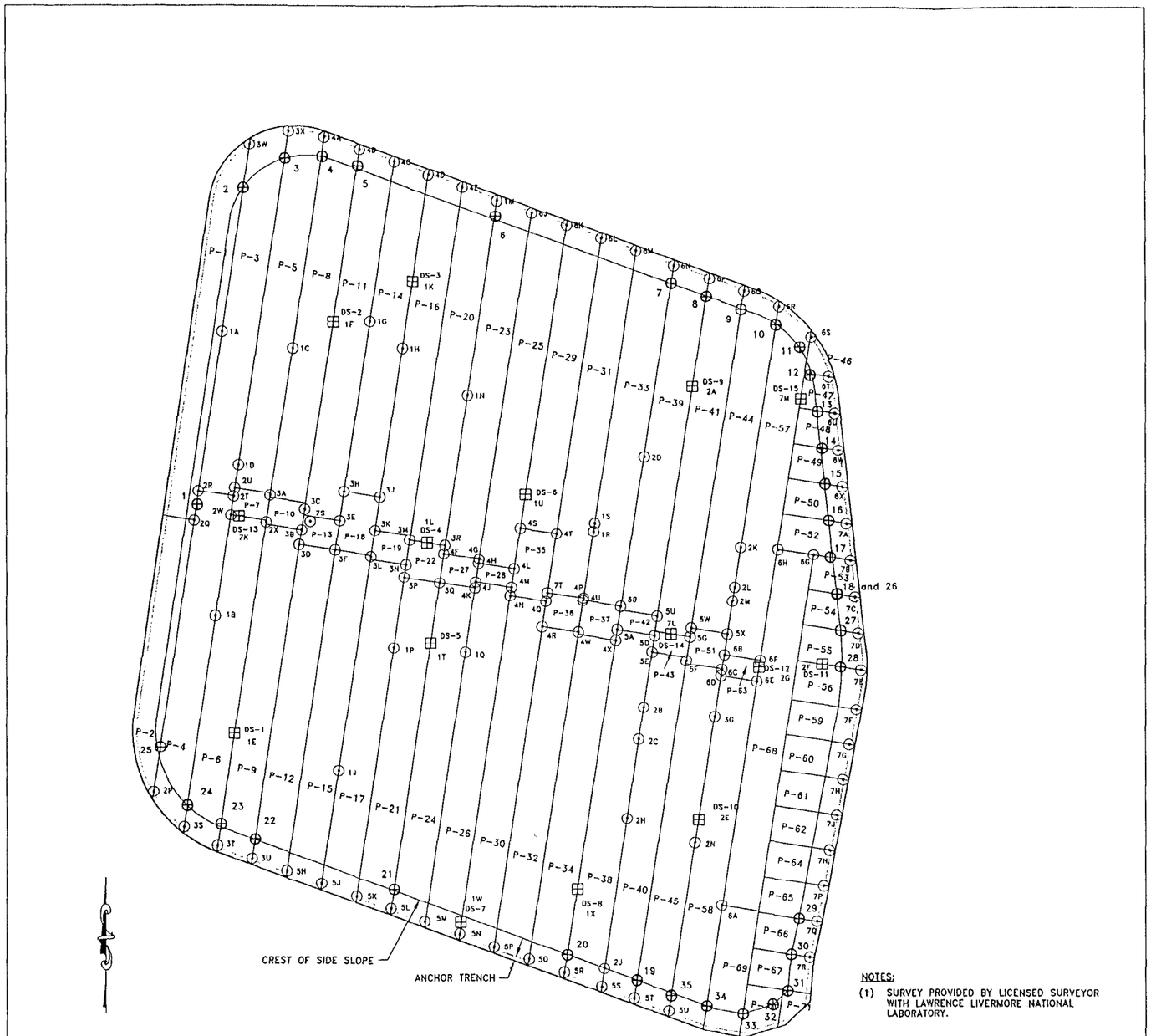
SHEET TITLE: BORROW AREA 1 GRADING PLAN AND SECTION

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 18 OF 20

DRAWING NO.	REV.
15	0

DWG ID: \963-7108\GA\3177 10-28-97 14:02



NOTES:

(1) SURVEY PROVIDED BY LICENSED SURVEYOR WITH LAWRENCE LIVERMORE NATIONAL LABORATORY.

(2) HDPE PANELS, DESTRUCTIVE SAMPLES, AND REPAIRS LOCATED BY GCS USING WHEEL MEASUREMENT.

(3) THIS DRAWING IS NOT AN ORIGINAL DESIGN DRAWING. THIS DRAWING ILLUSTRATES THE LOCATION OF INDIVIDUAL GUNSEAL PANELS. DESTRUCTIVE TESTS AND REPAIRS.

LEGEND

P-48	PANEL NUMBER
DS-9	DESTRUCTIVE LOCATION
6T	REPAIR NUMBER
28	SURVEY POINT

PANEL SURVEY DATA

POINT NO.	NORTHING	EASTING	ELEVATION
1	414906.271	1698253.382	706.301
2	415056.010	1698275.248	720.002
3	415069.417	1698294.433	721.721
4	415071.109	1698312.086	722.025
5	415066.318	1698328.751	721.451
6	415042.853	1698394.186	720.849
7	415011.677	1698476.479	722.239
8	415005.264	1698492.824	722.436
9	414999.339	1698509.228	722.871
10	414992.083	1698525.562	722.286
11	414981.317	1698536.500	721.230
12	414968.980	1698541.736	720.198
13	414951.291	1698546.206	718.531
14	414934.041	1698547.533	717.131
15	414916.765	1698548.902	715.564
16	414899.478	1698550.503	713.890
17	414882.129	1698551.369	712.469
18	414864.701	1698554.616	710.908
19	414681.853	1698460.127	694.318
20	414693.659	1698427.379	694.752
21	414724.161	1698345.676	695.922
22	414747.606	1698280.472	696.602
23	414754.712	1698264.332	696.936
24	414763.791	1698248.527	697.342
25	414791.060	1698235.874	698.658
26	414864.576	1698554.200	710.919
27	414847.527	1698556.176	709.373
28	414830.219	1698556.077	707.962
29	414711.226	1698536.316	697.268
30	414694.457	1698532.517	696.160
31	414677.449	1698530.895	694.508
32	414671.020	1698523.840	693.952
33	414666.347	1698509.685	693.193
34	414669.875	1698492.684	693.668
35	414674.805	1698476.152	693.863

DES BY	NE	9/22/97
DR BY	BFM	10/30/97
CHK BY	DVR	10/30/97
RVW BY	REK	10/30/97
SCALE:	AS SHOWN	

REGISTERED PROFESSIONAL ENGINEER RICHARD E. NILL EXP. 12/31/00 NO. 04747 STATE OF CALIFORNIA

Golder Associates

PROJECT NO.: 963-7108 | TASK NO.: 430

PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

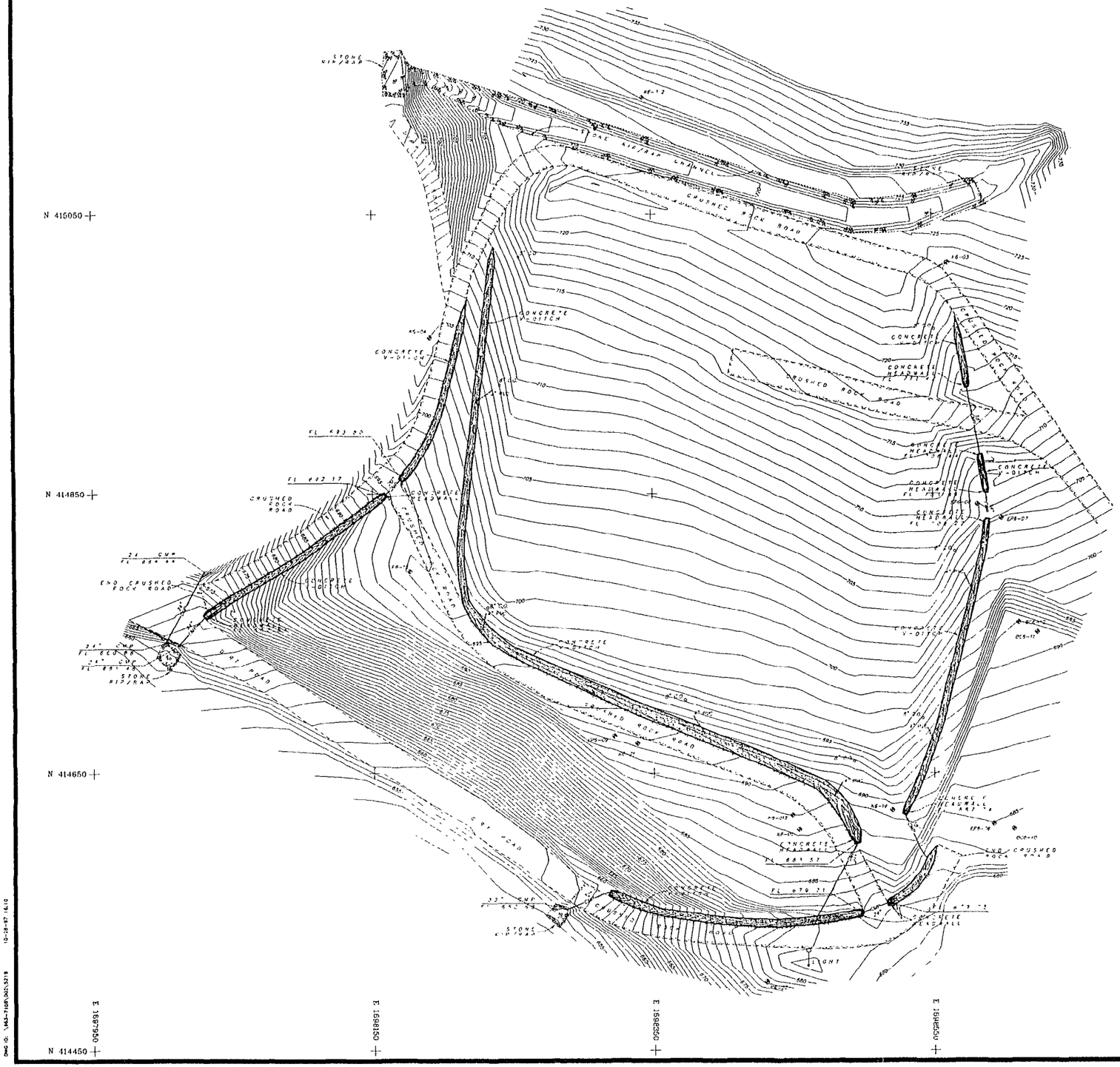
SHEET TITLE: AS-BUILT HDPE PANEL LAYOUT

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 19 OF 2

DRAWING NO. 16

DWG ID: \\963-7108\002\311881 10-28-97 14:18


N 415250
N 415050
N 414850
N 414650
N 414450
E 1587950
E 1588150
E 1588250
E 1588350
E 1588250
STONE RIP/RAP
DOE AIRSTRIP CHANNEL
CRUSHED ROCK ROAD
CONCRETE V-DITCH
CONCRETE HEADWALL
CONCRETE FLUME
END CRUSHED ROCK ROAD
24" CMP
36" CMP
48" CMP
FL 693.80
FL 692.17
FL 688.44
FL 681.28
FL 679.71
FL 665.57
LIGHT
16-03
RE-13
RE-14
RE-15
RE-16
RE-17
RE-18
RE-19
RE-20
RE-21
RE-22
RE-23
RE-24
RE-25
RE-26
RE-27
RE-28
RE-29
RE-30
RE-31
RE-32
RE-33
RE-34
RE-35
RE-36
RE-37
RE-38
RE-39
RE-40
RE-41
RE-42
RE-43
RE-44
RE-45
RE-46
RE-47
RE-48
RE-49
RE-50
RE-51
RE-52

Appendix E

Addendum's and RFI's

University of California
Lawrence Livermore National Laboratory

Request for Information # 01

Project:

To: Engineering/Construction Department
Lawrence Livermore National Laboratory

Subject: Geogrid P.O. _____
Attention: Harry Tsenstead
Spec. Sect: 02754
Drawing Ref: _____

From: Jeff Brown, Enviocon

Priority	[X] 1 - Immediate	[ ] 2 - 10 Days	[ ] 10 - 20 Days

Request: Per our conversation, could you please review the testing requirments for Tensar UX1600HS Geogrid. Attached manufatures letter outlining differences in tests. They can produce and test per requirments but may not beable to manufacture until mid June.

Date Issued: May 27, 1997 By: _____
Title: Construction Manager

Response:

Date Received: _____ By: _____
C.C. _____ Title: _____

This is issued for Clarification/Information only, and is not intended or directed to change the Project cost or time schedule

TENSAR®
Earth Technologies, Inc.

5775-B Glenridge Drive
Lakeside Center, Suite 450
Atlanta, Georgia 30328
Tel. 404 • 250 • 1290
Fax 404 • 250 • 9185

May 22, 1997

Mr. Jeff Brown
Envirocon
5200 Little Brush Ridge Road
Placerville, CA 95667

Phone: 916-676-8820
FAX: 916-676-8820

Subject: Lawrence Livermore Laboratory - S.300 Pit 6 Closure Cover

Dear Mr. Brown;

Thank you for speaking with me yesterday and today about the status of the Lawrence Livermore Pit #6 Closure project. Here is the quotation for Tensar UX1600HS geogrid and Evergreen TG700 (8 oz.) nonwoven geotextile.

We have reviewed the specifications you submitted to us (S.300 Pit 6 Closure Cover) and have noted that the conformance testing in your specification for geogrid differs slightly from Tensar's normal QA/QC procedures. The differences noted are as follows:

1.) Your specification requests the frequency of sampling for testing to be every 50,000 square feet. Tensar normally samples UX1600HS every 60,000 square feet.

2.) Tensar does not measure spacing between strands with a caliper. We do a rib count per sample width measurement using a metal tape measure with accuracy to 1mm (0.039 in.)

3.) Your specification calls for tensile strength to be tested by ASTM D4595 which is the standard test method for tensile properties of geotextiles by the wide-width strip method. ASTM D4595 is a test that was designed specifically for geotextile not geogrid. Tensar measures ultimate tensile load with the GRI - GG1 and GRI - GG2 methods. They are modified for a speed of 10% of the Gage Length/minute. This is done in the machine direction only for uniaxial grid. The gage length is two (2) apertures.

Meeting your requirements will require us to schedule the manufacture of your geogrid with our existing production schedule rather than to be at liberty to fill your order using existing inventory from our warehouse. The next manufacture date for UX1600HS is now expected to be some time in June. Also as noted on our quotation these special test requirements will add a cost to your geogrid purchase. We suggest you approach your engineers on the project and have them consider modifying the specification to incorporate Tensar's standard test procedures as mentioned above.

We will assume for the present time that your order will be supplied to meet the specifications as received from you. Please complete the enclosed credit application and return to me by fax as soon as possible.

Please call me if you have any questions.

Sincerely,

Peter Romocki
Market Manager
Tensar Earth Technologies

cc: Mr. Tom Stitt, Mr. Tom Dobras

Golder Associates Inc.
198 Cirby Way, Suite 105
Roseville, CA USA 95678
Telephone (916) 786-2424
Fax (916) 786-2434

May 29, 1997 Our Ref: 963-7108(001).000

Lawrence Livermore National Laboratory
Plant Engineering
P.O. Box 808, L-522
Livermore, CA 94551

Attention: Mr. Harry Benstead

RE: RESPONSE TO LETTER FROM TENSAR
SITE 300, PIT 6 LANDFILL CLOSURE COVER CONSTRUCTION

Dear Mr. Benstead:

Golder Associates reviewed the correspondence dated May 22, 1997 from Mr. Peter Romocki of Tensar, Earth Technologies, Inc. Our response to each item follows:

1) *Your specification requests the frequency of sampling for testing to be every 50,000 square feet. Tensar normally samples UX1600HS every 60,000 square feet.*

This is acceptable to Golder. A minimum of two samples will be required for either frequency. In addition, the product will be tested at the frequency of one sample every 50,000 square feet when it arrives at the site as required in the specifications.

2) *Tensar does not measure spacing between strands with a caliper. We do a rib count per sample width measurement using a metal tape measure with accuracy to 1 mm (0.039 in.)*

This is acceptable. When the product arrives at the site, it will be measured with a caliper as specified.

3) *Your specification calls for tensile strength to be tested by ASTM D4595 which is the standard test method for tensile properties of geotextiles by the wide-width strip method. ASTM D4595 is a test that was designed specifically for geotextile not geogrid. Tensar measures ultimate tensar load with the GRI - GG1 and GRI - GG2 methods. They are modified for a speed of 10% of the Gage Length/minute. This is done in the machine direction only for uniaxial grid. The gage length is two (2) apertures.*

Both test methods are accepted practices for measuring the tensile strength of geogrids. Golder feels either method will produce similar results, and therefore, Golder will accept GRI-GG1 test results as part of Tensar's manufacturing quality control program. However, Golder anticipates that conformance sampling and testing of the product as part of the quality assurance program will utilize the ASTM D4595 test method.

These minor differences are not sufficient to require a special product run. The material must still pass conformance testing when it arrives at the site.

Sincerely Yours,

GOLDER ASSOCIATES INC.

Kenneth G. Haskell, P.E.
Associate

for Kenneth S. Obenauf, P.E.
Senior Sub-Consultant

cc: Cal Dibble, LLNL-Plant Engineering
Dave Littlefield, LLNL-Plant Engineering
Tom Berry, LLNL-ERD (Weiss)
Rick Kiel, GCS

University of California
Lawrence Livermore National Laboratory

Request for Information # 02

Project:

To: Engineering/Construction Department
Lawrence Livermore National Laboratory

Subject: Rebar P.O. _____
Attention: _____
Spec. Sect: _____
Drawing Ref: _____

From: Jeff Brown, Envirocon

Priority	☐ 1 - Immediate	☐ 2 - 10 Days	☐ 10 - 20 Days

Request: Please clarify the 12' OC specification for Rebar as noted on Drawing #14 Detail #8

Date Issued: 09 June 1997 By: _____

Title: Construction Manager

Response:

Date Received: _____ By: _____

C.C. _____ Title: _____

This is issued for Clarification/Information only, and is not intended or directed to change the Project cost or time schedule

Golder Associates Inc.

180 Grand Avenue, Suite 250
Oakland, CA USA 94612
Telephone (510) 239-9000
Fax (510) 239-9010

June 10, 1997

Our Ref: 963-7108.001

Lawrence Livermore National Laboratory
Engineering/Construction Department
P.O. Box 808,L-654
Livermore, CA 94551

Attention: Mr. Harry Benstead

RE: RESPONSE TO REQUEST FOR INFORMATION NOS. 2 AND 3, OF SITE 300, PIT 6 LANDFILL TITLE II DESIGN

Dear Mr. Benstead:

We have received two requests for information (RFI) Nos. 2 and 3 from Envirocon. We have reviewed the requests by Envirocon and have the following responses:

RFI 2: *"Please clarify the 12 ' OC specification for rebar as noted on Drawing #14, Detail #8."*

Response 2: The 12-foot on center (O.C.) is incorrect. The specification should be No. 4 Rebar, Grade 40 steel (12 In. (inch) O.C.).

RFI 3: *"Please clarify the compaction requirements for vegetative cover material. Section 02229 of the construction specifications."*

Response 3: The compaction by track-walking specification in Section 02229 of the construction specifications applies to the entire 2-foot thick vegetative soil cover. We recommend placing the vegetative soil cover in two 12-inch thick lifts.

If you have any questions or comments please us a call.

Sincerely Yours,

GOLDER ASSOCIATES INC.

Barry A. Mac Donnell

Barry A. Mac Donnell, P.E.
Project Engineer

for: Kenneth G. Haskell, P.E.
Associate

cc: Kenneth S. Obenauf, P.E.
David Littlefield LLNL-Plant Engineering

University of California
Lawrence Livermore National Laboratory

Request for Information # 03

Project:

To: Engineering/Construction Department
Lawrence Livermore National Laboratory

Subject: _____ P.O. _____
Attention: _____
Spec. Sect: _____
Drawing Ref: _____

From: Jeff Brown

Priority	☐ 1 - Immediate	☐ 2 - 10 Days	☐ 10 - 20 Days

Request: Please clarify the compaction requirments for Vegetative Cover material. Section ~~00~~ 02229 of the construction Specifications

Date Issued: 6/9/97 By: _____

Title: Construction Manager

Response:

Date Received: _____ By: _____

C.C. _____ Title: _____

This is issued for Clarification/Information only, and is not intended or directed to change the Project cost or time schedule

Golder Associates Inc.

180 Grand Avenue, Suite 250
Oakland, CA USA 94612
Telephone (510) 239-9000
Fax (510) 239-9010

June 10, 1997

Our Ref: 963-7108.001

Lawrence Livermore National Laboratory
Engineering/Construction Department
P.O. Box 808,L-654
Livermore, CA 94551

Attention: Mr. Harry Benstead

RE: RESPONSE TO REQUEST FOR INFORMATION NOS. 2 AND 3, OF SITE 300, PIT 6 LANDFILL TITLE II DESIGN

Dear Mr. Benstead:

We have received two requests for information (RFI) Nos. 2 and 3 from Envirocon. We have reviewed the requests by Envirocon and have the following responses:

RFI 2: *"Please clarify the 12 ' OC specification for rebar as noted on Drawing #14, Detail #8."*

Response 2: The 12-foot on center (O.C.) is incorrect. The specification should be No. 4 Rebar, Grade 40 steel (12 In. (inch) O.C.).

RFI 3: *"Please clarify the compaction requirements for vegetative cover material. Section 02229 of the construction specifications."*

Response 3: The compaction by track-walking specification in Section 02229 of the construction specifications applies to the entire 2-foot thick vegetative soil cover. We recommend placing the vegetative soil cover in two 12-inch thick lifts.

If you have any questions or comments please us a call.

Sincerely Yours,

GOLDER ASSOCIATES INC.

Barry A. Mac Donnell

Barry A. Mac Donnell, P.E.
Project Engineer

for: Kenneth G. Haskell, P.E.
Associate

cc: Kenneth S. Obenauf, P.E.
David Littlefield LLNL-Plant Engineering

REQUEST FOR INFORMATION (RFI)
NO. 4

To: Harry Benstead
LLNL
P.O. Box 808, L-522
Livermore, CA 94551
Fax #: (510) 422-5264

Date: June 20, 1997
Project: Pit 6 Landfill Closure
Subject: GCL Liner Material Testing
Spec. Sec.: 02756
Dwg. No.: _____

LLNL P.O.#: _____

We are requesting the following information:

LLNL has contracted for the use of a "Gunseal" liner instead of a 2 part GCL system. What are the QC Testing and Submittal requirments for this product. Additionally what are the installation requirments and specifications. During the bidding process the only mention of this material was a reference on page 02756-4 2.01 C as acceptable material/manufacturer. Please advise as to wheather there are any changes to required testing

The above information is needed no later than: June 25, 1997
(Date)

Jeffrey Brown 6/20/97
(Subcontractor) (Date)

Response:

_____
(LLNL) (Date)

Golder Associates Inc.

198 Cirby Way, Suite 105
Roseville, CA USA 95678
Telephone (916) 786-2424
Fax (916) 786-2434

Golder Associates

June 30, 1997

Our Ref: 963-7108.001

Lawrence Livermore National Laboratory
Engineering/Construction Department
P.O. Box 808, L-654
Livermore, CA 94551

Attention: Mr. Harry Benstead

RE: RESPONSE TO REQUEST FOR INFORMATION NOS. 4, 5, 6, AND 7 FOR SITE 300, PIT 6 LANDFILL CONSTRUCTION

Dear Mr. Benstead:

We have received four Request For Information (RFI) No.'s 4, 5, 6, and 7 from Envirocon. We have reviewed the requests and have the following responses:

RFI 4: *LLNL has contracted for the use of a "Gundseal" liner instead of a 2 part GCL system. What are the QC Testing and submittal requirements for this product. Additionally what are the installation requirements and specifications. During the bidding process the only mention of this material was referenced on page 02756-4 2.01 C. as acceptable material with manufacturer. Please advise as to whether there are any changes to required testing.*

Response 4: The HDPE component must meet the testing requirements for geomembrane (02751). Since there is no geotextile component to Gundseal, none of the testing for geotextile applies. Therefore, conformance testing of the Gundseal shall consist of the following:

2.02 B. 1. Bentonite content: 1 lb/sq ft (minimum average roll value)

2.02 B. 3. Minimum free swell of 24 ml per ASTM D 5890.

Installation requirements specified for GCL shall apply for the Gundseal (except for references to geotextiles).

RFI 5: *Please refer to GSE Correspondence dated 6/24/97 and clarify.*

5a: *Melt Index (resin). The melt flow for GSE resin will have a minimum value of 0.05 g/10 min. The specified minimum is 0.1 g/10 min. Melt flow is an indicator of the processability of the resin and is not an indicator of a geomembranes ability to function as a barrier. Please accept this minimum value.*

Response 5a: Melt Index is a reference to processability of the resin. The proposed material with a Melt Index of 0.05 g/10 min. is acceptable.

5b: Tensile Break Strength/Elongation. The minimum average break strength and break elongation values for 60 mil GSE HD Textured geomembrane are 75 lbs/in and 120%, respectively. The specified values of 228 lb/in and 600% are indicative of values for smooth GSE HD 60 mil geomembrane and not 60 mil HD Textured material. GSE requests these tensile break properties be acceptable.

Response 5b: The values for Tensile Break Strength and Elongation at break given in the specifications were incorrectly given for smooth HDPE. Table 02751-1 should be modified as follows to reflect the textured geomembrane:

Property	Units	Specification
Tensile Properties		
2. Break strength	lb/in	75
4. Elongation at break	%	120

5c: Puncture Resistance. GSE certifies that the material will meet the specified value when tested in accordance with ASTM D 4833. However, GSE standard testing procedures include testing puncture resistance in accordance with ASTM D [sic] FTMS 101, method 2065. Please accept this testing method and reporting.

Response 5c: GSE indicates that the material will meet the specified values in accordance with ASTM D 4833. Puncture Resistance testing of the material delivered to the site will be in accordance with ASTM D 4833, as specified.

5d: Table 02751-2, HDPE Geomembrane Seam Properties. Pass/Fail Criteria. GSE requests standard pass/fail requirement for the welded 60 mil HD Textured seams be film tear bond (FTB). Please accept this seam testing requirement.

Response 5d: Golder is specifying pass/fail criteria based on FTB (see Figures 02751-1 and 2) and minimum seam strengths. This criteria has been successfully applied to smooth and textured geomembrane application in California. Therefore, we are not proposing to modify the pass/fail criteria.

RFI 6: *Please refer to GSE Correspondence dated 6/13/97 and clarify.*

6a: [02755] Article 1.04. C. The average peel strength of GSE FabriNet is 1 ppi.

Response 6a: A reduction of average peel strength from 2 ppi to 1 ppi is acceptable for the conditions expected at the Pit 6 Landfill.

6b: Article 1.04. D. DIRECT SHEAR - The direct shear test (ASTM D5321) is a design test, not an index test. As such, GSE's Manufacturing Quality Assurance Laboratory does not perform this test. GSE cannot certify to direct shear results since the test relies on site-specific conditions. Interface values are greatly affected

by material interface, rate of displacement and normal load applied. GSE will, however provide samples to the laboratory of your choosing for performance of this testing. GSE can bear no responsibility for test results that do not give the results required in the specifications.

Response 6b: The material must be tested using soils from the site to verify that it meets the minimum required 15 degrees friction angle interface shear strength. GSE indicates that they can not be responsible for the material, however, someone in the Contractor's team must take ultimate responsibility for selection of the proposed geosynthetic materials.

6c: *ELONGATION AT BREAK/MINIMUM TENSILE STRENGTH - Because GSE does not manufacture the geotextile component of the geocomposite material, we do not routinely test tensile elongation or tensile strength of composite. The composite will meet the tensile strength requirements, but SE, our geotextile supplier lists break elongation as 40%.*

Response 6c: After further review, Golder proposes to modify Table 02755-1 as follows:

Test	Geocomposite Properties
~~Elongation at break (%) (ASTM D 4595)~~	~~500~~
Grab Elongation (%) (ASTM D 4632)	40

6d: *SHEARING STRENGTH - No method is specified for this, so it is unclear as to what this references.*

Response 6d: Shear Strength requirement has been removed as per Addendum No. 4.

RFI 7: *Please refer the attached test documentation for Bodkin Joints. Please approve use of Bodkin Joints over trenches.*

Response 7: Bodkin Joints are approved for the Pit 6 Landfill Closure Cover construction provided joints in adjacent panels are offset a minimum of 25 feet apart.

REQUEST FOR INFORMATION (RFI)
NO. 5

To: Harry Benstead
LLNL
P.O. Box 808, L-522
Livermore, CA 94551
Fax #: (510) 422-5264

Date: June 24, 1997
Project: P.I. 6 Landfill Closure
Subject: Gundseal HDPE Clarification
Spec. Sec.:
Dwg. No.:

LLNL P.O.#:

We are requesting the following information:

Please refer to attached GSE Correspondence Dated 6/24/97 and Clarify

The above information is needed no later than:
(Date)

6/24/97
(Subcontractor) (Date)

Response:

(LLNL) (Date)

GSE Lining Technology, Inc.
Technical Services

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-230-6799
Fax 281-230-2525

TELEFAX TRANSMISSION

DATE: June 24, 1997

TO: Jeffrey Brown
Envirocon

FAX: 510/454-0528
No. of Pages: 3

FROM: Richard Erickson
Technical Support Engineer

SUBJECT: Livermore Labs Closure
60 mil Textured Geomembrane Technical Clarifications

COPY: Larry Giowacky

This fax is in regard to the 60 mil textured geomembrane specifications for the referenced project.

GSE has reviewed the material specifications as provided for the referenced project. GSE certifies that the 60 mil HD Textured™ geomembrane will meet the material specifications. This is provided the following clarifications are acceptable. GSE requests these clarifications be accepted so that standard GSE material can be supplied for this project. Attached find the material specification for the GSE HD Textured 60 mil geomembrane.

TABLE 02751-1, HDPE Geomembrane Properties

Melt Index (resin). The melt flow for the GSE resin will have a minimum value of 0.05 g/10 min. The specified minimum is 0.1 g/10 min. Melt flow is an indicator of the processability of the resin and is not an indication of a geomembranes ability to function as a barrier. Please accept this minimum value.

Tensile Break Strength/Elongation. The minimum average break strength and break elongation values for 60 mil GSE HD Textured geomembrane are 75 lb/in and 120%, respectively. The specified values of 228 lb/in and 600% are indicative of values for smooth GSE HD 60 mil geomembrane and not 60 mil HD Textured material. GSE requests these tensile break properties be acceptable.

Puncture Resistance. GSE certifies that the material will meet the specified value when tested in accordance with ASTM D 4833. However, GSE standard testing procedures include testing puncture resistance in accordance with ASTM D FTMS 101, method 2065. Please accept this testing method and reporting.

TABLE 02751-2, HDPE Geomembrane Seam Properties

Pass/Fail Criteria. GSE requests standard pass/fail requirement for the welded 60 mil HD Textured seams be film tear bond (FTB). Please accept this seam testing requirement.

If you have any questions or comments, please contact Larry Glowacky or me. Thank you for your consideration

Regards,

Richard B. Erickson
Technical Support Engineer

GSE®

GSE HD™ Textured

Textured HDPE Geomembrane

GSE HD Textured is the textured version of GSE HD. It is a high quality, high density polyethylene (HDPE) geomembrane with one or two co-extruded, textured surfaces, and consisting of approximately 97.5% polyethylene, 2.5% carbon black and trace amounts of antioxidants and heat stabilizers; no other additives, fillers or extenders are used. The resin used is a specially formulated, proprietary virgin polyethylene and is designed specifically for flexible geomembrane applications. GSE HD Textured has excellent resistance to UV radiation and is suitable for exposed conditions. This product allows projects with greater slopes to be designed since frictional characteristics are enhanced.

TESTED PROPERTY	TEST METHOD	MINIMUM VALUES				
Thickness, mils (mm)	ASTM D 751/1593/5199	27 (0.68)	36 (0.90)	54 (1.35)	72 (1.80)	90 (2.25)
Density, g/cm³	ASTM D 792/1505	0.94	0.94	0.94	0.94	0.94
Tensile Properties (each direction)[1]	ASTM D 638, Type IV					
Strength at Break, lb/in-width (N/mm)	Dumbell, 2 ipm	38 (7)	50 (9)	75 (13)	100 (18)	125 (22)
Strength at Yield, lb/in-width (N/mm)	Gauge lengths per	65 (11)	86 (15)	130 (23)	173 (30)	216 (38)
Elongation at Break, %	NSF Std. 54	120	120	120	120	120
Elongation at Yield, %		13	13	13	13	13
Tear Resistance, lb (N)	ASTM D 1004	22 (98)	30 (134)	45 (200)	60 (267)	75 (334)
Puncture Resistance, lb (N)	FTMS 101, Method 2065	38 (169)	52 (231)	80 (356)	105 (467)	130 (579)
Carbon Black Content, %	ASTM D 1603	2.0	2.0	2.0	2.0	2.0
Environmental Stress Crack Resistance, hr[2]	ASTM D 1693, Cond. B	1500	1500	1500	1500	1500

REFERENCE PROPERTY	TEST METHOD	NOMINAL VALUES				
Thickness, mils (mm)	ASTM D 751/1593/5199	30 (0.75)	40 (1.0)	60 (1.5)	80 (2.0)	100 (2.5)
Roll Length (approximate), ft (m)		625 (190)	600 (183)	420 (128)	320 (97)	250 (76)
Low Temperature Brittleness, °F (°C)	ASTM D 746, Cond. B	<-107 (<-77)	<-107 (<-77)	<-107 (<-77)	<-107 (<-77)	<-107 (<-77)
Oxidative Induction Time, minutes	ASTM D 3895, 200 °C Pure O_2, 1 atm	100	100	100	100	100
Carbon Black Dispersion	ASTM D 3015	A1,A2,B1	A1,A2,B1	A1,A2,B1	A1,A2,B1	A1,A2,B1
Dimensional Stability (each direction), %	ASTM D 1204, 100 °C, 1 hr	±2	±2	±2	±2	±2
Melt Flow Index, g/10 minutes	ASTM D 1238, Cond.190/2.16	≤1.0	≤1.0	≤1.0	≤1.0	≤1.0

GSE HD Textured is available in rolls approximately 22.5 ft (6.9 m) wide and weighing about 3,000 lb (1,360 kg). Other material thicknesses are available upon request.

[1]The combination of stress concentrations due to coextrusion texture geometry and the small specimen size results in large variation of test results. Therefore, these tensile properties are minimum average roll values.

[2]Note: ESCR for HD Textured is conducted on representative smooth membrane samples.

This information is provided for reference purposes only and is not intended as a warranty or guarantee. GSE assumes no liability in connection with the use of this information. Check with GSE for current, standard minimum quality assurance procedures.

GSE Lining Technology, Inc.
Corporate Headquarters
19103 Gundle Road
Houston, Texas 77073
USA
800-435-2008, 281-443-8564
FAX: 281-875-6010

GSE Lining Technology GmbH
European Headquarters
Beatenberger Straße 112
D-21073 Hamburg
Germany
49-40-767-420
FAX: 49-40-767-42-33

Sales/Installation Offices
Australia
Egypt
Singapore
United Kingdom

Distributed by:

For environmental lining solutions...the world comes to GSE.®

A Gundle/SLT Environmental, Inc. Company

Golder Associates Inc.

198 Cirby Way, Suite 105
Roseville, CA USA 95678
Telephone (916) 786-2424
Fax (916) 786-2434

June 30, 1997

Our Ref: 963-7108.001

Lawrence Livermore National Laboratory
Engineering/Construction Department
P.O. Box 808, L-654
Livermore, CA 94551

Attention: Mr. Harry Benstead

RE: RESPONSE TO REQUEST FOR INFORMATION NOS. 4, 5, 6, AND 7 FOR SITE 300, PIT 6 LANDFILL CONSTRUCTION

Dear Mr. Benstead:

We have received four Request For Information (RFI) No.'s 4, 5, 6, and 7 from Envirocon. We have reviewed the requests and have the following responses:

RFI 4: *LLNL has contracted for the use of a "Gundseal" liner instead of a 2 part GCL system. What are the QC Testing and submittal requirements for this product. Additionally what are the installation requirements and specifications. During the bidding process the only mention of this material was referenced on page 02756-4 2.01 C. as acceptable material with manufacturer. Please advise as to whether there are any changes to required testing.*

Response 4: The HDPE component must meet the testing requirements for geomembrane (02751). Since there is no geotextile component to Gundseal, none of the testing for geotextile applies. Therefore, conformance testing of the Gundseal shall consist of the following:

2.02 B. 1. Bentonite content: 1 lb/sq ft (minimum average roll value)

2.02 B. 3. Minimum free swell of 24 ml per ASTM D 5890.

Installation requirements specified for GCL shall apply for the Gundseal (except for references to geotextiles).

RFI 5: *Please refer to GSE Correspondence dated 6/24/97 and clarify.*

5a: *Melt Index (resin). The melt flow for GSE resin will have a minimum value of 0.05 g/10 min. The specified minimum is 0.1 g/10 min. Melt flow is an indicator of the processability of the resin and is not an indicator of a geomembranes ability to function as a barrier. Please accept this minimum value.*

Response 5a: Melt Index is a reference to processability of the resin. The proposed material with a Melt Index of 0.05 g/10 min. is acceptable.

5b: *Tensile Break Strength/Elongation. The minimum average break strength and break elongation values for 60 mil GSE HD Textured geomembrane are 75 lbs/in and 120%, respectively. The specified values of 228 lb/in and 600% are indicative of values for smooth GSE HD 60 mil geomembrane and not 60 mil HD Textured material. GSE requests these tensile break properties be acceptable.*

Response 5b: The values for Tensile Break Strength and Elongation at break given in the specifications were incorrectly given for smooth HDPE. Table 02751-1 should be modified as follows to reflect the textured geomembrane:

Property	Units	Specification
Tensile Properties		
2. Break strength	lb/in	75
4. Elongation at break	%	120

5c: *Puncture Resistance. GSE certifies that the material will meet the specified value when tested in accordance with ASTM D 4833. However, GSE standard testing procedures include testing puncture resistance in accordance with ASTM D [sic] FTMS 101, method 2065. Please accept this testing method and reporting.*

Response 5c: GSE indicates that the material will meet the specified values in accordance with ASTM D 4833. Puncture Resistance testing of the material delivered to the site will be in accordance with ASTM D 4833, as specified.

5d: *Table 02751-2, HDPE Geomembrane Seam Properties. Pass/Fail Criteria. GSE requests standard pass/fail requirement for the welded 60 mil HD Textured seams be film tear bond (FTB). Please accept this seam testing requirement.*

Response 5d: Golder is specifying pass/fail criteria based on FTB (see Figures 02751-1 and 2) and minimum seam strengths. This criteria has been successfully applied to smooth and textured geomembrane application in California. Therefore, we are not proposing to modify the pass/fail criteria.

RFI 6: *Please refer to GSE Correspondence dated 6/13/97 and clarify.*

6a: *[02755] Article 1.04. C. The average peel strength of GSE FabriNet is 1 ppi.*

Response 6a: A reduction of average peel strength from 2 ppi to 1 ppi is acceptable for the conditions expected at the Pit 6 Landfill.

6b: *Article 1.04. D. DIRECT SHEAR - The direct shear test (ASTM D5321) is a design test, not an index test. As such, GSE's Manufacturing Quality Assurance Laboratory does not perform this test. GSE cannot certify to direct shear results since the test relies on site-specific conditions. Interface values are greatly affected*

by material interface, rate of displacement and normal load applied. GSE will, however provide samples to the laboratory of your choosing for performance of this testing. GSE can bear no responsibility for test results that do not give the results required in the specifications.

Response 6b: The material must be tested using soils from the site to verify that it meets the minimum required 15 degrees friction angle interface shear strength. GSE indicates that they can not be responsible for the material, however, someone in the Contractor's team must take ultimate responsibility for selection of the proposed geosynthetic materials.

6c: *ELONGATION AT BREAK/MINIMUM TENSILE STRENGTH - Because GSE does not manufacture the geotextile component of the geocomposite material, we do not routinely test tensile elongation or tensile strength of composite. The composite will meet the tensile strength requirements, but SE, our geotextile supplier lists break elongation as 40%.*

Response 6c: After further review, Golder proposes to modify Table 02755-1 as follows:

Test	Geocomposite Properties
~~Elongation at break (%) (ASTM D 4595)~~	~~500~~
Grab Elongation (%) (ASTM D 4632)	40

6d: *SHEARING STRENGTH - No method is specified for this, so it is unclear as to what this references.*

Response 6d: Shear Strength requirement has been removed as per Addendum No. 4.

RFI 7: *Please refer the attached test documentation for Bodkin Joints. Please approve use of Bodkin Joints over trenches.*

Response 7: Bodkin Joints are approved for the Pit 6 Landfill Closure Cover construction provided joints in adjacent panels are offset a minimum of 25 feet apart.

REQUEST FOR INFORMATION (RFI)
NO. 6

To: Harry Benstead
LLNL
P.O. Box 808, L-522
Livermore, CA 94551
Fax #: (510) 422-5264

Date: June 24, 1997
Project: Pit 6 Landfill Closure
Subject: GSE Fabricet
Spec. Sec.:
Dwg. No.:

LLNL P.O.#: _____

We are requesting the following information:

Please review the attached letter from GSE and advise.

The above information is needed no later than: _____
(Date)

_____ 6/24/97
(Subcontractor) (Date)

Response:

_____
(LLNL) (Date)

GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax 281-875-6013

13 JUNE 1997

JEFFREY BROWN
ENVIROCON

RE: GSE Project L1241
Lawrence Livermore

The specifications provided for the above referenced job have been reviewed with the following comments. GSE intends to supply GSE FabriNet® for this project. The following is a list of clarifications that GSE is requesting so that the referenced material may be supplied.

ARTICLE 1.04.C.

The average peel strength of GSE FabriNet is 1 ppi.

ARTICLE 1.04.D.

DIRECT SHEAR - The direct shear test (ASTM D 5321) is a design test, not an index test. As such, GSE's Manufacturing Quality Assurance Laboratory does not perform this test. GSE cannot certify to direct shear results since the test relies on site-specific conditions. Interface values are greatly affected by material interface, rate of displacement and normal load applied. GSE will, however provide samples to the laboratory of your choosing for performance of this testing. GSE can bear no responsibility for test results that do not give the results required in the specifications.

ELONGATION AT BREAK/MINIMUM TENSILE STRENGTH - Because GSE does not manufacture the geotextile component of the geocomposite material, we do not routinely test tensile elongation or tensile strength of composite. The composite will meet the tensile strength requirements, but SI, our geotextile supplier lists break elongation as 40%.

SHEARING STRENGTH - No method is specified for this, so it is unclear as to what this references.

If you have any questions regarding any of these clarifications, please contact me at (281) 230-6726. You or an authorized representative may sign this letter acknowledging acceptance of these clarifications and faxing it to me at (281) 230-2527.

Regards,

Nathan Ivy
Technical Support Engineer

The above are acceptable:

Signature : _____

Printed Name : _____

Title: _____

Golder Associates Inc.

198 Cirby Way, Suite 105
Roseville, CA USA 95678
Telephone (916) 786-2424
Fax (916) 786-2434

June 30, 1997

Our Ref: 963-7108.001

Lawrence Livermore National Laboratory
Engineering/Construction Department
P.O. Box 808, L-654
Livermore, CA 94551

Attention: Mr. Harry Benstead

RE: RESPONSE TO REQUEST FOR INFORMATION NOS. 4, 5, 6, AND 7 FOR SITE 300, PIT 6 LANDFILL CONSTRUCTION

Dear Mr. Benstead:

We have received four Request For Information (RFI) No.'s 4, 5, 6, and 7 from Envirocon. We have reviewed the requests and have the following responses:

RFI 4: *LLNL has contracted for the use of a "Gundseal" liner instead of a 2 part GCL system. What are the QC Testing and submittal requirements for this product. Additionally what are the installation requirements and specifications. During the bidding process the only mention of this material was referenced on page 02756-4 2.01 C. as acceptable material with manufacturer. Please advise as to whether there are any changes to required testing.*

Response 4: The HDPE component must meet the testing requirements for geomembrane (02751). Since there is no geotextile component to Gundseal, none of the testing for geotextile applies. Therefore, conformance testing of the Gundseal shall consist of the following:

2.02 B. 1. Bentonite content: 1 lb/sq ft (minimum average roll value)

2.02 B. 3. Minimum free swell of 24 ml per ASTM D 5890.

Installation requirements specified for GCL shall apply for the Gundseal (except for references to geotextiles).

RFI 5: *Please refer to GSE Correspondence dated 6/24/97 and clarify.*

5a: *Melt Index (resin). The melt flow for GSE resin will have a minimum value of 0.05 g/10 min. The specified minimum is 0.1 g/10 min. Melt flow is an indicator of the processability of the resin and is not an indicator of a geomembranes ability to function as a barrier. Please accept this minimum value.*

Response 5a: Melt Index is a reference to processability of the resin. The proposed material with a Melt Index of 0.05 g/10 min. is acceptable.

5b: *Tensile Break Strength/Elongation. The minimum average break strength and break elongation values for 60 mil GSE HD Textured geomembrane are 75 lbs/in and 120%, respectively. The specified values of 228 lb/in and 600% are indicative of values for smooth GSE HD 60 mil geomembrane and not 60 mil HD Textured material. GSE requests these tensile break properties be acceptable.*

Response 5b: The values for Tensile Break Strength and Elongation at break given in the specifications were incorrectly given for smooth HDPE. Table 02751-1 should be modified as follows to reflect the textured geomembrane:

Property	Units	Specification
Tensile Properties		
2. Break strength	lb/in	75
4. Elongation at break	%	120

5c: *Puncture Resistance. GSE certifies that the material will meet the specified value when tested in accordance with ASTM D 4833. However, GSE standard testing procedures include testing puncture resistance in accordance with ASTM D [sic] FTMS 101, method 2065. Please accept this testing method and reporting.*

Response 5c: GSE indicates that the material will meet the specified values in accordance with ASTM D 4833. Puncture Resistance testing of the material delivered to the site will be in accordance with ASTM D 4833, as specified.

5d: *Table 02751-2, HDPE Geomembrane Seam Properties. Pass/Fail Criteria. GSE requests standard pass/fail requirement for the welded 60 mil HD Textured seams be film tear bond (FTB). Please accept this seam testing requirement.*

Response 5d: Golder is specifying pass/fail criteria based on FTB (see Figures 02751-1 and 2) and minimum seam strengths. This criteria has been successfully applied to smooth and textured geomembrane application in California. Therefore, we are not proposing to modify the pass/fail criteria.

RFI 6: *Please refer to GSE Correspondence dated 6/13/97 and clarify.*

6a: *[02755] Article 1.04. C. The average peel strength of GSE FabriNet is 1 ppi.*

Response 6a: A reduction of average peel strength from 2 ppi to 1 ppi is acceptable for the conditions expected at the Pit 6 Landfill.

6b: *Article 1.04. D. DIRECT SHEAR - The direct shear test (ASTM D5321) is a design test, not an index test. As such, GSE's Manufacturing Quality Assurance Laboratory does not perform this test. GSE cannot certify to direct shear results since the test relies on site-specific conditions. Interface values are greatly affected*

by material interface, rate of displacement and normal load applied. GSE will, however provide samples to the laboratory of your choosing for performance of this testing. GSE can bear no responsibility for test results that do not give the results required in the specifications.

Response 6b: The material must be tested using soils from the site to verify that it meets the minimum required 15 degrees friction angle interface shear strength. GSE indicates that they can not be responsible for the material, however, someone in the Contractor's team must take ultimate responsibility for selection of the proposed geosynthetic materials.

6c: *ELONGATION AT BREAK/MINIMUM TENSILE STRENGTH - Because GSE does not manufacture the geotextile component of the geocomposite material, we do not routinely test tensile elongation or tensile strength of composite. The composite will meet the tensile strength requirements, but SE, our geotextile supplier lists break elongation as 40%.*

Response 6c: After further review, Golder proposes to modify Table 02755-1 as follows:

Test	Geocomposite Properties
~~Elongation at break (%) (ASTM D 4595)~~	~~500~~
Grab Elongation (%) (ASTM D 4632)	40

6d: *SHEARING STRENGTH - No method is specified for this, so it is unclear as to what this references.*

Response 6d: Shear Strength requirement has been removed as per Addendum No. 4.

RFI 7: *Please refer the attached test documentation for Bodkin Joints. Please approve use of Bodkin Joints over trenches.*

Response 7: Bodkin Joints are approved for the Pit 6 Landfill Closure Cover construction provided joints in adjacent panels are offset a minimum of 25 feet apart.

REQUEST FOR INFORMATION (RFI)
NO. 7

To: Harry Benstead
LLNL
P.O. Box 808, L-522
Livermore, CA 94551
Fax #: (510) 422-5264

Date: June 24, 1997
Project: Pit 6 Landfill Closure
Subject:
Spec. Sec.:
Dwg. No.:

LLNL P.O.#: _____

We are requesting the following information:

Please review attached test documentation for bodkin joints. Please approve use of Bodkin Joints over trench

The above information is needed no later than: _____
(Date)

[signature] 6/24/97
(Subcontractor) (Date)

Response:

_____
(LLNL) (Date)

Golder Associates Inc.

198 Cirby Way, Suite 105
Roseville, CA USA 95678
Telephone (916) 786-2424
Fax (916) 786-2434

Golder Associates

June 30, 1997

Our Ref: 963-7108.001

Lawrence Livermore National Laboratory
Engineering/Construction Department
P.O. Box 808, L-654
Livermore, CA 94551

Attention: Mr. Harry Benstead

RE: RESPONSE TO REQUEST FOR INFORMATION NOS. 4, 5, 6, AND 7 FOR SITE 300, PIT 6 LANDFILL CONSTRUCTION

Dear Mr. Benstead:

We have received four Request For Information (RFI) No.'s 4, 5, 6, and 7 from Envirocon. We have reviewed the requests and have the following responses:

RFI 4: *LLNL has contracted for the use of a "Gundseal" liner instead of a 2 part GCL system. What are the QC Testing and submittal requirements for this product. Additionally what are the installation requirements and specifications. During the bidding process the only mention of this material was referenced on page 02756-4 2.01 C. as acceptable material with manufacturer. Please advise as to whether there are any changes to required testing.*

Response 4: The HDPE component must meet the testing requirements for geomembrane (02751). Since there is no geotextile component to Gundseal, none of the testing for geotextile applies. Therefore, conformance testing of the Gundseal shall consist of the following:

2.02 B. 1. Bentonite content: 1 lb/sq ft (minimum average roll value)

2.02 B. 3. Minimum free swell of 24 ml per ASTM D 5890.

Installation requirements specified for GCL shall apply for the Gundseal (except for references to geotextiles).

RFI 5: *Please refer to GSE Correspondence dated 6/24/97 and clarify.*

5a: *Melt Index (resin). The melt flow for GSE resin will have a minimum value of 0.05 g/10 min. The specified minimum is 0.1 g/10 min. Melt flow is an indicator of the processability of the resin and is not an indicator of a geomembranes ability to function as a barrier. Please accept this minimum value.*

Response 5a: Melt Index is a reference to processability of the resin. The proposed material with a Melt Index of 0.05 g/10 min. is acceptable.

5b: *Tensile Break Strength/Elongation. The minimum average break strength and break elongation values for 60 mil GSE HD Textured geomembrane are 75 lbs/in and 120%, respectively. The specified values of 228 lb/in and 600% are indicative of values for smooth GSE HD 60 mil geomembrane and not 60 mil HD Textured material. GSE requests these tensile break properties be acceptable.*

Response 5b: The values for Tensile Break Strength and Elongation at break given in the specifications were incorrectly given for smooth HDPE. Table 02751-1 should be modified as follows to reflect the textured geomembrane:

Property	Units	Specification
Tensile Properties		
2. Break strength	lb/in	75
4. Elongation at break	%	120

5c: *Puncture Resistance. GSE certifies that the material will meet the specified value when tested in accordance with ASTM D 4833. However, GSE standard testing procedures include testing puncture resistance in accordance with ASTM D [sic] FTMS 101, method 2065. Please accept this testing method and reporting.*

Response 5c: GSE indicates that the material will meet the specified values in accordance with ASTM D 4833. Puncture Resistance testing of the material delivered to the site will be in accordance with ASTM D 4833, as specified.

5d: *Table 02751-2, HDPE Geomembrane Seam Properties. Pass/Fail Criteria. GSE requests standard pass/fail requirement for the welded 60 mil HD Textured seams be film tear bond (FTB). Please accept this seam testing requirement.*

Response 5d: Golder is specifying pass/fail criteria based on FTB (see Figures 02751-1 and 2) and minimum seam strengths. This criteria has been successfully applied to smooth and textured geomembrane application in California. Therefore, we are not proposing to modify the pass/fail criteria.

RFI 6: *Please refer to GSE Correspondence dated 6/13/97 and clarify.*

6a: *[02755] Article 1.04. C. The average peel strength of GSE FabriNet is 1 ppi.*

Response 6a: A reduction of average peel strength from 2 ppi to 1 ppi is acceptable for the conditions expected at the Pit 6 Landfill.

6b: *Article 1.04. D. DIRECT SHEAR - The direct shear test (ASTM D5321) is a design test, not an index test. As such, GSE's Manufacturing Quality Assurance Laboratory does not perform this test. GSE cannot certify to direct shear results since the test relies on site-specific conditions. Interface values are greatly affected*

by material interface, rate of displacement and normal load applied. GSE will, however provide samples to the laboratory of your choosing for performance of this testing. GSE can bear no responsibility for test results that do not give the results required in the specifications.

Response 6b: The material must be tested using soils from the site to verify that it meets the minimum required 15 degrees friction angle interface shear strength. GSE indicates that they can not be responsible for the material, however, someone in the Contractor's team must take ultimate responsibility for selection of the proposed geosynthetic materials.

6c: *ELONGATION AT BREAK/MINIMUM TENSILE STRENGTH - Because GSE does not manufacture the geotextile component of the geocomposite material, we do not routinely test tensile elongation or tensile strength of composite. The composite will meet the tensile strength requirements, but SE, our geotextile supplier lists break elongation as 40%.*

Response 6c: After further review, Golder proposes to modify Table 02755-1 as follows:

Test	Geocomposite Properties
~~Elongation at break (%) (ASTM D 4595)~~	~~500~~
Grab Elongation (%) (ASTM D 4632)	40

6d: *SHEARING STRENGTH - No method is specified for this, so it is unclear as to what this references.*

Response 6d: Shear Strength requirement has been removed as per Addendum No. 4.

RFI 7: *Please refer the attached test documentation for Bodkin Joints. Please approve use of Bodkin Joints over trenches.*

Response 7: Bodkin Joints are approved for the Pit 6 Landfill Closure Cover construction provided joints in adjacent panels are offset a minimum of 25 feet apart.

REQUEST FOR INFORMATION (RFI)
NO. 8

To: Harry Benstead
LLNL
P.O. Box 808, L-522
Livermore, CA 94551
Fax #: (510) 422-5264

Date: July 18, 1997
Project: P+6 Landfill Closure
Subject: HDPE Pipe
Spec. Sec.: 2725
Dwg. No.:

LLNL P.O.#:

We are requesting the following information:

Please review the attached HDPE pipe data. Enviroconw request a change from SDR26 to SDR17 pipe for subdrain applications. Note that SDR17 pipe exceeds the performance specifications of SDR26.

The above information is needed no later than: July 18, 1997
(Date)

Jeffrey Brown
(Subcontractor) (Date)

Response:

O.K. to substitute SDR-26 Pipe with SDR-17 HDPE pipe per Ken Haskell (GCS Co.)

Harry Benstead 7-18-97
(LLNL) (Date)

1000 series Pipe Standard Sizes & Dimensions

• 2" (2.375 OD)				
SDR 11	160 psi	0.64 lbs./ft.	1.943 ID	.216 wall
• 3" (3.500 OD)				
SDR 11	160 psi	1.39 lbs./ft.	2.864 ID	.318 wall
SDR 17	100 psi	0.93	3.088	.206
• 4" (4.500 OD)				
SDR 11	160 psi	2.39 lbs./ft.	3.682 ID	.409 wall
SDR 15.5	110 psi	1.68	3.920	.290
SDR 17	100 psi	1.54	3.970	.265
SDR 26	64 psi	1.03	4.154	.173
• 6" (6.625 OD)				
SDR 11	160 psi	4.97 lbs./ft.	6.421 ID	.602 wall
SDR 17	100 psi	3.34	5.845	.390
SDR 21	80 psi	2.73	6.095	.315
SDR 26	64 psi	2.23	6.115	.255
SDR 32.5	51 psi	1.80	6.217	.204
• 7" (7.125 OD)				
SDR 26	64 psi	2.58 lbs./ft.	6.577 ID	.274 wall
• 8" (8.625 OD)				
SDR 11	160 psi	8.42 lbs./ft.	7.057 ID	.784 wall
SDR 17	100 psi	5.65	7.611	.507
SDR 21	80 psi	4.64	7.803	.411
SDR 26	64 psi	3.79	7.961	.332
SDR 32.5	51 psi	3.05	8.095	.265
• 10" (10.750 OD)				
SDR 11	160 psi	13.09 lbs./ft.	8.796 ID	.977 wall
SDR 17	100 psi	8.78	9.486	.632
SDR 21	80 psi	7.21	9.726	.512
SDR 26	64 psi	5.87	9.924	.413
SDR 32.5	51 psi	4.75	10.088	.331
• 12" (12.750 OD)				
SDR 11	160 psi	18.41 lbs./ft.	10.432 ID	1.159 wall
SDR 15.5	110 psi	13.48	11.104	.823
SDR 17	100 psi	12.26	11.250	.750
SDR 26	64 psi	8.26	11.770	.490
SDR 32.5	51 psi	6.57	11.966	.392
• 14.000 OD				
SDR 11	160 psi	22.20 lbs./ft.	11.454 ID	1.273 wall
SDR 17	100 psi	14.91	12.352	.824
SDR 26	64 psi	9.96	12.924	.538
• 16.000 OD				
SDR 11	160 psi	29.00 lbs./ft.	13.090 ID	1.455 wall
SDR 17	100 psi	19.46	14.118	.941
SDR 21	80 psi	15.96	14.476	.763
SDR 26	64 psi	13.01	14.770	.615

• 18.000 OD					
SDR 11	160 psi	36.69 lbs./ft.	14.728 ID	1.636 wall	
SDR 15.5	110 psi	26.84	15.678	1.161	
SDR 17	100 psi	24.64	15.882	1.059	
SDR 26	64 psi	16.47	16.616	.692	
• 20.000 OD					
SDR 11	160 psi	45.30 lbs./ft.	16.364 ID	1.818 wall	
SDR 17	100 psi	30.41	17.648	1.176	
SDR 26	64 psi	20.34	18.462	.769	
SDR 32.5	51 psi	16.41	18.770	.615	
• 22.000 OD					
SDR 11	160 psi	54.82 lbs./ft.	18.000 ID	2.000 wall	
SDR 26	64 psi	24.61	20.308	.846	
SDR 32.5	51 psi	19.86	20.646	.677	
• 24.000 OD					
SDR 11	160 psi	65.24 lbs./ft.	19.636 ID	2.182 wall	
SDR 17	100 psi	43.81	21.176	1.412	
SDR 21	80 psi	35.714	21.714	1.143	
SDR 26	64 psi	29.30	22.154	.923	
SDR 32.5	51 psi	23.62	22.524	.738	
• 26.000 OD					
SDR 32.5	51 psi	27.74 lbs./ft.	24.400 ID	.800 wall	
• 28.000 OD					
SDR 17	100 psi	59.63 LBS./ft.	24.706 ID	1.647 wall	
SDR 32.5	51 psi	32.19	26.276	.862	
• 30.000 OD					
SDR 21	80 psi	56.12 lbs./ft.	27.142 ID	1.429 wall	
SDR 32.5	51 psi	36.93	28.154	.923	
• 32.000 OD					
SDR 32.5	51 psi	42.04 lbs./ft.	30.030 ID	.985 wall	
• 36.000 OD					
SDR 21	80 psi	80.78 lbs./ft.	30.572	1.714 wall	
SDR 26	64 psi	65.94	33.230	1.385	
SDR 32.5	51 psi	53.20	33.784	1.108	← ST only
• 42.000 OD					
SDR 26	64 psi	89.71 lbs./ft.	36.770 ID	1.615 wall	
SDR 32.5	51 psi	72.37	39.416	1.292	
• 1200 mm (47.244 OD)					
SDR 26	64 psi	113.59 lbs./ft.	41.630 ID	1.817 wall	
SDR 32.5	51 psi	91.62	44.336	1.454	← ST only
• 54.000 OD					
SDR 26	64 psi	148.33 lbs./ft.	49.846 ID	2.077 wall	
SDR 32.5	51 psi	119.70	50.676	1.662	← BW only

• Sizes shown in Bold and Larger Print are considered to be preferred standard sizes. This means that production and /or stocking for inventory will receive priority over the other listed sizes.

REQUEST FOR INFORMATION (RFI)
NO. 9

To: Harry Benstead
LLNL
P.O. Box 808, L-522
Livermore, CA 94551
Fax #: (510) 422-5264

Date: August 5, 1997
Project: Pit 6 Landfill Closure
Subject:
Spec. Sec.:
Dwg. No.:

LLNL P.O.#: _____

We are requesting the following information:

Please confirm LLNL approval to use shotcrete rather than concrete ditches & wingwalls

The above information is needed no later than: _____ (Date)

Jeffrey Brown 8/5/97
(Subcontractor) (Date)

Response:

Approval is given to use Shotcrete for ditches and wingwalls in lieu of the Specified Concrete. Use the Specifications for Concrete excepting the aggregate. Use fine aggregate instead of Coarse aggregate.

Harry Benstead 8-5-97
(LLNL) (Date)

Golder Associates Inc.

180 Grand Avenue, Suite 250
Oakland, CA USA 94612
Telephone (510) 239-9000
Fax (510) 239-9010

July 7, 1997

Our Ref: 963-7108.001

Lawrence Livermore National Laboratory
Engineering/Construction Department
P.O. Box 808, L-~~654~~ 522
Livermore, CA 94551

Attention: Mr. Harry Benstead

RE: RESPONSE TO REQUEST FOR NEW CONCRETE SPECIFICATIONS FOR SITE 300, PIT 6 LANDFILL CONSTRUCTION

Dear Mr. Benstead:

Golder understands that the contractor for the Pit 6 landfill closure indicated that the concrete specifications (Sections 03100, 03200, and 03300) were too stringent. We would like to point out that these specifications are standard specifications that Golder has applied for various concrete projects including recently constructed concrete lined ditches, culvert headwalls and tank foundations at the Altamont Pass Landfill in Livermore. We are not aware of any problems in local contractors complying with these specifications.

However, we have reviewed the concrete specifications with respect to the Pit 6 closure project and have determined that there are some requirements that could be eliminated and/or clarified that will benefit the contractor. To facilitate the project, we have simplified and revised the concrete specifications under the following new section:

Section 02514 - PORTLAND CEMENT CONCRETE

This new specification replaces the following specifications:

Section 03100 - Concrete Formwork
Section 03200 - Concrete Reinforcement
Section 03300 - Cast-in-Place Concrete

If you have any questions or comments, please give us a call.

Sincerely Yours,

GOLDER ASSOCIATES INC.

Kenneth G. Haskell, P.E.
Associate

for Kenneth S. Obenauf, P.E.
Senior Sub-consultant

cc: David Littlefield, Plant Engineering
Rick Kiel, GCS
Nancy Evans, GCS

SECTION 02514

PORTLAND CEMENT CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

Cast-in-place concrete for surface-water control ditches and culvert inlets/outlets

1.02 RELATED SECTIONS

A. Section 02222 - Excavation

B. Section 02722 - Corrugated Metal Pipe Culverts

1.03 REFERENCES

The following documents form a part of these specifications to the extent stated herein. Unless otherwise indicated, use the issue in effect on the date of request for quotation. Bring any conflicts between specifications, drawings, and the referenced documents to the attention of the University, in writing, for resolution before taking any related action. Where differences exist between codes and standards, the one affording the greatest protection shall apply.

State of California, Department of Transportation (CALTRANS)

CALTRANS	Standard Specifications:
	Sec 37. Bituminous Seals
	Sec 72. Slope Protection
	Sec 90. Portland Cement Concrete

American Society for Testing and Materials (ASTM)

ASTM A 185	Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

ASTM C 31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C 33	Concrete Aggregates
ASTM C 39	Compressive Strength of Cylindrical Concrete Specimens
ASTM C 42	Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C 143	Slump of Hydraulic Cement Concrete
ASTM C 150	Portland Cement
ASTM C 260	Air-Entraining Admixtures for Concrete
ASTM C 494	Chemical Admixtures for Concrete

International Conference of Building Officials (ICBO)

ICBO UBC	Uniform Building Code

1.04 SUBMITTALS

A. Submit product data under provisions of section 01230.

B. Include material data and installation instructions on joint filler, admixtures, and curing compounds.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with CALTRANS Sec 37, 72, and 90.

B. Obtain materials from same source throughout.

C. Sampling and testing will be performed by an independent testing laboratory and paid for by the CQA Engineer.

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

A. Cement: ASTM C 150 normal-type II.

B. Aggregates: Fine and coarse aggregate for concrete, and shall be in accordance with ASTM C 33 with a specific gravity not less than 2.50. In reinforced concrete, maximum size of aggregate shall not exceed 3/4 of the distance between reinforcing bars or as shown below for coarse aggregate.

1. Fine aggregate shall be well graded from coarse to fine and shall have a gradation within the following limits:

U.S. STANDARD SIEVE SIZE	*PERCENT PASSING BY WEIGHT*
3/8-inch	100
No. 4	95-100
No. 8	70-90
No. 16	45-75
No. 30	25-55
No. 50	10-30
No. 100	2-10
No. 200	0-5

2. Coarse aggregate shall have a gradation within the following limits:

U.S. STANDARD SIEVE SIZE	*PERCENT PASSING BY WEIGHT*
1-inch	100
3/4-inch	80
3/8-inch	10
No. 4	0

3. Coarse aggregate tested in the Los Angeles machine shall show loss of weight not to exceed 40% after 500 revolutions. Minimum number of tests for aggregate grading shall be 1 per 100 tons of material.

C. Water: Clean and not detrimental to concrete.

2.02 USAGE

The following table presents a schedule of uses of concrete, maximum size aggregate, maximum slump, and total air content of above concrete mixes:

CONCRETE ELEMENT	*AGGREGATE SIZE*	*MAXIMUM SLUMP*	*TOTAL AIR CONTENT (PERCENT)*
Drainage Inlet and Outlet Structures	Coarse	4 inch	4.5
Concrete-Lined Ditches	Fine	4 inch	4.5
Utility Box Encasement Other Miscellaneous Items	1 inch	4 inch	---

2.03 FORM MATERIALS

Conform to and comply with CALTRANS.

2.04 REINFORCEMENT

A. Reinforcing Steel: ASTM A 615; 40-ksi yield grade; deformed steel bars, uncoated finish.

B. Welded Steel Wire Fabric: Plain type, ASTM A 185; in flat sheets; 10 AWG, both directions; uncoated finish.

C. Tie Wire: Annealed steel, 16 AWG or heavier.

2.05 ACCESSORIES

A. Curing Compound: CALTRANS Sec 90-7.01B.

B. Expansion Joint Material: At concrete-lined ditches, use 1/2 inch premolded asphalt joint composed of asphalt fiber an mineral filler with an asphalt-impregnated liner on both sides for reinforcement, completely waterproof and vermin resistant.

2.06 CONCRETE MIX

A. Mix concrete in accordance with ASTM C 94.

B. Provide concrete of the following characteristics:

UNIT	*MEASUREMENT*
Compressive Strength at 28 days	3000 psi

C. Use accelerating admixtures meeting ASTM C 494 in cold weather only when approved by the University. Use of admixtures shall not relax cold weather placement requirements.

D. Use set-retarding admixtures meeting ASTM C 494 during hot weather only when approved by the University.

E. Add air entraining agent meeting ASTM C 260, to concrete mix for concrete work exposed to exterior.

2.07 SOURCE QUALITY CONTROL

The Construction Manager and CQA Engineer may at any time request and secure samples of concrete, cement, aggregates, and other materials.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that compacted subgrade is ready to support paving and imposed loads.

B. Verify that gradients and elevations of base are correct.

C. By starting the work of this section, the Subcontractor warrants that it has examined and verified that the existing conditions comply with and conform to the provisions of the preceding paragraphs of subpart 3.01.

D. Where vapor barrier is not specified, at Subcontractor's option, provide vapor barrier or wet soil surface thoroughly prior to placement of concrete.

3.02 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Notify the University at least 48 hours prior to commencement of concreting operations.

3.03 FORMING

A. Place and secure forms to correct location, dimension, and profile.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint fillers vertically, in straight lines. Secure to formwork during concrete placement.

3.04 REINFORCEMENT

A. Place reinforcement as detailed on the drawings.

B. Reinforcing steel will be inspected by the CQA Engineer before being covered with concrete.

3.05 FORMED JOINTS

A. Place expansion joints at 20 foot intervals or as otherwise shown on the drawings or where approved by the CQA Engineer.

B. Place joint filler between paving components as required at joints.

3.06 PLACING CONCRETE

A. Place concrete in accordance with CALTRANS Sec 37, 72, and 90.

B. Ensure that reinforcement, inserts, embedded parts, and formed joints are not disturbed during concrete placement.

C. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

D. Trowel smooth.

3.07 FINISHING

A. Surface Water Ditches: Light broom.

B. Culvert Inlets/Outlets: Light broom.

3.08 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed in accordance with section 01400.

B. Test concrete to control slump in accordance with ASTM C 143.

C. Test laboratory will test concrete for compressive strength in accordance with ICBO UBC section 2604 and as follows:

1. Make and cure 3 cylinders according to ASTM C 31 for each 150 cubic yards, or fraction thereof, of each class of structural concrete poured at site each day and otherwise comply with ICBO UBC section 2604(h).

2. Test one cylinder at 7 days and 2 cylinders at 28 days for strength in accordance with ASTM C 39.

D. When laboratory tests of specimen cylinders show compressive strengths below specified minimum, the Subcontractor shall pay the testing laboratory for taking core specimens of hardened structural concrete and testing specimens according to ASTM C 42.

3.09 PROTECTION

Immediately after placement, protect concrete from premature drying, excessive hot or cold temperatures, and mechanical injury.

END OF SECTION

Golder Associates Inc.

180 Grand Avenue, Suite 250
Oakland, CA USA 94612
Telephone (510) 239-9000
Fax (510) 239-9010

Golder Associates

July 7, 1997

Our Ref: 963-7108.001

Lawrence Livermore National Laboratory
Engineering/Construction Department
P.O. Box 808, ~~L-654~~ 522
Livermore, CA 94551

Attention: Mr. Harry Benstead

RE: RESPONSE TO REQUEST FOR INFORMATION ON DRAINAGE DETAILS, OF SITE 300, PIT 6 LANDFILL TITLE II DESIGN

Dear Mr. Benstead:

We have received a request for information (RFI) from Envirocon concerning additional details associated with the Pit 6 Landfill cover surface water control structures. Attached are the following figures:

Figure 1 - Headwall at STA 4+06.
Figure 2 - Culvert at STA 4+42.
Figure 3 - Headwall at STA 5+90.
Figure 4 - Tailwall at STA 6+52.
Figure 5 - Headwall at STA 2+76.

Also, attached are revised Drawings Nos. 12 and 14. These drawings have been revised to included the additional culvert that crosses underneath the access road at STA 0+55.

If you have any questions or comments please call us.

Sincerely Yours,

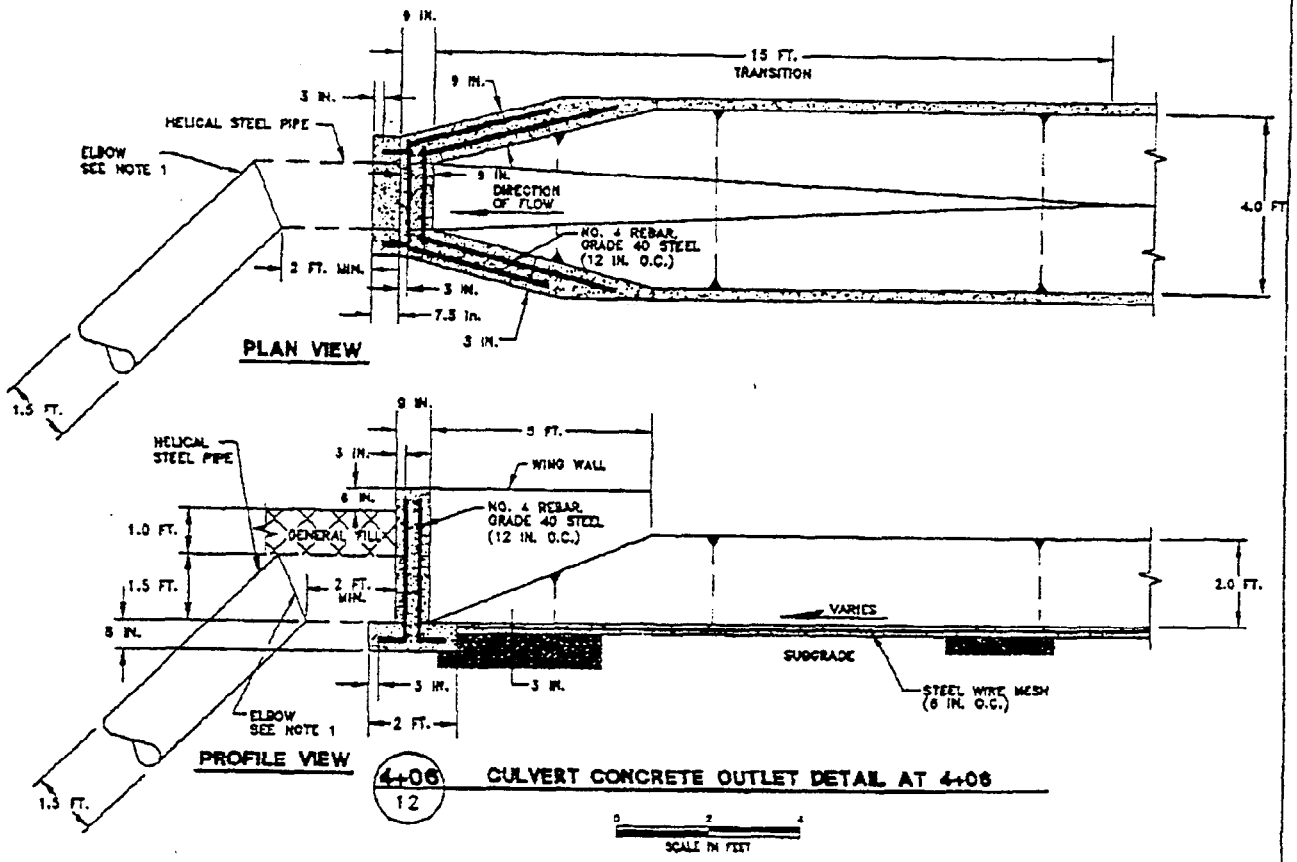
GOLDER ASSOCIATES INC.

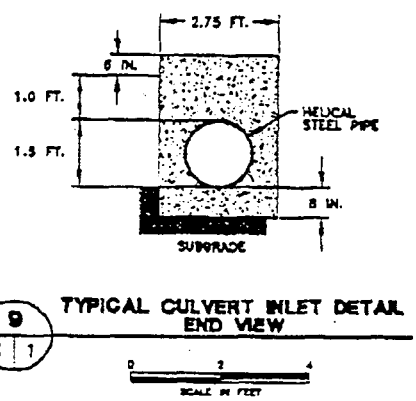
Barry A. Mac Donnell

Barry A. Mac Donnell, P.E.
Project Engineer

Kenneth G. Haskell, P.E.
Associate

cc: Kenneth S. Obenauf, P.E.
David Littlefield — LLNL-Plant Engineering
Rick Kiel — GCS
Nancy Evans — GCS





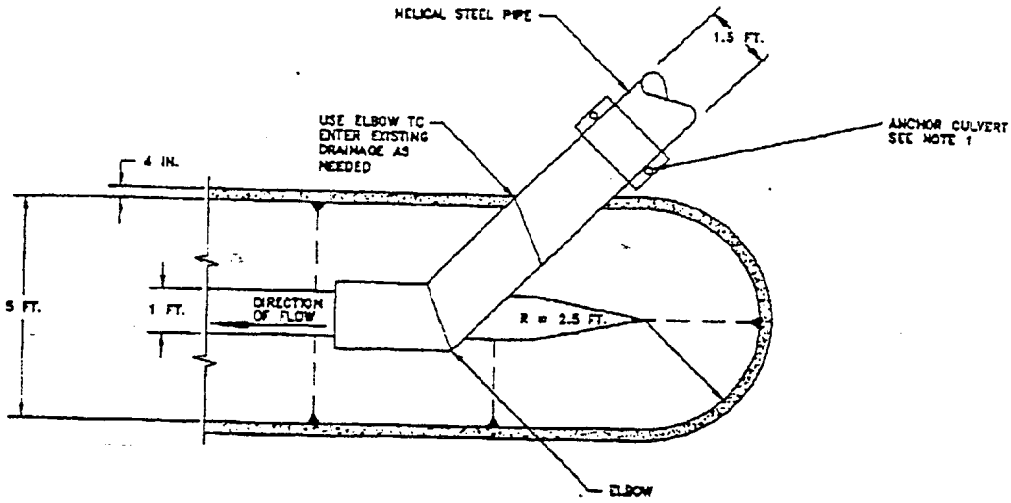
NOTES:

1) PIPE SHALL PROJECT A MINIMUM OF 2 FEET FROM HEADWALL BEFORE BEING BENT AND ENTERING THE EXISTING DRAINAGE.

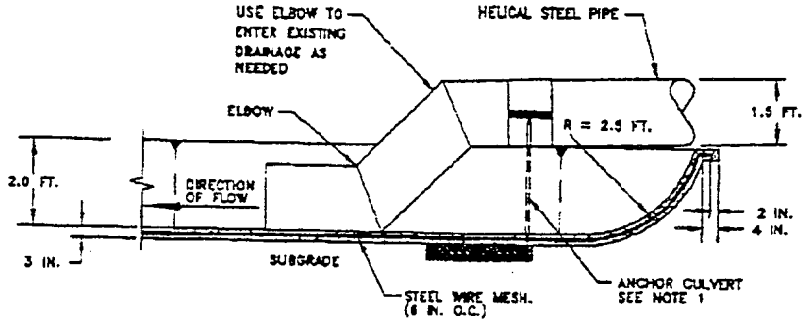
FIGURE 1

HEADWALL AT STA 4+06

LLNL/CONSTRUCTION SUPPORT/CA



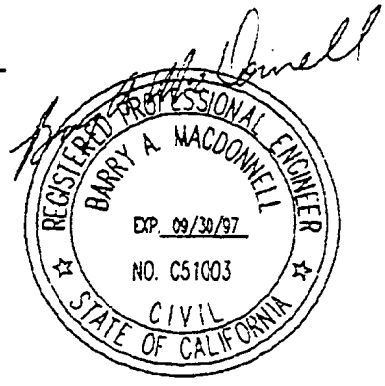
PLAN VIEW



PROFILE VIEW

4+42 / 12 CULVERT TO CONCRETE TRAPEZOIDAL DITCH DETAIL

0 2 4
SCALE IN FEET



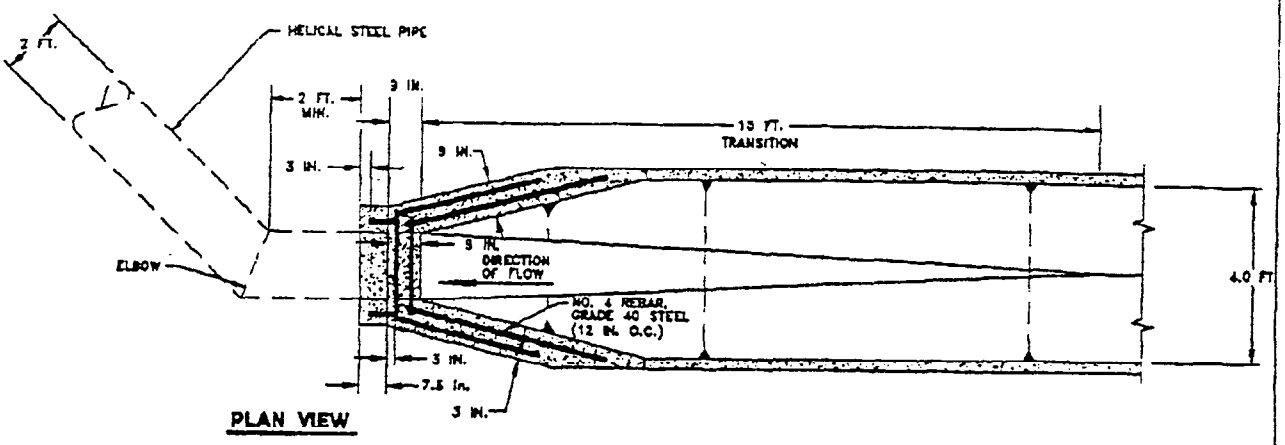
NOTES:

1) ANCHOR PIPE USING A MINIMUM 12 IN. X 0.052 IN. GALVANIZED HELICAL COUPLING BAND, AND 1 1/2 IN. DIA. X 6 FOOT LONG GALVANIZED PIPE STAKES PER CALTRANS D87A,B STANDARD PLANS.

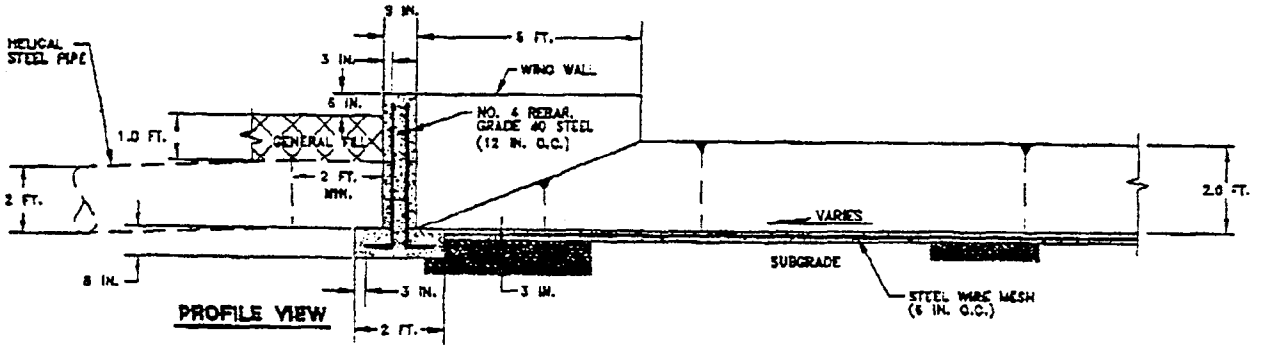
FIGURE 2
CULVERT AT STA 4+42
LLNL/CONSTRUCTION SUPPORT/CA

DWG ID: \BAM\9637108\5081 DATE 7-5-97 11:29 DRAWN BAM

Golder Associates



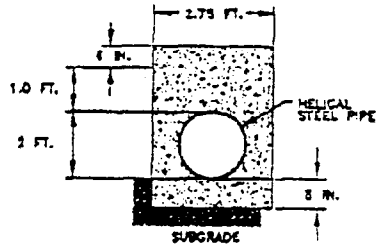
PLAN VIEW



PROFILE VIEW

5+90 / 12 CULVERT CONCRETE INLET DETAIL AT STA 5+90

SCALE IN FEET



9 / 3 | 3 TYPICAL CULVERT INLET DETAIL END VIEW

SCALE IN FEET

REGISTERED PROFESSIONAL ENGINEER
BARRY A. MACDONNELL
EXP. 09/30/97
NO. C51003
CIVIL
STATE OF CALIFORNIA

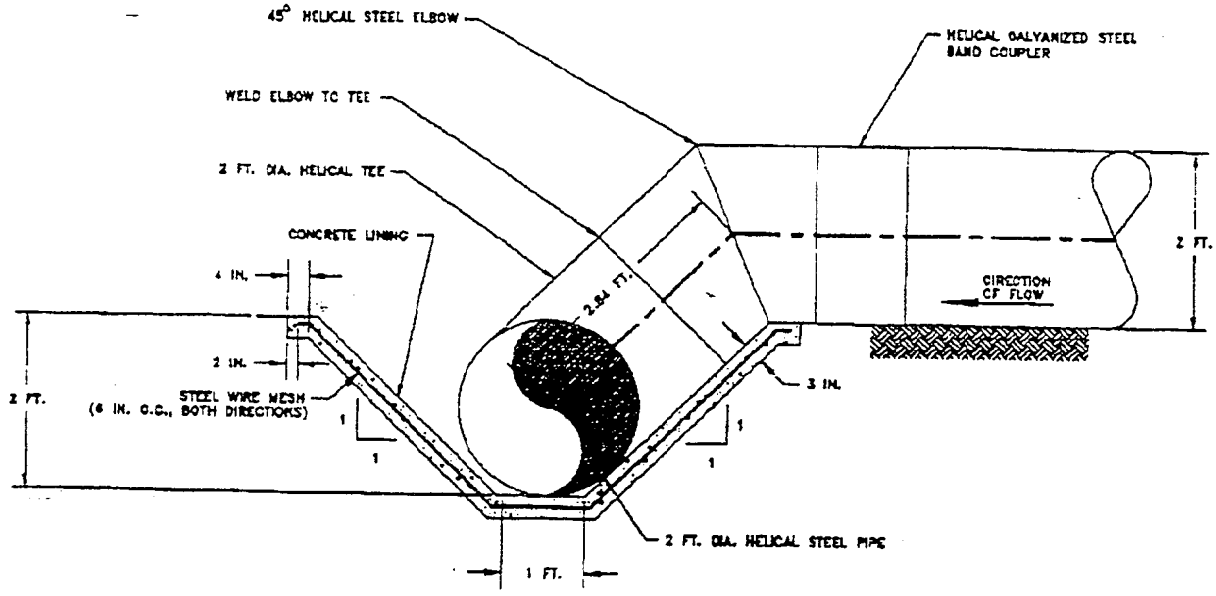
FIGURE 3

HEADWALL AT STA 5+90

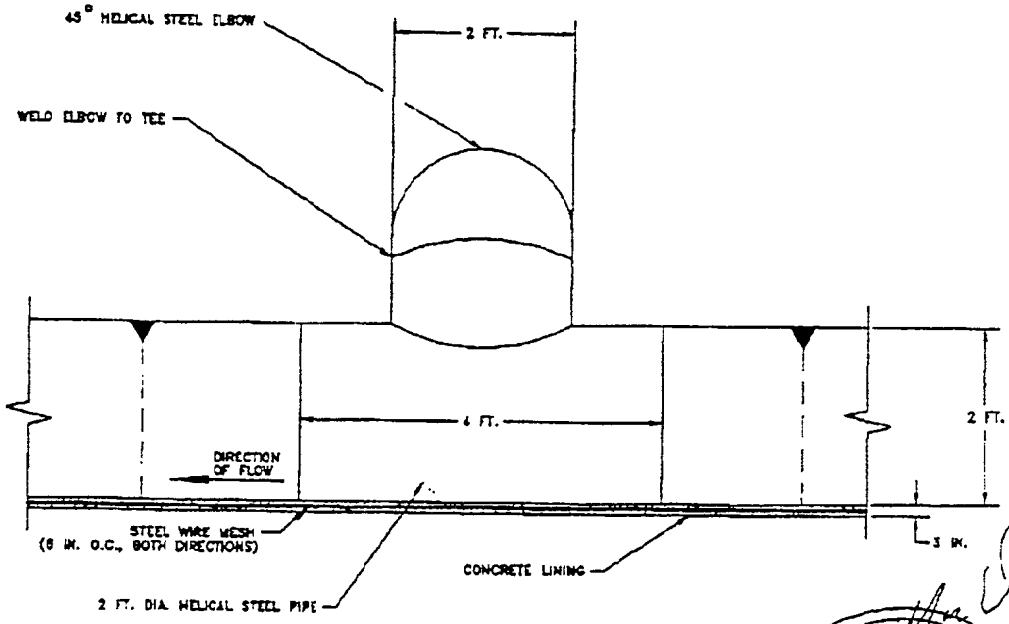
LLNL/CONSTRUCTION SUPPORT/CA

DWG ID: \BAM\9637108\5082 DATE 7-7-97 11:43 DRAWN BAM

Golder Associates



DOWNSTREAM VIEW



VIEW PERPENDICULAR TO DITCH

6+52 / 12 **CULVERT TO CONCRETE TRAPEZOIDAL DITCH DETAIL AT STA 6+52**

SCALE IN FEET

REGISTERED PROFESSIONAL ENGINEER
BARRY A. MACDONNELL
EXP. 09/30/97
NO. C51003
CIVIL
STATE OF CALIFORNIA

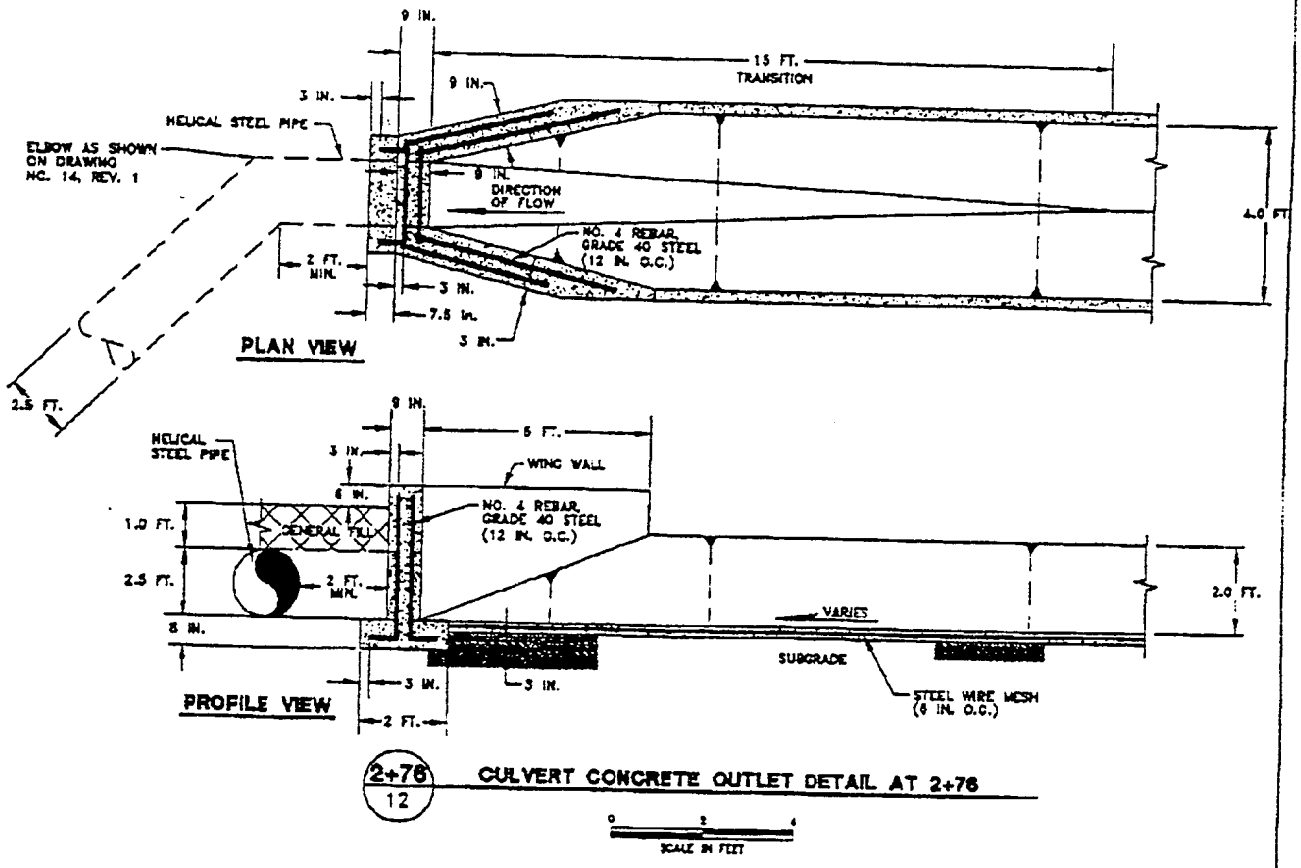
FIGURE **4**

TAILWALL AT STA 6+52

LLNL/CONSTRUCTION SUPPORT/CA

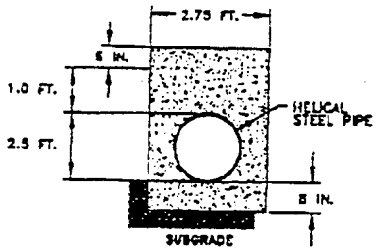
DWG D: \BAM\9637108\5083 DATE 7-7-97 12:11 DRAWN BAM

Golder Associates



2+76 / 12 CULVERT CONCRETE OUTLET DETAIL AT 2+76

SCALE IN FEET



9 / 5 | 5 TYPICAL CULVERT INLET DETAIL END VIEW

SCALE IN FEET

REGISTERED PROFESSIONAL ENGINEER
BARRY A. MACDONNELL
EXP. 09/30/97
NO. C51003
CIVIL
STATE OF CALIFORNIA

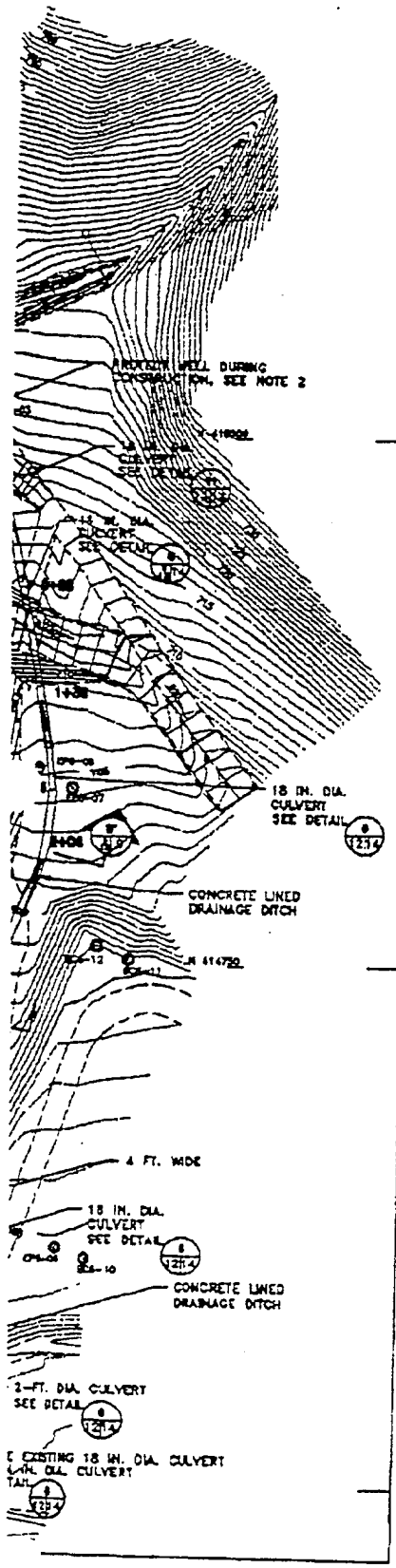
FIGURE 5

HEADWALL AT STA 2+76

LLNL/CONSTRUCTION SUPPORT/CA

DWG ID: \BAM\9637108\5084 DATE 7-7-97 11:45 DRAWN BAM

Golder Associates



LEGEND:

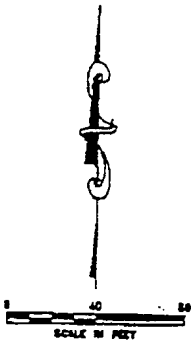
- LIMIT OF LANDFILL COVER
- EXISTING DITCH FLOWLINE
- 710 — EXISTING GROUND SURFACE ELEVATION CONTOURS (FT., MSL)
- 710 — FINAL COVER CONTOURS AND ELEVATION (FT., MSL)
- GRADE BREAK
- EXISTING DIRT ROAD
- 400 CONTROL POINT AND NUMBER
- K6-01 EXISTING MONITORING WELL AND NUMBER
- HELICAL CULVERT
- RIP-RAP
- DETAIL/SECTION DESIGNATION (A / 4 | 5)
- DRAWING WHERE SECTION/DETAIL IS LOCATED
- DRAWING WHERE SECTION/DETAIL IS REFERENCED

NOTES:

1) TOPOGRAPHY SUPPLIED BY LAWRENCE LIVERMORE NATIONAL LABORATORY. DRAWING NO. 586010. COORDINATES ARE BASED ON SITE 300-SPECIFIC GRID SYSTEM.
2) WELLS K6-03, K6-04, K6-21, K6-32, EP6-07, EP6-08 AND EP6-09 SHALL BE PROTECTED BY PLACEMENT OF A 5 FT. DIA. CONCRETE PIPE SECTION AROUND WELLS DURING CONSTRUCTION. CONCRETE PIPE IS TO BE REMOVED AFTER CONSTRUCTION IS COMPLETED.
3) ONE-FOOT DRAINAGE DITCH CONTOURS ARE NOT SHOWN FOR CLARITY.
4) DRAINAGE DITCHES WILL BE FIELD-FIT.
5) RIP-RAP FOR SOUTHWEST CULVERT OUTLETS SHALL BE THE SAME AS FOR THE NORTHERN DITCH AT REACH c-d.

CONTROL POINTS:

POINT NO.	NORTHING (FEET)	EASTING (FEET)	ELEV. (FT MSL)
400	414613.37	1598259.20	657.00
401	414563.71	1598310.42	660.00
402	414557.81	1598325.03	661.36
403	414543.25	1598376.57	672.06
404	414541.22	1598399.83	675.00
405	414522.84	1598436.31	681.00



RIPRAP FOR NORTHERN DITCH

REACH	D_{max}	D_{50}	D_{10}	THICKNESS
a-b	7.5 in.	6 in.	2 in.	12 in.
b-c	7.5 in.	6 in.	2 in.	12 in.
c-d	15 in	12 in.	4 in.	18 in.

REV.	DATE	DESCRIPTION	DRN BY	REV BY
1	7/3/97	ADD CULVERT AT STA 0+55. REVISE CULVERTS AT STA 2+76 AND 4+42	BAM	KSO

PE/A		DATE	
BL/RL		DATE	
SECURITY		DATE	
M/O		DATE	
M.C.		DATE	
PFM	EBD - 96001	LLNL DWG. NO.	

DES BY	PES		
DR BY	PES		
CHK BY	MSM		
RVW BY	KSO		

SCALE: AS SHOWN

REGISTERED PROFESSIONAL ENGINEER — BARRY K. MACDONELL — No. 43405 — CIVIL — STATE OF CALIFORNIA

Golder Associates

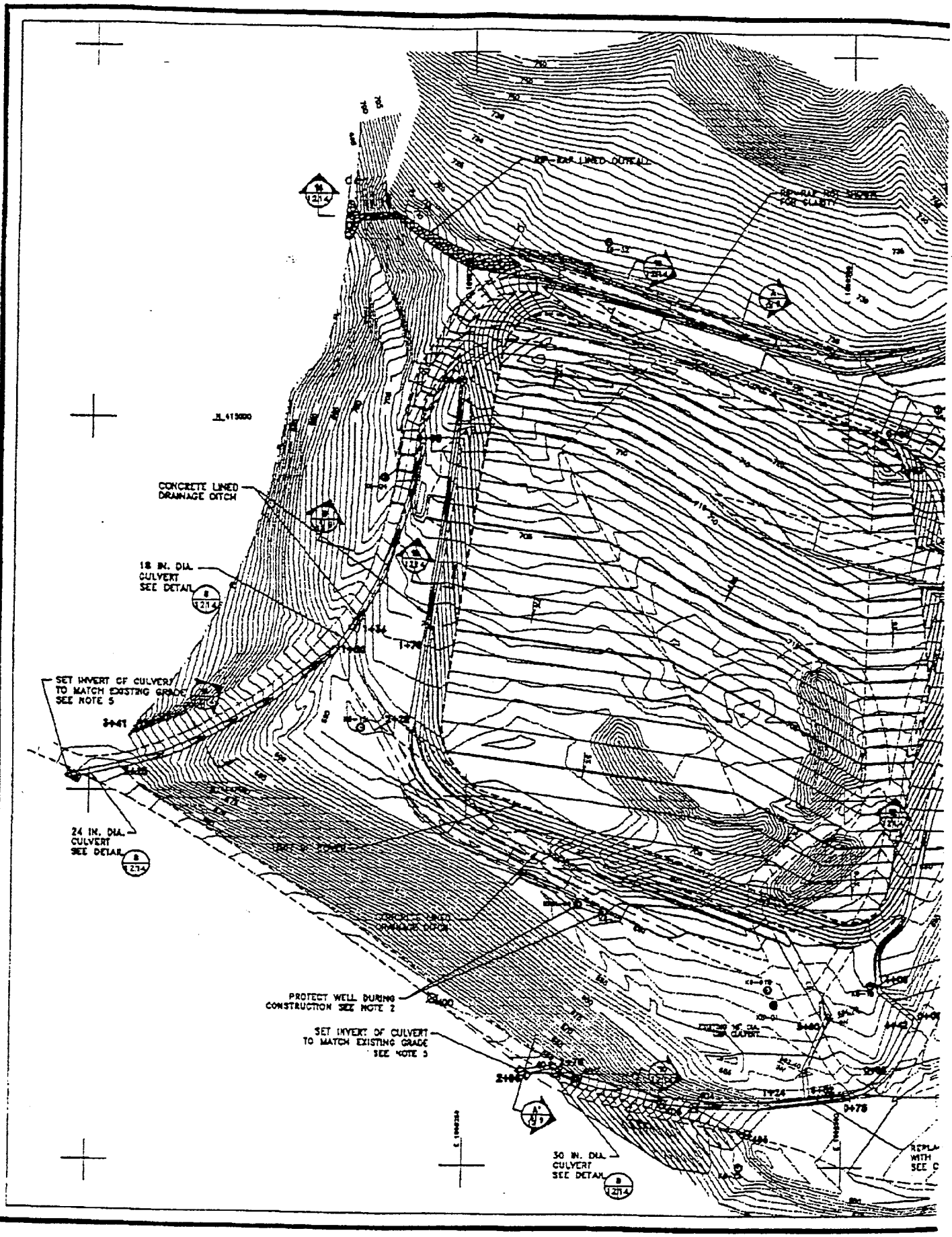
PROJECT NO.: 963-7186 | TASK NO.: 411

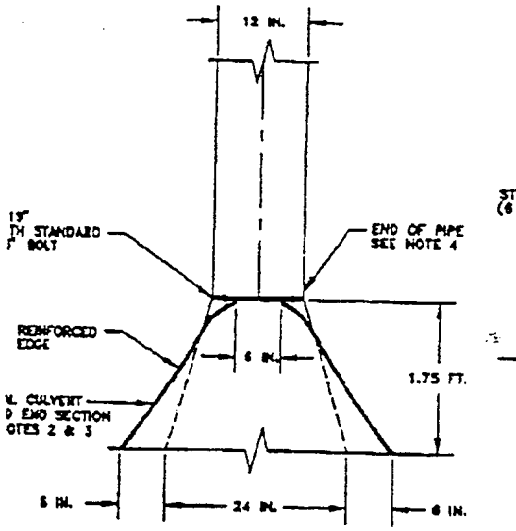
PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: SURFACE WATER CONTROL PLAN

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

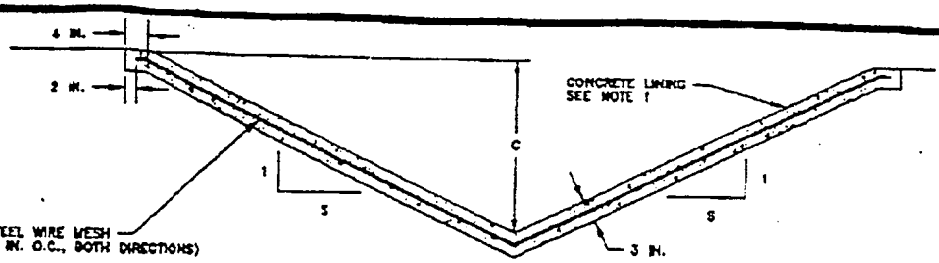
SHEET 12 OF 15 | DRAWING NO. 12 | REV. 1


CONCRETE LINED DRAINAGE DITCH
18 IN. DIA. CULVERT SEE DETAIL
SET INVERT OF CULVERT TO MATCH EXISTING GRADE SEE NOTE 5
24 IN. DIA. CULVERT SEE DETAIL
PROTECT WELL DURING CONSTRUCTION SEE NOTE 2
SET INVERT OF CULVERT TO MATCH EXISTING GRADE SEE NOTE 5
30 IN. DIA. CULVERT SEE DETAIL



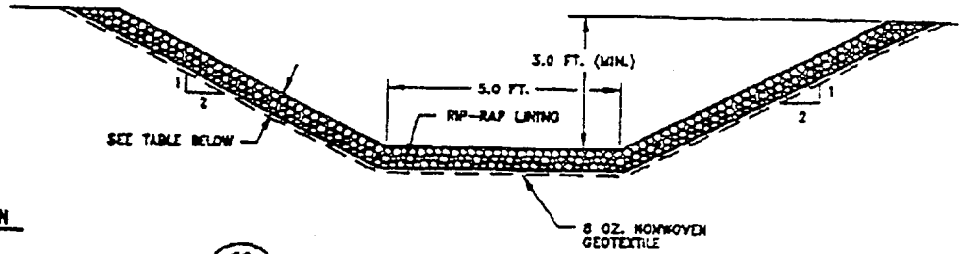
11 2|14 METAL CULVERT FLARED END SECTION

SCALE IN FEET



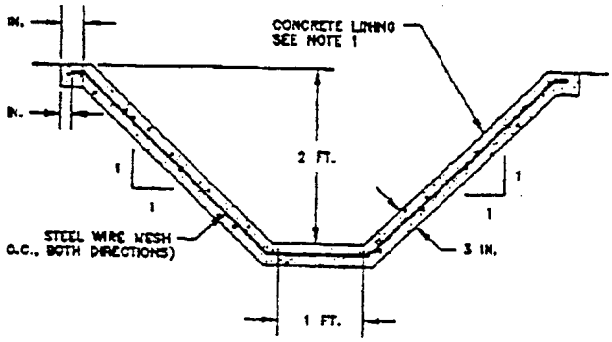
12 12|14 TYPICAL DRAINAGE DITCH DETAIL

SCALE IN FEET



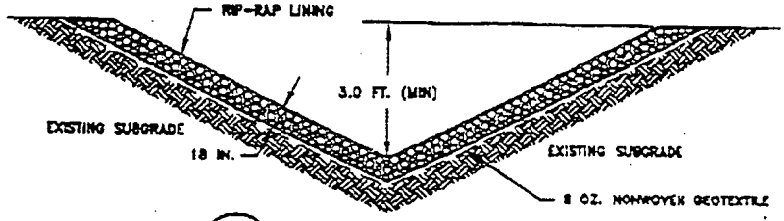
13 12|14 TYPICAL NORTH TRAPEZOIDAL CHANNEL DETAIL

SCALE IN FEET



10 12|14 CONCRETE TRAPEZOIDAL CHANNEL DETAIL

SCALE IN FEET



14 12|14 RIP-RAP PLUNGE POOL

SCALE IN FEET

RIPRAP FOR NORTHERN DITCH

REACH	D_{max}	D_{50}	D_{16}	THICKNESS
a–b	7.5 in.	6 in.	2 in.	12 in.
b–c	7.5 in.	6 in.	2 in.	12 in.
c–d	15 in	12 in.	4 in.	18 in.

NOTES:

1) EXPANSION JOINTS SHALL BE INSTALLED TRANSVERSELY AT 20-FT. INTERVALS. EXPANSION JOINTS SHALL BE FILLED WITH EXPANSION JOINT FILLER 1/2 IN. THICK.

2) HELICAL CULVERT FLARED END SECTION SHALL BE CONSTRUCTED AS PER CALTRANS STANDARD PLAN D94A.

3) ALL 3-PIECE BODIES TO HAVE 0.109 IN. THICK SIDES AND 0.138 IN. THICK CENTER PANELS. WIDTH OF CENTER TO BE GREATER THAN 20% OF THE PIPE PERIPHERY. MULTIPLE PANEL BODIES TO HAVE LAP SEAMS WHICH ARE TO BE TIGHTLY JOINED BY RIVETS OR BOLTS.

4) END OF PIPE TO BE FINISHED WITH ANNULAR CORRUGATIONS TO CONFORM FLARED END SECTION SO THAT MINIMAL LEAKAGE RESULTS FROM THE CONNECTION. OTHER DESIGNS MAY BE USED WITH APPROVAL OF THE ENGINEER.

8 13|14 — DETAIL/SECTION DESIGNATION; DRAWING WHERE SECTION/DETAIL IS LOCATED; DRAWING WHERE SECTION/DETAIL IS REFERENCED

REV.	DATE	DESCRIPTION	DRN BY	REV BY
1	7/3/97	INCLUDE DIMENSIONS FOR CULVERT AT 0455 TO 0475	BAM	KSO

RE/A		DATE	
SL/GL		DATE	
SECURITY		DATE	
M/O		DATE	
H.O.		DATE	
PFN	ENG – 38091	LLNL DWG. NO.	
DES BY	BAM/KSO		
DR BY	BAM/DWS		
CHK BY	KSH		
RVW BY	CSO		
SCALE:	AS SHOWN		

Golder Associates

PROJECT NO.: 963-7196 TASK NO.: 411

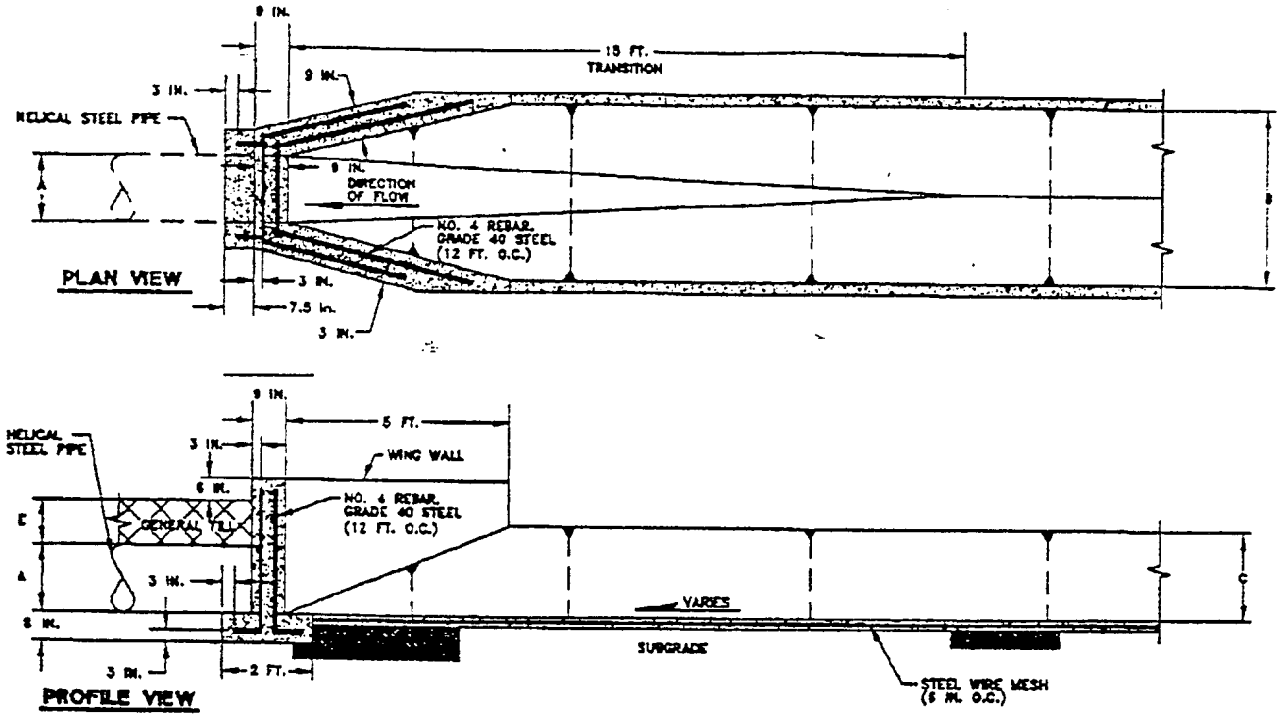
PROJECT: LLNL/PIT 6 LANDFILL COVER/CA

SHEET TITLE: SURFACE WATER CONTROL DETAILS

LAWRENCE LIVERMORE NATIONAL LABORATORY SITE 300

SHEET: 14 OF 15

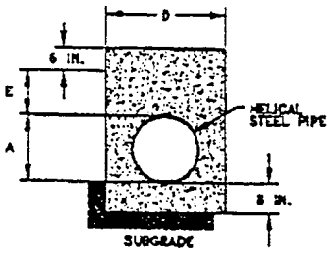
DRAWING NO.: 14 REV.: 1



T1
12 14

8 TYPICAL CULVERT CONCRETE INLET/OUTLET DETAIL
8 12 14

SCALE IN FEET



9 TYPICAL CULVERT INLET DETAIL END VIEW
9 14 14

SCALE IN FEET

4 IN.

2 IN.

(6 IN. O.C.,

CULVERT INLET/OUTLET DIMENSIONS

BEGINNING STATION	ENDING STATION	PIPE A (FEET)	WIDTH B (FEET)	DEPTH C (FEET)	WIDTH D (FEET)	THICKNESS E (FEET)
EAST DITCH						
0+88	1+36	1.5	4.0	2.0	2.75	1.0
1+86	2+06	1.5	4.0	2.0	2.75	1.0
4+06	4+42	1.5	4.0	2.0	2.75	1.0
SOUTHEAST TRAPEZOIDAL DITCH						
0+55	0+75	2.0	6.0	2.0	2.75	1.5
2+76	2+88	2.5	6.0	2.0	3.25	1.5
WEST + SOUTH DITCHES						
5+90	6+52	2.0	8.0	2.0	2.75	1.5
WEST ROAD DITCH						
1+34	1+50	1.5	4.0	2.0	2.75	1.0
3+15	3+41	2.0	4.0	2.0	2.75	1.5

SURFACE WATER CONTROL DITCH DIMENSIONS

BEGINNING STATION	ENDING STATION	DITCH DEPTH (D)	SIDESLOPES (S)
EAST DITCH			
0+13	0+88	2.0	1H:1V
1+36	1+86	2.0	1H:1V
2+06	4+06	2.0	1H:1V
SOUTHEAST TRAPEZOIDAL DITCH			
0+00	2+66	2.0	1H:1V
0+75	2+78	2.0	1H:1V
WEST + SOUTH DITCHES			
0+00	1+76	2.0	1H:1V
1+76	2+28	TRANSITION FROM 1H:1V TO 2H:1V	
2+28	5+90	2.0	2H:1V
WEST ROAD DITCH			
0+00	1+34	2.0	1H:1V
1+50	3+15	2.0	1H:1V

ADDENDUM NO. 01

to

SOLICITATION NO. B336701

for

Pit 6 Landfill Closure Cover

Site 300

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
LAWRENCE LIVERMORE NATIONAL LABORATORY
LIVERMORE, CALIFORNIA 94550

The following changes shall apply to the plans, specifications and/or drawings, are hereby made a part thereof and are subject to all the requirements of this Solicitation as if originally included therein.

RECEIPT AND INCLUSION OF THIS ADDENDUM NO. 01 SHALL BE ACKNOWLEDGED ON THE BID FOR LUMP SUM CONTRACT IN THE SECTION ENTITLED "ADDENDA".

The bid date remains unchanged.

PROCUREMENT & MATERIEL
LAWRENCE LIVERMORE NATIONAL LABORATORY

February 25, 1997

ADDENDUM NO. 01

February 25, 1997

I. GENERAL

The following changes are made in the documents indicated. All other terms and conditions shall remain the same.

SPECIFICATIONS

Specification Section 02060, "Site Demolition"

Page 02060-2, Paragraph 1.04.E, REPLACE with the following:

"The University has determined that paint used on the structure to be demolished is lead free. Arsenic is present at 0.01 to 0.6% by weight. Ensure compliance with applicable sections of 29 CFR 1900.1018."

Specification Section 02223, "Backfilling"

Page 02223-7, Subparagraph 3.04.D.4, ADD the following sentence at the end:

"After placing a minimum of 3 inches of gravel over the pipe, compact the gravel by making at least two passes with a vibratory plate."

Specification Section 02231, "Aggregate Base Course"

Page 02231-2, Subpart 3.01, DELETE the last sentence:

~~"The subgrade shall also have a minimum R-value of 50 as determined by ASTM D2844."~~

Specification Section 02710, "Subdrainage Systems"

1. Page 02710-1, Subpart 1.01, REVISE the sentence to read as follows:

   "General requirements for subdrainage ***and drainage*** systems"

2. Page 02710-2, Subpart 2.02, ADD the following Paragraphs F and G:

   "F. Animal Grate: The band shall be type UNS S30400 stainless steel, 1/8-inch thick by 1 inch wide; the bars shall be stainless steel rounds, type UNS S30400 stainless steel, at least 1/4-inch diameter; set screws shall be type UNS S31600 stainless steel, 1/4-inch x 20 course thread cup point, socket-set screw of sufficient length to properly seat.

G. Rip-Rap Material: CALTRANS Sec 72, for facing class rock slope protection. Rock sizes shall be one of the following gradations, placed in accordance with the drawings:

D_{max}	D_{50}	D_{10}
7.5"	6"	2"
15"	12"	4"

Specification Section 02752, "Geotextile"

1. Page 02752-4, Table 02752-1, in the first row entitled "Mass Per Unit Area" and the last column entitled "Minimum Values" REVISE the value from "7" to "8."

2. Page 02752-5, Subpart 3.01, ADD the following Paragraph C:

   C. Place geotextile on existing subgrade prior to placing riprap in surface-water control ditches.

Specification Section 02756, "Geosynthetic Clay Liner"

1. Page 02756-4, Paragraph 2.02.A, REVISE the sentence to read:

   "The GCL shall consist of CETCO "Bentomat ST" or equivalent and shall include stitching or adhesive through the material that joins the backing ***materials.***"

2. Page 02756-4, Subparagraph 2.02.B.4, REVISE to read:

   "Backing Material: Polyester or polypropylene, minimum weight 3.0 oz/sq. yd ***or HDPE geomembrane.***"

3. Page 02756-5, Subparagraph 2.03.A.2, ADD the following sentence at the end:

   "If bentonite is attached to the HDPE geomembrane, remove it and remold for permeability testing."

DRAWINGS

Drawing 10, "Animal Grate"

REVISE the scale bar from "SCALE IN FEET" to "SCALE IN INCHES."

END OF ADDENDUM NO. 1

University of California
Lawrence Livermore National Laboratory
Procurement & Materiel (U.S. Department of Energy Contract W-7405-ENG-48)

May 9, 1997

Envirocon, Inc.
500 Taylor Street
Missoula, MT 59807

Attention: Mr. Al Brule'

Subject: **Supplemental Agreement No. 01**
Subcontract No. B336701

Enclosed are two copies of the above referenced Supplemental Agreement.

One (1) copy of the Supplemental Agreement is to be signed by an authorized member of your firm and returned within five days to my attention at our Livermore Laboratory. Retain one copy for your records.

Sincerely,

Gennie McPeak
Sr. Subcontract Administrator
Construction and Fabrication Group

Enclosures: As noted

c: Jeff Brown, Envirocon, Inc., Placerville, CA w/encl.
Harry Benstead, L-522 w/encl.

UNIVERSITY OF CALIFORNIA
LAWRENCE LIVERMORE NATIONAL LABORATORY

SUBCONTRACT NO. B336701
DATE: MAY 9, 1997

SUPPLEMENTAL AGREEMENT

Supplemental Agreement No. 01

Name of Project: Pit 6 Landfill Closure Cover, Site 300

Subcontractor: Envirocon, Inc.
500 Taylor Street
Missoula, MT 59807

This Subcontract is hereby modified as specifically set forth below.

Reference: Drawing No.6 - Geogrid Layout Plan
Relocate the third layer of geogrid to the following location:

Point No.	Northing (feet)	Easting (feet)
104	414696.86	1698440.28
105	414762.14	1698395.94
106	414833.97	1698501.70
107	414768.68	1698546.04

The total fixed price of the Subcontract hereby remains unchanged at $630,211.00. The Subcontract completion date remains unchanged.

By acceptance of this Supplemental Agreement, the Subcontractor acknowledges that the modification to Subcontract No. B336701 set forth immediately above represent full compensation for the changes to the work. This includes all adjustments to the work schedule and all costs and expenses. All other terms and conditions of the Subcontract shall remain in full force and effect.

SUPPLEMENTAL AGREEMENT (Continued)

The acceptance of this Supplemental Agreement by the Subcontractor shall not release nor exonerate any surety(ies) and bond(s) given to secure performance of the Subcontract.

ACCEPTANCE	AUTHORIZATION
ENVIROCON, INC.	**THE REGENTS OF THE UNIVERSITY OF CALIFORNIA**
BY: _____	BY: Gennie McPeak Gennie McPeak
TITLE: _____	TITLE: Sr. Subcontract Administrator Construction and Fabrication Group Procurement & Materiel
DATE: _____	DATE: May 9, 1997

(Form #PS-222;10/10/96)

ADDENDUM NO. 02

to

SOLICITATION NO. B336701

for

Pit 6 Landfill Closure Cover

Site 300

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
LAWRENCE LIVERMORE NATIONAL LABORATORY
LIVERMORE, CALIFORNIA 94550

The following changes shall apply to the plans, specifications and/or drawings, are hereby made a part thereof and are subject to all the requirements of this Solicitation as if originally included therein.

RECEIPT AND INCLUSION OF THIS ADDENDUM NO. 01 SHALL BE ACKNOWLEDGED ON THE BID FOR LUMP SUM CONTRACT IN THE SECTION ENTITLED "ADDENDA".

The bid date remains unchanged.

PROCUREMENT & MATERIEL
LAWRENCE LIVERMORE NATIONAL LABORATORY

March 19, 1997

ADDENDUM NO. 02

March 19, 1997

I. GENERAL

The following changes are made in the documents indicated. All other terms and conditions shall remain the same.

SPECIFICATIONS

Specification Section 01230, "Special Requirements (Site 300)"

Page 01230-28, Paragraph 1.12.A.2, REPLACE with the following:

"The Subcontractor shall be responsible for advising the **University** of any submittal that may be delayed and which might, if delayed further, extend completion of the project."

Specification Section 02756, "Geosynthetic Clay Liner"

Page 02756-3, Paragraph 1.05.E.1, REPLACE with the following:

"1. Convene a conference one week prior to commencing work of the Section, under provisions of Section **01230**."

END OF ADDENDUM NO. 2

ADDENDUM NO. 03

to

SOLICITATION NO. B336701

for

Pit 6 Landfill Closure Cover System

Site 300

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
LAWRENCE LIVERMORE NATIONAL LABORATORY
LIVERMORE, CALIFORNIA 94550

The following changes shall apply to the plans, specifications and/or drawings, are hereby made a part thereof and are subject to all the requirements of this Solicitation as if originally included therein.

RECEIPT AND INCLUSION OF THIS ADDENDUM NO. 03 SHALL BE ACKNOWLEDGED ON THE BID FOR LUMP SUM CONTRACT IN THE SECTION ENTITLED "ADDENDA".

Bid date remains unchanged

PROCUREMENT & MATERIEL
LAWRENCE LIVERMORE NATIONAL LABORATORY

March 26, 1997

ADDENDUM NO. 03

March 26, 1997

I. GENERAL

The following answers are provided to questions received regarding the IFB package:

Question: Is it possible to work from 5:30 am to 10:00 pm 6 days per week?

Answer: This is an acceptable work schedule.

Question: Can a water hydrant be installed along Corral Hollow Road, immediately adjacent to the job site, in order to eliminate the trucking of water from the Site 300 entrance area?

Answer: No. The only water available is at the Site 300 main entrance.

Question: Exactly where is the fire hydrant located at the Site 300 entrance area?

Answer: The fire hydrant location is inside the outer gate at Corral Hollow Road, and west of the parking lot. The University will install a fire hose connection to the water line.

Question: Are full size drawings available?

Answer: Not at this time.

Question: Performance Bond. What is the percentage of the total amount of the bid for this item?

Answer: Performance Bonds are 100% of the bid price.

Question: Payment Bond. What is the percentage of the total amount of the bid for this item?

Answer: Payment Bonds are 50% of the bid price.

Question: What are the insurance requirements for this project?

Answer: See Clause 9 of the General Provisions for Fixed Price Construction Subcontracts, attached.

Question: Who is the Surveyor at Site 300?

Answer: Surveying is done with in-house forces.

ADDENDUM NO. 03

March 26, 1997

II. DOCUMENTS

The following documents are attached and hereby become part of the IFB package for Solicitation No. B336701.

- General Provisions for Fixed Price Construction Subcontracts, dated 12/9/96
- List of Holidays

(end of Addendum No. 03)

LAWRENCE LIVERMORE NATIONAL LABORATORY

GENERAL PROVISIONS FOR FIXED PRICE CONSTRUCTION SUBCONTRACTS

INDEX

CAUSE 1 – ENVIRONMENT, SAFETY, AND HEALTH

The Subcontractor shall take all reasonable precautions in the performance of the work under this Subcontract to protect the environment, and the safety and health of employees and of members of the public and shall comply with all applicable environmental, safety and health regulations and requirements (including reporting requirements) of the University and DOE.

The University shall notify the Subcontractor, in writing, of any noncompliance with the provisions of this clause and the corrective action to be taken. After receipt of such notice, the Subcontractor shall immediately take corrective action. In the event that the Subcontractor fails to comply with said regulations or requirements of the University or DOE, the University may, without prejudice to any other legal or contractual rights of the University, issue an order stopping all or any part of the work; thereafter, a start order for resumption of the work may be issued at the discretion of the University. The Subcontractor shall make no claim for an extension of time or for compensation or damages by reason of, or in connection with, such work stoppage.

CLAUSE 2 – ACCIDENT PREVENTION PROGRAM REQUIREMENTS

The Subcontractor shall submit seven (7) copies of the following to the University for approval prior to start of any construction work. Items 1 through 4 shall be submitted separately on company letterhead, and not combined into a single document.

1. A descriptive outline of an accident prevention program. The University will provide either a pre-job checklist or a Safety Accident Prevention and Fire Prevention Plan that can serve as the descriptive outline.

   A report of its injury, accident, fire, and property damage experience, including motor vehicle, for the previous two (2) years.

3. Detailed site-specific safety/work plans. Examples of areas to be covered are:
   a. Fire protection systems.
   b. Industrial Safety : Fall protection, scaffolding, trenching and/or shoring, etc.
   c. Industrial Hygiene: Confined spaces; radiological and asbestos-containing materials handling; use of chemicals, oils, solvents, paints, epoxies, adhesives, binders, and gases.
   d. Environmental Protection: Washdown/spilling/release of water or liquids to storm or sanitary sewer systems; abrasive blasting; generation of hazardous wastes.
4. The name and qualifications of the job site management official assigned responsibility for the Subcontractor's safety, accident prevention, and fire protection program.

This information will be reviewed for completeness and compliance with the federal Occupational Safety and Health Act (OSHA) and University safety requirements. The University's written authorization to proceed with construction may be deferred until the University receives and approves an acceptable safety program, including required site-specific safety/work plans.

CAUSE 3 – TECHNICAL DIRECTION AND CHANGES

Performance of the work under this Subcontract shall be subject to the technical direction of the University's Technical Representative (also known as the Construction Manager). The term "technical direction" is defined to include, without limitation:

1. Supplying all construction decisions required of the University relating to the drawings, specifications, and other construction data furnished to the Subcontractor pursuant to the Subcontract, or necessary for successful performance of the work;
2. General surveillance over implementation of safety and security procedures;
3. Participation in the initiation and preparation of technical changes affecting cost or time of performance;
4. Inspecting the work in progress; providing interpretations and clarification for the Subcontractor on the applicable drawings, specifications, and other construction data, and reconciling discrepancies in the aforementioned documents as required;
5. Authorizing and requiring the Subcontractor to correct defects in partially or fully completed work;
6. Reviewing and approving the Subcontractor's invoices for payment based upon percentage of completed work; and
7. Responsibility for rendering decisions or otherwise acting for the University in the above designated areas.

Neither the rights of general direction, surveillance, inspection, review, comment or approval conferred on the Technical Representative, nor its exercise of these rights, shall relieve the Subcontractor from any obligations set forth in Subcontract's documents, except the Technical Representative's written acceptance of specific portions of work containing patent defects shall be final if the Subcontractor has brought such defects to the Technical Representative's attention, in writing, before the Technical Representative's review and approval.

B. General Submittals

All proposals for additive or deductive changes or modifications to the Subcontract must include the following:

1. A summary of all costs by cost element.
2. Identification, description, and submittal of all rate agreements utilized.
3. Identification and submittal of cost or pricing data which are based on verifiable factual information.
4. Documentation and explanation of the estimating process used, including the judgmental factors applied and the mathematical or other methods used in the estimate, including those used in projecting from known data.

C. Materials

Proposals involving materials must include the following:

1. An explanation of the basis for the kinds, quantities and cost of all material elements proposed.
2. A priced bill of material for the entire proposal showing part number/description, unit cost, quantity required, extended cost, basis for the proposed price (quotation, prior buy, similar item, etc.) and the rationale for the proposed price, unless an alternate method of estimating material costs has been accepted by the University.
3. A summary by class of material (subcontracts, purchase parts, raw materials, etc.) showing base material costs and any factors applied (i.e. escalation, attrition, usage variance, etc.) and the basis for the development and application of these factors.
4. Specific subcontract effort to be performed and identification of each subcontractor. For each subcontract change, provide a listing by source, item, quantity, and price, including the results of review of subcontract proposals. Where the required data or reviews have not been made available, provide the reasons for the omission.
5. Identification of any inter organizational transfers. Provide complete supporting data and basis for these transfers.

D Direct Labor

Proposals involving direct labor must include the following:

1. Identification of labor hours by Task by labor category/skill mix.
2. Identification of rate agreement. In the absence of a labor rate agreement, provide a component breakdown of each labor rate by category. Identify any adjustment factors to these rates including the effect of union agreements, insurance adjustments, etc.

E. Other Job Site Costs

Proposals involving other job site costs must include a list all other costs by category/element (utilities, equipment rental, supervision, etc.) and provide supporting schedules and rationale for the amount proposed for each category element.

F. Markups

Proposals involving markups must reflect the allowable percentages, in accordance with the *CHANGE ORDER ADJUSTMENTS* clause.

CLAUSE 6 – PERFORMANCE AND PAYMENT BONDS

A. Upon the execution of this Subcontract the Subcontractor shall furnish to the University the following bonds:

1. A Performance Bond, guaranteeing the faithful performance of this Subcontract, and
2. A Payment Bond, guaranteeing the payment of claims of mechanics, material men, and others.

Said bonds shall be in the forms hereto attached and with sureties approved by the University. The premiums upon all such bonds shall be paid by the Subcontractor.

B. The penal amount of the Performance Bond shall be 100% of the Subcontract price. The penal amount of the Payment Bond shall be, as follows:

1. When the Subcontract price is not more than $1,000,000, the penal amount shall be 50% of the Subcontract price;
2. When the Subcontract price is more than $1,000,000 but not more than $5,000,000, the penal amount shall be 40% of the Subcontract price; and
3. When the Subcontract price is more than $5,000,000, the penal amount shall be $2,500,000.

C. The University shall approve any surety company which, at the time of execution of this Subcontract, is listed in the latest published U.S. Treasury Department list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies."

D. The Subcontractor shall promptly furnish additional security as may be required from time to time to protect the interest of the University and the Government and of persons supplying labor or materials under this Subcontract, if:

1. Any surety upon any bond furnished in connection with this Subcontract becomes unacceptable to the University;
2. Any such surety fails to furnish reports as to its financial condition as required from time to time by the University; or
3. The Subcontract price is increased to such an extent that the penal sum of the existing bonds becomes inadequate, in the opinion of the University.

CLAUSE 7 – LIENS AND CLAIMS FOR LABOR OR MATERIALS

The Subcontractor agrees that at any time upon request of the University it will submit a sworn statement setting forth the work performed or material furnished by the subcontractors, suppliers and material men, and the amount due to become due to each, and that before final payment called for hereunder, the Subcontractor will, if requested, submit to University a complete set of vouchers showing what payments have been made for material and labor used in connection with the work called for hereunder.

For Subcontracts below $10,000,000

• General Aggregate (Bodily Injury, Property Damage)	$ 5,000,000
• Products, Completed Operations Aggregate	$ 5,000,000
• Personal and Advertising Injury	$ 3,000,000
• Each Occurrence	$ 1,500,000
• Fire Damage (any one occurrence)	$ 50,000

For Subcontracts below $20,000,000

• General Aggregate (Bodily Injury, Property Damage)	$ 7,500,000
• Products, Completed Operations Aggregate	$ 7,500,000
• Personal and Advertising Injury	$ 4,000,000
• Each Occurrence	$ 2,000,000
• Fire Damage (any one occurrence)	$ 50,000

For Subcontracts of $20,000,000 or More

• General Aggregate (Bodily Injury, Property Damage)	$10,000,000
• Products, Completed Operations Aggregate	$10,000,000
• Personal and Advertising Injury	$ 5,000,000
• Each Occurrence	$ 2,500,000
• Fire Damage (any one occurrence)	$ 50,000

2. Business Auto Liability; for Owned, Scheduled, Non-Owned, or Hired Automobiles with a combined single limit of no less than $1,000,000 per occurrence.
3. Workers' Compensation; which shall compensate up to the maximum benefits as stated in the Workers' Compensation Law of the State of California.

B. Conditions of Coverage

1. The Commercial General Liability Insurance shall include (a) a provision designating the University and the Department of Energy (DOE) as **"additional named insureds"** by certificate, endorsement, or otherwise; (b) a provision that the policies are primary and shall not participate with or be excess over any other valid and collective insurance; and (c) a waiver of subrogation in favor of the University and Government.
2. The policies evidencing the required insurance shall contain an endorsement to the effect that any cancellation or any material change adversely affecting the University's or Government's interest shall not be effective (a) for such period as the laws of the State in which this Subcontract is to be performed prescribe, or (b) until 30 days after the insurer or the Subcontractor gives written notice to the University, whichever period is longer.

   The required insurance shall be kept in full force and effect by the Subcontractor during the entire performance of this Subcontract, until final acceptance of the completed work by the University.
4. The required insurance shall be maintained with insurance companies, underwriters or underwriting firms satisfactory to the University. The required insurance shall be obtained from an insurance carrier or carriers approved by the University, under an insurance policy or policies satisfactory to the University in form and substance.
5. The Commercial General Liability Insurance shall not be written on a claims made form without the written approval of the University. If the said insurance is written on a claims made form, the coverage shall survive for a period of no less than five years following termination of this Subcontract and shall have a retroactive date of placement coinciding with the effective date of this Subcontract.

C. Subcontractor's Warranty of Insurance Coverage: Insurers

The Subcontractor warrants that all of the insurance required by this clause is currently in effect and will be maintained throughout the period of this Subcontract.

Certificates of Insurance

Prior to commencement of the work, the Subcontractor shall issue to the University a certificate or certificates of insurance substantiating and covering the policies required under this clause, specifically addressing the conditions of coverage set forth in paragraph B, above. The certificate or certificates of insurance shall be submitted on a form acceptable to the University and shall show all companies affording coverage. The certificate shall show the name of the Subcontractor exactly in the manner which it is licensed by the Contractors State License Board.

F. Lower-Tier Subcontractor's Insurance

The Subcontractor shall insert the substance of this clause, including this paragraph E, in its lower-tier subcontracts under this Subcontract for the performance of any work, other than the furnishing of standard commercial materials and supplies, and shall require its subcontractors to provide and maintain the types and coverage amounts indicated, based on the value of the lower-tier subcontract. The Subcontractor shall maintain a copy of all such lower-tier subcontractors' proofs of required insurance, and shall make copies available to the University upon request.

ARTICLE 10 – ASSUMPTION OF RISK UNTIL FINAL ACCEPTANCE

(Applicable to Subcontracts under $50,000)

The Subcontractor shall and does hereby assume all risk and responsibility for damage to any materials used or work done in connection with the work from any cause or causes whatsoever, including fire, earthquake and storm, prior to the completion and acceptance of the work, and shall at Subcontractor's own cost and expense, repair and/or replace any work or materials damaged or destroyed. Since no form of property insurance is to be carried by University, it will be the responsibility of Subcontractor to provide its own protection in this respect, and the cost of such protection shall be deemed to be included in the Subcontract price.

occupational disease acts, and similar state and/or federal statutes enacted for the benefit of employees. Each such policy must contain a provision waiving any right of subrogation against the University of California and the Government which may arise by reason of any payment under the policy.

C. 'ndemnification

ubcontractor agrees to indemnify and hold harmless the University and the Government from any or all claims and expenses, including reasonable legal fees, arising from personal injury, including death, which may be asserted against the University of California and Government by the subcontractor's/sub-subcontractor's employees who have visited or may visit Site 300 area, or other individuals exposed by such employees resulting from the natural occurrences of the risks enumerated above, provided the subcontractor/sub-subcontractor(s) at any tier, as appropriate, is given written notice by registered mail of any claim instituted against the University regarding the subject matter indemnified herein.

CLAUSE 13 – BUY AMERICAN ACT

A. The *BUY AMERICAN ACT - CONSTRUCTION MATERIALS* clause requires that only domestic construction material be used in the performance of this Subcontract.

B. The use of any non-domestic materials under this Subcontract must be approved by the University prior to installation. Unapproved, non-domestic materials delivered to the project site shall be immediately removed from the site by the Subcontractor at the Subcontractor's expense. If non-conforming materials are installed, the Subcontractor shall remove the non-conforming material from the work and replace the material with approved domestic material, at the Subcontractor's expense. If the cost of removal is prohibitive, as determined by the University, and the non-conforming material otherwise meets the requirements of the specifications, the cost of the non-conforming material shall be deducted from the Subcontract amount. The Subcontractor shall not have an option in this matter.

CLAUSE 14 – LIMITATIONS ON SUBCONTRACTING

(Applicable if the Subcontract is in excess of $100,000 and results from a Set-Aside to Small Business.)

By submission of an offer and execution of a Subcontract, the Subcontractor agrees that in performance of the Subcontract in the case of a Subcontract for-

General construction. The Subcontractor will perform at least 15% of the cost of the Subcontract, not including the cost of materials, with its own employees.

Construction by special trade contractors. The Subcontractor will perform at least 25% of the cost of the Subcontract, not including the cost of materials, with its own employees.

CLAUSE 15 – NOTICE OF LABOR DISPUTES

A. If the Subcontractor has knowledge that any actual or potential labor dispute is delaying or threatens to delay the performance of is Subcontract, the Subcontractor shall give immediate notice, including all relevant information, to the University.

The Subcontractor agrees to insert the substance of this clause, including this paragraph B, in any subcontract to which a labor dispute may delay the timely performance of this Subcontract; except that each subcontract shall provide that in the event its timely performance is delayed or threatened to be delayed by any actual or potential labor dispute, the subcontractor shall immediately notify the next higher tier subcontractor or the Subcontractor as the case may be, of all relevant information concerning the dispute.

CLAUSE 16 – NON WAIVER OF DEFAULT

Any failure by the University at any time, or from time to time, to enforce or require the strict keeping and performance of any of the terms or conditions of this Subcontract shall not constitute a waiver of such terms or conditions and shall not affect or impair such terms or conditions in any way nor the right of University at any time to avail itself of such remedies as it may have for any breach or breaches of such terms or conditions.

CLAUSE 17 – ASSIGNMENTS

A. This Subcontract shall be assignable by the University to a successor-in-interest or the Government.

B. Except as to assignment of payment due hereunder, the Subcontractor shall have no right, power or authority to sell, mortgage, transfer or assign this Subcontract, any portion hereof, any interest herein, or any claim hereunder, nor allow or permit any other party or parties to have any interest in or use any part of the rights or obligations granted hereunder for any purpose whatsoever without the prior written consent of the University.

C. Neither this Subcontract nor any interest created thereby or any claim here under shall pass by operation of law or otherwise to any trustee or receiver in bankruptcy or to any other receiver or assignee for the benefit of creditors, or to any other party or parties, except as expressly authorized by the University. The breach of the foregoing prohibition, whether voluntary, or by operation of law, by any process or proceeding of any court or by attachment, execution, proceeding in reorganization, composition, insolvency, or bankruptcy, whether voluntary or involuntary, shall be cause for default under this Subcontract.

CLAUSE 18 – DISPUTES AND CLAIMS

A. Submittal Of Claim

1. Except as otherwise provided in the Subcontract, any dispute between the Subcontractor and the University arising out of this Subcontract, or its breach, which is not informally disposed of by agreement shall be promptly submitted by the Subcontractor to the University as a claim. The term "claim," as used in this clause, shall mean a written request for adjustment or interpretation of Subcontract terms, payment of compensation, extension of time, or other relief with respect to the terms of the Subcontract submitted by the Subcontractor to the University with adequate supporting data and including a demand for a decision by the University. The term "adequate supporting data," as used in this clause, shall mean a detailed statement of the basis and supporting reasons for the asserted entitlement and an itemized breakdown of any adjustment or compensation sought.

j. The arbitrator(s) shall decide the claim in accordance with the applicable substantive law of California, except that clauses based upon federal regulations will be interpreted in accordance with applicable federal decisions. An award, including an award of costs and fees, is beyond the power of the arbitrator(s) if the award is based on an error of law. The award shall include a determination of all the questions submitted to the arbitrator(s) the decision of which is necessary to determine the claim, and a summary of the evidence and the reasons, factual and legal, for the decision. The award shall be in writing and signed by either the sole arbitrator or by at least a majority if there be more than one. The arbitrator(s) shall have no authority to add to, subtract from, modify, change, alter or ignore in any way the provisions of this Subcontract or expressly written modification or supplemental agreement thereto, or to extend its duration, unless all the parties hereto have expressly agreed, in writing, to give the arbitrator(s) specific authority to do so.

k. Each party to the arbitration shall pay its pro rata share of the arbitrator(s), together with other expenses of the arbitration incurred or approved by the arbitrator(s), not including counsel fees or witness fees or other expenses incurred by a party for its own benefit.

F Litigation

1. The Subcontractor may elect to litigate the University's decision on, or denial of, a claim if the amount of the claim is $100,000 or more. Such an election shall constitute an irrevocable waiver of the right to arbitrate.
2. No demand for litigation on a dispute may be made unless the Subcontractor has submitted a claim exceeding $100,000 to the University and until (a) the University has issued a written decision, or (b) the one hundred eighty (180) days after the date of the University's receipt of a claim exceeding $100,000, if a decision has not been issued by that date.
3. Timely notice of an intention to litigate a claim shall be a prerequisite to an effective election to litigate. Except as otherwise provided in this clause, the decision of the University on a claim shall be final and conclusive unless the Subcontractor delivers to the University a written notice of the intention to litigate, by certified mail, return receipt requested, or any other method that provides evidence of receipt, within:
   a. ninety (90) days from the date the Subcontractor receives the University's decision on a claim; or
   b. two hundred forty (240) days after the date of the University's receipt of a claim exceeding $100,000, if a decision has not been issued by that date.
4. The parties hereby elect the Superior Court of the State of California for the County in which the Subcontract was to be performed as the exclusive forum for such litigation.
5. If the University's decision involves a claim of $100,000 or more, and a party to this Subcontract has demanded arbitration, the other party to this Subcontract shall have seven (7) days from the date of its receipt of the notice of such filing from the AAA within which to file an answering statement of a notice of intention to litigate the decision in lieu of arbitrating it. If the other party does not deliver a written notice of intention to litigate within the seven (7) day period, by certified mail, return receipt requested, or any other method that provides evidence of receipt, that party shall be deemed to have consented to arbitration and to have irrevocably waived the right to litigate the University's decision. If no answering statement is filed within the seven (7) day period, it shall be considered as a denial of the claim.

Claims Excluded

The procedures and remedies provided in this clause shall not apply to:

1. any claim for or dispute about penalties or forfeitures prescribed by these General Provisions or by statute or regulation which another State or Federal agency is specifically authorized to administer, settle or determine;
2. any claim for or respecting personal injury or death or reimbursement or other compensation arising out of or resulting from liability for personal injury or death;
3. any claim or dispute involving fraud and misrepresentation;
4. any claim or dispute relating to stop payment requests or stop notices or the procedures authorized by *LIENS AND CLAIMS FOR LABOR OR MATERIALS* clause;
5. any claim related to the approval, refusal to approve, or substitution of subcontractors, regardless of tier, and supplies; or
6. any claim based on or involving noncompliance with or violation of any applicable health, safety or environmental regulations, statutes or provision(s).

Continuance of Performance

Pending any University decision on a dispute or claim, award by the arbitrator(s), or a final adjudication by the courts, the Subcontractor shall proceed diligently with the performance of this Subcontract and in accordance with the University's decision, and the University shall pay for such performance in accordance with the payment terms of this Subcontract, unless the parties to this Subcontract otherwise agree in writing.

CLAUSE 19 – ORDER OF PRECEDENCE

ıy inconsistency in this Subcontract shall be resolved by giving precedence in the following order: (a) the Schedule of Articles; (b) ese General Provisions; (c) the specifications, and (d) other documents, exhibits, and attachments.

CLAUSE 20 – CLAUSES INCORPORATED BY REFERENCE

The Federal Acquisition Regulation ("FAR") and Department of Energy Acquisition Regulation ("DEAR") clauses in this list are incorporated by reference as a part of the University Subcontract or Purchase Order ("Subcontract") referencing or attaching this list, as prescribed below, with the same force and effect as if they were included therein in full text, unless otherwise specified in Subcontract.

...roughout the clauses, the term "contract" shall mean the Subcontract; the term "Contractor" shall mean the entity ("Subcontractor") who entered into the Subcontract with the University; the term "subcontractor" shall mean the Subcontractor's subcontractor, and the terms "Government" and "Contracting Officer" shall mean the University, except in clauses FAR 52.215-2, 52.227-1, 52.227-1 Alternate I, 52.227-2, 52.227-3, 52.227-14, and 52.227-19, and DEAR 952.227-11 and 952.227-13, in which

THE FOLLOWING CLAUSES APPLY IF THE SUBCONTRACT EXCEEDS $100,000:

FAR 52.203-5	COVENANT AGAINST CONTINGENT FEES (APR 1984), as modified by DEAR 970.5203-1.
FAR 52.203-6	RESTRICTIONS ON SUBCONTRACTOR SALES TO THE GOVERNMENT (JUL 1995)
FAR 52.203-7	ANTI-KICKBACK PROCEDURES (JUL 1995), excluding paragraph (c)(1)
FAR 52.203-12	LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS (JAN 1990)
FAR 52.214-26	AUDIT AND RECORDS – SEALED BIDDING (OCT 1995), if the Subcontract resulted from a Sealed Bid Proposal
FAR 52.215-2	AUDIT AND RECORDS – NEGOTIATION (OCT 1995), if the Subcontract resulted from a Negotiated (Non-Sealed Bid) Proposal
FAR 52.222-4	CONTRACT WORK HOURS AND SAFETY STANDARDS ACT – OVERTIME COMPENSATION (JUL 1995)
FAR 52.223-2	CLEAN AIR AND WATER (APR 1984)
FAR 52.225-11	RESTRICTIONS ON CERTAIN FOREIGN PURCHASES (MAY 1992)

THE FOLLOWING CLAUSES APPLY IF THE SUBCONTRACT EXCEEDS $500,000:

DEAR 970.5204-24	CERTIFIED COST OR PRICING DATA (APR 1995), unless the Subcontract & all Modifications are exempt from the submission of certified cost or pricing data, per FAR 15.804.

THE FOLLOWING CLAUSES APPLY IF THE SUBCONTRACT EXCEEDS $1,000,000:

FAR 52.219-9	SMALL, SMALL DISADVANTAGED AND WOMEN-OWNED SMALL BUSINESS SUBCONTRACTING PLAN (OCT 1995), unless the Subcontractor is a small business or there are no subcontracting possibilities.

THE FOLLOWING CLAUSES APPLY IF THE SUBCONTRACT INVOLVES CLASSIFIED INFORMATION OR UNRESTRICTED ACCESS TO "LIMITED" OR "EXCLUSION" SECURITY AREAS:

DEAR 952-204-2	SECURITY (OCT 1987)
DEAR 952-204-58	WORKPLACE SUBSTANCE ABUSE PROGRAMS AT DOE SITES (AUG 1992)
DEAR 952.204-70	CLASSIFICATION (APR 1984)
DEAR 952.204-74	FOREIGN OWNERSHIP, CONTROL, OR INFLUENCE OVER CONTRACTOR (APR 1984)

(END OF GENERAL PROVISIONS)

LIST OF HOLIDAYS

The following is a list of Holidays observed by Lawrence Livermore National Laboratory. No work may be performed on these Holidays without making prior arrangements with the Construction Manager.

1997 - 2000 Holiday Schedule

January 1, 1997	Wednesday	New Year's Holiday
January 20, 1997	Monday	Rev. Martin Luther King Jr. Day
February 17, 1997	Monday	Presidents' Day
March 31, 1997	Monday	University Spring Holiday
May 26, 1997	Monday	Memorial Day
July 4, 1997	Friday	Independence Day
September 1, 1997	Monday	Labor Day
November 27, 28, 1997	Thursday, Friday	Thanksgiving Holiday
December 25, 26, 1997	Thursday, Friday	Christmas Holiday
January 1, 2, 1998	Thursday, Friday	New Year's Holiday
January 19, 1998	Monday	Rev. Martin Luther King Jr. Day
February 16, 1998	Monday	Presidents' Day
April 13, 1998	Monday	University Spring Holiday
May 25, 1998	Monday	Memorial Day
July 3, 1998	Friday	Independence Day
September 7, 1998	Monday	Labor Day
November 26, 27, 1998	Thursday, Friday	Thanksgiving Holiday
December 24, 25, 1998	Thursday, Friday	Christmas Holiday
December 31, 1998	Thursday	New Year's Holiday
January 1, 1999	Friday	New Year's Holiday
January 15, 1999	Monday	Rev. Martin Luther King Jr. Day
February 15, 1999	Monday	Presidents' Day
April 5, 1999	Monday	University Spring Holiday
May 31, 1999	Monday	Memorial Day
July 5, 1999	Monday	Independence Day
September 1, 1999	Monday	Labor Day
November 25, 26, 1999	Thursday, Friday	Thanksgiving Holiday
December 24, 27, 1999	Friday, Monday	Christmas Holiday
December 31, 1999	Friday	New Year's Holiday
January 3, 2000	Monday	New Year's Holiday
January 17, 2000	Monday	Rev. Martin Luther King Jr. Day
February 21, 2000	Monday	Presidents' Day
April 24, 2000	Monday	University Spring Holiday
May 29, 2000	Monday	Memorial Day
July 4, 2000	Monday	Independence Day
September 4, 2000	Monday	Labor Day
November 23, 24, 2000	Thursday, Friday	Thanksgiving Holiday
December 25, 26, 2000	Monday, Tuesday	Christmas Holiday
December 31, 2000	Monday	New Year's Holiday
January 1, 2001	Tuesday	New Year's Holiday

ADDENDUM NO. 04

to

SOLICITATION NO. B336701

for

Pit 6 Landfill Closure Cover

Site 300

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
LAWRENCE LIVERMORE NATIONAL LABORATORY
LIVERMORE, CALIFORNIA 94550

The following changes shall apply to the plans, specifications and/or drawings, are hereby made a part thereof and are subject to all the requirements of this Solicitation as if originally included therein.

RECEIPT AND INCLUSION OF THIS ADDENDUM NO. 04 SHALL BE ACKNOWLEDGED ON THE BID FOR LUMP SUM CONTRACT IN THE SECTION ENTITLED "ADDENDA".

Bid date remains unchanged.

PROCUREMENT & MATERIEL
LAWRENCE LIVERMORE NATIONAL LABORATORY

April 1, 1997

ADDENDUM NO. 04

April 1, 1997

I. GENERAL

Two questions have been received with respect to the Solicitation IFB Package. The questions with their respective answers follow:

Question 1): *It is unclear who is performing the CQA Surveying. See page 18 of the CQA Inspection Plan. Please clarify if an LLNL representative or the Subcontractor is to perform this task?*

Answer: The CQA Surveying will be the responsibility of the CQA firm. They will contract directly with a 3rd party surveyor. See description of CQA Surveyor Section 2.10 on Page 8 of the CQA plan.

Question 2): *One of our Geosynthetic Subcontractors (National Seal Co.) has asked to get a clarification on the "Shearing Strength" specification (2,000 psf) identified in Section 02755-2, paragraph 1.04, Table 02755-1. National Seal has requested more information regarding the 2,000 psf specification and to inquire as to the intent of the specification.*

Answer: ***Specification Section 02755, Table 02755-1 is modified as follows:***

(a) Remove the "Shearing Strength - 2,000 psf" row
(b) modify Minimum tensile strength (#/ft) from 680 to 480.

(end of Addendum No. 04)

Appendix F

Borrow Soil Preconstruction Test Results

Appendix F.1

Preconstruction General Fill Test Results

Appendix F.1.1

Proctors

MOISTURE-DENSITY CURVE - ASTM D1557

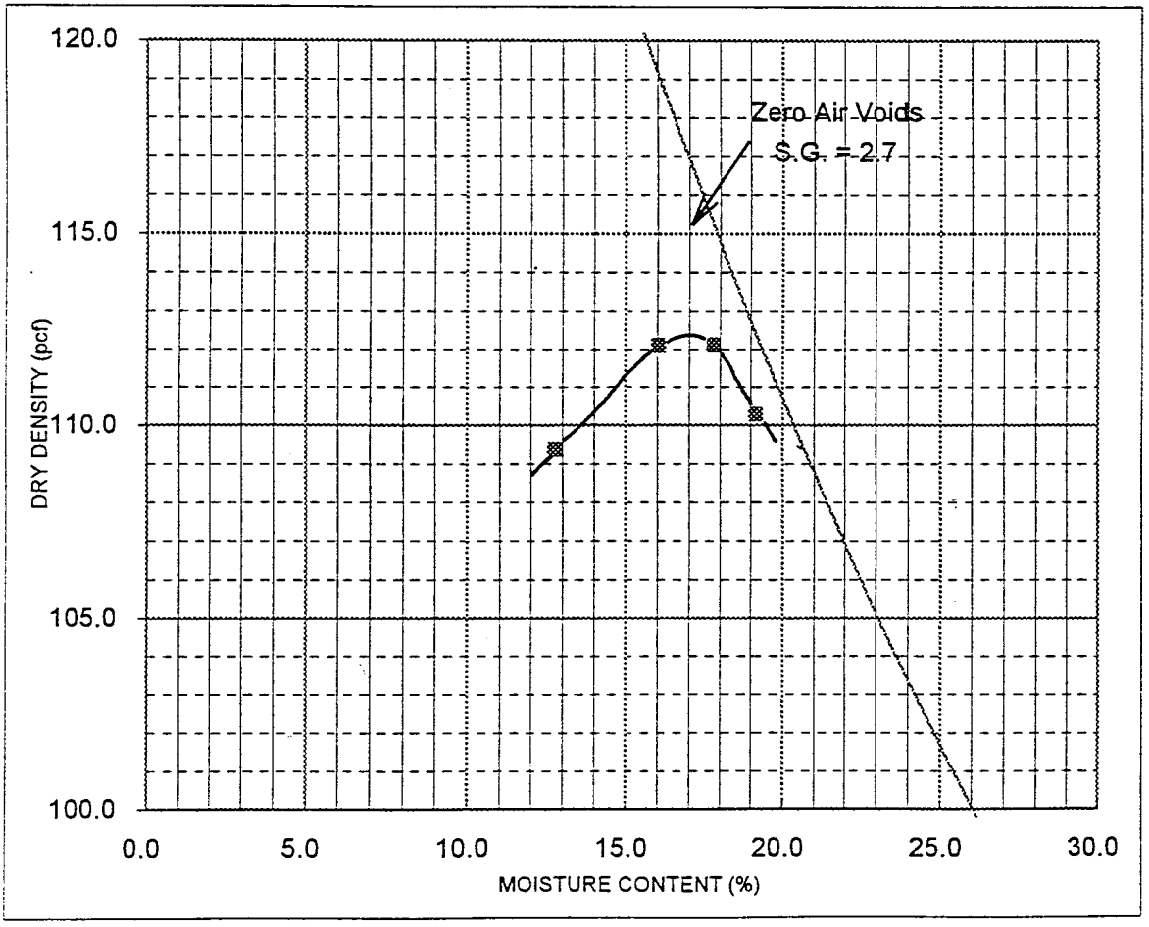
PROJECT:	LLNL, Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJ. NO:	977-5116.200	Date	June 13, 1997
SAMPLE #:	PF-1	Review:	RK

METHOD:	ASTM D 1557	MOLD VOLUME (c.f.):	0.033
DESCRIPTION:	Preconstruction Fill	S.G.:	2.75

TRIAL NO:	1	2	3	4	5
WT. MOLD & SOIL (gm):	6104	6205	6235	6225	0
MOLD TARE (gm):	4258	4258	4258	4258	
WET DENSITY (pcf):	123.3	130.1	132.1	131.4	0.0

MOISTURE CAN NO:	P1	P2	P3	P4	P5
TARE CAN (gm):	30.3	30.3	30.2	30.5	
WT. MOIST SOIL & CAN (gm):	184.1	170	159.9	162.4	
WT. DRY SOIL & CAN (gm):	166.7	150.7	140.3	141.2	

WATER CONTENT (%):	12.8%	16.0%	17.8%	19.2%	#DIV/0!
DRY DENSITY (pcf):	109.4	112.1	112.1	110.3	#DIV/0!



Maximum Dry Density = 112.7 pcf
Optimum Moisture Content = 16.8%

GCS
Golder Construction Services, Inc.

MOISTURE-DENSITY CURVE - ASTM D1557

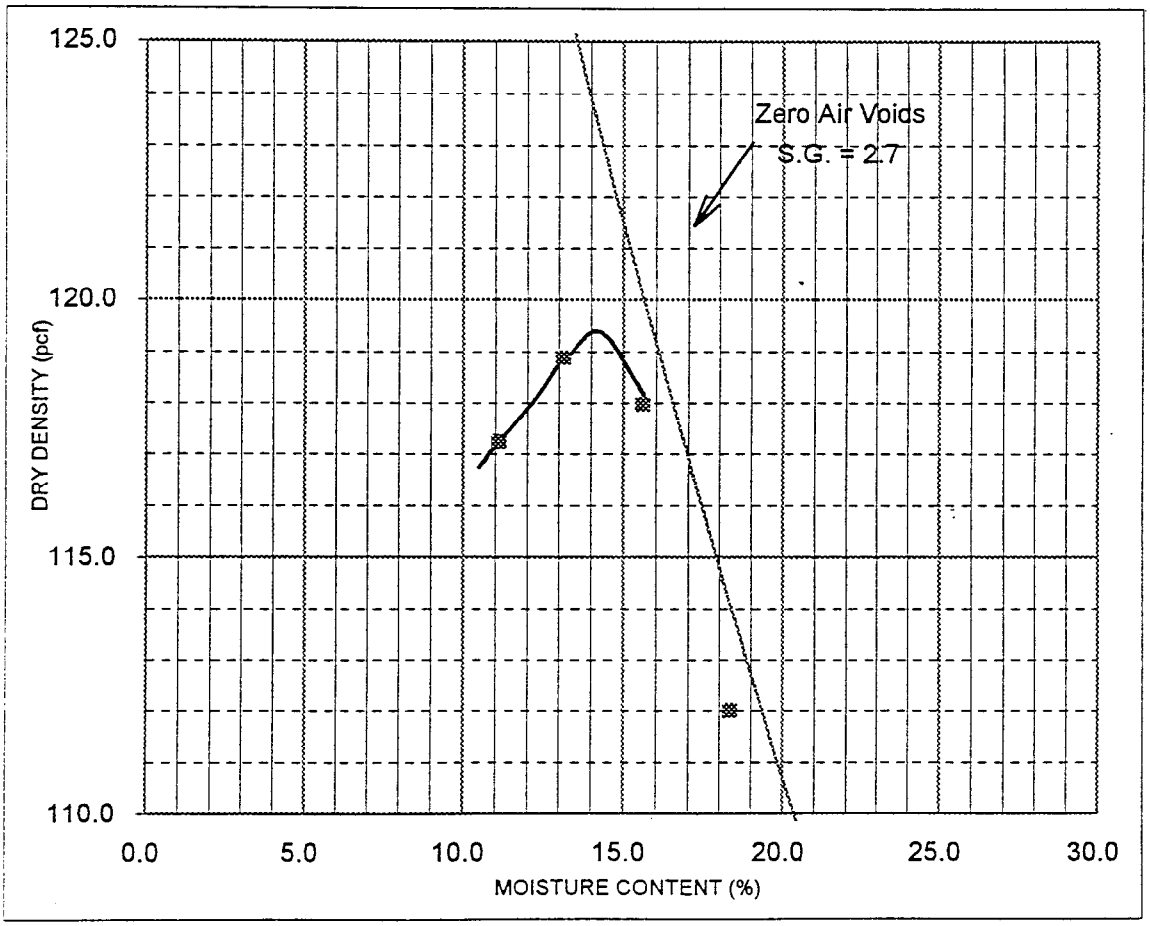
PROJECT:	LLNL, Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJ. NO:	977-5116.200	Date	June 23, 1997
SAMPLE #:	PF-2	Review:	RK

METHOD:	ASTM D 1557	MOLD VOLUME (c.f.):	0.033
DESCRIPTION:	Preconstruction Fill	S.G.:	2.75

TRIAL NO:	1	2	3	4	5
WT. MOLD & SOIL (gm):	6271	6299	6242	6208	0
MOLD TARE (gm):	4258	4258	4258	4258	
WET DENSITY (pcf):	134.5	136.4	132.5	130.3	0.0

MOISTURE CAN NO:	P1	P2	P3	P4	P5
TARE CAN (gm):	30.3	30.3	30.2	30.5	
WT. MOIST SOIL & CAN (gm):	185.4	181.5	195.4	179.4	
WT. DRY SOIL & CAN (gm):	167.4	161.1	169.8	164.5	

WATER CONTENT (%):	13.1%	15.6%	18.3%	11.1%	#DIV/0!
DRY DENSITY (pcf):	118.9	118.0	112.0	117.2	#DIV/0!



Maximum Dry Density = 119.5 pcf
Optimum Moisture Content = 14.0%

GCS
Golder Construction Services, Inc.

MOISTURE-DENSITY CURVE - ASTM D1557

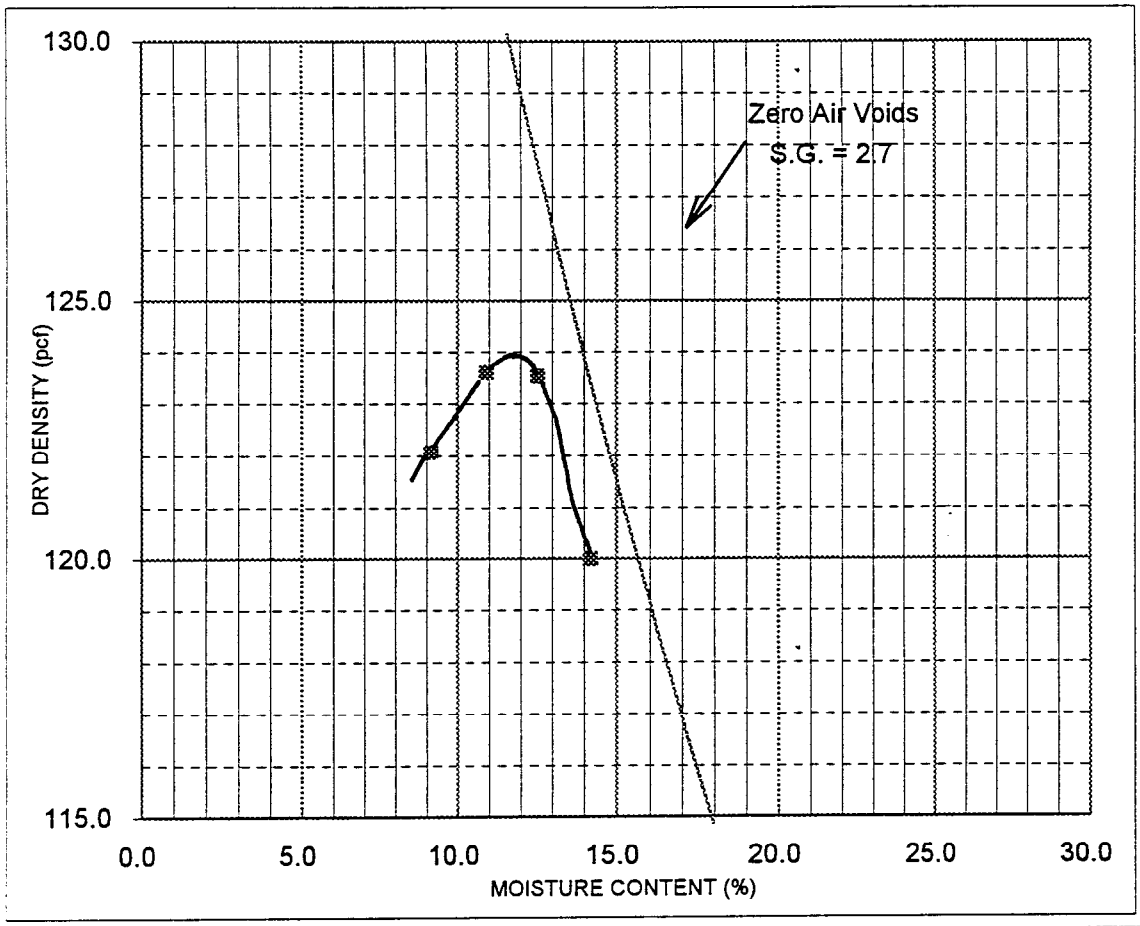
PROJECT:	LLNL, Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJ. NO:	977-5116.200	Date	June 27, 1997
SAMPLE #:	PF-3	Review:	RK

METHOD:	ASTM D 1557	MOLD VOLUME (c.f.):	0.033
DESCRIPTION:	Preconstruction Fill	S.G.:	2.75

TRIAL NO:	1	2	3	4	5
WT. MOLD & SOIL (gm):	6310	6339	6309	6252	0
MOLD TARE (gm):	4258	4258	4258	4258	
WET DENSITY (pcf):	137.1	139.0	137.0	133.2	0.0

MOISTURE CAN NO:	P1	P2	P3	P4	P5
TARE CAN (gm):	30.3	30.3	30.2	30.5	
WT. MOIST SOIL & CAN (gm):	187.9	188.2	224.9	195.4	
WT. DRY SOIL & CAN (gm):	172.4	170.6	200.7	181.6	

WATER CONTENT (%):	10.9%	12.5%	14.2%	9.1%	#DIV/0!
DRY DENSITY (pcf):	123.6	123.5	120.0	122.1	#DIV/0!



Maximum Dry Density = 124.0 pcf
Optimum Moisture Content = 11.5%

GCS
Golder Construction Services, Inc.

Appendix F.1.2

Sieves

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	June 13, 1997
SAMPLE #:	PF-1 (Preconstruction Fill)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	40
Weight of Wet Soil& Tare (g)	739.80
Weight of Dry Soil & Tare (g)	688.80
Weight of Tare (g)	78.90
Weight of Water (g)	51.00
Weight of Dry Soil (g)	609.90
% Moisture	**8.36%**

200 WASH (Percent Fines)

Tare Number	40
Weight of Soil & Tare, before wash (g)	688.80
Weight of Soil & Tare, after wash (g)	353.50
Weight of Tare (g)	78.90
Weight of Fines Lost (g)	335.30
Weight of Dry Soil (g)	609.90
% Fines Lost	**54.98%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	10.40	1.71%	**98.29%**	#4	Coarse Sand
Medium Sand	#10	18.80	3.08%	**96.92%**	#10	Medium Sand
	#20	22.60	3.71%	**96.29%**	#20	
Fine Sand	#40	67.50	11.07%	**88.93%**	#40	Fine Sand
	#60	130.60	21.41%	**78.59%**	#60	
	#100	202.20	33.15%	**66.85%**	#100	
	#200	268.70	44.06%	**55.94%**	#200	
Fines	PAN	274.60	45.02%	**54.98%**	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	274.60
Weight of Split for Fine Sieve Stack	274.60
Percent of Original Weight in Pan	100.00%

% C GRVL:	**0.00%**
% F GRVL:	**1.71%**
% C SAND:	**1.38%**
% M SAND:	**7.98%**
% F SAND:	**33.96%**
% FINES:	**54.98%**
% TOTAL:	**100.00%**

LL:	40
PL:	20
PI :	20

Wet Color:	**Very dark brown (5YR 2/2)**
Description:	**(CL)**
	Sandy CLAY

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	June 13, 1997
SAMPLE #:	PF-2 (Preconstruction Fill)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	53
Weight of Wet Soil& Tare (g)	735.90
Weight of Dry Soil & Tare (g)	708.60
Weight of Tare (g)	79.40
Weight of Water (g)	27.30
Weight of Dry Soil (g)	629.20
% Moisture	**4.34%**

200 WASH (Percent Fines)

Tare Number	53
Weight of Soil & Tare, before wash (g)	708.60
Weight of Soil & Tare, after wash (g)	400.40
Weight of Tare (g)	79.40
Weight of Fines Lost (g)	308.20
Weight of Dry Soil (g)	629.20
% Fines Lost	**48.98%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	47.30	7.52%	**92.48%**	#4	Coarse Sand
Medium Sand	#10	59.20	9.41%	**90.59%**	#10	Medium Sand
	#20	73.60	11.70%	**88.30%**	#20	
Fine Sand	#40	106.20	16.88%	**83.12%**	#40	Fine Sand
	#60	167.60	26.64%	**73.36%**	#60	
	#100	243.50	38.70%	**61.30%**	#100	
	#200	317.10	50.40%	**49.60%**	#200	
Fines	PAN	321.00	51.02%	**48.98%**	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	321.00
Weight of Split for Fine Sieve Stack	321.00
Percent of Original Weight in Pan	100.00%

% C GRVL:	**0.00%**
% F GRVL:	**7.52%**
% C SAND:	**1.89%**
% M SAND:	**7.47%**
% F SAND:	**34.14%**
% FINES:	**48.98%**
% TOTAL:	**100.00%**

LL:	28
PL:	16
PI :	12

Wet Color: **Dark grayish brown (5YR 3/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	June 27, 1997
SAMPLE #:	PF-3 (Preconstruction Fill)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	53
Weight of Wet Soil& Tare (g)	783.90
Weight of Dry Soil & Tare (g)	740.30
Weight of Tare (g)	79.40
Weight of Water (g)	43.60
Weight of Dry Soil (g)	660.90
% Moisture	**6.60%**

200 WASH (Percent Fines)

Tare Number	53
Weight of Soil & Tare, before wash (g)	740.30
Weight of Soil & Tare, after wash (g)	497.00
Weight of Tare (g)	79.40
Weight of Fines Lost (g)	243.30
Weight of Dry Soil (g)	660.90
% Fines Lost	**36.81%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	46.50	7.04%	**92.96%**	0.750	Fine Gravel
	0.375	46.50	7.04%	**92.96%**	0.375	
Coarse Sand	#4	74.20	11.23%	**88.77%**	#4	Coarse Sand
Medium Sand	#10	96.20	14.56%	**85.44%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	417.60
Weight of Split for Fine Sieve Stack	417.60
Percent of Original Weight in Pan	100.00%

	#20	116.60	17.64%	**82.36%**	#20	
Fine Sand	#40	164.50	24.89%	**75.11%**	#40	Fine Sand
	#60	238.80	36.13%	**63.87%**	#60	
	#100	317.70	48.07%	**51.93%**	#100	
	#200	409.10	61.90%	**38.10%**	#200	
Fines	PAN	417.60	63.19%	**36.81%**	PAN	Fines

% C GRVL:	**7.04%**
% F GRVL:	**4.19%**
% C SAND:	**3.33%**
% M SAND:	**10.33%**
% F SAND:	**38.30%**
% FINES:	**36.81%**
% TOTAL:	**100.00%**

LL:	**22**
PL:	**18**
PI :	**4**

Wet Color: **Dark yellowish brown (10YR 4/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

Appendix F.1.3

Atterberg Limits

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	June 13,1997
SAMPLE #:	PF-1 (Preconstruction Fill)	Review:	RK

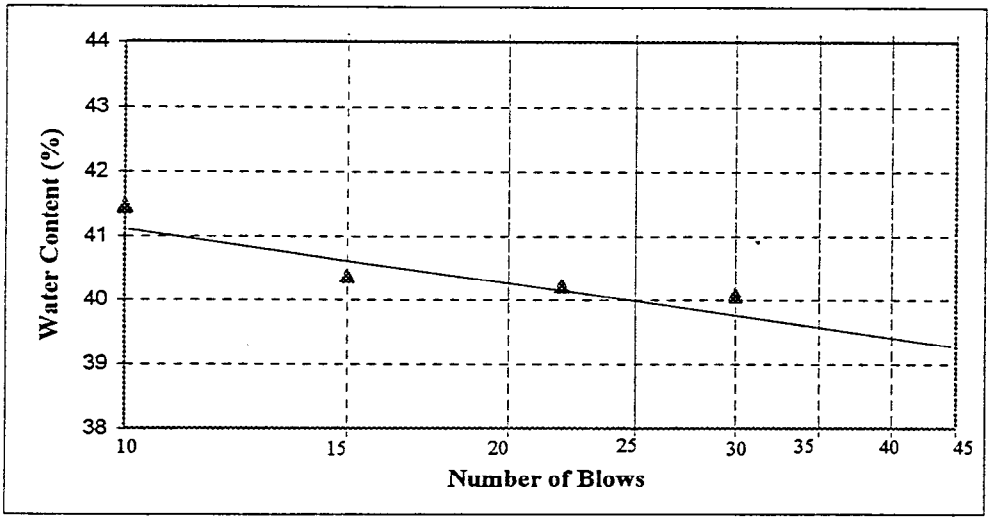
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

						Natural Moisture Content
Tare Number		205	111			40
Weight of Wet Soil & Tare	(w1)	15.55	15.58			739.80
Weight of Dry Soil & Tare	(w2)	14.82	14.92			688.80
Weight of Tare	(w3)	11.22	11.47			78.90
Weight of Water	(w4=w1-w2)	0.73	0.66	----		51.00
Weight of Dry Soil	(w5=w2-w3)	3.60	3.45	----		609.90
Water Content (%)	(w4/w5)*100	**20.3**	**19.1**	----		**8.4**

LIQUID LIMIT

Number of Blows		15	30	10	22	
Tare Number		12	6	10	21	
Weight of Wet Soil & Tare	(w6)	49.17	47.63	47.42	46.20	
Weight of Dry Soil & Tare	(w7)	41.20	40.14	39.69	39.15	
Weight of Tare	(w8)	21.46	21.45	21.05	21.62	
Weight of Water	(w9=w6-w7)	7.97	7.49	7.73	7.05	----
Weight of Dry Soil	(w10=w7-w8)	19.74	18.69	18.64	17.53	----
Water Content (%)	(w9/w10)*100	**40.4**	**40.1**	**41.5**	**40.2**	----



LIQUID LIMIT	40
PLASTIC LIMIT	20
PLASTICITY INDEX	20
MOISTURE CONTENT (%)	8.4

Description: Very dark brown (5 YR 2/2) Sandy CLAY

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	June 13, 1997
SAMPLE #:	PF-2 (Preconstruction Fill)	Review:	RK

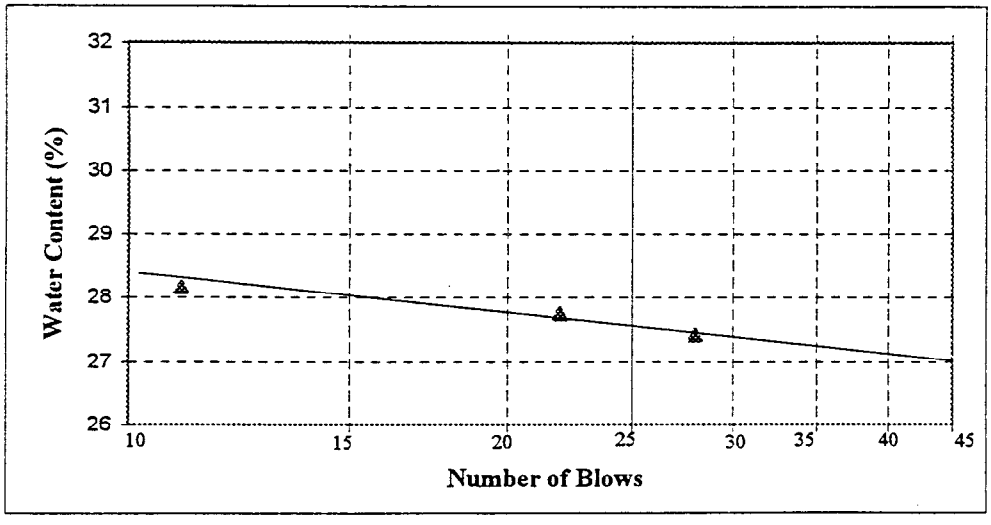
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		109	108		53
Weight of Wet Soil & Tare	(w1)	16.68	16.77		735.90
Weight of Dry Soil & Tare	(w2)	15.93	16.05		708.60
Weight of Tare	(w3)	11.50	11.31		79.40
Weight of Water	(w4=w1-w2)	0.75	0.72	—	27.30
Weight of Dry Soil	(w5=w2-w3)	4.43	4.74	—	629.20
Water Content (%)	**(w4/w5)*100**	**16.9**	**15.2**	—	**4.3**

LIQUID LIMIT

Number of Blows		11	22	28		
Tare Number		16	1	21		
Weight of Wet Soil & Tare	(w6)	43.10	48.85	47.97		
Weight of Dry Soil & Tare	(w7)	38.22	42.82	42.30		
Weight of Tare	(w8)	20.89	21.09	21.62		
Weight of Water	(w9=w6-w7)	4.88	6.03	5.67	-----	-----
Weight of Dry Soil	(w10=w7-w8)	17.33	21.73	20.68	-----	-----
Water Content (%)	**(w9/w10)*100**	**28.2**	**27.7**	**27.4**	—	—



LIQUID LIMIT	28
PLASTIC LIMIT	16
PLASTICITY INDEX	12
MOISTURE CONTENT (%)	4.3

Description: Dark grayish brown (5 YR 3/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	June 24, 1997
SAMPLE #:	PF-3 (Preconstruction Fill)	Review:	RK

SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

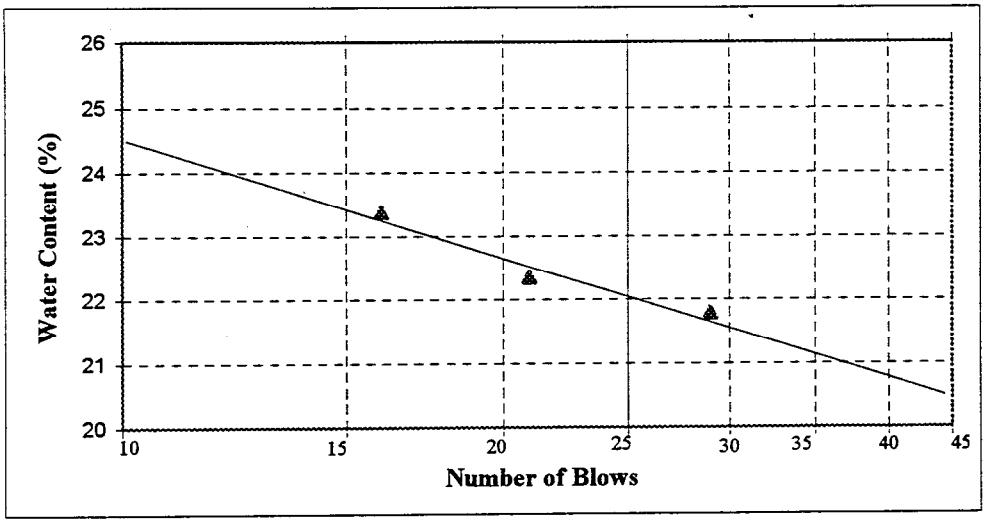
PLASTIC LIMIT

Tare Number		111	108		53
Weight of Wet Soil & Tare	(w1)	16.35	16.16		783.90
Weight of Dry Soil & Tare	(w2)	15.61	15.40		740.30
Weight of Tare	(w3)	11.47	11.31		79.40
Weight of Water	(w4=w1-w2)	0.74	0.76	-----	43.60
Weight of Dry Soil	(w5=w2-w3)	4.14	4.09	-----	660.90
Water Content (%)	**(w4/w5)*100**	**17.9**	**18.6**	-----	**6.6**

Natural Moisture Content

LIQUID LIMIT

Number of Blows		16	21	29		
Tare Number		10	1	16		
Weight of Wet Soil & Tare	(w6)	51.87	48.07	48.50		
Weight of Dry Soil & Tare	(w7)	46.03	43.14	43.56		
Weight of Tare	(w8)	21.05	21.09	20.89		
Weight of Water	(w9=w6-w7)	5.84	4.93	4.94	-----	-----
Weight of Dry Soil	(w10=w7-w8)	24.98	22.05	22.67	-----	-----
Water Content (%)	**(w9/w10)*100**	**23.4**	**22.4**	**21.8**	-----	-----



LIQUID LIMIT	**22**
PLASTIC LIMIT	**18**
PLASTICITY INDEX	**4**
MOISTURE CONTENT (%)	**6.6**

Description: **Dark yellowish brown (10 YR 4/2) Sandy CLAY with gravel**

USCS **CL**

GCS
Golder Construction Services, Inc.

Appendix F.2

Preconstruction Vegetative Cover Test Results

Appendix F.2.1

Sieves

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 25, 1997
SAMPLE #:	PVC-1 (Preconst. Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	40
Weight of Wet Soil& Tare (g)	856.10
Weight of Dry Soil & Tare (g)	811.70
Weight of Tare (g)	78.90
Weight of Water (g)	44.40
Weight of Dry Soil (g)	732.80
% Moisture	**6.06%**

200 WASH (Percent Fines)

Tare Number	40
Weight of Soil & Tare, before wash (g)	811.70
Weight of Soil & Tare, after wash (g)	502.50
Weight of Tare (g)	78.90
Weight of Fines Lost (g)	309.20
Weight of Dry Soil (g)	732.80
% Fines Lost	**42.19%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	29.10	3.97%	**96.03%**	0.750	Fine Gravel
	0.375	29.10	3.97%	**96.03%**	0.375	
Coarse Sand	#4	78.20	10.67%	**89.33%**	#4	Coarse Sand
Medium Sand	#10	100.20	13.67%	**86.33%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	502.50
Weight of Split for Fine Sieve Stack	502.50
Percent of Original Weight in Pan	100.00%

	#20	121.50	16.58%	**83.42%**	#20	
Fine Sand	#40	157.20	21.45%	**78.55%**	#40	Fine Sand
	#60	228.90	31.24%	**68.76%**	#60	
	#100	318.40	43.45%	**56.55%**	#100	
	#200	414.00	56.50%	**43.50%**	#200	
Fines	PAN	423.60	57.81%	**42.19%**	PAN	Fines

% C GRVL:	**3.97%**
% F GRVL:	**6.70%**
% C SAND:	**3.00%**
% M SAND:	**7.78%**
% F SAND:	**36.35%**
% FINES:	**42.19%**
% TOTAL:	**100.00%**

LL:	**28**
PL:	**18**
PI :	**10**

Wet Color: **Pale brown (5YR 5/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 25, 1997
SAMPLE #:	PVC-2 (Preconst. Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	53
Weight of Wet Soil& Tare (g)	833.50
Weight of Dry Soil & Tare (g)	737.10
Weight of Tare (g)	79.40
Weight of Water (g)	96.40
Weight of Dry Soil (g)	657.70
% Moisture	**14.66%**

200 WASH (Percent Fines)

Tare Number	53
Weight of Soil & Tare, before wash (g)	737.10
Weight of Soil & Tare, after wash (g)	459.60
Weight of Tare (g)	79.40
Weight of Fines Lost (g)	277.50
Weight of Dry Soil (g)	657.70
% Fines Lost	**42.19%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	23.30	3.54%	**96.46%**	#4	Coarse Sand
Medium Sand	#10	37.20	5.66%	**94.34%**	#10	Medium Sand
	#20	60.10	9.14%	**90.86%**	#20	
Fine Sand	#40	99.10	15.07%	**84.93%**	#40	Fine Sand
	#60	173.20	26.33%	**73.67%**	#60	
	#100	272.40	41.42%	**58.58%**	#100	
	#200	370.40	56.32%	**43.68%**	#200	
Fines	PAN	380.20	57.81%	**42.19%**	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	459.60
Weight of Split for Fine Sieve Stack	459.60
Percent of Original Weight in Pan	100.00%

% C GRVL:	**0.00%**
% F GRVL:	**3.54%**
% C SAND:	**2.11%**
% M SAND:	**9.41%**
% F SAND:	**42.74%**
% FINES:	**42.19%**
% TOTAL:	**100.00%**

LL:	**28**
PL:	**18**
PI :	**10**

Wet Color:	**Grayish brown (5YR 3/2)**
Description:	**(CL)**
	Sandy CLAY with gravel

GCS
Golder Construction Services, Inc.

Appendix F.2.2

Atterberg Limits

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 25, 1997
SAMPLE #:	PVC-1 (Preconst. Vegetative Cover)	Review:	RK

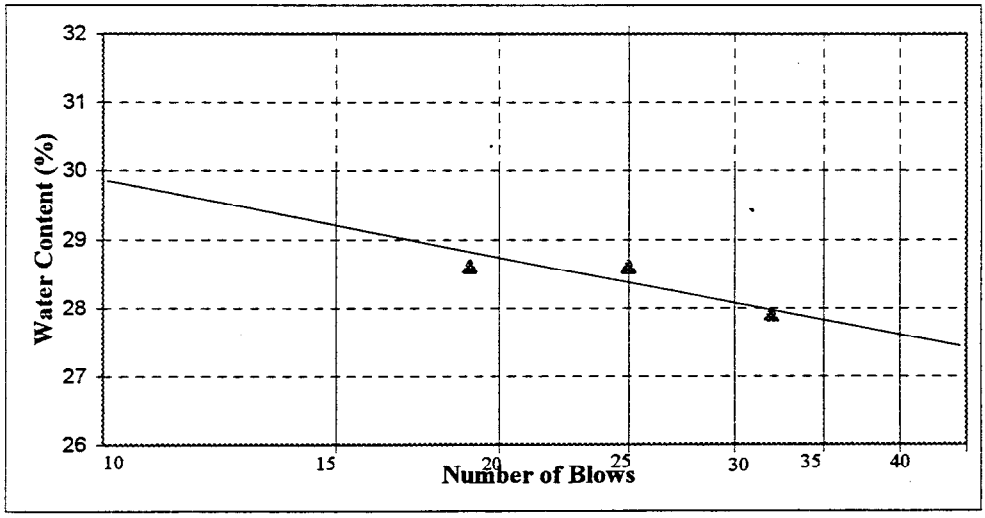
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

						Natural Moisture Content
Tare Number		109	108			40
Weight of Wet Soil & Tare	(w1)	17.28	17.12			856.10
Weight of Dry Soil & Tare	(w2)	16.38	16.25			811.70
Weight of Tare	(w3)	11.50	11.31			78.90
Weight of Water	(w4=w1-w2)	0.90	0.87	-----		44.40
Weight of Dry Soil	(w5=w2-w3)	4.88	4.94	-----		732.80
Water Content (%)	**(w4/w5)*100**	**18.4**	**17.6**	----		**6.1**

LIQUID LIMIT

Number of Blows		32	19	25		
Tare Number		23C	21	24C		
Weight of Wet Soil & Tare	(w6)	43.16	43.07	41.82		
Weight of Dry Soil & Tare	(w7)	38.36	38.31	37.37		
Weight of Tare	(w8)	21.16	21.67	21.81		
Weight of Water	(w9=w6-w7)	4.80	4.76	4.45	-----	-----
Weight of Dry Soil	(w10=w7-w8)	17.20	16.64	15.56	-----	-----
Water Content (%)	**(w9/w10)*100**	**27.9**	**28.6**	**28.6**	----	----



LIQUID LIMIT	**28**
PLASTIC LIMIT	**18**
PLASTICITY INDEX	**10**
MOISTURE CONTENT (%)	**6.1**

Description: **Pale brown (5YR 5/2) Sandy CLAY with gravel**

USCS **CL**

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 25, 1997
SAMPLE #:	PVC-2 (Preconst. Vegetative Cover)	Review:	RK

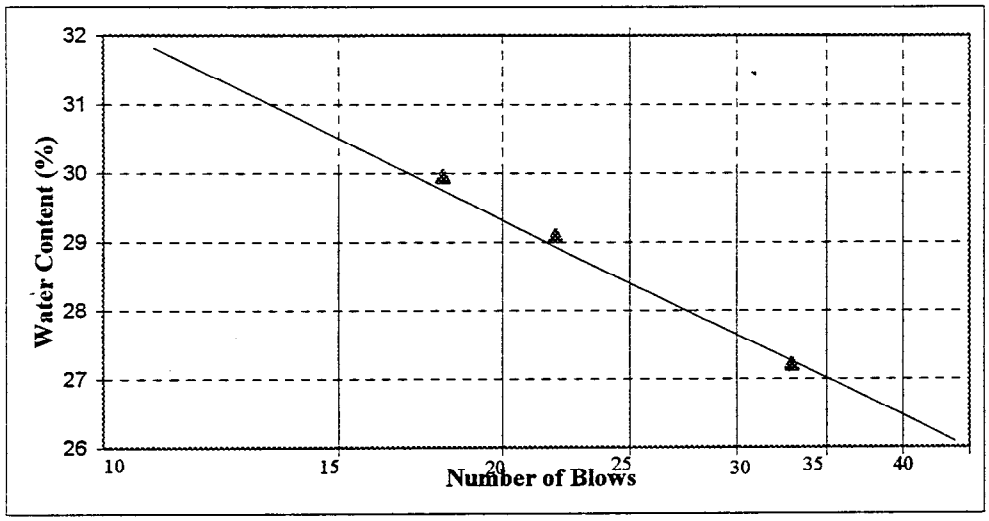
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

						Natural Moisture Content
Tare Number		111	205			53
Weight of Wet Soil & Tare	(w1)	17.34	18.38			833.50
Weight of Dry Soil & Tare	(w2)	16.46	17.26			737.10
Weight of Tare	(w3)	11.47	11.22			79.40
Weight of Water	(w4=w1-w2)	0.88	1.12	-----		96.40
Weight of Dry Soil	(w5=w2-w3)	4.99	6.04	-----		657.70
Water Content (%)	**(w4/w5)*100**	**17.6**	**18.5**	----		**14.7**

LIQUID LIMIT

Number of Blows		33	22	18		
Tare Number		1	6	16		
Weight of Wet Soil & Tare	(w6)	46.10	47.28	45.23		
Weight of Dry Soil & Tare	(w7)	40.75	41.46	39.62		
Weight of Tare	(w8)	21.09	21.45	20.89		
Weight of Water	(w9=w6-w7)	5.35	5.82	5.61	----	----
Weight of Dry Soil	(w10=w7-w8)	19.66	20.01	18.73	----	----
Water Content (%)	**(w9/w10)*100**	**27.2**	**29.1**	**30.0**	----	----



LIQUID LIMIT	**28**
PLASTIC LIMIT	**18**
PLASTICITY INDEX	**10**
MOISTURE CONTENT (%)	**14.7**

Description: **Grayish brown (5YR 3/2) Sandy CLAY with gravel**

USCS CL

GCS
Golder Construction Services, Inc.

Appendix G

General Fill Test Results

Appendix G.1

Proctors

MOISTURE-DENSITY CURVE - ASTM D1557

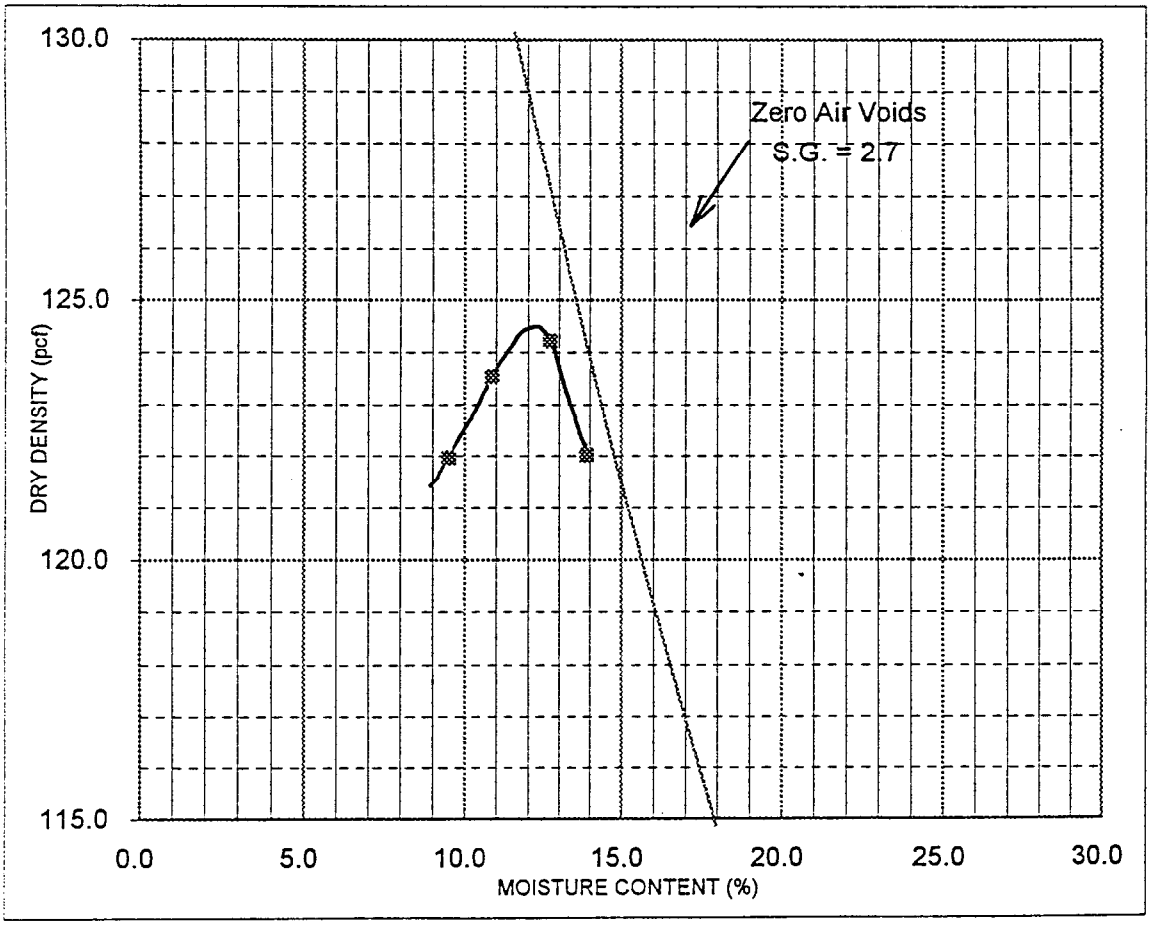
PROJECT:	LLNL, Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJ. NO:	977-5116.200	Date	June 30, 1997
SAMPLE #:	CF-1	Review:	RK

METHOD:	ASTM D 1557	MOLD VOLUME (c.f.):	0.033
DESCRIPTION:	Compacted Fill	S.G.:	2.75

TRIAL NO:	1	2	3	4	5
WT. MOLD & SOIL (gm):	6257	6308	6354	6338	0
MOLD TARE (gm):	4258	4258	4258	4258	
WET DENSITY (pcf):	133.5	137.0	140.0	139.0	0.0

MOISTURE CAN NO:	P1	P2	P3	P4	P5
TARE CAN (gm):	30.3	30.3	30.2	30.5	
WT. MOIST SOIL & CAN (gm):	197.4	191.5	196.8	190.3	
WT. DRY SOIL & CAN (gm):	182.9	175.7	178	170.8	

WATER CONTENT (%):	9.5%	10.9%	12.7%	13.9%	#DIV/0!
DRY DENSITY (pcf):	122.0	123.5	124.2	122.0	#DIV/0!



Maximum Dry Density = 124.5 pcf
Optimum Moisture Content = 12.0%

GCS
Golder Construction Services, Inc.

MOISTURE-DENSITY CURVE - ASTM D1557

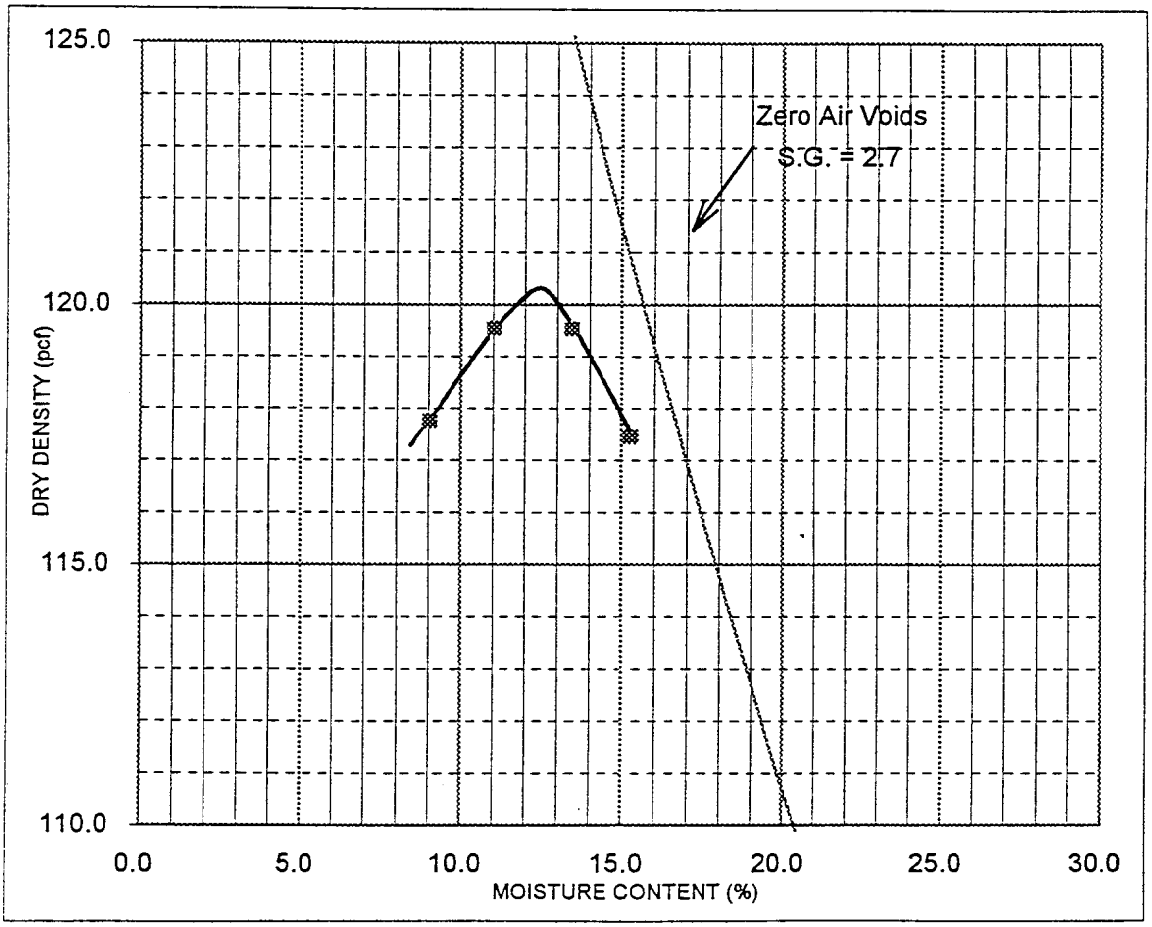
PROJECT:	LLNL, Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJ. NO:	977-5116.200	Date	July 2, 1997
SAMPLE #:	CF-2	Review:	RK

METHOD:	ASTM D 1557	MOLD VOLUME (c.f.):	0.033
DESCRIPTION:	Compacted Fill	S.G.:	2.75

TRIAL NO:	1	2	3	4	5
WT. MOLD & SOIL (gm):	6245	6288	6285	6180	0
MOLD TARE (gm):	4258	4258	4258	4258	
WET DENSITY (pcf):	132.7	135.6	135.4	128.4	0.0

MOISTURE CAN NO:	P1	P2	P3	P4	P5
TARE CAN (gm):	30.3	30.3	30.2	30.5	
WT. MOIST SOIL & CAN (gm):	188.2	189.6	206.6	194.5	
WT. DRY SOIL & CAN (gm):	172.5	170.7	183.2	180.9	

WATER CONTENT (%):	11.0%	13.5%	15.3%	9.0%	#DIV/0!
DRY DENSITY (pcf):	119.5	119.5	117.5	117.8	#DIV/0!



Maximum Dry Density = 120.5 pcf
Optimum Moisture Content = 12.5%

GCS
Golder Construction Services, Inc.

MOISTURE-DENSITY CURVE - ASTM D1557

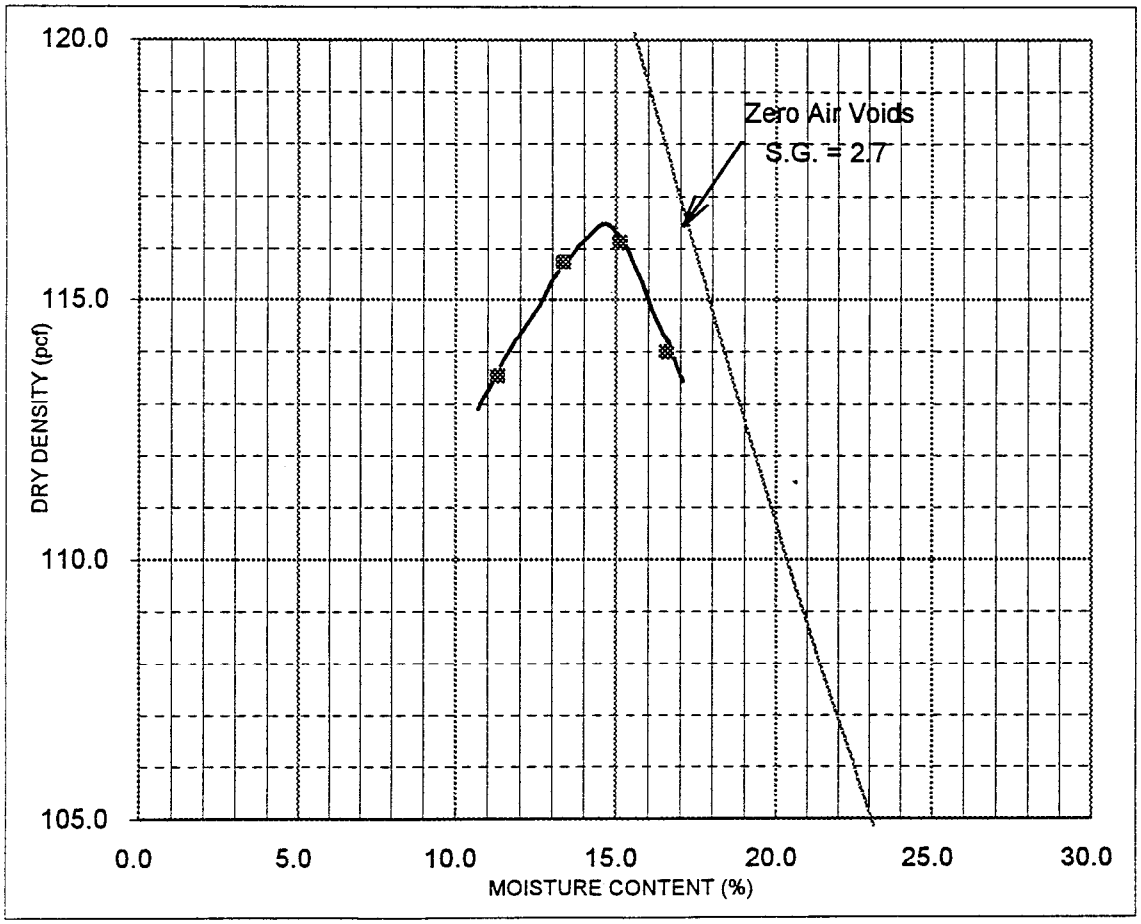
PROJECT:	LLNL, Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJ. NO:	977-5116.200	Date	July 9, 1997
SAMPLE #:	CF-3	Review:	RK

METHOD:	ASTM D 1557	MOLD VOLUME (c.f.):	0.033
DESCRIPTION:	Compacted Fill	S.G.:	2.75

TRIAL NO:	1	2	3	4	5
WT. MOLD & SOIL (gm):	6150	6222	6259	6247	0
MOLD TARE (gm):	4258	4258	4258	4258	
WET DENSITY (pcf):	126.4	131.2	133.7	132.9	0.0

MOISTURE CAN NO:	P1	P2	P3	P4	P5
TARE CAN (gm):	30.3	30.3	30.2	30.5	
WT. MOIST SOIL & CAN (gm):	188.6	193.1	187.7	195.8	
WT. DRY SOIL & CAN (gm):	172.5	173.9	167	172.3	

WATER CONTENT (%):	11.3%	13.4%	15.1%	16.6%	#DIV/0!
DRY DENSITY (pcf):	113.5	115.7	116.1	114.0	#DIV/0!



Maximum Dry Density = 116.5 pcf
Optimum Moisture Content = 14.5%

GCS
Golder Construction Services, Inc.

Appendix G.2

Sieves

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	June 30, 1997
SAMPLE #:	CF-1 (Compacted Fill)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	53
Weight of Wet Soil& Tare (g)	872.00
Weight of Dry Soil & Tare (g)	805.50
Weight of Tare (g)	79.40
Weight of Water (g)	66.50
Weight of Dry Soil (g)	726.10
% Moisture	**9.16%**

200 WASH (Percent Fines)

Tare Number	53
Weight of Soil & Tare, before wash (g)	805.50
Weight of Soil & Tare, after wash (g)	562.00
Weight of Tare (g)	79.40
Weight of Fines Lost (g)	243.50
Weight of Dry Soil (g)	726.10
% Fines Lost	**33.54%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	16.00	2.20%	**97.80%**	0.750	Fine Gravel
	0.375	16.00	2.20%	**97.80%**	0.375	
Coarse Sand	#4	88.60	12.20%	**87.80%**	#4	Coarse Sand
Medium Sand	#10	116.30	16.02%	**83.98%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	417.60
Weight of Split for Fine Sieve Stack	417.60
Percent of Original Weight in Pan	100.00%

	#20	139.20	19.17%	**80.83%**	#20	
Fine Sand	#40	189.50	26.10%	**73.90%**	#40	Fine Sand
	#60	287.70	39.62%	**60.38%**	#60	
	#100	378.60	52.14%	**47.86%**	#100	
	#200	477.20	65.72%	**34.28%**	#200	
Fines	PAN	482.60	66.46%	**33.54%**	PAN	Fines

% C GRVL:	**2.20%**
% F GRVL:	**10.00%**
% C SAND:	**3.81%**
% M SAND:	**10.08%**
% F SAND:	**40.37%**
% FINES:	**33.54%**
% TOTAL:	**100.00%**

LL:	**20**
PL:	**15**
PI:	**5**

Wet Color: **Dark yellowish brown (10YR 4/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 2, 1997
SAMPLE #:	CF-2 (Compacted Fill)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	40
Weight of Wet Soil& Tare (g)	868.60
Weight of Dry Soil & Tare (g)	797.90
Weight of Tare (g)	78.90
Weight of Water (g)	70.70
Weight of Dry Soil (g)	719.00
% Moisture	**9.83%**

200 WASH (Percent Fines)

Tare Number	40
Weight of Soil & Tare, before wash (g)	797.90
Weight of Soil & Tare, after wash (g)	474.90
Weight of Tare (g)	78.90
Weight of Fines Lost (g)	323.00
Weight of Dry Soil (g)	719.00
% Fines Lost	**44.92%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	44.40	6.18%	**93.82%**	0.750	Fine Gravel
	0.375	44.40	6.18%	**93.82%**	0.375	
Coarse Sand	#4	79.30	11.03%	**88.97%**	#4	Coarse Sand
Medium Sand	#10	104.80	14.58%	**85.42%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	474.90
Weight of Split for Fine Sieve Stack	474.90
Percent of Original Weight in Pan	100.00%

	#20	104.80	14.58%	**85.42%**	#20	
Fine Sand	#40	136.00	18.92%	**81.08%**	#40	Fine Sand
	#60	208.80	29.04%	**70.96%**	#60	
	#100	290.60	40.42%	**59.58%**	#100	
	#200	388.10	53.98%	**46.02%**	#200	
Fines	PAN	396.00	55.08%	**44.92%**	PAN	Fines

% C GRVL:	**6.18%**
% F GRVL:	**4.85%**
% C SAND:	**3.55%**
% M SAND:	**4.34%**
% F SAND:	**36.16%**
% FINES:	**44.92%**
% TOTAL:	**100.00%**

LL:	24
PL:	11
PI :	13

Wet Color: **Dark yellowish brown (10YR 4/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 9, 1997
SAMPLE #:	CF-3 (Compacted Fill)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	40
Weight of Wet Soil& Tare (g)	834.30
Weight of Dry Soil & Tare (g)	761.80
Weight of Tare (g)	78.90
Weight of Water (g)	72.50
Weight of Dry Soil (g)	682.90
% Moisture	**10.62%**

200 WASH (Percent Fines)

Tare Number	40
Weight of Soil & Tare, before wash (g)	761.80
Weight of Soil & Tare, after wash (g)	466.50
Weight of Tare (g)	78.90
Weight of Fines Lost (g)	295.30
Weight of Dry Soil (g)	682.90
% Fines Lost	**43.24%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	22.90	3.35%	**96.65%**	#4	Coarse Sand
Medium Sand	#10	44.30	6.49%	**93.51%**	#10	Medium Sand
	#20	67.50	9.88%	**90.12%**	#20	
Fine Sand	#40	113.40	16.61%	**83.39%**	#40	Fine Sand
	#60	199.30	29.18%	**70.82%**	#60	
	#100	293.60	42.99%	**57.01%**	#100	
	#200	382.40	56.00%	**44.00%**	#200	
Fines	PAN	387.60	56.76%	**43.24%**	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	466.50
Weight of Split for Fine Sieve Stack	466.50
Percent of Original Weight in Pan	100.00%

% C GRVL:	**0.00%**
% F GRVL:	**3.35%**
% C SAND:	**3.13%**
% M SAND:	**10.12%**
% F SAND:	**40.15%**
% FINES:	**43.24%**
% TOTAL:	**100.00%**

LL:	**28**
PL:	**17**
PI :	**11**

Wet Color: **Dark yellowish brown (10YR 4/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

Appendix G.3

Atterberg Limits

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	June 30, 1997
SAMPLE #:	CF-1 (1st lift Compacted Fill)	Review:	RK

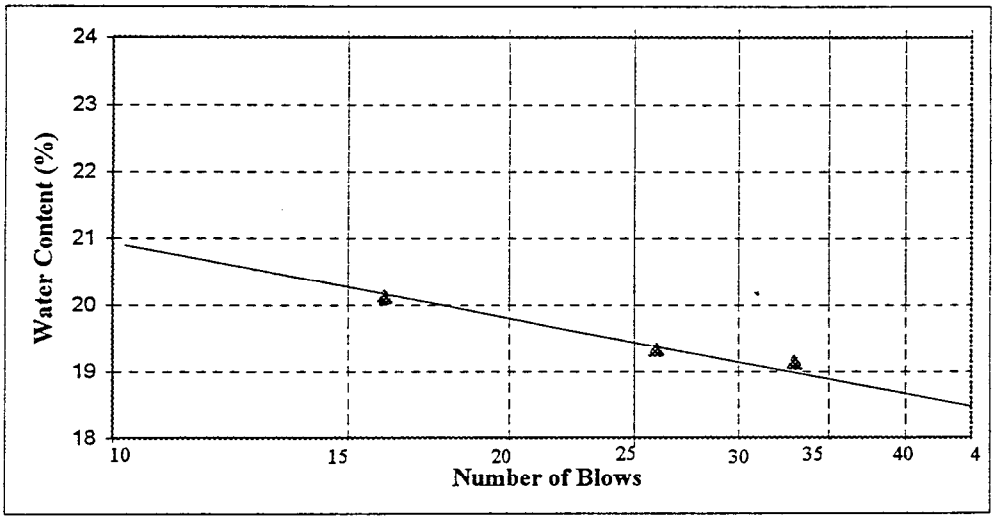
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

						Natural Moisture Content
Tare Number		111	108			53
Weight of Wet Soil & Tare	(w1)	16.25	16.85			872.00
Weight of Dry Soil & Tare	(w2)	15.63	16.15			805.50
Weight of Tare	(w3)	11.47	11.31			79.40
Weight of Water	(w4=w1-w2)	0.62	0.70	-----		66.50
Weight of Dry Soil	(w5=w2-w3)	4.16	4.84	-----		726.10
Water Content (%)	**(w4/w5)*100**	**14.9**	**14.5**	----		**9.2**

LIQUID LIMIT

Number of Blows		16	26	33		
Tare Number		1	16	21		
Weight of Wet Soil & Tare	(w6)	48.25	48.30	46.21		
Weight of Dry Soil & Tare	(w7)	43.70	43.86	42.24		
Weight of Tare	(w8)	21.09	20.89	21.50		
Weight of Water	(w9=w6-w7)	4.55	4.44	3.97	----	----
Weight of Dry Soil	(w10=w7-w8)	22.61	22.97	20.74	----	----
Water Content (%)	**(w9/w10)*100**	**20.1**	**19.3**	**19.1**	----	----



LIQUID LIMIT	20
PLASTIC LIMIT	15
PLASTICITY INDEX	5
MOISTURE CONTENT (%)	9.2

Description: Dark yellowish brown (10 YR 4/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 2,1997
SAMPLE #:	CF-2 (2nd lift Compacted Fill)	Review:	RK

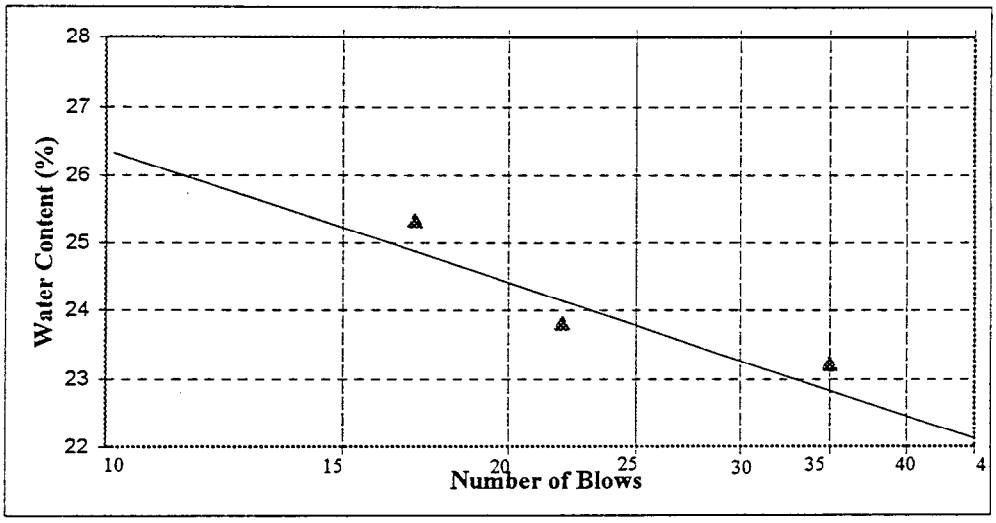
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		205	108		40
Weight of Wet Soil & Tare	(w1)	15.87	15.26		868.60
Weight of Dry Soil & Tare	(w2)	15.40	14.85		797.90
Weight of Tare	(w3)	11.22	11.31		78.90
Weight of Water	(w4=w1-w2)	0.47	0.41	-----	70.70
Weight of Dry Soil	(w5=w2-w3)	4.18	3.54	-----	719.00
Water Content (%)	**(w4/w5)*100**	**11.2**	**11.6**	----	**9.8**

LIQUID LIMIT

Number of Blows		35	22	17		
Tare Number		12	6	10		
Weight of Wet Soil & Tare	(w6)	43.32	46.94	49.90		
Weight of Dry Soil & Tare	(w7)	39.13	41.93	44.16		
Weight of Tare	(w8)	21.09	20.89	21.50		
Weight of Water	(w9=w6-w7)	4.19	5.01	5.74	-----	-----
Weight of Dry Soil	(w10=w7-w8)	18.04	21.04	22.66	-----	-----
Water Content (%)	**(w9/w10)*100**	**23.2**	**23.8**	**25.3**	----	----



LIQUID LIMIT	24
PLASTIC LIMIT	11
PLASTICITY INDEX	13
MOISTURE CONTENT (%)	9.8

Description: **Dark yellowish brown (10 YR 4/2) Sandy CLAY with gravel**

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 9,1997
SAMPLE #:	CF-3 (3rd lift Compacted Fill)	Review:	RK

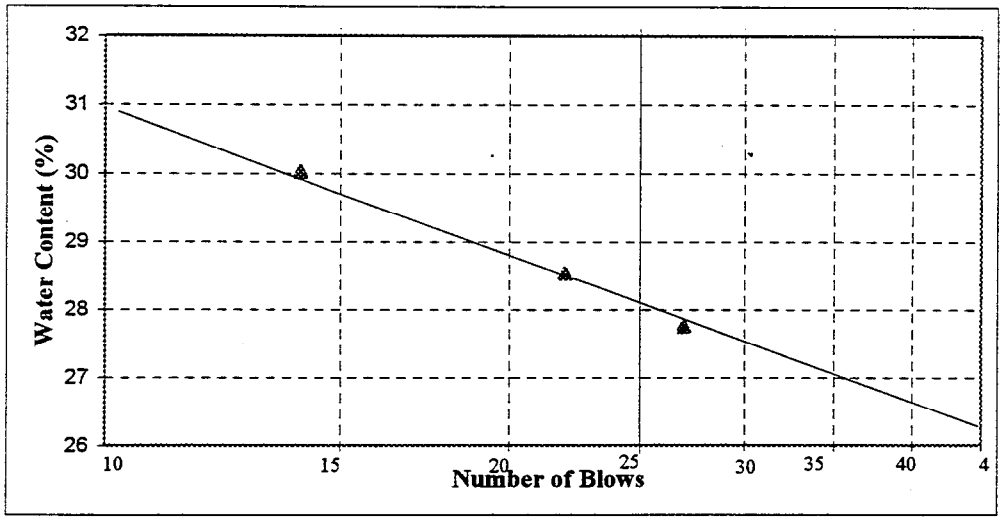
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

						Natural Moisture Content
Tare Number		205	111			40
Weight of Wet Soil & Tare	(w1)	16.92	16.90			834.30
Weight of Dry Soil & Tare	(w2)	16.09	16.10			761.80
Weight of Tare	(w3)	11.22	11.47			78.90
Weight of Water	(w4=w1-w2)	0.83	0.80	-----		72.50
Weight of Dry Soil	(w5=w2-w3)	4.87	4.63	-----		682.90
Water Content (%)	**(w4/w5)*100**	**17.0**	**17.3**	-----		**10.6**

LIQUID LIMIT

Number of Blows		27	22	14		
Tare Number		1	6	16		
Weight of Wet Soil & Tare	(w6)	39.91	41.18	44.49		
Weight of Dry Soil & Tare	(w7)	35.82	36.80	39.04		
Weight of Tare	(w8)	21.09	21.45	20.89		
Weight of Water	(w9=w6-w7)	4.09	4.38	5.45	-----	-----
Weight of Dry Soil	(w10=w7-w8)	14.73	15.35	18.15	-----	-----
Water Content (%)	**(w9/w10)*100**	**27.8**	**28.5**	**30.0**	-----	-----



LIQUID LIMIT	28
PLASTIC LIMIT	17
PLASTICITY INDEX	11
MOISTURE CONTENT (%)	10.6

Description: Dark yellowish brown (10 YR 4/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

Appendix G.4

Moisture

MOISTURE CONTENT
LLNL, SITE 300 - PIT 6 LANDFILL CLOSURE
LIVERMORE, CA

Date	30-Jun	30-Jun	30-Jun	30-Jun	1-Jul	1-Jul	1-Jul
Sample No.	CFD-1	CFD-2	CFD-3	CFD-4	CFD-5	CFD-6	CFD-7
Moisture Tin	1C	2C	3C	4C	5C	6C	7C
Wet Weight Soil + Tare	196.7	185.4	190.2	192.2	197.0	189.8	190.3
Dry Weight Soil + Tare	181.6	168.9	174.7	173.7	177.3	173.3	170.2
Weight Water	15.1	16.5	15.5	18.5	19.7	16.5	20.1
Tare	31.3	30.1	29.9	31.0	31.2	30.0	29.8
Weight Dry Soil	150.3	138.8	144.8	142.7	146.1	143.3	140.4
Percent Moisture	10.0%	11.9%	10.7%	13.0%	13.5%	11.5%	14.3%
Date	1-Jul	2-Jul	2-Jul	2-Jul	2-Jul	3-Jul	3-Jul
Sample No.	CFD-8	CFD-9	CFD-10	CFD-11	CFD-12	CFD-13	CFD-14
Moisture Tin	9C	18C	21C	23C	24C	1C	2C
Wet Weight Soil + Tare	192.9	193.2	197.4	119.1	120.8	188.3	191.6
Dry Weight Soil + Tare	171.2	177.4	177.0	108.1	110.8	169.1	172.8
Weight Water	21.7	15.8	20.4	11.0	10.0	19.2	18.8
Tare	30.3	30.5	30.5	20.7	21.5	31.3	30.1
Weight Dry Soil	140.9	146.9	146.5	87.4	89.3	137.8	142.7
Percent Moisture	15.4%	10.8%	13.9%	12.6%	11.2%	13.9%	13.2%
Date	3-Jul	3-Jul	3-Jul	3-Jul	3-Jul	3-Jul	3-Jul
Sample No.	CFD-15	CFD-16	CFD-17	CFD-18	CFD-19	CFD-20	CFD-21
Moisture Tin	3C	4C	5C	6C	7C	9C	18C
Wet Weight Soil + Tare	197.7	188.0	190.1	191.8	187.5	188.6	192.5
Dry Weight Soil + Tare	177.6	168.5	174.6	172.8	167.5	170.1	172.9
Weight Water	20.1	19.5	15.5	19.0	20.0	18.5	19.6
Tare	29.9	31.0	31.2	30.0	29.8	30.3	30.5
Weight Dry Soil	147.7	137.5	143.4	142.8	137.7	139.8	142.4
Percent Moisture	13.6%	14.2%	10.8%	13.3%	14.5%	13.2%	13.8%
Date	3-Jul	3-Jul	3-Jul	8-Jul	8-Jul	8-Jul	8-Jul
Sample No.	CFD-22	CFD-23	CFD-24	CFD-25	CFD-26	CFD-27	CFD-28
Moisture Tin	21C	23C	24C	1C	2C	3C	4C
Wet Weight Soil + Tare	195.1	121.6	119.0	193.2	191.7	196.6	190.2
Dry Weight Soil + Tare	176.8	110.5	107.6	173.6	171.9	176.7	172.5
Weight Water	18.3	11.1	11.4	19.6	19.8	19.9	17.7
Tare	30.5	20.7	21.5	31.3	30.1	29.9	31.0
Weight Dry Soil	146.3	89.8	86.1	142.3	141.8	146.8	141.5
Percent Moisture	12.5%	12.4%	13.2%	13.8%	14.0%	13.6%	12.5%
Date	3-Jul	3-Jul	3-Jul	8-Jul	9-Jul	9-Jul	9-Jul
Sample No.	CFD-29	CFD-30	CFD-31	CFD-32	CFD-33	CFD-34	CFD-35
Moisture Tin	5C	6C	7C	9C	18C	21C	23C
Wet Weight Soil + Tare	189.5	192.2	194.7	195.0	193.6	197.5	120.2
Dry Weight Soil + Tare	170.2	173.1	174.3	175.4	175.1	176.7	108.1
Weight Water	19.3	19.1	20.4	19.6	18.5	20.8	12.1
Tare	31.2	30.0	29.8	30.3	30.5	30.5	20.7
Weight Dry Soil	139.0	143.1	144.5	145.1	144.6	146.2	87.4
Percent Moisture	13.9%	13.3%	14.1%	13.5%	12.8%	14.2%	13.8%

MOISTURE CONTENT
LLNL, SITE 300 - PIT 6 LANDFILL CLOSURE
LIVERMORE, CA

Date	9-Jul	9-Jul	9-Jul	9-Jul	9-Jul	9-Jul	9-Jul
Sample No.	CFD-36	CFD-37	CFD-38	CFD-39	CFD-40	CFD-41	CFD-42
Moisture Tin	24C	1C	2C	3C	4C	5C	6C
Wet Weight Soil + Tare	125.8	192.7	198.0	194.1	187.8	195.3	191.1
Dry Weight Soil + Tare	112.4	172.5	177.5	174.4	167.9	176.8	172.3
Weight Water	13.4	20.2	20.5	19.7	19.9	18.5	18.8
Tare	21.5	31.3	30.1	29.9	31.0	31.2	30.0
Weight Dry Soil	90.9	141.2	147.4	144.5	136.9	145.6	142.3
Percent Moisture	14.7%	14.3%	13.9%	13.6%	14.5%	12.7%	13.2%
Date	9-Jul	9-Jul	10-Jul	10-Jul	10-Jul	10-Jul	10-Jul
Sample No.	CFD-43	CFD-44	CFD-45	CFD-46	CFD-47	CFD-48	CFD-49
Moisture Tin	7C	9C	18C	21C	23C	24C	1C
Wet Weight Soil + Tare	197.7	195.9	194.6	193.6	115.9	121.4	190.8
Dry Weight Soil + Tare	177.1	176.2	173.0	174.1	104.4	110.3	174.0
Weight Water	20.6	19.7	21.6	19.5	11.5	11.1	16.8
Tare	29.8	30.3	30.5	30.5	20.7	21.5	31.3
Weight Dry Soil	147.3	145.9	142.5	143.6	83.7	88.8	142.7
Percent Moisture	14.0%	13.5%	15.2%	13.6%	13.7%	12.5%	11.8%
Date	10-Jul	10-Jul	10-Jul	10-Jul	10-Jul	10-Jul	24-Jul
Sample No.	CFD-50	CFD-51	CFD-52	CFD-53	CFD-54	CFD-55	CFD-56
Moisture Tin	2C	3C	4C	5C	6C	7C	9C
Wet Weight Soil + Tare	186.8	190.4	191.6	195.8	196.6	196.2	194.0
Dry Weight Soil + Tare	167.7	171.9	173.5	176.0	175.9	176.9	177.1
Weight Water	19.1	18.5	18.1	19.8	20.7	19.3	16.9
Tare	30.1	29.9	31.0	31.2	30.0	29.8	30.3
Weight Dry Soil	137.6	142.0	142.5	144.8	145.9	147.1	146.8
Percent Moisture	13.9%	13.0%	12.7%	13.7%	14.2%	13.1%	11.5%
Date	24-Jul	24-Jul					
Sample No.	CFD-57	CFD-58					
Moisture Tin	18C	21C					
Wet Weight Soil + Tare	190.9	194.3					
Dry Weight Soil + Tare	172.8	176.6					
Weight Water	18.1	17.7	0.0	0.0	0.0	0.0	0.0
Tare	30.5	30.5	20.7	20.6	24.9	24.7	24.7
Weight Dry Soil	142.3	146.1	-20.7	-20.6	-24.9	-24.7	-24.7
Percent Moisture	12.7%	12.1%	0.0%	0.0%	0.0%	0.0%	0.0%

Appendix G.5

Nuclear Density Test Summary

MOISTURE/DENSITY TEST SUMMARY
LLNL, Site 300 - PIT 6 LANDFILL CLOSURE
LIVERMORE, CA

Test No.	Date Tested	Lift No.	Bearing (degrees)	Distance (feet)	Stake No.	Depth Tested	Wet Density (pcf)	Lab Moisture (%)	Curve No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Dry Density (pcf)	Percent D1557 Proctor	Required Compaction (%)
CFD-1	6/30/97	1	35	20	103	4"	118.2	10.0	CF-1	124.5	12.0	107.5	86.3%	85
CFD-2	6/30/97	1	15	75	103	4"	119.7	11.9	CF-1	124.5	12.0	107.0	85.9%	85
CFD-3	6/30/97	1	160	80	102	4"	123.9	10.7	CF-1	124.5	12.0	111.9	89.9%	85
CFD-4	6/30/97	1	45	80	102	4"	125.6	13.0	CF-1	124.5	12.0	111.2	89.3%	85
CFD-5	7/1/97	1	110	110	102	4"	127.8	13.5	CF-1	124.5	12.0	112.6	90.4%	85
CFD-6	7/1/97	1	35	150	103	4"	119.5	11.5	CF-1	124.5	12.0	107.2	86.1%	85
CFD-7	7/1/97	1	15	150	103	4"	130.0	14.3	CF-1	124.5	12.0	113.7	91.4%	85
CFD-8	7/1/97	1	90	150	102	4"	129.4	15.4	CF-1	124.5	12.0	112.1	90.1%	85
CFD-9	7/2/97	1	315	45	101	4"	122.4	10.8	CF-1	124.5	12.0	110.5	88.7%	85
CFD-10	7/2/97	1	190	50	101	4"	121.2	13.9	CF-1	124.5	12.0	106.4	85.5%	85
CFD-11	7/2/97	1	310	150	51	4"	119.3	12.6	CF-1	124.5	12.0	106.0	85.1%	85
CFD-12	7/2/97	1	290	50	51	4"	120.1	11.2	CF-1	124.5	12.0	108.0	86.7%	85
CFD-13	7/3/97	2	55	50	103	4"	125.2	13.9	CF-2	120.5	12.0	109.9	91.2%	90
CFD-14	7/3/97	2	25	100	103	4"	126.6	13.2	CF-2	120.5	12.5	111.8	92.8%	90
CFD-15	7/3/97	2	120	60	102	4"	127.1	13.6	CF-2	120.5	12.5	111.9	92.8%	90
CFD-16	7/3/97	2	25	75	102	4"	126.9	14.2	CF-2	120.5	12.5	111.1	92.2%	90
CFD-17	7/3/97	2	70	150	102	4"	126.9	10.8	CF-2	120.5	12.5	114.5	95.0%	90
CFD-18	7/3/97	2	90	125	102	4"	125.2	13.3	CF-2	120.5	12.5	110.5	91.7%	90
CFD-19	7/3/97	2	45	180	103	4"	128.6	14.5	CF-2	120.5	12.5	112.3	93.2%	90
CFD-20	7/3/97	2	25	200	103	4"	126.0	13.2	CF-2	120.5	12.5	111.3	92.4%	90
CFD-21	7/3/97	2	90	25	51	4"	127.9	13.8	CF-2	120.5	12.5	112.4	93.3%	90
CFD-22	7/3/97	2	285	120	51	4"	127.3	12.5	CF-2	120.5	12.5	113.2	93.9%	90
CFD-23	7/3/97	2	190	75	101	4"	127.7	12.4	CF-2	120.5	12.5	113.6	94.3%	90
CFD-24	7/3/97	2	275	60	101	4"	126.6	13.2	CF-2	120.5	12.5	111.8	92.8%	90
CFD-25	7/8/97	3	140	25	205	4"	125.5	13.8	CF-2	120.5	12.5	110.3	91.5%	90
CFD-26	7/8/97	3	150	100	205	4"	124.3	14.0	CF-2	120.5	12.5	109.0	90.5%	90
CFD-27	7/8/97	3	5	100	203	4"	125.1	13.6	CF-2	120.5	12.5	110.1	91.4%	90
CFD-28	7/8/97	3	35	50	203	4"	124.4	12.5	CF-2	120.5	12.5	110.6	91.8%	90
CFD-29	7/8/97	3	90	125	205	4"	123.5	13.9	CF-2	120.5	12.5	108.4	90.0%	90
CFD-30	7/8/97	3	120	100	205	4"	124.8	13.3	CF-2	120.5	12.5	110.2	91.4%	90
CFD-31	7/8/97	3	20	175	203	4"	123.8	14.1	CF-2	120.5	12.5	108.5	90.0%	90

MOISTURE/DENSITY TEST SUMMARY
LLNL, Site 300 - PIT 6 LANDFILL CLOSURE
LIVERMORE, CA

Test No.	Date Tested	Lift No.	Bearing (degrees)	Distance (feet)	Stake No.	Depth Tested	Wet Density (pcf)	Lab Moisture (%)	Curve No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Dry Density (pcf)	Percent D1557 Proctor	Required Compaction (%)
CFD-32	7/8/97	3	55	120	203	4"	123.3	13.5	CF-2	120.5	12.5	108.6	90.2%	90
CFD-33	7/9/97	4	50	75	203	4"	122.9	12.8	CF-2	116.5	14.5	109.0	93.5%	90
CFD-34	7/9/97	4	350	150	203	4"	125.2	14.2	CF-3	116.5	14.5	109.6	94.1%	90
CFD-35	7/9/97	4	100	80	205	4"	124.3	13.8	CF-3	116.5	14.5	109.2	93.8%	90
CFD-36	7/9/97	4	50	50	205	4"	126.4	14.7	CF-3	116.5	14.5	110.2	94.6%	90
CFD-37	7/9/97	3	250	120	214	4"	124.4	14.3	CF-3	116.5	14.5	108.8	93.4%	90
CFD-38	7/9/97	3	285	170	214	4"	125.8	13.9	CF-3	116.5	14.5	110.4	94.8%	90
CFD-39	7/9/97	3	195	120	200	4"	124.6	13.6	CF-3	116.5	14.5	109.7	94.1%	90
CFD-40	7/9/97	3	230	130	200	4"	124.7	14.5	CF-3	116.5	14.5	108.9	93.5%	90
CFD-41	7/9/97	3	245	40	214	4"	123.9	12.7	CF-3	116.5	14.5	109.9	94.4%	90
CFD-42	7/9/97	3	300	110	214	4"	124.9	13.2	CF-3	116.5	14.5	110.3	94.7%	90
CFD-43	7/9/97	3	170	140	200	4"	125.8	14.0	CF-3	116.5	14.5	110.4	94.7%	90
CFD-44	7/9/97	3	200	40	200	4"	125.2	13.5	CF-3	116.5	14.5	110.3	94.7%	90
CFD-45	7/10/97	4	65	110	203	4"	123.7	15.2	CF-3	116.5	14.5	107.4	92.2%	90
CFD-46	7/10/97	4	35	130	203	4"	127.0	13.6	CF-3	116.5	14.5	111.8	96.0%	90
CFD-47	7/10/97	4	125	150	205	4"	126.8	13.7	CF-3	116.5	14.5	111.5	95.7%	90
CFD-48	7/10/97	4	85	130	205	4"	126.2	12.5	CF-3	116.5	14.5	112.2	96.3%	90
CFD-49	7/10/97	4	215	100	200	4"	125.9	11.8	CF-3	116.5	14.5	112.6	96.7%	90
CFD-50	7/10/97	4	100	180	200	4"	125.5	13.9	CF-3	116.5	14.5	110.2	94.6%	90
CFD-51	7/10/97	4	305	110	214	4"	126.3	13.0	CF-3	116.5	14.5	111.8	95.9%	90
CFD-52	7/10/97	4	255	75	214	4"	126.9	12.7	CF-3	116.5	14.5	112.6	96.7%	90
CFD-53	7/10/97	4	215	25	200	4"	124.6	13.7	CF-3	116.5	14.5	109.6	94.1%	90
CFD-54	7/10/97	4	190	80	200	4"	124.0	14.2	CF-3	116.5	14.5	108.6	93.2%	90
CFD-55	7/10/97	4	325	60	214	4"	124.7	13.1	CF-3	116.5	14.5	110.3	94.6%	90
CFD-56	7/24/97	4	25	80	205	4"	125.8	11.5	CF-3	116.5	14.5	112.8	96.8%	90
CFD-57	7/24/97	4	40	160	205	4"	126.1	12.7	CF-3	116.5	14.5	111.9	96.0%	90
CFD-58	7/24/97	4	265	70	200	4"	125.6	12.1	CF-3	116.5	14.5	112.0	96.2%	90

Appendix H

Vegetative Cover Test Results

Appendix H.1

Sieves

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 28, 1997
SAMPLE #:	VC-1 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-1
Weight of Wet Soil& Tare (g)	819.20
Weight of Dry Soil & Tare (g)	784.30
Weight of Tare (g)	91.80
Weight of Water (g)	34.90
Weight of Dry Soil (g)	692.50
% Moisture	**5.04%**

200 WASH (Percent Fines)

Tare Number	B-1
Weight of Soil & Tare, before wash (g)	784.30
Weight of Soil & Tare, after wash (g)	493.70
Weight of Tare (g)	91.80
Weight of Fines Lost (g)	290.60
Weight of Dry Soil (g)	692.50
% Fines Lost	**41.96%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	38.60	5.57%	**94.43%**	0.750	Fine Gravel
	0.375	38.60	5.57%	**94.43%**	0.375	
Coarse Sand	#4	80.50	11.62%	**88.38%**	#4	Coarse Sand
Medium Sand	#10	99.60	14.38%	**85.62%**	#10	Medium Sand
	#20	120.70	17.43%	**82.57%**	#20	
Fine Sand	#40	157.40	22.73%	**77.27%**	#40	Fine Sand
	#60	226.10	32.65%	**67.35%**	#60	
	#100	313.70	45.30%	**54.70%**	#100	
	#200	396.90	57.31%	**42.69%**	#200	
Fines	PAN	401.90	58.04%	**41.96%**	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	493.70
Weight of Split for Fine Sieve Stack	493.70
Percent of Original Weight in Pan	100.00%

% C GRVL:	**5.57%**
% F GRVL:	**6.05%**
% C SAND:	**2.76%**
% M SAND:	**8.35%**
% F SAND:	**35.31%**
% FINES:	**41.96%**
% TOTAL:	**100.00%**

LL:	**29**
PL:	**18**
PI :	**11**

Wet Color: **Dark yellowish brown (10YR 4/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 28, 1997
SAMPLE #:	VC-2 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-2
Weight of Wet Soil& Tare (g)	806.50
Weight of Dry Soil & Tare (g)	740.70
Weight of Tare (g)	89.30
Weight of Water (g)	65.80
Weight of Dry Soil (g)	651.40
% Moisture	**10.10%**

200 WASH (Percent Fines)

Tare Number	B-2
Weight of Soil & Tare, before wash (g)	740.70
Weight of Soil & Tare, after wash (g)	424.20
Weight of Tare (g)	89.30
Weight of Fines Lost (g)	316.50
Weight of Dry Soil (g)	651.40
% Fines Lost	**48.59%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	26.90	4.13%	**95.87%**	#4	Coarse Sand
Medium Sand	#10	40.60	6.23%	**93.77%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	424.20
Weight of Split for Fine Sieve Stack	424.20
Percent of Original Weight in Pan	100.00%

	#20	60.70	9.32%	**90.68%**	#20	
Fine Sand	#40	94.00	14.43%	**85.57%**	#40	Fine Sand
	#60	155.30	23.84%	**76.16%**	#60	
	#100	240.90	36.98%	**63.02%**	#100	
	#200	325.90	50.03%	**49.97%**	#200	
Fines	PAN	334.90	51.41%	**48.59%**	PAN	Fines

% C GRVL:	**0.00%**
% F GRVL:	**4.13%**
% C SAND:	**2.10%**
% M SAND:	**8.20%**
% F SAND:	**36.98%**
% FINES:	**48.59%**
% TOTAL:	**100.00%**

LL:	33
PL:	19
PI :	14

Wet Color:	**Grayish brown (5YR 3/2)**
Description:	**(CL)**
	Sandy CLAY with gravel

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 28, 1997
SAMPLE #:	VC-3 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-3
Weight of Wet Soil& Tare (g)	883.80
Weight of Dry Soil & Tare (g)	842.10
Weight of Tare (g)	94.70
Weight of Water (g)	41.70
Weight of Dry Soil (g)	747.40
% Moisture	**5.58%**

200 WASH (Percent Fines)

Tare Number	B-3
Weight of Soil & Tare, before wash (g)	842.10
Weight of Soil & Tare, after wash (g)	504.20
Weight of Tare (g)	94.70
Weight of Fines Lost (g)	337.90
Weight of Dry Soil (g)	747.40
% Fines Lost	**45.21%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	33.70	4.51%	**95.49%**	#4	Coarse Sand
Medium Sand	#10	57.20	7.65%	**92.35%**	#10	Medium Sand
	#20	82.20	11.00%	**89.00%**	#20	
Fine Sand	#40	126.30	16.90%	**83.10%**	#40	Fine Sand
	#60	205.70	27.52%	**72.48%**	#60	
	#100	303.90	40.66%	**59.34%**	#100	
	#200	400.10	53.53%	**46.47%**	#200	
Fines	PAN	409.50	54.79%	**45.21%**	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	504.20
Weight of Split for Fine Sieve Stack	504.20
Percent of Original Weight in Pan	100.00%

% C GRVL:	**0.00%**
% F GRVL:	**4.51%**
% C SAND:	**3.14%**
% M SAND:	**9.25%**
% F SAND:	**37.89%**
% FINES:	**45.21%**
% TOTAL:	**100.00%**

LL:	30
PL:	18
PI :	12

Wet Color:	**Pale brown (5YR 5/2)**
Description:	**(CL)**
	Sandy CLAY with gravel

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 28, 1997
SAMPLE #:	VC-4 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-4
Weight of Wet Soil& Tare (g)	849.50
Weight of Dry Soil & Tare (g)	774.80
Weight of Tare (g)	94.50
Weight of Water (g)	74.70
Weight of Dry Soil (g)	680.30
% Moisture	**10.98%**

200 WASH (Percent Fines)

Tare Number	B-4
Weight of Soil & Tare, before wash (g)	774.80
Weight of Soil & Tare, after wash (g)	488.00
Weight of Tare (g)	94.50
Weight of Fines Lost (g)	286.80
Weight of Dry Soil (g)	680.30
% Fines Lost	**42.16%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	21.50	3.16%	**96.84%**	0.750	Fine Gravel
	0.375	21.50	3.16%	**96.84%**	0.375	
Coarse Sand	#4	59.60	8.76%	**91.24%**	#4	Coarse Sand
Medium Sand	#10	74.20	10.91%	**89.09%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	488.00
Weight of Split for Fine Sieve Stack	488.00
Percent of Original Weight in Pan	100.00%

	#20	95.40	14.02%	**85.98%**	#20	
Fine Sand	#40	134.80	19.81%	**80.19%**	#40	Fine Sand
	#60	210.50	30.94%	**69.06%**	#60	
	#100	306.40	45.04%	**54.96%**	#100	
	#200	388.10	57.05%	**42.95%**	#200	
Fines	PAN	393.50	57.84%	**42.16%**	PAN	Fines

% C GRVL:	**3.16%**
% F GRVL:	**5.60%**
% C SAND:	**2.15%**
% M SAND:	**8.91%**
% F SAND:	**38.03%**
% FINES:	**42.16%**
% TOTAL:	**100.00%**

LL:	**30**
PL:	**18**
PI :	**12**

Wet Color:	**Grayish brown (5YR 3/2)**
Description:	**(CL)**
	Sandy CLAY with gravel

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 29, 1997
SAMPLE #:	VC-5 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-5
Weight of Wet Soil& Tare (g)	844.80
Weight of Dry Soil & Tare (g)	810.80
Weight of Tare (g)	94.50
Weight of Water (g)	34.00
Weight of Dry Soil (g)	716.30
% Moisture	**4.75%**

200 WASH (Percent Fines)

Tare Number	B-5
Weight of Soil & Tare, before wash (g)	810.80
Weight of Soil & Tare, after wash (g)	480.30
Weight of Tare (g)	94.50
Weight of Fines Lost (g)	330.50
Weight of Dry Soil (g)	716.30
% Fines Lost	**46.14%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	45.40	6.34%	**93.66%**	#4	Coarse Sand
Medium Sand	#10	68.80	9.60%	**90.40%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	480.30
Weight of Split for Fine Sieve Stack	480.30
Percent of Original Weight in Pan	100.00%

	#20	92.40	12.90%	**87.10%**	#20	
Fine Sand	#40	130.20	18.18%	**81.82%**	#40	Fine Sand
	#60	197.80	27.61%	**72.39%**	#60	
	#100	289.60	40.43%	**59.57%**	#100	
	#200	381.40	53.25%	**46.75%**	#200	
Fines	PAN	385.80	53.86%	**46.14%**	PAN	Fines

% C GRVL:	**0.00%**
% F GRVL:	**6.34%**
% C SAND:	**3.27%**
% M SAND:	**8.57%**
% F SAND:	**35.68%**
% FINES:	**46.14%**
% TOTAL:	**100.00%**

LL:	30
PL:	17
PI :	13

Wet Color:	**Pale brown (5YR 5/2)**
Description:	**(CL)**
	Sandy CLAY with gravel

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 29, 1997
SAMPLE #:	VC-6 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-6
Weight of Wet Soil& Tare (g)	817.60
Weight of Dry Soil & Tare (g)	749.20
Weight of Tare (g)	94.10
Weight of Water (g)	68.40
Weight of Dry Soil (g)	655.10
% Moisture	**10.44%**

200 WASH (Percent Fines)

Tare Number	B-6
Weight of Soil & Tare, before wash (g)	749.20
Weight of Soil & Tare, after wash (g)	480.90
Weight of Tare (g)	94.10
Weight of Fines Lost (g)	268.30
Weight of Dry Soil (g)	655.10
% Fines Lost	**40.96%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	31.90	4.87%	**95.13%**	#4	Coarse Sand
Medium Sand	#10	51.20	7.82%	**92.18%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	480.90
Weight of Split for Fine Sieve Stack	480.90
Percent of Original Weight in Pan	100.00%

	#20	74.60	11.39%	**88.61%**	#20	
Fine Sand	#40	116.60	17.80%	**82.20%**	#40	Fine Sand
	#60	196.90	30.06%	**69.94%**	#60	
	#100	293.00	44.73%	**55.27%**	#100	
	#200	381.00	58.16%	**41.84%**	#200	
Fines	PAN	386.80	59.04%	**40.96%**	PAN	Fines

% C GRVL:	**0.00%**
% F GRVL:	**4.87%**
% C SAND:	**2.95%**
% M SAND:	**9.98%**
% F SAND:	**41.25%**
% FINES:	**40.96%**
% TOTAL:	**100.00%**

LL:	27
PL:	19
PI :	8

Wet Color: **Pale brown (5YR 5/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 29, 1997
SAMPLE #:	VC-7 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-7
Weight of Wet Soil& Tare (g)	835.30
Weight of Dry Soil & Tare (g)	784.50
Weight of Tare (g)	97.50
Weight of Water (g)	50.80
Weight of Dry Soil (g)	687.00
% Moisture	7.39%

200 WASH (Percent Fines)

Tare Number	B-7
Weight of Soil & Tare, before wash (g)	784.50
Weight of Soil & Tare, after wash (g)	471.80
Weight of Tare (g)	97.50
Weight of Fines Lost (g)	312.70
Weight of Dry Soil (g)	687.00
% Fines Lost	45.52%

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	100.00%	3.000	Coarse Gravel
	1.500	0.00	0.00%	100.00%	1.500	
	1.000	0.00	0.00%	100.00%	1.000	
Fine Gravel	0.750	0.00	0.00%	100.00%	0.750	Fine Gravel
	0.375	0.00	0.00%	100.00%	0.375	
Coarse Sand	#4	21.70	3.16%	96.84%	#4	Coarse Sand
Medium Sand	#10	40.60	5.91%	94.09%	#10	Medium Sand
	#20	66.20	9.64%	90.36%	#20	
Fine Sand	#40	106.40	15.49%	84.51%	#40	Fine Sand
	#60	186.80	27.19%	72.81%	#60	
	#100	279.30	40.66%	59.34%	#100	
	#200	368.20	53.60%	46.40%	#200	
Fines	PAN	374.30	54.48%	45.52%	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	471.80
Weight of Split for Fine Sieve Stack	471.80
Percent of Original Weight in Pan	100.00%

% C GRVL:	0.00%
% F GRVL:	3.16%
% C SAND:	2.75%
% M SAND:	9.58%
% F SAND:	39.00%
% FINES:	45.52%
% TOTAL:	100.00%

LL:	31
PL:	19
PI :	12

Wet Color:	Pale brown (5YR 5/2)
Description:	(CL) Sandy CLAY with gravel

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 30, 1997
SAMPLE #:	VC-8 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	40
Weight of Wet Soil& Tare (g)	852.70
Weight of Dry Soil & Tare (g)	781.00
Weight of Tare (g)	78.90
Weight of Water (g)	71.70
Weight of Dry Soil (g)	702.10
% Moisture	**10.21%**

200 WASH (Percent Fines)

Tare Number	40
Weight of Soil & Tare, before wash (g)	781.00
Weight of Soil & Tare, after wash (g)	450.20
Weight of Tare (g)	78.90
Weight of Fines Lost (g)	330.80
Weight of Dry Soil (g)	702.10
% Fines Lost	**47.12%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	16.50	2.35%	**97.65%**	0.750	Fine Gravel
	0.375	16.50	2.35%	**97.65%**	0.375	
Coarse Sand	#4	56.10	7.99%	**92.01%**	#4	Coarse Sand
Medium Sand	#10	75.20	10.71%	**89.29%**	#10	Medium Sand
	#20	95.80	13.64%	**86.36%**	#20	
Fine Sand	#40	132.60	18.89%	**81.11%**	#40	Fine Sand
	#60	202.00	28.77%	**71.23%**	#60	
	#100	285.80	40.71%	**59.29%**	#100	
	#200	367.60	52.36%	**47.64%**	#200	
Fines	PAN	371.30	52.88%	**47.12%**	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	450.20
Weight of Split for Fine Sieve Stack	450.20
Percent of Original Weight in Pan	100.00%

% C GRVL:	**2.35%**
% F GRVL:	**5.64%**
% C SAND:	**2.72%**
% M SAND:	**8.18%**
% F SAND:	**34.00%**
% FINES:	**47.12%**
% TOTAL:	**100.00%**

LL:	**30**
PL:	**19**
PI:	**11**

Wet Color:	**Dusky brown (5YR 2/2)**
Description:	**(CL)**
	Sandy CLAY with gravel

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 30, 1997
SAMPLE #:	VC-9 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	53
Weight of Wet Soil& Tare (g)	808.90
Weight of Dry Soil & Tare (g)	723.70
Weight of Tare (g)	79.40
Weight of Water (g)	85.20
Weight of Dry Soil (g)	644.30
% Moisture	**13.22%**

200 WASH (Percent Fines)

Tare Number	53
Weight of Soil & Tare, before wash (g)	723.70
Weight of Soil & Tare, after wash (g)	406.60
Weight of Tare (g)	79.40
Weight of Fines Lost (g)	317.10
Weight of Dry Soil (g)	644.30
% Fines Lost	**49.22%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	39.20	6.08%	**93.92%**	#4	Coarse Sand
Medium Sand	#10	56.50	8.77%	**91.23%**	#10	Medium Sand
	#20	75.90	11.78%	**88.22%**	#20	
Fine Sand	#40	107.10	16.62%	**83.38%**	#40	Fine Sand
	#60	169.20	26.26%	**73.74%**	#60	
	#100	237.50	36.86%	**63.14%**	#100	
	#200	320.00	49.67%	**50.33%**	#200	
Fines	PAN	327.20	50.78%	**49.22%**	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	406.60
Weight of Split for Fine Sieve Stack	406.60
Percent of Original Weight in Pan	100.00%

% C GRVL:	**0.00%**
% F GRVL:	**6.08%**
% C SAND:	**2.69%**
% M SAND:	**7.85%**
% F SAND:	**34.16%**
% FINES:	**49.22%**
% TOTAL:	**100.00%**

LL:	30
PL:	18
PI :	12

Wet Color: **Grayish brown (5YR 3/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 30, 1997
SAMPLE #:	VC-10 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-1
Weight of Wet Soil& Tare (g)	812.10
Weight of Dry Soil & Tare (g)	750.80
Weight of Tare (g)	91.80
Weight of Water (g)	61.30
Weight of Dry Soil (g)	659.00
% Moisture	**9.30%**

200 WASH (Percent Fines)

Tare Number	B-1
Weight of Soil & Tare, before wash (g)	750.80
Weight of Soil & Tare, after wash (g)	457.00
Weight of Tare (g)	91.80
Weight of Fines Lost (g)	293.80
Weight of Dry Soil (g)	659.00
% Fines Lost	**44.58%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	36.90	5.60%	**94.40%**	#4	Coarse Sand
Medium Sand	#10	52.60	7.98%	**92.02%**	#10	Medium Sand
	#20	76.80	11.65%	**88.35%**	#20	
Fine Sand	#40	124.10	18.83%	**81.17%**	#40	Fine Sand
	#60	204.20	30.99%	**69.01%**	#60	
	#100	282.30	42.84%	**57.16%**	#100	
	#200	353.50	53.64%	**46.36%**	#200	
Fines	PAN	365.20	55.42%	**44.58%**	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	457.00
Weight of Split for Fine Sieve Stack	457.00
Percent of Original Weight in Pan	100.00%

% C GRVL:	**0.00%**
% F GRVL:	**5.60%**
% C SAND:	**2.38%**
% M SAND:	**10.85%**
% F SAND:	**36.59%**
% FINES:	**44.58%**
% TOTAL:	**100.00%**

LL:	**32**
PL:	**19**
PI:	**13**

Wet Color:	**Grayish brown (5YR 3/2)**
Description:	**(CL)**
	Sandy CLAY with gravel

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 30, 1997
SAMPLE #:	VC-11 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-2
Weight of Wet Soil& Tare (g)	821.10
Weight of Dry Soil & Tare (g)	745.30
Weight of Tare (g)	89.30
Weight of Water (g)	75.80
Weight of Dry Soil (g)	656.00
% Moisture	**11.55%**

200 WASH (Percent Fines)

Tare Number	B-2
Weight of Soil & Tare, before wash (g)	745.30
Weight of Soil & Tare, after wash (g)	454.20
Weight of Tare (g)	89.30
Weight of Fines Lost (g)	291.10
Weight of Dry Soil (g)	656.00
% Fines Lost	**44.38%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	12.90	1.97%	**98.03%**	0.750	Fine Gravel
	0.375	12.90	1.97%	**98.03%**	0.375	
Coarse Sand	#4	66.00	10.06%	**89.94%**	#4	Coarse Sand
Medium Sand	#10	82.40	12.56%	**87.44%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	454.20
Weight of Split for Fine Sieve Stack	454.20
Percent of Original Weight in Pan	100.00%

	#20	102.10	15.56%	**84.44%**	#20	
Fine Sand	#40	141.70	21.60%	**78.40%**	#40	Fine Sand
	#60	214.50	32.70%	**67.30%**	#60	
	#100	293.40	44.73%	**55.27%**	#100	
	#200	359.00	54.73%	**45.27%**	#200	
Fines	PAN	364.90	55.63%	**44.38%**	PAN	Fines

% C GRVL:	**1.97%**
% F GRVL:	**8.09%**
% C SAND:	**2.50%**
% M SAND:	**9.04%**
% F SAND:	**34.02%**
% FINES:	**44.38%**
% TOTAL:	**100.00%**

LL:	28
PL:	17
PI :	11

Wet Color:	**Grayish brown (5YR 3/2)**
Description:	**(CL)**
	Sandy CLAY with gravel

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 31, 1997
SAMPLE #:	VC-12 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-3
Weight of Wet Soil& Tare (g)	829.20
Weight of Dry Soil & Tare (g)	761.80
Weight of Tare (g)	94.70
Weight of Water (g)	67.40
Weight of Dry Soil (g)	667.10
% Moisture	**10.10%**

200 WASH (Percent Fines)

Tare Number	B-3
Weight of Soil & Tare, before wash (g)	761.80
Weight of Soil & Tare, after wash (g)	463.20
Weight of Tare (g)	94.70
Weight of Fines Lost (g)	298.60
Weight of Dry Soil (g)	667.10
% Fines Lost	**44.76%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	62.90	9.43%	**90.57%**	#4	Coarse Sand
Medium Sand	#10	82.30	12.34%	**87.66%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	463.20
Weight of Split for Fine Sieve Stack	463.20
Percent of Original Weight in Pan	100.00%

	#20	102.50	15.37%	**84.63%**	#20	
Fine Sand	#40	140.40	21.05%	**78.95%**	#40	Fine Sand
	#60	213.80	32.05%	**67.95%**	#60	
	#100	293.00	43.92%	**56.08%**	#100	
	#200	364.90	54.70%	**45.30%**	#200	
Fines	PAN	368.50	55.24%	**44.76%**	PAN	Fines

% C GRVL:	**0.00%**
% F GRVL:	**9.43%**
% C SAND:	**2.91%**
% M SAND:	**8.71%**
% F SAND:	**34.19%**
% FINES:	**44.76%**
% TOTAL:	**100.00%**

LL:	**28**
PL:	**18**
PI :	**10**

Wet Color:	**Grayish brown (5YR 3/2)**
Description:	(CL) **Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 31, 1997
SAMPLE #:	VC-13 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-4
Weight of Wet Soil& Tare (g)	840.90
Weight of Dry Soil & Tare (g)	768.60
Weight of Tare (g)	94.50
Weight of Water (g)	72.30
Weight of Dry Soil (g)	674.10
% Moisture	**10.73%**

200 WASH (Percent Fines)

Tare Number	B-4
Weight of Soil & Tare, before wash (g)	768.60
Weight of Soil & Tare, after wash (g)	476.10
Weight of Tare (g)	94.50
Weight of Fines Lost (g)	292.50
Weight of Dry Soil (g)	674.10
% Fines Lost	**43.39%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	13.70	2.03%	**97.97%**	0.750	Fine Gravel
	0.375	13.70	2.03%	**97.97%**	0.375	
Coarse Sand	#4	61.60	9.14%	**90.86%**	#4	Coarse Sand
Medium Sand	#10	79.70	11.82%	**88.18%**	#10	Medium Sand
	#20	97.40	14.45%	**85.55%**	#20	
Fine Sand	#40	138.60	20.56%	**79.44%**	#40	Fine Sand
	#60	217.10	32.21%	**67.79%**	#60	
	#100	296.20	43.94%	**56.06%**	#100	
	#200	378.40	56.13%	**43.87%**	#200	
Fines	PAN	381.60	56.61%	**43.39%**	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	476.10
Weight of Split for Fine Sieve Stack	476.10
Percent of Original Weight in Pan	100.00%

% C GRVL:	**2.03%**
% F GRVL:	**7.11%**
% C SAND:	**2.69%**
% M SAND:	**8.74%**
% F SAND:	**36.05%**
% FINES:	**43.39%**
% TOTAL:	**100.00%**

LL:	**28**
PL:	**19**
PI :	**9**

Wet Color: **Grayish brown (5YR 3/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 31, 1997
SAMPLE #:	VC-14 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-5
Weight of Wet Soil& Tare (g)	811.90
Weight of Dry Soil & Tare (g)	749.60
Weight of Tare (g)	94.50
Weight of Water (g)	62.30
Weight of Dry Soil (g)	655.10
% Moisture	**9.51%**

200 WASH (Percent Fines)

Tare Number	B-5
Weight of Soil & Tare, before wash (g)	749.60
Weight of Soil & Tare, after wash (g)	442.70
Weight of Tare (g)	94.50
Weight of Fines Lost (g)	306.90
Weight of Dry Soil (g)	655.10
% Fines Lost	**46.85%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	50.30	7.68%	**92.32%**	#4	Coarse Sand
Medium Sand	#10	68.30	10.43%	**89.57%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	442.70
Weight of Split for Fine Sieve Stack	442.70
Percent of Original Weight in Pan	100.00%

	#20	85.80	13.10%	**86.90%**	#20	
Fine Sand	#40	123.00	18.78%	**81.22%**	#40	Fine Sand
	#60	191.40	29.22%	**70.78%**	#60	
	#100	269.20	41.09%	**58.91%**	#100	
	#200	346.40	52.88%	**47.12%**	#200	
Fines	PAN	348.20	53.15%	**46.85%**	PAN	Fines

% C GRVL:	**0.00%**
% F GRVL:	**7.68%**
% C SAND:	**2.75%**
% M SAND:	**8.35%**
% F SAND:	**34.38%**
% FINES:	**46.85%**
% TOTAL:	**100.00%**

LL:	**29**
PL:	**18**
PI :	**11**

Wet Color:	**Pale brown (5YR 5/2)**
Description:	**(CL)**
	Sandy CLAY with gravel

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 31, 1997
SAMPLE #:	VC-15 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-6
Weight of Wet Soil& Tare (g)	834.90
Weight of Dry Soil & Tare (g)	771.90
Weight of Tare (g)	94.10
Weight of Water (g)	63.00
Weight of Dry Soil (g)	677.80
% Moisture	**9.29%**

200 WASH (Percent Fines)

Tare Number	B-6
Weight of Soil & Tare, before wash (g)	771.90
Weight of Soil & Tare, after wash (g)	464.30
Weight of Tare (g)	94.10
Weight of Fines Lost (g)	307.60
Weight of Dry Soil (g)	677.80
% Fines Lost	**45.38%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	51.00	7.52%	**92.48%**	#4	Coarse Sand
Medium Sand	#10	68.90	10.17%	**89.83%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	464.30
Weight of Split for Fine Sieve Stack	464.30
Percent of Original Weight in Pan	100.00%

	#20	86.80	12.81%	**87.19%**	#20	
Fine Sand	#40	126.40	18.65%	**81.35%**	#40	Fine Sand
	#60	206.30	30.44%	**69.56%**	#60	
	#100	293.80	43.35%	**56.65%**	#100	
	#200	367.80	54.26%	**45.74%**	#200	
Fines	PAN	370.20	54.62%	**45.38%**	PAN	Fines

% C GRVL:	**0.00%**
% F GRVL:	**7.52%**
% C SAND:	**2.64%**
% M SAND:	**8.48%**
% F SAND:	**35.97%**
% FINES:	**45.38%**
% TOTAL:	**100.00%**

Wet Color:	**Grayish brown (5YR 3/2)**
Description:	**(CL)**
	Sandy CLAY with gravel

LL:	**29**
PL:	**18**
PI :	**11**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 1, 1997
SAMPLE #:	VC-16 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	40
Weight of Wet Soil& Tare (g)	763.20
Weight of Dry Soil & Tare (g)	699.50
Weight of Tare (g)	78.90
Weight of Water (g)	63.70
Weight of Dry Soil (g)	620.60
% Moisture	**10.26%**

200 WASH (Percent Fines)

Tare Number	40
Weight of Soil & Tare, before wash (g)	699.50
Weight of Soil & Tare, after wash (g)	357.80
Weight of Tare (g)	78.90
Weight of Fines Lost (g)	341.70
Weight of Dry Soil (g)	620.60
% Fines Lost	**55.06%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	17.30	2.79%	**97.21%**	#4	Coarse Sand
Medium Sand	#10	27.30	4.40%	**95.60%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	357.80
Weight of Split for Fine Sieve Stack	357.80
Percent of Original Weight in Pan	100.00%

	#20	39.60	6.38%	**93.62%**	#20	
Fine Sand	#40	65.60	10.57%	**89.43%**	#40	Fine Sand
	#60	105.70	17.03%	**82.97%**	#60	
	#100	173.00	27.88%	**72.12%**	#100	
	#200	266.00	42.86%	**57.14%**	#200	
Fines	PAN	278.90	44.94%	**55.06%**	PAN	Fines

% C GRVL:	**0.00%**
% F GRVL:	**2.79%**
% C SAND:	**1.61%**
% M SAND:	**6.17%**
% F SAND:	**34.37%**
% FINES:	**55.06%**
% TOTAL:	**100.00%**

LL:	30
PL:	19
PI:	11

Wet Color: **Very dark brown (5YR 2/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 1, 1997
SAMPLE #:	VC-17 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	53
Weight of Wet Soil& Tare (g)	789.40
Weight of Dry Soil & Tare (g)	721.10
Weight of Tare (g)	79.40
Weight of Water (g)	68.30
Weight of Dry Soil (g)	641.70
% Moisture	**10.64%**

200 WASH (Percent Fines)

Tare Number	53
Weight of Soil & Tare, before wash (g)	721.10
Weight of Soil & Tare, after wash (g)	335.20
Weight of Tare (g)	79.40
Weight of Fines Lost (g)	385.90
Weight of Dry Soil (g)	641.70
% Fines Lost	**60.14%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	7.60	1.18%	**98.82%**	#4	Coarse Sand
Medium Sand	#10	9.30	1.45%	**98.55%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	335.20
Weight of Split for Fine Sieve Stack	335.20
Percent of Original Weight in Pan	100.00%

	#20	19.30	3.01%	**96.99%**	#20	
Fine Sand	#40	45.00	7.01%	**92.99%**	#40	Fine Sand
	#60	84.70	13.20%	**86.80%**	#60	
	#100	172.50	26.88%	**73.12%**	#100	
	#200	265.50	41.37%	**58.63%**	#200	
Fines	PAN	255.80	39.86%	**60.14%**	PAN	Fines

% C GRVL:	**0.00%**
% F GRVL:	**1.18%**
% C SAND:	**0.26%**
% M SAND:	**5.56%**
% F SAND:	**32.85%**
% FINES:	**60.14%**
% TOTAL:	**100.00%**

LL:	**28**
PL:	**19**
PI:	**9**

Wet Color: **Grayish brown (5YR 3/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 1, 1997
SAMPLE #:	VC-18 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-1
Weight of Wet Soil& Tare (g)	723.70
Weight of Dry Soil & Tare (g)	654.30
Weight of Tare (g)	91.80
Weight of Water (g)	69.40
Weight of Dry Soil (g)	562.50
% Moisture	**12.34%**

200 WASH (Percent Fines)

Tare Number	B-1
Weight of Soil & Tare, before wash (g)	654.30
Weight of Soil & Tare, after wash (g)	358.00
Weight of Tare (g)	91.80
Weight of Fines Lost (g)	296.30
Weight of Dry Soil (g)	562.50
% Fines Lost	**52.68%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	4.00	0.71%	**99.29%**	#4	Coarse Sand
Medium Sand	#10	10.80	1.92%	**98.08%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	358.00
Weight of Split for Fine Sieve Stack	358.00
Percent of Original Weight in Pan	100.00%

	#20	20.10	3.57%	**96.43%**	#20	
Fine Sand	#40	45.00	8.00%	**92.00%**	#40	Fine Sand
	#60	83.10	14.77%	**85.23%**	#60	
	#100	156.10	27.75%	**72.25%**	#100	
	#200	252.50	44.89%	**55.11%**	#200	
Fines	PAN	266.20	47.32%	**52.68%**	PAN	Fines

% C GRVL:	**0.00%**
% F GRVL:	**0.71%**
% C SAND:	**1.21%**
% M SAND:	**6.08%**
% F SAND:	**39.32%**
% FINES:	**52.68%**
% TOTAL:	**100.00%**

LL:	**29**
PL:	**19**
PI :	**10**

Wet Color: **Grayish brown (5YR 3/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 4, 1997
SAMPLE #:	VC-19 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-2
Weight of Wet Soil& Tare (g)	712.40
Weight of Dry Soil & Tare (g)	619.20
Weight of Tare (g)	89.30
Weight of Water (g)	93.20
Weight of Dry Soil (g)	529.90
% Moisture	17.59%

200 WASH (Percent Fines)

Tare Number	B-2
Weight of Soil & Tare, before wash (g)	619.20
Weight of Soil & Tare, after wash (g)	306.20
Weight of Tare (g)	89.30
Weight of Fines Lost (g)	313.00
Weight of Dry Soil (g)	529.90
% Fines Lost	59.07%

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	100.00%	3.000	Coarse Gravel
	1.500	0.00	0.00%	100.00%	1.500	
	1.000	0.00	0.00%	100.00%	1.000	
Fine Gravel	0.750	0.00	0.00%	100.00%	0.750	Fine Gravel
	0.375	0.00	0.00%	100.00%	0.375	
Coarse Sand	#4	4.40	0.83%	99.17%	#4	Coarse Sand
Medium Sand	#10	10.40	1.96%	98.04%	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	306.20
Weight of Split for Fine Sieve Stack	306.20
Percent of Original Weight in Pan	100.00%

	#20	19.90	3.76%	96.24%	#20	
Fine Sand	#40	43.20	8.15%	91.85%	#40	Fine Sand
	#60	77.80	14.68%	85.32%	#60	
	#100	132.60	25.02%	74.98%	#100	
	#200	207.60	39.18%	60.82%	#200	
Fines	PAN	216.90	40.93%	59.07%	PAN	Fines

% C GRVL:	0.00%
% F GRVL:	0.83%
% C SAND:	1.13%
% M SAND:	6.19%
% F SAND:	32.78%
% FINES:	59.07%
% TOTAL:	100.00%

LL:	29
PL:	19
PI :	10

Wet Color:	Grayish brown (5YR 3/2)
Description:	(CL) Sandy CLAY with gravel

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 4, 1997
SAMPLE #:	VC-20 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-3
Weight of Wet Soil& Tare (g)	750.60
Weight of Dry Soil & Tare (g)	689.20
Weight of Tare (g)	94.70
Weight of Water (g)	61.40
Weight of Dry Soil (g)	594.50
% Moisture	**10.33%**

200 WASH (Percent Fines)

Tare Number	B-3
Weight of Soil & Tare, before wash (g)	689.20
Weight of Soil & Tare, after wash (g)	385.60
Weight of Tare (g)	94.70
Weight of Fines Lost (g)	303.60
Weight of Dry Soil (g)	594.50
% Fines Lost	**51.07%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	6.80	1.14%	**98.86%**	#4	Coarse Sand
Medium Sand	#10	17.90	3.01%	**96.99%**	#10	Medium Sand
	#20	36.90	6.21%	**93.79%**	#20	
Fine Sand	#40	66.50	11.19%	**88.81%**	#40	Fine Sand
	#60	107.50	18.08%	**81.92%**	#60	
	#100	170.30	28.65%	**71.35%**	#100	
	#200	260.60	43.84%	**56.16%**	#200	
Fines	PAN	290.90	48.93%	**51.07%**	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	385.60
Weight of Split for Fine Sieve Stack	385.60
Percent of Original Weight in Pan	100.00%

% C GRVL:	**0.00%**
% F GRVL:	**1.14%**
% C SAND:	**1.87%**
% M SAND:	**8.17%**
% F SAND:	**37.75%**
% FINES:	**51.07%**
% TOTAL:	**100.00%**

LL:	**31**
PL:	**20**
PI :	**11**

Wet Color: **Very dark brown (5YR 2/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 5, 1997
SAMPLE #:	VC-21 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-4
Weight of Wet Soil& Tare (g)	805.90
Weight of Dry Soil & Tare (g)	742.90
Weight of Tare (g)	94.50
Weight of Water (g)	63.00
Weight of Dry Soil (g)	648.40
% Moisture	**9.72%**

200 WASH (Percent Fines)

Tare Number	B-4
Weight of Soil & Tare, before wash (g)	742.90
Weight of Soil & Tare, after wash (g)	388.60
Weight of Tare (g)	94.50
Weight of Fines Lost (g)	354.30
Weight of Dry Soil (g)	648.40
% Fines Lost	**54.64%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	8.50	1.31%	**98.69%**	#4	Coarse Sand
Medium Sand	#10	15.90	2.45%	**97.55%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	388.60
Weight of Split for Fine Sieve Stack	388.60
Percent of Original Weight in Pan	100.00%

	#20	30.10	4.64%	**95.36%**	#20	
Fine Sand	#40	55.10	8.50%	**91.50%**	#40	Fine Sand
	#60	73.20	11.29%	**88.71%**	#60	
	#100	180.50	27.84%	**72.16%**	#100	
	#200	287.50	44.34%	**55.66%**	#200	
Fines	PAN	294.10	45.36%	**54.64%**	PAN	Fines

% C GRVL:	**0.00%**
% F GRVL:	**1.31%**
% C SAND:	**1.14%**
% M SAND:	**6.05%**
% F SAND:	**36.86%**
% FINES:	**54.64%**
% TOTAL:	**100.00%**

LL:	30
PL:	19
PI:	11

Wet Color: **Grayish brown (5YR 3/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 6, 1997
SAMPLE #:	VC-22 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-5
Weight of Wet Soil& Tare (g)	790.30
Weight of Dry Soil & Tare (g)	727.30
Weight of Tare (g)	94.50
Weight of Water (g)	63.00
Weight of Dry Soil (g)	632.80
% Moisture	**9.96%**

200 WASH (Percent Fines)

Tare Number	B-5
Weight of Soil & Tare, before wash (g)	727.30
Weight of Soil & Tare, after wash (g)	390.10
Weight of Tare (g)	94.50
Weight of Fines Lost (g)	337.20
Weight of Dry Soil (g)	632.80
% Fines Lost	**53.29%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	5.60	0.88%	**99.12%**	#4	Coarse Sand
Medium Sand	#10	12.40	1.96%	**98.04%**	#10	Medium Sand
	#20	31.80	5.03%	**94.97%**	#20	
Fine Sand	#40	53.40	8.44%	**91.56%**	#40	Fine Sand
	#60	83.90	13.26%	**86.74%**	#60	
	#100	169.80	26.83%	**73.17%**	#100	
	#200	286.20	45.23%	**54.77%**	#200	
Fines	PAN	295.60	46.71%	**53.29%**	PAN	Fines

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	390.10
Weight of Split for Fine Sieve Stack	390.10
Percent of Original Weight in Pan	100.00%

% C GRVL:	**0.00%**
% F GRVL:	**0.88%**
% C SAND:	**1.07%**
% M SAND:	**6.48%**
% F SAND:	**38.27%**
% FINES:	**53.29%**
% TOTAL:	**100.00%**

LL:	30
PL:	20
PI :	10

Wet Color: **Grayish brown (5YR 3/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

PARTICLE-SIZE ANALYSIS - ASTM D1140/D422

PROJECT TITLE:	LLNL/Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 6, 1997
SAMPLE #:	VC-23 (Vegetative Cover)	Review:	RK

MOISTURE CONTENT (Delivered Moisture)

Tare Number	B-6
Weight of Wet Soil& Tare (g)	802.10
Weight of Dry Soil & Tare (g)	727.30
Weight of Tare (g)	94.10
Weight of Water (g)	74.80
Weight of Dry Soil (g)	633.20
% Moisture	**11.81%**

200 WASH (Percent Fines)

Tare Number	B-6
Weight of Soil & Tare, before wash (g)	727.30
Weight of Soil & Tare, after wash (g)	388.90
Weight of Tare (g)	94.10
Weight of Fines Lost (g)	338.40
Weight of Dry Soil (g)	633.20
% Fines Lost	**53.44%**

	SIEVE	wt ret	% ret	% pass	SIEVE	
Coarse Gravel	3.000	0.00	0.00%	**100.00%**	3.000	Coarse Gravel
	1.500	0.00	0.00%	**100.00%**	1.500	
	1.000	0.00	0.00%	**100.00%**	1.000	
Fine Gravel	0.750	0.00	0.00%	**100.00%**	0.750	Fine Gravel
	0.375	0.00	0.00%	**100.00%**	0.375	
Coarse Sand	#4	8.10	1.28%	**98.72%**	#4	Coarse Sand
Medium Sand	#10	20.30	3.21%	**96.79%**	#10	Medium Sand

SPLITTING INFORMATION

Weight in Pan, from Coarse Sieve Stack	388.90
Weight of Split for Fine Sieve Stack	388.90
Percent of Original Weight in Pan	100.00%

	#20	33.70	5.32%	**94.68%**	#20	
Fine Sand	#40	54.90	8.67%	**91.33%**	#40	Fine Sand
	#60	82.40	13.01%	**86.99%**	#60	
	#100	172.10	27.18%	**72.82%**	#100	
	#200	284.40	44.91%	**55.09%**	#200	
Fines	PAN	294.80	46.56%	**53.44%**	PAN	Fines

% C GRVL:	**0.00%**
% F GRVL:	**1.28%**
% C SAND:	**1.93%**
% M SAND:	**5.46%**
% F SAND:	**37.89%**
% FINES:	**53.44%**
% TOTAL:	**100.00%**

LL:	**30**
PL:	**20**
PI :	**10**

Wet Color: **Grayish brown (5YR 3/2)**

Description: **(CL) Sandy CLAY with gravel**

GCS
Golder Construction Services, Inc.

Appendix H.2

Atterberg Limits

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 28, 1997
SAMPLE #:	VC-1 (Vegetative Cover)	Review:	RK

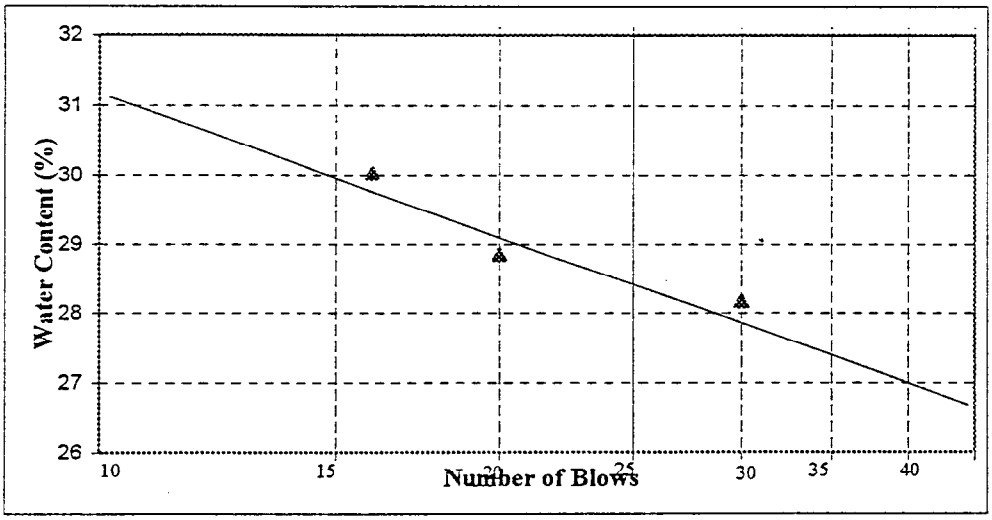
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		109	108		B-1
Weight of Wet Soil & Tare	(w1)	17.89	16.91		819.20
Weight of Dry Soil & Tare	(w2)	16.89	16.07		784.30
Weight of Tare	(w3)	11.50	11.31		91.80
Weight of Water	(w4=w1-w2)	1.00	0.84	-----	34.90
Weight of Dry Soil	(w5=w2-w3)	5.39	4.76	-----	692.50
Water Content (%)	**(w4/w5)*100**	**18.6**	**17.6**	-----	**5.0**

LIQUID LIMIT

Number of Blows		30	20	16		
Tare Number		12	10	18C		
Weight of Wet Soil & Tare	(w6)	43.30	44.05	56.16		
Weight of Dry Soil & Tare	(w7)	38.50	38.90	50.30		
Weight of Tare	(w8)	21.46	21.05	30.78		
Weight of Water	(w9=w6-w7)	4.80	5.15	5.86	-----	-----
Weight of Dry Soil	(w10=w7-w8)	17.04	17.85	19.52	-----	-----
Water Content (%)	**(w9/w10)*100**	**28.2**	**28.9**	**30.0**	----	----



LIQUID LIMIT	29
PLASTIC LIMIT	18
PLASTICITY INDEX	11
MOISTURE CONTENT (%)	5.0

Description: Dark yellowish brown (10YR 4/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician: NE	NE
PROJECT NO:	977-5116.200	Date:	July 28, 1997
SAMPLE #:	VC-2 (Vegetative Cover)	Review:	RK

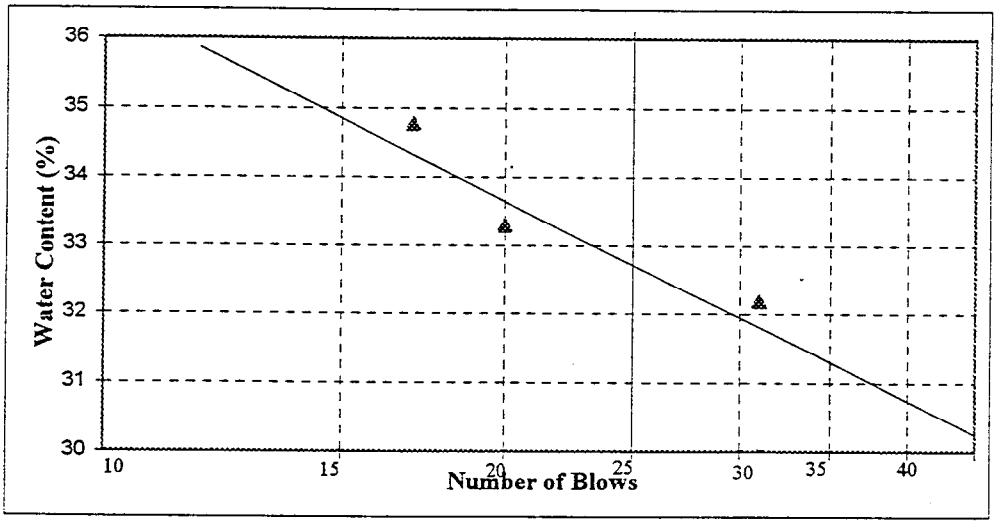
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		10	12		B-2
Weight of Wet Soil & Tare	(w1)	26.57	27.12		806.50
Weight of Dry Soil & Tare	(w2)	25.70	26.21		740.70
Weight of Tare	(w3)	21.05	21.46		89.30
Weight of Water	(w4=w1-w2)	0.87	0.91	-----	65.80
Weight of Dry Soil	(w5=w2-w3)	4.65	4.75	-----	651.40
Water Content (%)	**(w4/w5)*100**	**18.7**	**19.2**	----	**10.1**

LIQUID LIMIT

Number of Blows		20	31	17		
Tare Number		7C	P2	21C		
Weight of Wet Soil & Tare	(w6)	58.47	51.47	55.39		
Weight of Dry Soil & Tare	(w7)	51.39	46.28	49.03		
Weight of Tare	(w8)	30.12	30.15	30.74		
Weight of Water	(w9=w6-w7)	7.08	5.19	6.36	----	----
Weight of Dry Soil	(w10=w7-w8)	21.27	16.13	18.29	----	----
Water Content (%)	**(w9/w10)*100**	**33.3**	**32.2**	**34.8**	----	----



LIQUID LIMIT	33
PLASTIC LIMIT	19
PLASTICITY INDEX	14
MOISTURE CONTENT (%)	10.1

Description: Grayish brown (5YR 3/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 28, 1997
SAMPLE #:	VC-3 (Vegetative Cover)	Review:	RK

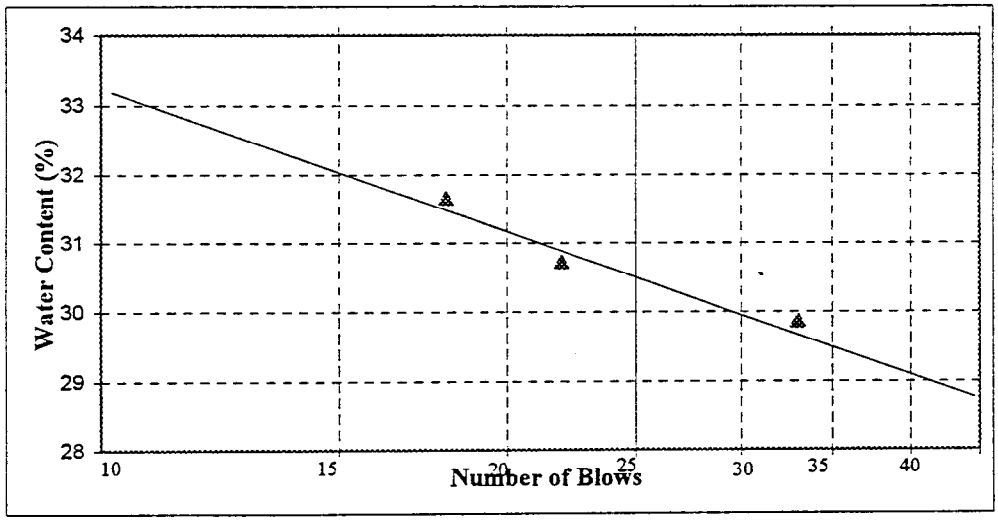
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

						Natural Moisture Content
Tare Number		P1	P4			B-3
Weight of Wet Soil & Tare	(w1)	35.75	35.17			883.80
Weight of Dry Soil & Tare	(w2)	34.90	34.43			842.10
Weight of Tare	(w3)	30.24	30.34			94.70
Weight of Water	(w4=w1-w2)	0.85	0.74	-----		41.70
Weight of Dry Soil	(w5=w2-w3)	4.66	4.09	-----		747.40
Water Content (%)	**(w4/w5)*100**	**18.2**	**18.1**	----		**5.6**

LIQUID LIMIT

Number of Blows		22	33	18		
Tare Number		9C	5C	1C		
Weight of Wet Soil & Tare	(w6)	52.48	53.44	52.62		
Weight of Dry Soil & Tare	(w7)	47.34	48.34	47.54		
Weight of Tare	(w8)	30.61	31.26	31.49		
Weight of Water	(w9=w6-w7)	5.14	5.10	5.08	-----	----
Weight of Dry Soil	(w10=w7-w8)	16.73	17.08	16.05	-----	----
Water Content (%)	**(w9/w10)*100**	**30.7**	**29.9**	**31.7**	----	----



LIQUID LIMIT	30
PLASTIC LIMIT	18
PLASTICITY INDEX	12
MOISTURE CONTENT (%)	5.6

Description: Pale brown (5YR 5/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 28, 1997
SAMPLE #:	VC-4 (Vegetative Cover)	Review:	RK

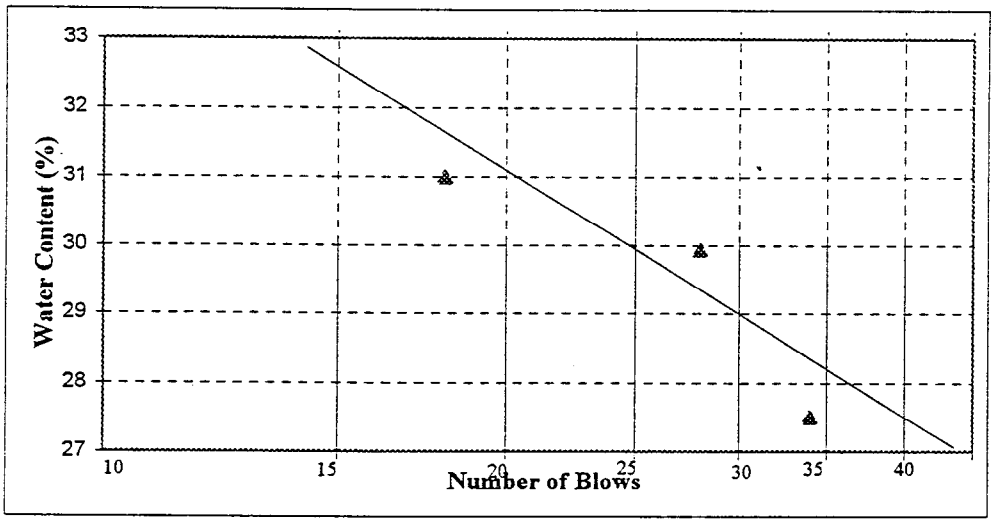
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		3C	P3		B-4
Weight of Wet Soil & Tare	(w1)	35.09	35.82		849.50
Weight of Dry Soil & Tare	(w2)	34.33	34.96		774.80
Weight of Tare	(w3)	30.14	30.03		94.50
Weight of Water	(w4=w1-w2)	0.76	0.86	-----	74.70
Weight of Dry Soil	(w5=w2-w3)	4.19	4.93	-----	680.30
Water Content (%)	**(w4/w5)*100**	**18.1**	**17.4**	----	**11.0**

LIQUID LIMIT

Number of Blows		34	18	28		
Tare Number		2C	6C	4C		
Weight of Wet Soil & Tare	(w6)	51.80	51.82	50.50		
Weight of Dry Soil & Tare	(w7)	47.17	46.72	46.08		
Weight of Tare	(w8)	30.34	30.27	31.31		
Weight of Water	(w9=w6-w7)	4.63	5.10	4.42	-----	-----
Weight of Dry Soil	(w10=w7-w8)	16.83	16.45	14.77	-----	-----
Water Content (%)	**(w9/w10)*100**	**27.5**	**31.0**	**29.9**	----	----



LIQUID LIMIT	30
PLASTIC LIMIT	18
PLASTICITY INDEX	12
MOISTURE CONTENT (%)	11.0

Description: Grayish brown (5YR 3/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 29, 1997
SAMPLE #:	VC-5 (Vegetaative Cover)	Review:	RK

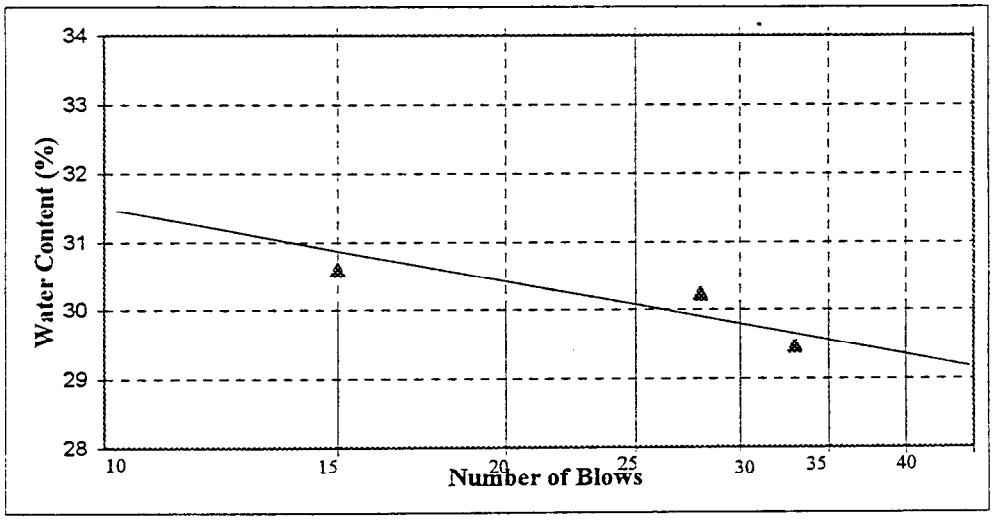
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		10	12		B-5
Weight of Wet Soil & Tare	(w1)	27.22	28.00		844.80
Weight of Dry Soil & Tare	(w2)	26.34	27.00		810.80
Weight of Tare	(w3)	21.05	21.46		94.50
Weight of Water	(w4=w1-w2)	0.88	1.00	-----	34.00
Weight of Dry Soil	(w5=w2-w3)	5.29	5.54	-----	716.30
Water Content (%)	(w4/w5)*100	**16.6**	**18.1**	----	**4.7**

LIQUID LIMIT

Number of Blows		33	15	28		
Tare Number		23C	21	24C		
Weight of Wet Soil & Tare	(w6)	39.62	44.21	41.67		
Weight of Dry Soil & Tare	(w7)	35.42	38.93	37.06		
Weight of Tare	(w8)	21.16	21.67	21.81		
Weight of Water	(w9=w6-w7)	4.20	5.28	4.61	-----	-----
Weight of Dry Soil	(w10=w7-w8)	14.26	17.26	15.25	-----	-----
Water Content (%)	(w9/w10)*100	**29.5**	**30.6**	**30.2**	----	----



LIQUID LIMIT	30
PLASTIC LIMIT	17
PLASTICITY INDEX	13
MOISTURE CONTENT (%)	4.7

Description: Pale brown (5YR 5/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 29, 1997
SAMPLE #:	VC-6 (Vegetative Cover)	Review:	RK

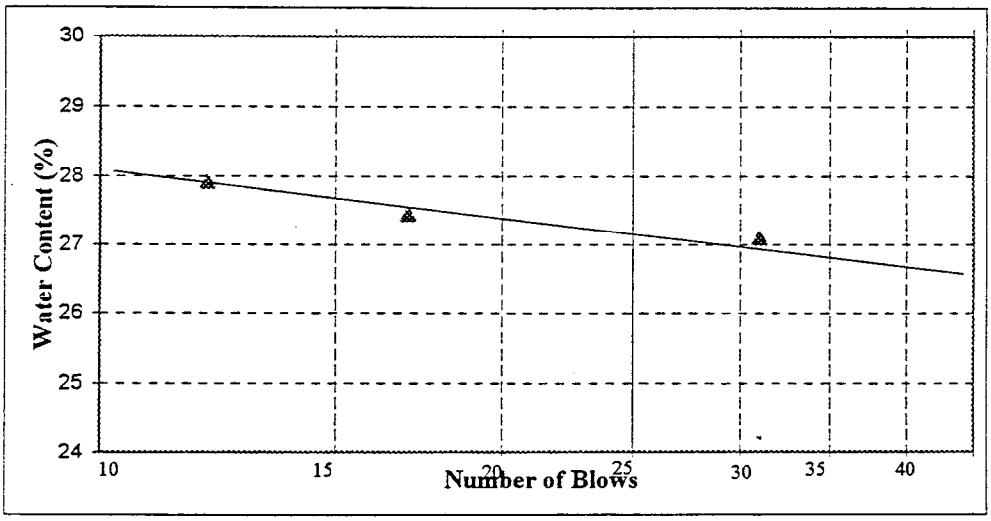
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

						Natural Moisture Content
Tare Number		109	108			B-6
Weight of Wet Soil & Tare	(w1)	17.08	16.55			817.60
Weight of Dry Soil & Tare	(w2)	16.20	15.74			749.20
Weight of Tare	(w3)	11.50	11.31			94.10
Weight of Water	(w4=w1-w2)	0.88	0.81	-----		68.40
Weight of Dry Soil	(w5=w2-w3)	4.70	4.43	-----		655.10
Water Content (%)	(w4/w5)*100	**18.7**	**18.3**	----		**10.4**

LIQUID LIMIT

Number of Blows		12	17	31		
Tare Number		P2	21C	7C		
Weight of Wet Soil & Tare	(w6)	50.91	52.20	51.79		
Weight of Dry Soil & Tare	(w7)	46.38	47.58	47.17		
Weight of Tare	(w8)	30.15	30.74	30.12		
Weight of Water	(w9=w6-w7)	4.53	4.62	4.62	-----	-----
Weight of Dry Soil	(w10=w7-w8)	16.23	16.84	17.05	-----	-----
Water Content (%)	(w9/w10)*100	**27.9**	**27.4**	**27.1**	----	----



LIQUID LIMIT	27
PLASTIC LIMIT	19
PLASTICITY INDEX	8
MOISTURE CONTENT (%)	10.4

Description: Pale brown (5YR 5/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 29, 1997
SAMPLE #:	VC-7 (Vegetative Cover)	Review:	RK

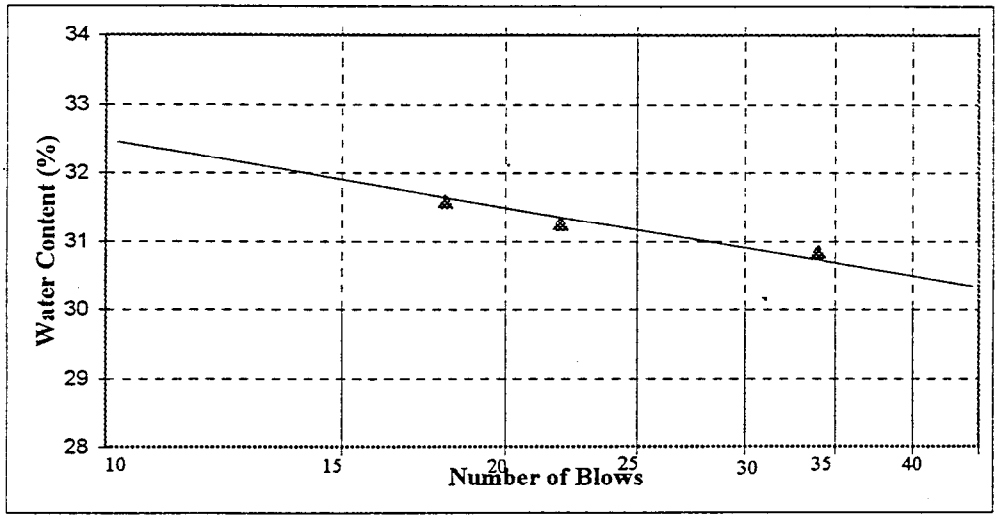
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		205	111		B-7
Weight of Wet Soil & Tare	(w1)	16.57	16.46		835.30
Weight of Dry Soil & Tare	(w2)	15.69	15.68		784.50
Weight of Tare	(w3)	11.22	11.47		97.50
Weight of Water	(w4=w1-w2)	0.88	0.78	-----	50.80
Weight of Dry Soil	(w5=w2-w3)	4.47	4.21	-----	687.00
Water Content (%)	**(w4/w5)*100**	**19.7**	**18.5**	----	**7.4**

LIQUID LIMIT

Number of Blows		34	22	18		
Tare Number		18C	10	12		
Weight of Wet Soil & Tare	(w6)	53.86	44.02	45.83		
Weight of Dry Soil & Tare	(w7)	48.42	38.55	39.98		
Weight of Tare	(w8)	30.78	21.05	21.46		
Weight of Water	(w9=w6-w7)	5.44	5.47	5.85	-----	-----
Weight of Dry Soil	(w10=w7-w8)	17.64	17.50	18.52	-----	-----
Water Content (%)	**(w9/w10)*100**	**30.8**	**31.3**	**31.6**	----	----



LIQUID LIMIT	31
PLASTIC LIMIT	19
PLASTICITY INDEX	12
MOISTURE CONTENT (%)	7.4

Description: Pale brown (5YR 5/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 30, 1997
SAMPLE #:	VC-8 (Vegetative Cover)	Review:	RK

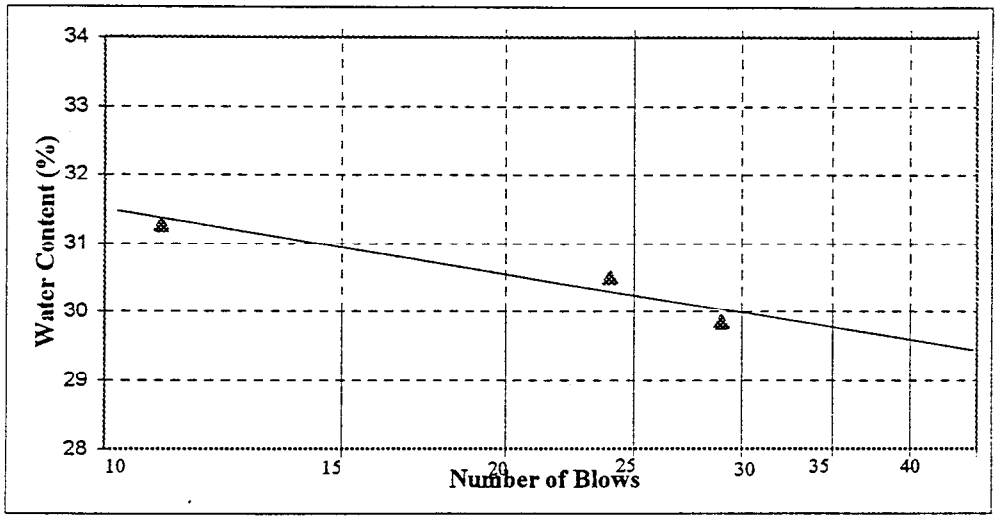
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		1	16		40
Weight of Wet Soil & Tare	(w1)	26.96	27.58		852.70
Weight of Dry Soil & Tare	(w2)	26.03	26.55		781.00
Weight of Tare	(w3)	21.09	20.89		78.90
Weight of Water	(w4=w1-w2)	0.93	1.03	-----	71.70
Weight of Dry Soil	(w5=w2-w3)	4.94	5.66	-----	702.10
Water Content (%)	**(w4/w5)*100**	**18.8**	**18.2**	-----	**10.2**

LIQUID LIMIT

Number of Blows		29	11	24		
Tare Number		23C	24C	21		
Weight of Wet Soil & Tare	(w6)	44.65	41.96	46.23		
Weight of Dry Soil & Tare	(w7)	39.25	37.16	40.49		
Weight of Tare	(w8)	21.16	21.81	21.67		
Weight of Water	(w9=w6-w7)	5.40	4.80	5.74	-----	-----
Weight of Dry Soil	(w10=w7-w8)	18.09	15.35	18.82	-----	-----
Water Content (%)	**(w9/w10)*100**	**29.9**	**31.3**	**30.5**	-----	-----



LIQUID LIMIT	30
PLASTIC LIMIT	19
PLASTICITY INDEX	11
MOISTURE CONTENT (%)	10.2

Description: Dusky brown (5YR 2/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 30, 1997
SAMPLE #:	VC-9 (Vegetative Cover)	Review:	RK

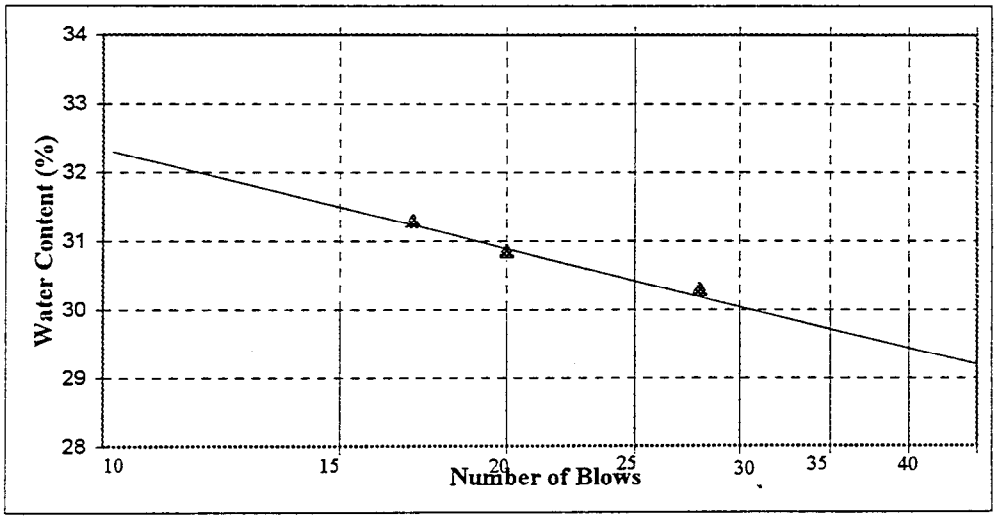
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		109	108		53
Weight of Wet Soil & Tare	(w1)	16.66	18.33		808.90
Weight of Dry Soil & Tare	(w2)	15.86	17.27		723.70
Weight of Tare	(w3)	11.50	11.31		79.40
Weight of Water	(w4=w1-w2)	0.80	1.06	-----	85.20
Weight of Dry Soil	(w5=w2-w3)	4.36	5.96	-----	644.30
Water Content (%)	**(w4/w5)*100**	**18.3**	**17.8**	—	**13.2**

LIQUID LIMIT

Number of Blows		28	20	17		
Tare Number		21C	P2	7C		
Weight of Wet Soil & Tare	(w6)	54.35	51.23	53.16		
Weight of Dry Soil & Tare	(w7)	48.86	46.26	47.67		
Weight of Tare	(w8)	30.74	30.15	30.12		
Weight of Water	(w9=w6-w7)	5.49	4.97	5.49	-----	-----
Weight of Dry Soil	(w10=w7-w8)	18.12	16.11	17.55	-----	-----
Water Content (%)	**(w9/w10)*100**	**30.3**	**30.9**	**31.3**	—	—



LIQUID LIMIT	30
PLASTIC LIMIT	18
PLASTICITY INDEX	12
MOISTURE CONTENT (%)	13.2

Description: Grayish brown (5YR 3/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 30, 1997
SAMPLE #:	VC-10 (Vegetative Cover)	Review:	RK

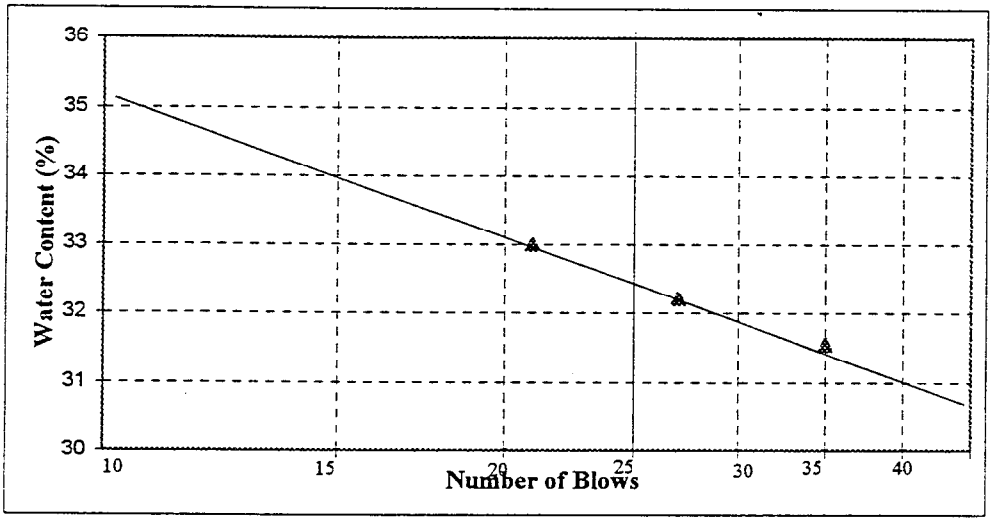
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		6	4C		B-1
Weight of Wet Soil & Tare	(w1)	27.33	39.56		812.10
Weight of Dry Soil & Tare	(w2)	26.44	38.21		750.80
Weight of Tare	(w3)	21.45	31.31		91.80
Weight of Water	(w4=w1-w2)	0.89	1.35	-----	61.30
Weight of Dry Soil	(w5=w2-w3)	4.99	6.90	-----	659.00
Water Content (%)	**(w4/w5)*100**	**17.8**	**19.6**	----	**9.3**

LIQUID LIMIT

Number of Blows		35	27	21		
Tare Number		6C	1C	9C		
Weight of Wet Soil & Tare	(w6)	54.91	51.81	53.10		
Weight of Dry Soil & Tare	(w7)	49.00	46.86	47.52		
Weight of Tare	(w8)	30.27	31.49	30.61		
Weight of Water	(w9=w6-w7)	5.91	4.95	5.58	-----	-----
Weight of Dry Soil	(w10=w7-w8)	18.73	15.37	16.91	-----	-----
Water Content (%)	**(w9/w10)*100**	**31.6**	**32.2**	**33.0**	----	----



LIQUID LIMIT	32
PLASTIC LIMIT	19
PLASTICITY INDEX	13
MOISTURE CONTENT (%)	9.3

Description: Grayish brown (5YR 3/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 30, 1997
SAMPLE #:	VC-11 (Vegetative Cover)	Review:	RK

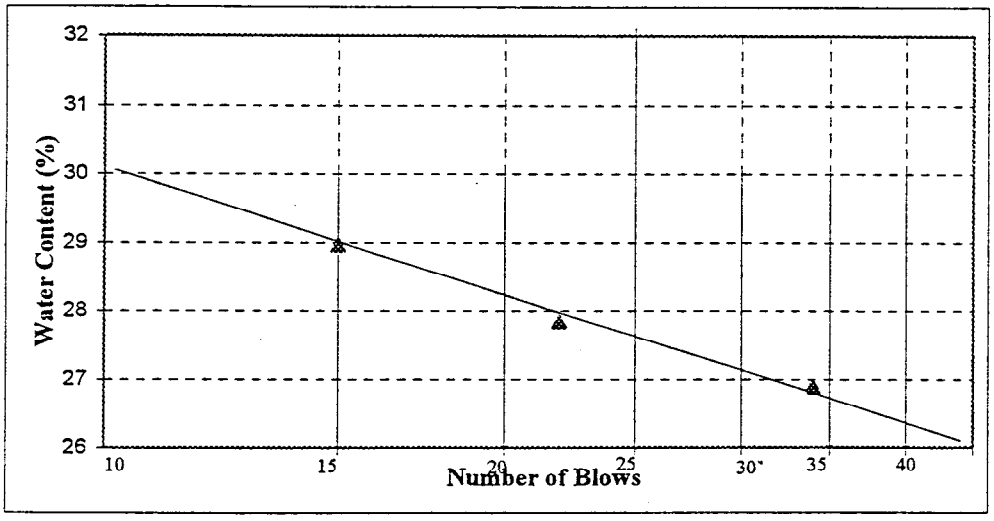
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

						Natural Moisture Content
Tare Number		205	111			B-2
Weight of Wet Soil & Tare	(w1)	16.49	16.58			821.10
Weight of Dry Soil & Tare	(w2)	15.69	15.84			745.30
Weight of Tare	(w3)	11.22	11.47			89.30
Weight of Water	(w4=w1-w2)	0.80	0.74	----		75.80
Weight of Dry Soil	(w5=w2-w3)	4.47	4.37	----		656.00
Water Content (%)	**(w4/w5)*100**	**17.9**	**16.9**	----		**11.6**

LIQUID LIMIT

Number of Blows		34	22	15		
Tare Number		P4	3C	5C		
Weight of Wet Soil & Tare	(w6)	51.34	49.43	52.38		
Weight of Dry Soil & Tare	(w7)	45.01	43.25	47.53		
Weight of Tare	(w8)	21.46	21.05	30.78		
Weight of Water	(w9=w6-w7)	6.33	6.18	4.85	-----	-----
Weight of Dry Soil	(w10=w7-w8)	23.55	22.20	16.75	-----	-----
Water Content (%)	**(w9/w10)*100**	**26.9**	**27.8**	**29.0**	----	----



LIQUID LIMIT	28	**Description:**	**Grayish brown (5YR 3/2) Sandy CLAY with gravel**
PLASTIC LIMIT	17		
PLASTICITY INDEX	11		
MOISTURE CONTENT (%)	11.6	USCS	CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 31, 1997
SAMPLE #:	VC-12 (Vegetative Cover)	Review:	RK

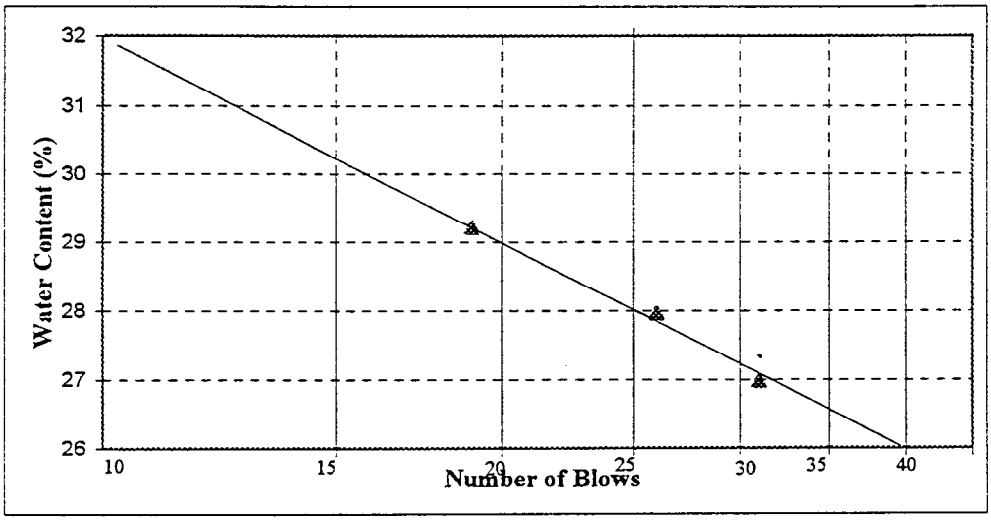
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		1	16		B-3
Weight of Wet Soil & Tare	(w1)	28.25	27.16		829.20
Weight of Dry Soil & Tare	(w2)	27.18	26.21		761.80
Weight of Tare	(w3)	21.09	20.89		94.70
Weight of Water	(w4=w1-w2)	1.07	0.95	-----	67.40
Weight of Dry Soil	(w5=w2-w3)	6.09	5.32	-----	667.10
Water Content (%)	**(w4/w5)*100**	**17.6**	**17.9**	----	**10.1**

LIQUID LIMIT

Number of Blows		31	26	19		
Tare Number		21C	P3	2C		
Weight of Wet Soil & Tare	(w6)	49.57	52.59	49.45		
Weight of Dry Soil & Tare	(w7)	45.57	47.66	45.13		
Weight of Tare	(w8)	30.74	30.03	30.34		
Weight of Water	(w9=w6-w7)	4.00	4.93	4.32	-----	-----
Weight of Dry Soil	(w10=w7-w8)	14.83	17.63	14.79	-----	-----
Water Content (%)	**(w9/w10)*100**	**27.0**	**28.0**	**29.2**	----	----



LIQUID LIMIT	28
PLASTIC LIMIT	18
PLASTICITY INDEX	10
MOISTURE CONTENT (%)	10.1

Description: Grayish brown (5YR 3/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 31, 1997
SAMPLE #:	VC-13 (Vegetative Cover)	Review:	RK

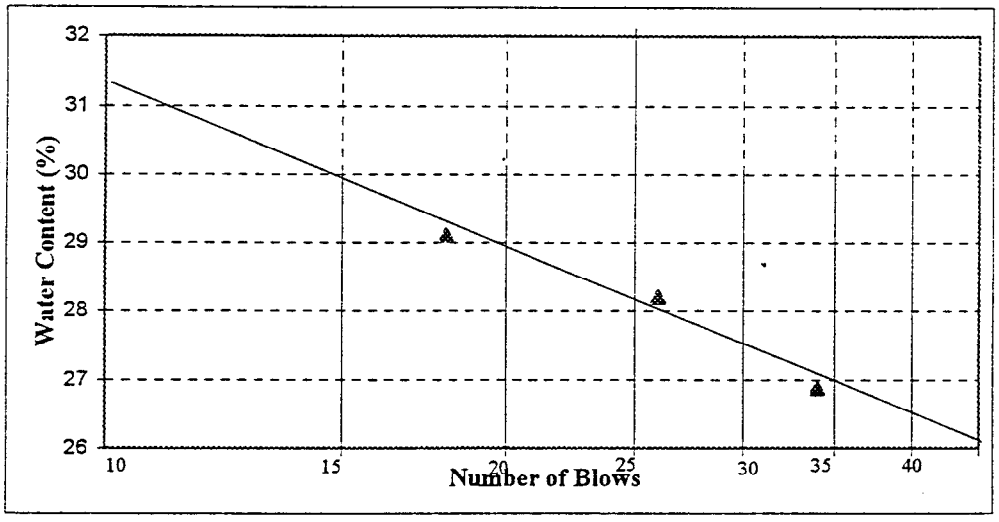
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

						Natural Moisture Content
Tare Number		109	108			B-4
Weight of Wet Soil & Tare	(w1)	17.73	16.31			840.90
Weight of Dry Soil & Tare	(w2)	16.78	15.49			768.60
Weight of Tare	(w3)	11.50	11.31			94.50
Weight of Water	(w4=w1-w2)	0.95	0.82	-----		72.30
Weight of Dry Soil	(w5=w2-w3)	5.28	4.18	-----		674.10
Water Content (%)	(w4/w5)*100	**18.0**	**19.6**	----		**10.7**

LIQUID LIMIT

Number of Blows		34	26	18		
Tare Number		18C	1C	7C		
Weight of Wet Soil & Tare	(w6)	50.09	52.63	51.90		
Weight of Dry Soil & Tare	(w7)	46.00	47.98	46.99		
Weight of Tare	(w8)	30.78	31.49	30.12		
Weight of Water	(w9=w6-w7)	4.09	4.65	4.91	----	----
Weight of Dry Soil	(w10=w7-w8)	15.22	16.49	16.87	----	----
Water Content (%)	(w9/w10)*100	**26.9**	**28.2**	**29.1**	----	----



LIQUID LIMIT	28
PLASTIC LIMIT	19
PLASTICITY INDEX	9
MOISTURE CONTENT (%)	10.7

Description: Grayish brown (5YR 3/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 31, 1997
SAMPLE #:	VC-14 (Vegetative Cover)	Review:	RK

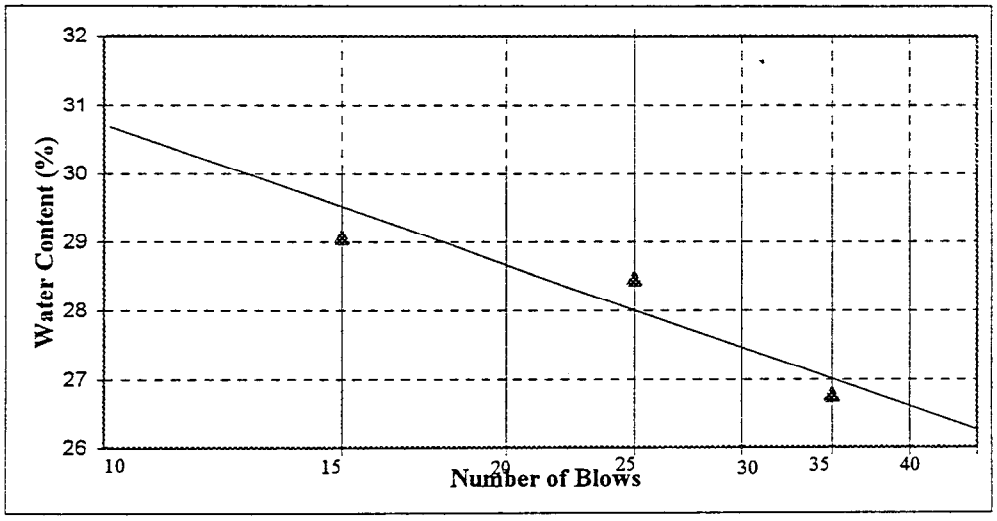
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		111	205		B-5
Weight of Wet Soil & Tare	(w1)	17.44	17.57		811.90
Weight of Dry Soil & Tare	(w2)	16.52	16.60		749.60
Weight of Tare	(w3)	11.47	11.22		94.50
Weight of Water	(w4=w1-w2)	0.92	0.97	-----	62.30
Weight of Dry Soil	(w5=w2-w3)	5.05	5.38	-----	655.10
Water Content (%)	**(w4/w5)*100**	**18.2**	**18.0**	----	**9.5**

LIQUID LIMIT

Number of Blows		35	25	15		
Tare Number		12	23C	6		
Weight of Wet Soil & Tare	(w6)	43.67	40.66	40.90		
Weight of Dry Soil & Tare	(w7)	38.98	36.34	36.52		
Weight of Tare	(w8)	21.46	21.16	21.45		
Weight of Water	(w9=w6-w7)	4.69	4.32	4.38	-----	-----
Weight of Dry Soil	(w10=w7-w8)	17.52	15.18	15.07	-----	-----
Water Content (%)	**(w9/w10)*100**	**26.8**	**28.5**	**29.1**	----	----



LIQUID LIMIT	29
PLASTIC LIMIT	18
PLASTICITY INDEX	11
MOISTURE CONTENT (%)	9.5

Description: Pale brown (5YR 5/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	July 31, 1997
SAMPLE #:	VC-15 (Vegetative Cover)	Review:	RK

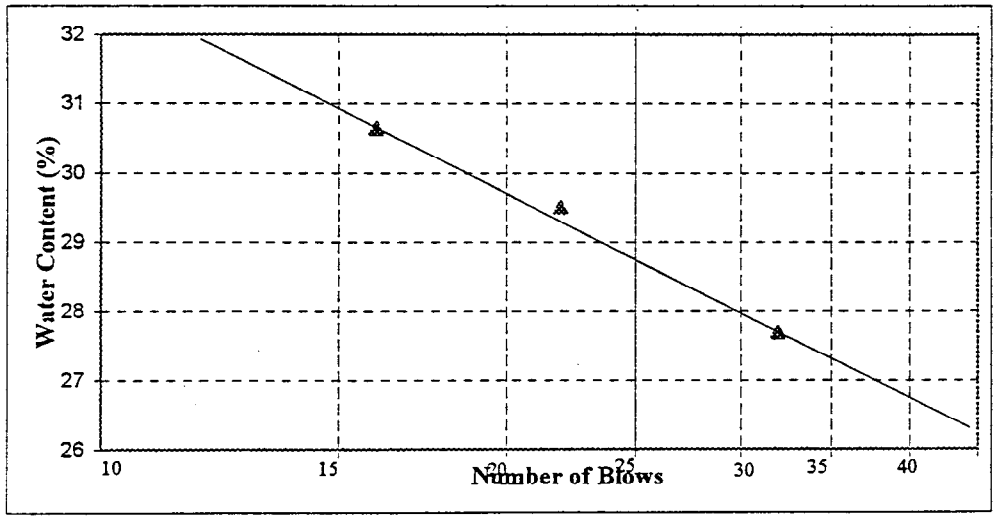
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		1	16		B-6
Weight of Wet Soil & Tare	(w1)	27.61	28.13		834.90
Weight of Dry Soil & Tare	(w2)	26.62	27.06		771.90
Weight of Tare	(w3)	21.09	20.89		94.10
Weight of Water	(w4=w1-w2)	0.99	1.07	-----	63.00
Weight of Dry Soil	(w5=w2-w3)	5.53	6.17	-----	677.80
Water Content (%)	(w4/w5)*100	**17.9**	**17.3**	----	**9.3**

LIQUID LIMIT

Number of Blows		22	16	32		
Tare Number		9C	P1	P2		
Weight of Wet Soil & Tare	(w6)	51.24	52.45	51.82		
Weight of Dry Soil & Tare	(w7)	46.54	47.24	47.12		
Weight of Tare	(w8)	30.61	30.24	30.15		
Weight of Water	(w9=w6-w7)	4.70	5.21	4.70	-----	----
Weight of Dry Soil	(w10=w7-w8)	15.93	17.00	16.97	-----	----
Water Content (%)	(w9/w10)*100	**29.5**	**30.6**	**27.7**	----	----



LIQUID LIMIT	29
PLASTIC LIMIT	18
PLASTICITY INDEX	11
MOISTURE CONTENT (%)	9.3

Description: Grayish brown (5YR 3/2) Sandy CLAY with gravel

USCS: CL

Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 1, 1997
SAMPLE #:	VC-16 (Vegetative Cover)	Review:	RK

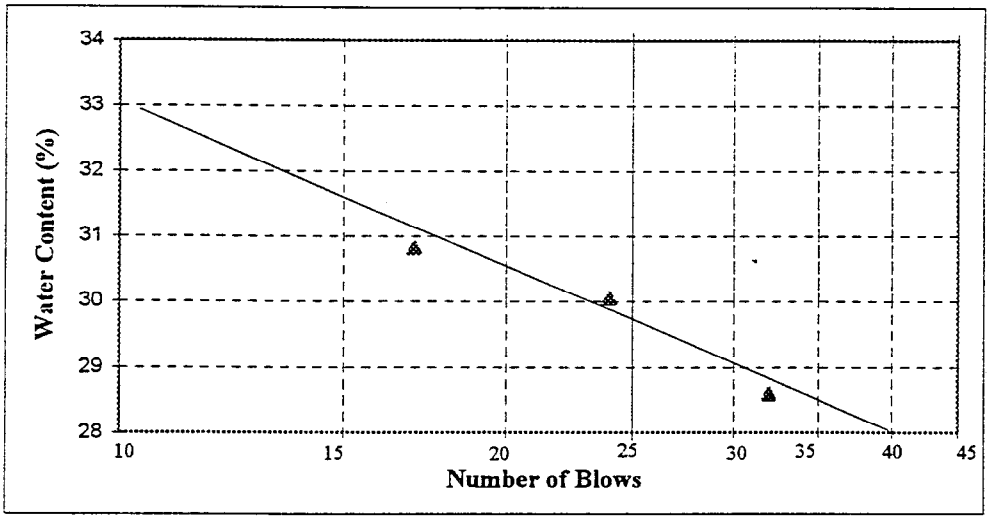
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		205	111		40
Weight of Wet Soil & Tare	(w1)	16.23	16.88		763.20
Weight of Dry Soil & Tare	(w2)	15.43	16.01		699.50
Weight of Tare	(w3)	11.22	11.47		78.90
Weight of Water	(w4=w1-w2)	0.80	0.87	-----	63.70
Weight of Dry Soil	(w5=w2-w3)	4.21	4.54	-----	620.60
Water Content (%)	**(w4/w5)*100**	**19.0**	**19.2**	**----**	**10.3**

LIQUID LIMIT

Number of Blows		17	24	32		
Tare Number		12	6	10		
Weight of Wet Soil & Tare	(w6)	48.54	49.32	47.80		
Weight of Dry Soil & Tare	(w7)	42.16	42.88	41.85		
Weight of Tare	(w8)	21.46	21.45	21.05		
Weight of Water	(w9=w6-w7)	6.38	6.44	5.95	-----	-----
Weight of Dry Soil	(w10=w7-w8)	20.70	21.43	20.80	-----	-----
Water Content (%)	**(w9/w10)*100**	**30.8**	**30.1**	**28.6**	**----**	**----**



LIQUID LIMIT	30
PLASTIC LIMIT	19
PLASTICITY INDEX	11
MOISTURE CONTENT (%)	10.3

Description: **Very dark brown (5 YR 2/2) Sandy CLAY with gravel**

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 1, 1997
SAMPLE #:	VC-17 (Vegetative Cover)	Review:	RK

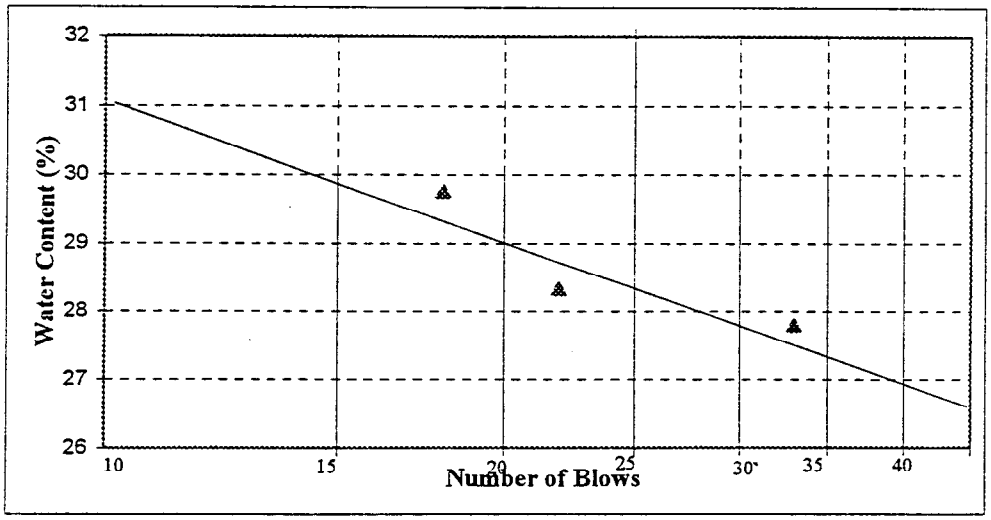
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		1	16		53
Weight of Wet Soil & Tare	(w1)	27.87	28.02		789.40
Weight of Dry Soil & Tare	(w2)	26.76	26.92		721.10
Weight of Tare	(w3)	21.09	20.89		79.40
Weight of Water	(w4=w1-w2)	1.11	1.10	—	68.30
Weight of Dry Soil	(w5=w2-w3)	5.67	6.03	—	641.70
Water Content (%)	**(w4/w5)*100**	**19.6**	**18.2**	—	**10.6**

LIQUID LIMIT

Number of Blows		33	22	18		
Tare Number		23C	24C	21		
Weight of Wet Soil & Tare	(w6)	44.52	41.88	46.09		
Weight of Dry Soil & Tare	(w7)	39.44	37.45	40.49		
Weight of Tare	(w8)	21.16	21.81	21.67		
Weight of Water	(w9=w6-w7)	5.08	4.43	5.60	-----	-----
Weight of Dry Soil	(w10=w7-w8)	18.28	15.64	18.82	-----	-----
Water Content (%)	**(w9/w10)*100**	**27.8**	**28.3**	**29.8**	—	—



LIQUID LIMIT	28
PLASTIC LIMIT	19
PLASTICITY INDEX	9
MOISTURE CONTENT (%)	10.6

Description: Grayish brown (5YR 3/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 1, 1997
SAMPLE #:	VC-18 (Vegetative Cover)	Review:	RK

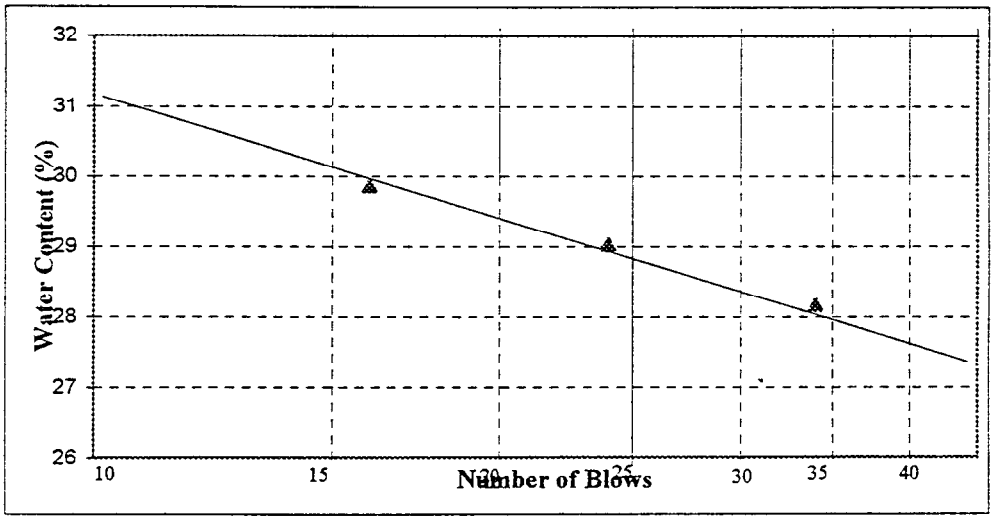
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		109	108		B-1
Weight of Wet Soil & Tare	(w1)	17.79	16.82		723.70
Weight of Dry Soil & Tare	(w2)	16.79	15.95		654.30
Weight of Tare	(w3)	11.50	11.31		91.80
Weight of Water	(w4=w1-w2)	1.00	0.87	-----	69.40
Weight of Dry Soil	(w5=w2-w3)	5.29	4.64	-----	562.50
Water Content (%)	**(w4/w5)*100**	**18.9**	**18.8**	**—**	**12.3**

LIQUID LIMIT

Number of Blows		34	24	16		
Tare Number		12	10	18C		
Weight of Wet Soil & Tare	(w6)	44.07	44.92	55.78		
Weight of Dry Soil & Tare	(w7)	39.10	39.55	50.03		
Weight of Tare	(w8)	21.46	21.05	30.78		
Weight of Water	(w9=w6-w7)	4.97	5.37	5.75	-----	-----
Weight of Dry Soil	(w10=w7-w8)	17.64	18.50	19.25	-----	-----
Water Content (%)	**(w9/w10)*100**	**28.2**	**29.0**	**29.9**	**—**	**—**



LIQUID LIMIT	29
PLASTIC LIMIT	19
PLASTICITY INDEX	10
MOISTURE CONTENT (%)	12.3

Description: Grayish brown (5YR 3/2 Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 4, 1997
SAMPLE #:	VC-19 (Vegetative Cover)	Review:	RK

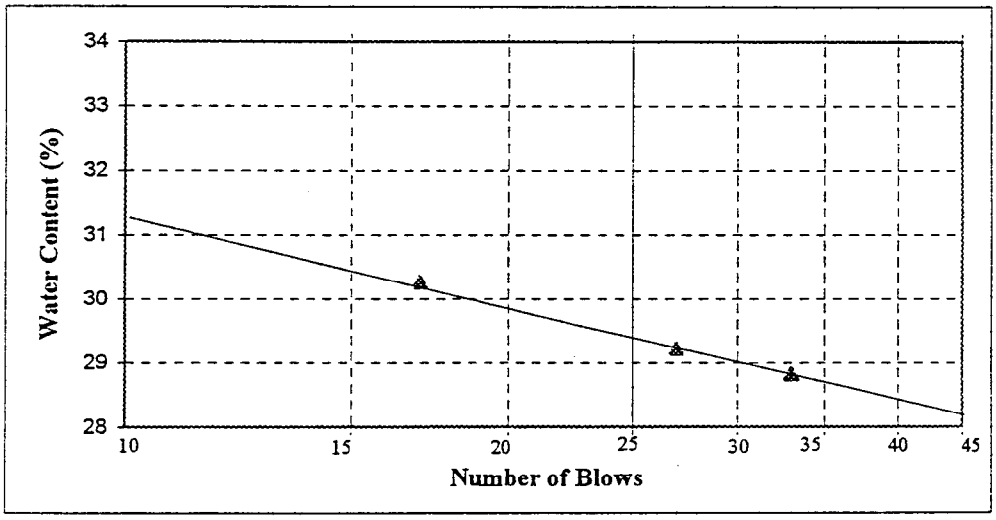
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		205	111		B-2
Weight of Wet Soil & Tare	(w1)	17.41	17.20		712.40
Weight of Dry Soil & Tare	(w2)	16.40	16.28		619.20
Weight of Tare	(w3)	11.22	11.47		89.30
Weight of Water	(w4=w1-w2)	1.01	0.92	-----	93.20
Weight of Dry Soil	(w5=w2-w3)	5.18	4.81	-----	529.90
Water Content (%)	**(w4/w5)*100**	**19.5**	**19.1**	----	**17.6**

LIQUID LIMIT

Number of Blows		17	27	33		
Tare Number		12	21	10		
Weight of Wet Soil & Tare	(w6)	50.38	50.23	49.96		
Weight of Dry Soil & Tare	(w7)	43.66	43.76	43.49		
Weight of Tare	(w8)	21.46	21.62	21.05		
Weight of Water	(w9=w6-w7)	6.72	6.47	6.47	-----	-----
Weight of Dry Soil	(w10=w7-w8)	22.20	22.14	22.44	-----	-----
Water Content (%)	**(w9/w10)*100**	**30.3**	**29.2**	**28.8**	----	----



LIQUID LIMIT	29
PLASTIC LIMIT	19
PLASTICITY INDEX	10
MOISTURE CONTENT (%)	17.6

Description: Grayish brown (5YR 3/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 4, 1997
SAMPLE #:	VC-20 (Vegetative Cover)	Review:	RK

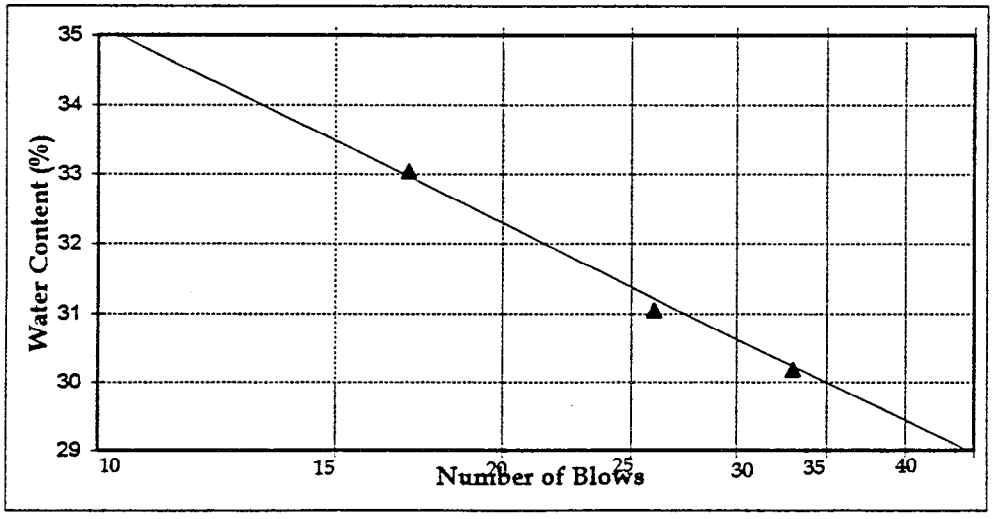
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

						Natural Moisture Content
Tare Number		6	4C			B-3
Weight of Wet Soil & Tare	(w1)	26.73	38.65			750.60
Weight of Dry Soil & Tare	(w2)	25.85	37.43			689.20
Weight of Tare	(w3)	21.45	31.31			94.70
Weight of Water	(w4=w1-w2)	0.88	1.22	—		61.40
Weight of Dry Soil	(w5=w2-w3)	4.40	6.12	—		594.50
Water Content (%)	**(w4/w5)*100**	**20.0**	**19.9**	—		**10.3**

LIQUID LIMIT

Number of Blows		33	26	17		
Tare Number		6C	1C	9C		
Weight of Wet Soil & Tare	(w6)	53.22	52.30	52.80		
Weight of Dry Soil & Tare	(w7)	47.90	47.37	47.29		
Weight of Tare	(w8)	30.27	31.49	30.61		
Weight of Water	(w9=w6-w7)	5.32	4.93	5.51	—	—
Weight of Dry Soil	(w10=w7-w8)	17.63	15.88	16.68	—	—
Water Content (%)	**(w9/w10)*100**	**30.2**	**31.0**	**33.0**	—	—



LIQUID LIMIT	31	**Description:**	**Very dark brown (5YR 2/2) Sandy CLAY with gravel**
PLASTIC LIMIT	20		
PLASTICITY INDEX	11		
MOISTURE CONTENT (%)	10.3	USCS	CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 5, 1997
SAMPLE #:	VC-21 (Vegetative Cover)	Review:	RK

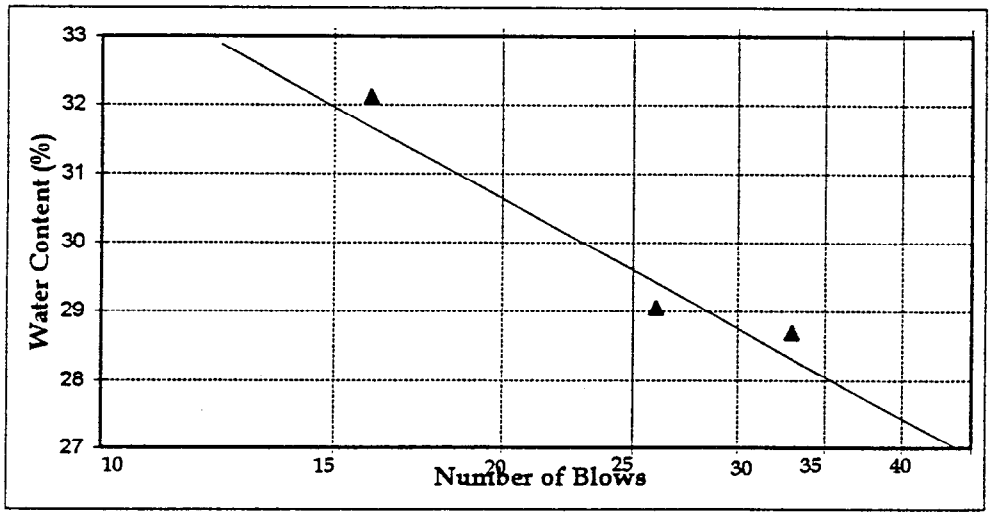
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

						Natural Moisture Content
Tare Number		205	111			B-4
Weight of Wet Soil & Tare	(w1)	17.22	16.78			805.90
Weight of Dry Soil & Tare	(w2)	16.28	15.92			742.90
Weight of Tare	(w3)	11.22	11.47			94.90
Weight of Water	(w4=w1-w2)	0.94	0.86	---		63.00
Weight of Dry Soil	(w5=w2-w3)	5.06	4.45	---		648.00
Water Content (%)	**(w4/w5)*100**	**18.6**	**19.3**	---		**9.7**

LIQUID LIMIT

Number of Blows		33	26	16		
Tare Number		P4	3C	5C		
Weight of Wet Soil & Tare	(w6)	50.21	48.59	53.49		
Weight of Dry Soil & Tare	(w7)	43.80	42.39	47.97		
Weight of Tare	(w8)	21.46	21.05	30.78		
Weight of Water	(w9=w6-w7)	6.41	6.20	5.52	---	---
Weight of Dry Soil	(w10=w7-w8)	22.34	21.34	17.19	---	---
Water Content (%)	**(w9/w10)*100**	**28.7**	**29.1**	**32.1**	---	---



LIQUID LIMIT	30
PLASTIC LIMIT	19
PLASTICITY INDEX	11
MOISTURE CONTENT (%)	9.7

Description: Grayish brown (5YR 3/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 6, 1997
SAMPLE #:	VC-22 (Vegetative Cover)	Review:	RK

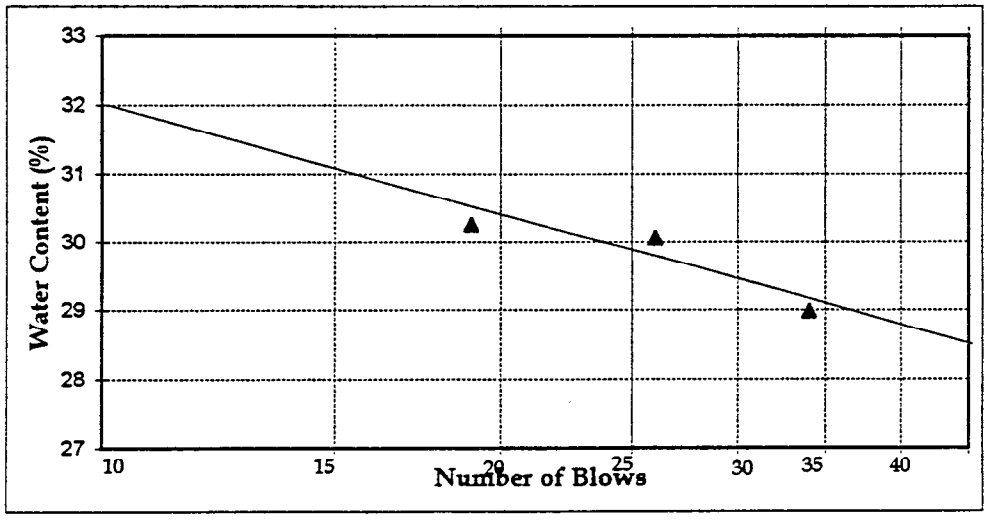
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

						Natural Moisture Content
Tare Number		1	16			B-5
Weight of Wet Soil & Tare	(w1)	27.98	27.34			790.30
Weight of Dry Soil & Tare	(w2)	26.80	26.29			727.30
Weight of Tare	(w3)	21.09	20.89			94.50
Weight of Water	(w4=w1-w2)	1.18	1.05	---		63.00
Weight of Dry Soil	(w5=w2-w3)	5.71	5.40	---		632.80
Water Content (%)	**(w4/w5)*100**	**20.7**	**19.4**	---		**10.0**

LIQUID LIMIT

Number of Blows		34	26	19		
Tare Number		21C	P3	2C		
Weight of Wet Soil & Tare	(w6)	51.52	52.27	52.17		
Weight of Dry Soil & Tare	(w7)	46.85	47.13	47.10		
Weight of Tare	(w8)	30.74	30.03	30.34		
Weight of Water	(w9=w6-w7)	4.67	5.14	5.07	---	---
Weight of Dry Soil	(w10=w7-w8)	16.11	17.10	16.76	---	---
Water Content (%)	**(w9/w10)*100**	**29.0**	**30.1**	**30.3**	---	---



LIQUID LIMIT	30
PLASTIC LIMIT	20
PLASTICITY INDEX	10
MOISTURE CONTENT (%)	10.0

Description: Grayish brown (5YR 3/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

ATTERBERG LIMITS - ASTM D4318

PROJECT TITLE:	LLNL/ Site 300 - Pit 6 Landfill Closure	Technician:	NE
PROJECT NO:	977-5116.200	Date:	August 6, 1997
SAMPLE #:	VC-23 (Vegetative Cover)	Review:	RK

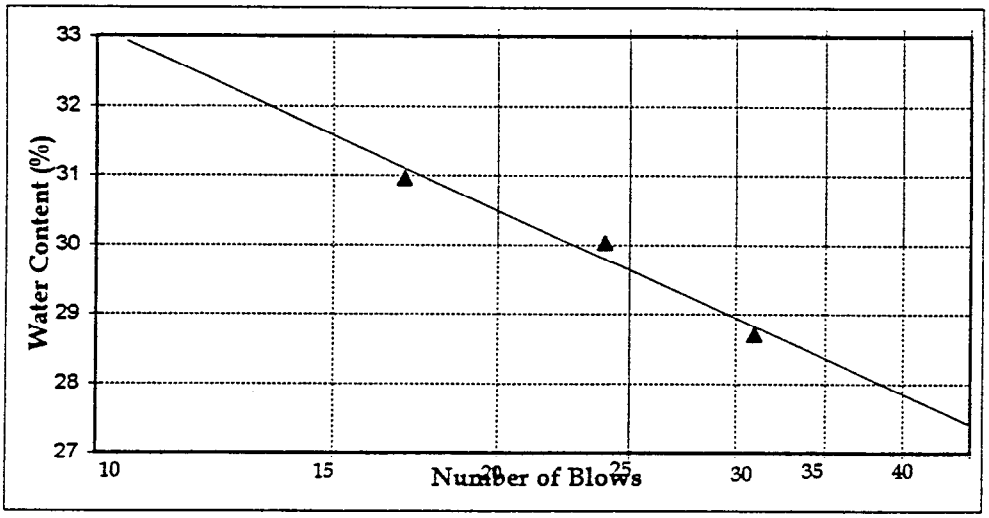
SAMPLE PREPARATION: DRY Minus #40 Sieve: Y

PLASTIC LIMIT

					Natural Moisture Content
Tare Number		109	108		B-6
Weight of Wet Soil & Tare	(w1)	18.65	27.44		802.10
Weight of Dry Soil & Tare	(w2)	17.48	26.32		727.30
Weight of Tare	(w3)	11.50	20.89		94.10
Weight of Water	(w4=w1-w2)	1.17	1.12	—	74.80
Weight of Dry Soil	(w5=w2-w3)	5.98	5.43	—	633.20
Water Content (%)	**(w4/w5)*100**	**19.6**	**20.6**	—	**11.8**

LIQUID LIMIT

Number of Blows		31	24	17		
Tare Number		18C	1C	7C		
Weight of Wet Soil & Tare	(w6)	51.50	51.89	51.99		
Weight of Dry Soil & Tare	(w7)	46.88	47.18	46.82		
Weight of Tare	(w8)	30.78	31.49	30.12		
Weight of Water	(w9=w6-w7)	4.62	4.71	5.17	—	—
Weight of Dry Soil	(w10=w7-w8)	16.10	15.69	16.70	—	—
Water Content (%)	**(w9/w10)*100**	**28.7**	**30.0**	**31.0**	—	—



LIQUID LIMIT	30
PLASTIC LIMIT	20
PLASTICITY INDEX	10
MOISTURE CONTENT (%)	11.8

Description: Grayish brown (5YR 3/2) Sandy CLAY with gravel

USCS: CL

GCS
Golder Construction Services, Inc.

Appendix I

Geosynthetic Components

Appendix I.1

Inventory

Appendix I.1.1

Geogrid

UX160040 GEOGRID
INVENTORY SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

977-5116

# of Rolls	Lot Number	Roll Number	Date Received	Roll Length (ft.)	Roll Width (ft.)	Square Feet	Conf. Tested	Remarks
1	15342	31	6/16/97	200	4.26	852		
2	15342	32	6/16/97	200	4.26	852		
3	15342	33	6/16/97	200	4.26	852		
4	15342	34	6/16/97	200	4.26	852		
5	15342	35	6/16/97	200	4.26	852		
6	15342	36	6/16/97	200	4.26	852		
7	15345	31	6/16/97	200	4.26	852		
8	15345	32	6/16/97	200	4.26	852		
9	15345	33	6/16/97	200	4.26	852		
10	15345	34	6/16/97	200	4.26	852		
11	15345	35	6/16/97	200	4.26	852		
12	15345	36	6/16/97	200	4.26	852		
13	15347	19	6/16/97	200	4.26	852		SENT 15347-17 (not used)
14	15347	20	6/16/97	200	4.26	852		
15	15347	21	6/16/97	200	4.26	852		
16	15347	22	6/16/97	200	4.26	852		
17	15347	23	6/16/97	200	4.26	852		
18	15347	24	6/16/97	200	4.26	852		
19	15347	49	6/16/97	200	4.26	852	YES	PASSED
20	15347	50	6/16/97	200	4.26	852		
21	15347	51	6/16/97	200	4.26	852		
22	15347	52	6/16/97	200	4.26	852		
23	15347	53	6/16/97	200	4.26	852		
24	15347	54	6/16/97	200	4.26	852		
25	15448	19	6/16/97	200	4.26	852		
26	15448	20	6/16/97	200	4.26	852		
27	15448	21	6/16/97	200	4.26	852		
28	15448	22	6/16/97	200	4.26	852		
29	15448	23	6/16/97	200	4.26	852		
30	15448	24	6/16/97	200	4.26	852		
31	15448	25	6/16/97	200	4.26	852		
32	15448	26	6/16/97	200	4.26	852		
33	15448	27	6/16/97	200	4.26	852		
34	15448	28	6/16/97	200	4.26	852		
35	15448	29	6/16/97	200	4.26	852		
36	15448	30	6/16/97	200	4.26	852		
37	15448	31	6/16/97	200	4.26	852		
38	15448	32	6/16/97	200	4.26	852		
39	15448	33	6/16/97	200	4.26	852		
40	15448	34	6/16/97	200	4.26	852		
41	15448	35	6/16/97	200	4.26	852		
42	15448	36	6/16/97	200	4.26	852		
43	15448	37	6/16/97	200	4.26	852		
44	15448	38	6/16/97	200	4.26	852		
45	15448	39	6/16/97	200	4.26	852		

UX160040 GEOGRID
INVENTORY SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

# of Rolls	Lot Number	Roll Number	Date Received	Roll Length (ft.)	Roll Width (ft.)	Square Feet	Conf. Tested	Remarks
46	15448	40	6/16/97	200	4.26	852		
47	15448	41	6/16/97	200	4.26	852		
48	15448	42	6/16/97	200	4.26	852		
49	15448	43	6/16/97	200	4.26	852		
50	15448	44	6/16/97	200	4.26	852		
51	15448	45	6/16/97	200	4.26	852		
52	15448	46	6/16/97	200	4.26	852		
53	15448	47	6/16/97	200	4.26	852		
54	15448	48	6/16/97	200	4.26	852		
55	15448	49	6/16/97	200	4.26	852		
56	15448	50	6/16/97	200	4.26	852	YES	PASSED
57	15448	51	6/16/97	200	4.26	852		
58	15448	52	6/16/97	200	4.26	852		
59	15448	53	6/16/97	200	4.26	852		
60	15448	54	6/16/97	200	4.26	852		
61	15448	55	6/16/97	200	4.26	852		
62	15448	56	6/16/97	200	4.26	852		
63	15448	57	6/16/97	200	4.26	852		
64	15448	58	6/16/97	200	4.26	852		
65	15448	59	6/16/97	200	4.26	852		
66	15448	60	6/16/97	200	4.26	852		
67	15448	61	6/16/97	200	4.26	852		
68	15448	62	6/16/97	200	4.26	852		
69	15448	63	6/16/97	200	4.26	852		
70	15448	64	6/16/97	200	4.26	852		
71	15448	65	6/16/97	200	4.26	852		
72	15448	66	6/16/97	200	4.26	852		
73	15448	67	6/16/97	200	4.26	852		
74	15448	68	6/16/97	200	4.26	852		
75	15448	69	6/16/97	200	4.26	852		
76	15448	70	6/16/97	200	4.26	852		
77	15448	71	6/16/97	200	4.26	852		
78	15448	72	6/16/97	200	4.26	852		
79	15448	79	6/16/97	200	4.26	852		
80	15448	80	6/16/97	200	4.26	852		
81	15448	81	6/16/97	200	4.26	852		
82	15448	82	6/16/97	200	4.26	852		
83	15448	83	6/16/97	200	4.26	852		
84	15452	1	6/16/97	200	4.26	852		
85	15452	2	6/16/97	200	4.26	852		
86	15452	3	6/16/97	200	4.26	852		
87	15452	4	6/16/97	200	4.26	852		
88	15452	5	6/16/97	200	4.26	852		
89	15452	6	6/16/97	200	4.26	852		
90	15452	7	6/16/97	200	4.26	852		

UX160040 GEOGRID
INVENTORY SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

# of Rolls	Lot Number	Roll Number	Date Received	Roll Length (ft.)	Roll Width (ft.)	Square Feet	Conf. Tested	Remarks
91	15452	8	6/16/97	200	4.26	852		
92	15452	9	6/16/97	200	4.26	852		
93	15452	10	6/16/97	200	4.26	852		
94	15452	11	6/16/97	200	4.26	852		
95	15452	12	6/16/97	200	4.26	852		
96	15452	13	6/16/97	200	4.26	852		
97	15452	14	6/16/97	200	4.26	852		
98	15452	15	6/16/97	200	4.26	852		
99	15452	16	6/16/97	200	4.26	852		
100	15452	17	6/16/97	200	4.26	852		
101	15452	18	6/16/97	200	4.26	852		
102	15452	19	6/16/97	200	4.26	852		
103	15452	20	6/16/97	200	4.26	852		
104	15452	21	6/16/97	200	4.26	852		
105	15452	22	6/16/97	200	4.26	852		
106	15452	23	6/16/97	200	4.26	852		
107	15452	24	6/16/97	200	4.26	852		
108	15452	25	6/16/97	200	4.26	852		
109	15452	26	6/16/97	200	4.26	852		
110	15452	27	6/16/97	200	4.26	852		
111	15452	28	6/16/97	200	4.26	852		
112	15452	29	6/16/97	200	4.26	852		
113	15452	30	6/16/97	200	4.26	852		
114	15452	31	6/16/97	200	4.26	852		
115	15452	32	6/16/97	200	4.26	852		
116	15452	33	6/16/97	200	4.26	852		
117	15452	34	6/16/97	200	4.26	852		
118	15452	35	6/16/97	200	4.26	852		
119	15452	36	6/16/97	200	4.26	852		
120	15452	37	6/16/97	200	4.26	852		
121	15452	38	6/16/97	200	4.26	852	YES	PASSED
122	15452	39	6/16/97	200	4.26	852		
123	15452	40	6/16/97	200	4.26	852		
124	15452	41	6/16/97	200	4.26	852		
125	15452	42	6/16/97	200	4.26	852		
126	15452	43	6/16/97	200	4.26	852		
127	15452	44	6/16/97	200	4.26	852		
128	15452	45	6/16/97	200	4.26	852		
129	15452	46	6/16/97	200	4.26	852		
130	15452	47	6/16/97	200	4.26	852		
131	15452	48	6/16/97	200	4.26	852		
132	15452	49	6/16/97	200	4.26	852		
133	15452	50	6/16/97	200	4.26	852		
134	15452	51	6/16/97	200	4.26	852		
135	15452	52	6/16/97	200	4.26	852		

UX160040 GEOGRID
INVENTORY SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

# of Rolls	Lot Number	Roll Number	Date Received	Roll Length (ft.)	Roll Width (ft.)	Square Feet	Conf. Tested	Remarks
136	15452	53	6/16/97	200	4.26	852		
137	15452	54	6/16/97	200	4.26	852		
138	15452	55	6/16/97	200	4.26	852		
139	15452	62	6/16/97	200	4.26	852		
140	15452	63	6/16/97	200	4.26	852		
141	15452	64	6/16/97	200	4.26	852		
142	15452	65	6/16/97	200	4.26	852		
143	15452	66	6/16/97	200	4.26	852		
144	15452	67	6/16/97	200	4.26	852		
145	15452	74	6/16/97	200	4.26	852		
146	15452	75	6/16/97	200	4.26	852		
147	15464	1	6/16/97	200	4.26	852		
148	15464	2	6/16/97	200	4.26	852		
149	15464	3	6/16/97	200	4.26	852		
150	15464	4	6/16/97	200	4.26	852		
151	15464	5	6/16/97	200	4.26	852		
152	15464	6	6/16/97	200	4.26	852		
153	15464	7	6/16/97	200	4.26	852		
154	15464	8	6/16/97	200	4.26	852		
155	15464	9	6/16/97	200	4.26	852		
156	15464	10	6/16/97	200	4.26	852		
157	15464	11	6/16/97	200	4.26	852		
158	15464	12	6/16/97	200	4.26	852		
159	15464	13	6/16/97	200	4.26	852		
160	15464	14	6/16/97	200	4.26	852		
161	15464	15	6/16/97	200	4.26	852		
162	15464	16	6/16/97	200	4.26	852	YES	PASSED
163	15464	41	6/16/97	200	4.26	852		
164	15464	42	6/16/97	200	4.26	852		
165	15464	43	6/16/97	200	4.26	852		
166	15464	44	6/16/97	200	4.26	852		
167	15464	45	6/16/97	200	4.26	852		
168	15464	46	6/16/97	200	4.26	852		
169	15464	47	6/16/97	200	4.26	852		
170	15464	48	6/16/97	200	4.26	852		
171	15464	49	6/16/97	200	4.26	852		
172	15464	50	6/16/97	200	4.26	852		
173	15464	51	6/16/97	200	4.26	852		
174	15464	52	6/16/97	200	4.26	852		
175	15464	53	6/16/97	200	4.26	852		
176	15464	54	6/16/97	200	4.26	852		
177	15464	55	6/16/97	200	4.26	852		
178	15464	56	6/16/97	200	4.26	852		
179	15464	57	6/16/97	200	4.26	852		
180	15464	58	6/16/97	200	4.26	852		

UX160040 GEOGRID
INVENTORY SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

# of Rolls	Lot Number	Roll Number	Date Received	Roll Length (ft.)	Roll Width (ft.)	Square Feet	Conf. Tested	Remarks
181	15464	59	6/16/97	200	4.26	852		
182	15464	60	6/16/97	200	4.26	852		
183	15464	61	6/16/97	200	4.26	852		
184	15464	62	6/16/97	200	4.26	852		
185	15464	63	6/16/97	200	4.26	852		
186	15464	64	6/16/97	200	4.26	852		
187	15465	85	6/16/97	200	4.26	852		
188	15465	86	6/16/97	200	4.26	852		
					Total	**160,176**		

Appendix I.1.2

GundSeal®

GUNDSEAL
INVENTORY SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

# of Rolls	Roll Number	Membrane Number	Date Received	Roll Length (ft.)	Roll Width (ft.)	Square Feet	Conf. Tested	Remarks
1	B21021068	3042448	7/10/97	174	17.5	3045		
2	B21021069	3042448	7/10/97	170	17.5	2975		
3	B21021070	3042448	7/10/97	172	17.5	3010		
4	B21021071	3042476	7/10/97	170	17.5	2975		
5	B21021072	3042476	7/10/97	170	17.5	2975		
6	B21021073	3042476	7/10/97	175	17.5	3062.5		
7	B21021074	3042479	7/10/97	170	17.5	2975		
8	B21021075	3042479	7/10/97	170	17.5	2975		
9	B21021076	3042479	7/10/97	175	17.5	3062.5	YES	PASSED
10	B21021077	3043866	7/10/97	170	17.5	2975		
11	B21021078	3043866	7/10/97	170	17.5	2975		
12	B21021079	3043866	7/10/97	175	17.5	3062.5		
13	B21021080	3043864	7/10/97	170	17.5	2975		
14	B21021081	3043864	7/10/97	170	17.5	2975		
15	B21021082	3043864	7/10/97	175	17.5	3062.5		
16	B21021083	3038871	7/10/97	170	17.5	2975		
17	B21021084	3038871	7/10/97	170	17.5	2975		
18	B21021085	3038871	7/10/97	168	17.5	2940		
19	B21021086	3039991	7/10/97	170	17.5	2975		
20	B21021087	3039991	7/10/97	170	17.5	2975		
21	B21021088	3039991	7/10/97	166	17.5	2905		
22	B21021089	3038911	7/10/97	170	17.5	2975		
23	B21021090	3038911	7/10/97	170	17.5	2975		
24	B21021091	3038911	7/10/97	167	17.5	2922.5		
25	B21021092	3038913	7/10/97	170	17.5	2975	YES	PASSED
26	B21021093	3038913	7/10/97	170	17.5	2975		
27	B21021094	3038913	7/10/97	165	17.5	2887.5		
28	B21021095	3038912	7/10/97	174	17.5	3045		
29	B21021096	3038912	7/10/97	170	17.5	2975		
30	B21021097	3038912	7/10/97	166	17.5	2905		
31	B21021098	3039989	7/10/97	170	17.5	2975		
32	B21021099	3039989	7/10/97	170	17.5	2975		
33	B21021100	3039989	7/10/97	168	17.5	2940		
34	B21021101	3039993	7/10/97	170	17.5	2975		
35	B21021102	3039993	7/10/97	170	17.5	2975		
36	B21021103	3039993	7/10/97	165	17.5	2887.5		
37	B21021104	3043865	7/10/97	170	17.5	2975		
38	B21021105	3043865	7/10/97	170	17.5	2975		
39	B21021106	3043865	7/10/97	176	17.5	3080	YES	PASSED
40	B21021107	3034954	7/10/97	170	17.5	2975		
41	B21021108	3034954	7/10/97	74	17.5	1295		
42	B21021109	3040298	7/10/97	170	17.5	2975		
43	B21021110	3040298	7/10/97	100	17.5	1750		

GUNDSEAL
INVENTORY SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

# of Rolls	Roll Number	Membrane Number	Date Received	Roll Length (ft.)	Roll Width (ft.)	Square Feet	Conf. Tested	Remarks
44	B21020837		7/10/97	170				2' wide strip
45	B21020842		7/10/97	170				2' wide strip
46	B21018469		7/10/97	75				2' wide strip
47	B21020841		7/10/97	170				2' wide strip
48	B21020852		7/10/97	170				2' wide strip
					Total	**125,213**		

Appendix I.1.3

Geocomposites

997-5116

GEOCOMPOSITE
INVENTORY SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

# of Rolls	Roll Number	Date Received	Roll Length (ft.)	Roll Width (ft.)	Square Feet	Conf. Tested	Remarks
1	10071824	7/15/97	200	14	2800	YES	PASSED
2	10071826	7/15/97	200	14	2800		
3	10071827	7/15/97	200	14	2800		
4	10071828	7/15/97	200	14	2800		
5	10071829	7/15/97	200	14	2800		
6	10071830	7/15/97	200	14	2800		
7	10071831	7/15/97	200	14	2800		
8	10071832	7/15/97	200	14	2800		
9	10071833	7/15/97	200	14	2800		
10	10071834	7/15/97	200	14	2800		
11	10071835	7/15/97	200	14	2800		
12	10071836	7/15/97	200	14	2800		
13	10071837	7/15/97	200	14	2800		
14	10071838	7/15/97	200	14	2800		
15	10071839	7/15/97	200	14	2800		
16	10071840	7/15/97	200	14	2800		
17	10071841	7/15/97	200	14	2800		
18	10071842	7/15/97	200	14	2800	YES	PASSED
19	10071843	7/15/97	200	14	2800		
20	10071845	7/15/97	200	14	2800		
21	10071848	7/15/97	200	14	2800		
22	10071849	7/15/97	200	14	2800		
23	10071852	7/15/97	200	14	2800		
24	10071851	7/15/97	200	14	2800		
25	10071988	7/18/97	200	14	2800		
26	10071989	7/18/97	200	14	2800		
27	10071990	7/18/97	200	14	2800		
28	10071993	7/18/97	200	14	2800		
29	10071994	7/18/97	200	14	2800		
30	10071995	7/18/97	200	14	2800		
31	10072002	7/18/97	200	14	2800	YES	PASSED (roll #2001 tested)
32	10072003	7/18/97	200	14	2800		
33	10072004	7/18/97	200	14	2800		
34	10072005	7/18/97	200	14	2800		
35	10072006	7/18/97	200	14	2800		
36	10072007	7/18/97	200	14	2800		
37	10072008	7/18/97	200	14	2800		
38	10072009	7/18/97	200	14	2800		
39	10072010	7/18/97	200	14	2800		
40	10072011	7/18/97	200	14	2800		
41	10072012	7/18/97	200	14	2800		

GEOCOMPOSITE
INVENTORY SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

# of Rolls	Roll Number	Date Received	Roll Length (ft.)	Roll Width (ft.)	Square Feet	Conf. Tested	Remarks
42	10072013	7/18/97	200	14	2800		
43	10072014	7/18/97	200	14	2800		
44	10072015	7/18/97	200	14	2800		
45	10072016	7/18/97	100	14	1400		
				Total	**124,600**		

Appendix I.1.4

Geotextile

GEOTEXTILE
INVENTORY SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

# of Rolls	Roll Number	Date Received	Roll Length (ft.)	Roll Width (ft.)	Square Feet	Conf. Tested	Remarks
1	5021011	7/10/97	300	15	4500	Y	PASSED
2	5021175	7/10/97	300	15	4500	Y	PASSED
3	7005799	8/1/97	300	15	4500	Y	PASSED
4	7005800	8/1/97	300	15	4500		
5	1046687	8/15/97	300	15	4500		
6	1046691	8/15/97	300	15	4500		
				Total	**27,000**		

Appendix I.2

Submittals and QC Certification

Appendix I.2.1

Geogrid

The Tensar Corporation

1210 Citizens Parkway
Morrow, Georgia 30260
Tel. 770 • 968 • 3255

June 19, 1997
Supplement to certification dated 6/6/97

Envirocon, Inc.
500 Taylor Street
P. O. Box 8243
Missoula, MT 59807
Attention: Nancy Evans

Reference:	TENSAR ORDER NUMBER:	TET 1815
	PURCHASE ORDER NUMBER:	15421
	BILL OF LADING NUMBER:	TMP 11577

Dear Ms. Evans,

Enclosed is a revised certification for the above referenced project, superseding the previous certification dated June 6, 1997. The revisions are described below:

1. The Product Listing and Quality Control Test Data have been revised to include the 18 rolls which were inadvertently left off the original certification.

2. We are sending a new a roll to your job site, at no additional charge, number 15448-08, to replace a roll previously shipped, number 15343-17. The certification reflects this change. Roll 15343-17 had been allocated for another project and was inadvertently placed on the wrong truck, This roll can be sent back to The Tensar Corporation (Tensar will pay for the shipping expense), if it is not too inconvenient.

Finally, your letter dated June 17, 1997 to Mr. Pete Romocki of Tensar Earth Technologies requests additional information regarding the lot numbering system used by The Tensar Corporation. Basically, it is a very simple system: Each of the extruders at the Morrow facility are numbered 1 and 2 respectively. Additional extruders are located in Oakwood, Georgia. These three are numbered with a two digit numbering system to differentiate from the Morrow facility as follows: 96, 98, and 99 respectively. As each reel of extruded sheet is produced off the line, the reel receives a unique lot number in succession (i.e. one digit is added to the previous reel produced). For uniaxial grid, UX160040 a extruded reel can produce approximately 60,000 square feet of finished product. The first number of every lot represents the extruder number. The last two

digits following the dash represent the individual roll number of finished product from that reel of extruded sheet. Two examples:

> **Example 1:** Roll number 15448-08 represents the eighth roll of UX160040 produced with lot number 15448, which represents the 5,448th reel of that extruded sheet produced from extruder number 1.
>
> **Example 2:** Roll number 96735-01 is the first roll of finished product produced from lot 96735 which represents the 735th extruded reel made from extruder number 96.

I hope this sufficiently answers your questions. If you desire additional information, please do not hesitate to contact our office. I apologize for any inconvenience, these changes may have caused.

Sincerely,

Thomas N. Dobras, P. E.
Quality Assurance Manager

cc: Mr. Pete Romocki
Tensar Earth Technology

The Tensar Corporation

1210 Citizens Parkway
Morrow, Georgia 30260
Tel. 770 • 968 • 3255

June 19, 1997
Supersedes certification dated 6/6/97

Envirocon, Inc.
5200 Little Brush Ridge Road
Placerville, CA 95667
Attention: Jeff Brown

RE: Submittal - Lawrence Livermore
National Labs
Suite 300
Tracy, CA

Tensar Sales Order Number: TET 1815

Dear Mr. Brown:

We have enclosed 9 copies of documentation which represents our submittal for the above referenced project. The required submittal items are listed in the order as presented in the project specifications, section 1.04 **SUBMITTALS,** page 02754-2.

1. The resin supplier certifications are enclosed. The resin used in the production of the UX1600HS allocated for this project was supplied by the same manufacturer. The resin supplier information is as follows:

   Resin Supplier's name: Mobil Chemical
   Identification: Polyethylene, type HYA-022
   Shipping dates: November 7, 1996; March 17, 1997; March 24, 1997; March 24, 1997

2. *Copies of quality control certifications issued by resin supplier* - enclosed.

3. *Reports on tests conducted by manufacturer to verify quality of resin used in production:* enclosed entitled "Resin Certification Report".

4. *Reports on quality control tests conducted by the manufacturer to verify that the geogrid meets the specifications:* enclosed entitled "Quality Control Test Data". Note: With the exceptions noted in correspondence dated May 22, 1997 from Mr. Peter Romocki of Tensar Earth Technology.

5. *A list of materials which comprise the geogrid:* other additives: 0%; polyethylene 97-98%; carbon black: 2 - 3%.

6. *A specification for the geogrid* - enclosed, entitled "Uniaxial Geogrid UX1600HS".

7. *Written certification that minimum value given in the specification are guaranteed:*

   The Tensar Corporation herein certifies that the UX1600HS product supplied to this project will meet or exceed minimum required specifications listed in **Part 2 Products, Section 2.01.**

8. *Quality Control certificates which include roll identification, sampling procedures, and the results of quality control tests:* Enclosed, entitled "Quality Control Test Data". We have enclosed long term design strength data for UX1600HS on the product data sheet enclosed.

Sampling & Testing Procedure:

The sampling procedures for the quality assurance testing program are as follows for the UX1600HS:

- A three foot by roll width sample of finished geogrid is collected at the start of each production lot.

- For the Tensar geogrid products, a lot is defined as an extruded reel of flat sheet which is the manufacturing step prior to punching and stretching. The lot size for UX1600HS (which is also the testing frequency) is approximately 60,000 sf (5575 sm) and contains 70 rolls, each 853 square feet (79 sm).

- If all the testing meets the project and/or Tensar specifications the lot is accepted. If any of the test results do not meet the specifications, additional testing for the failed parameter is performed on rolls on both sides of failed roll until acceptable results are achieved, in order to define the extent of nonconformance. In the event of noncomplying test results, all rolls between the acceptable test results are rejected and not shipped.

9. *Quality Control tests frequency* - See Paragraph 8 above.

10. *Panel layout drawing* - must be provided by the contractor.

11. *Laboratory test certificates for interface frictional parameters* - must be provided by independent testing laboratory, who have access to site specific soils and materials.

If you have any further questions or desire additional information, please feel free to contact the undersigned.

Sincerely,

Thomas N. Dobras, P.E.
Quality Assurance Manager

cc: Mr. Peter Romocki
Market Manager for Industrial Solid Waste
Tensar Earth Technologies, Inc.

The Tensar Corporation

1210 Citizens Parkway
Morrow, Georgia 30260
Tel. 770 • 968 • 3255

June 19, 1997
Supersedes certification dated 6/6/97

Envirocon, Inc
500 Taylor Street
P. O. Box 8243
Missoula, MT 59807

Reference:	TENSAR ORDER NUMBER:	TET 1815
	PURCHASE ORDER NUMBER:	15421
	BILL OF LADING NUMBER:	TMP 11577

SOLD TO:
ENVIROCON, INC
500 TAYLOR STREET
P. O. BOX 8243
MISSOULA, MT 59807

SHIP TO:
C/O LAWRENCE LIVERMORE
NATIONAL LABS
SUITE 300
TRACY, CA 95376

This is to certify that UX160040 geogrid as manufactured by The Tensar Corporation for the project referenced above meets the characteristics and properties per the enclosed specification sheet dated April 15, 1997. The referenced product has been manufactured and tested in accordance with The Tensar Corporation Quality Assurance Program. Quality control test data is enclosed.

Further, The Tensar Corporation UX1600 geogrid does not exceed 2% by weight of reclaimed polymer added to the resin during manufacturing.

Sincerely,

David Hall
Quality Assurance
Laboratory Supervisor

UNIAXIAL GEOGRID UX1600 HS

The geogrid shall be a regular grid structure formed by uniaxially drawing a continuous sheet of select high density polyethylene material and shall have aperture geometry and rib and junction cross-sections sufficient to permit significant mechanical interlock with the material being reinforced. The geogrid shall have high flexural rigidity and high tensile modulus in relation to the material being reinforced and shall also have high continuity of tensile strength through all ribs and junctions of the grid structure. The geogrid shall have high resistance to deformation under sustained long term design load while in service and shall also be resistant to ultraviolet degradation, to damage under normal construction practices and to all forms of biological or chemical degradation normally encountered in the material being reinforced.

The geogrid shall also conform in all respects to the property requirements listed below.

PROPERTY	TEST METHOD	UNITS	VALUE[6]
Reinforcement			
· creep limited strength[1]	ASTM-D5262	kN/m	
@ 5% strain			34.57 (min)
@ 10% strain			53.98 (min)
· flexural rigidity	ASTM D1388-64[2]	mg-cm	4,500,000
· tensile strength	GRI GG1-87[3]	kN/m	
@ 2% strain			35.01
@ 5% strain			64.93
@ ultimate			131.31
tensile modulus-MD	GRI GG1-87[4]	kN/m	1,750.8
· junctions - MD	GRI GG2-87[5]		
-strength		kN/m	118.18
Material			
· high density polyethylene	ASTM D 1248 Type III/Class A/Grade 5	%	97 (min)
· carbon black	ASTM 4218	%	2.0 (min)
Dimensions			
· roll length		m	60.98
· roll width		m	1.31
· roll weight		kg	64.5

Notes

1. The long-term allowable design strength (LTADS) is determined using the method outlined in GRI-GG4 "Determination of the Long Term Design Strength of Stiff Geogrids." The GRI-GG4 method applies various partial factors of safety to account for construction damage, junction strength, connections, chemical and biological degradation.
2. ASTM D 1388-64 modified to account for wide specimen testing as described in Tensar test method TTM-5.0 "Stiffness of Geosynthetics".The value shown is an average of the MD and CMD measurements.
3. The 2%,5% and ultimate strengths are measured by GeoSynthetic Research Institute test method GG1-87 as modified by AASHTO 97 at 10% of gauge length (G.L.) per min at 8 inch minimum G.L., or the greater of 3 junctions (2 repeat units).
4. Secant modulus at 2% elongation measured by Geosynthetic Research Institute test method GG1-87 "Geogrid Tensile Strength" as modified by AASHTO 97 at 10% of gauge length (G.L.) per min at 8 inch minimum G.L., or the greater of 3 junctions (2 repeat units). No offset allowances are made in calculating secant modulus.
5. Geogrid junction strength and junction efficiency measured by Geosynthetic Research Institute test method GG2-87 "Geogrid Junction Strength" as modified by AASHTO 97 at 10% of gauge length (G.L.) per min at 8 inch minimum G.L., or the greater of 3 junctions (2 repeat units).
6. Unless indicated otherwise, values shown are minimum average roll values determined in accordance with ASTM D-4759.

The Tensar Corporation

1210 Citizens Parkway
Morrow, Georgia 30260
Tel. 770 • 968 • 3255

PRODUCT LISTING

Submittal date: 6/19/97 Supersedes certification dated 6/6/97
SHIP DATE: 6/5/97
SOLD TO: ENVIROCON, INC
SHIP TO: LAWRENCE LIVERMORE
BILL OF LADING : TMP 11577 TET 1815
PRODUCT CODE : UX160040

LOT NO.	ROLL NO.										QUANTITY
15342	31-36										6
15345	31-36										6
15347	20-24	49-54									11
15448	19-72	79-83	8								60
15452	1-55	62-67	74	75							63
15464	1-16	41-46	47-64								40
15465	85	86									2

TOTAL 188

DCN: QA-BXQC-CERT
REV. NO: 2
REV. DATE: 08/07/96

The Tensar Corporation Quality Control Test Data

Product Type: Uniaxial Grid

Date Prepared: 6/19/97
Supersedes certification dated 6/6/97

Product Code: UX160040
Customer Name: ENVIROCON, INC
Project Name: LAWRENCE LIVERMORE

Bill of Lading: TMP 11577
Sales Order Number: TET 1815
Purchase Order Number: 15421

				Finished Product QC Testing							
QC Sample ID	Production Lot Number	Number of Rolls Shipped	Resin Lot Number	Ultimate Tensile Strength (kN/m) GRI-GG1	Ribs / Meter no of ribs divided by roll width GRI-GG1	Tensile @ 2% Strain (kN/m) GRI-GG1	Tensile @ 5% Strain (kN/m) GRI-GG1	Peak Extension (%) GRI-GG1	2% Tensile Modulus (kN/m) GRI-GG1	Junction Strength (kN/m) GRI-GG2	Carbon Black (%) ASTM D4218
15342004	15342	6	W51489	143.30	46.46	39.00	81.30	10.00	1952		2.58
15345003	15345	6	W51489	142.60	46.46	40.00	84.20	9.70	2013		2.56
15347021	15347	11	W51489	139.80	46.49	38.27	78.85	9.74	1914		2.73
15448003	15448	60	Y50316	138.70	46.18	36.01	69.99	12.30	1800	137	2.26
15452003	15452	63	Y50316	140.70	46.49	36.89	75.59	10.50	1845	138	2.23
15464002	15464	40	Y50313	144.90	46.39	38.52	78.03	11.24	1926	141	2.50
15465004	15465	2	Y50313	143.77	46.60	38.00	76.17	11.11	1900	139	2.40

Thomas N Dobson for

David Hall
Quality Control Supervisor

Date June 19, 1997

1 kN/m= 68.54 lbs/ft

The Tensar Corporation

1210 Citizens Parkway
Morrow, Georgia 30260
Tel. 770 • 968 • 3255

ate Tested: 11/27/96
Tested By: MONICA

T1	T2	T3	T4
B1	B2	B3	B4

RailCar Compartments

Resin Certification Report

Vendor: Mobil
Resin Type: HDPE
Resin Lot Number: W51489
Railcar Number MOBX 52396

Melt Flow Index (g/10 min.): ASTM D1238
Density (g/cc): ASTM D792

Compartment: **T1** Approved

MFI: 0.600 yes

DCN:	QA-RMQC-CERT
Revision No.:	1
Revision Date:	9/27/96

Authorization

RESIN.XLS

STAR... Safety Through Accountability and Recognition

Mobil Polyethylene
Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

Bill Wright
The Tensar Corporation
1210 Citizens Parkway
Box 986
Morrow, GA 30260

November 7, 1996

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of Material to your facility. The lot identification and analysis are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report please call your sales office in Atlanta, GA 770-396-4572.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HYA-022	Density (gms/cc)	0.951
Lot Number	W-51489	Melt Index (gms/10 min) I5	0.36
Hopper Car Number	MOBX-52396		
Quantity Shipped	183,250		
Date Shipped	07-Nov-96		
P.O. Number	6-9252		
Location Shipped to Morrow, GA			

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

Sincerely,

C. A. Winney
Quality Assurance Specialist

cc: MP-ATLANTA

The Tensar Corporation

1210 Citizens Parkway
Morrow, Georgia 30260
Tel. 770 • 968 • 3255

ate Tested: 3/26/97
Tested By: MONICA

T1	T2	T3	T4
B1	B2	B3	B4

RailCar Compartments

Resin Certification Report

Vendor: Mobil

Resin Type: HDPE

Resin Lot Number: Y50316

Railcar Number ACFX 55889

Melt Flow Index (g/10 min.): ASTM D1238

Density (g/cc): ASTM D792

Compartment:	T1	T2	Approved
MFI:	0.660	0.670	yes
MFI:	0.690	0.650	yes

DCN:	QA-RMQC-CERT
Revision No.:	1
Revision Date:	9/27/96

Authorization

RESIN.XLS

STAR... Safety Through Accountability and Recognition

Mobil Polyethylene
Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

Monica Minter
The Tensar Corporation
1210 Citizens Parkway
Box 986
Morrow, GA 30260

March 17, 1997

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of Material to your facility. The lot identification and analysis are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report please call your sales office in **Atlanta, GA** 770-396-4572.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HYA-022	Density (gms/cc)	0.951
Lot Number	Y-50316	Melt Index (gms/10 min) I5	0.00
Hopper Car Number	ACFX-52889		
Quantity Shipped	188,950		
Date Shipped	17-Mar-97		
P.O. Number	7-9039		
Location Shipped to Morrow, GA			—

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

Sincerely,

C. A. Winney
Quality Assurance Specialist

cc: MP-ATLANTA

The Tensar Corporation

1210 Citizens Parkway
Morrow, Georgia 30260
Tel. 770 • 968 • 3255

ate Tested: 4/4/97
Tested By: MONICA

T1	T2	T3	T4
B1	B2	B3	B4

RailCar Compartments

Resin Certification Report

Vendor: Mobil

Resin Type: HDPE

Resin Lot Number: Y50313

Railcar Number ACFX 55842

Melt Flow Index (g/10 min.): ASTM D1238

Density (g/cc): ASTM D792

Compartment:	T1	T2	Approved
MFI:	0.660	0.670	yes

DCN:	QA-RMQC-CERT
Revision No.:	1
Revision Date:	9/27/96

Authorization

RESTN.XLS

STAR... Safety Through Accountability and Recognition

Mobil Polyethylene

Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

Monica Minter
The Tensar Corporation
1210 Citizens Parkway
Box 986
Morrow, GA 30260

March 24, 1997

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of Material to your facility. The lot identification and analysis are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report please call your sales office in Atlanta, GA 770-396-4572.

Resin Identification		Resin Analysis	
		Test	Lot Data
Product Type	HYA-022	Density (gms/cc)	0.951
Lot Number	Y-50313	Melt Index (gms/10 min) I5	0.00
Hopper Car Number	ACFX-55842		
Quantity Shipped	191,300		
Date Shipped	24-Mar-97		
P.O. Number	7-9040		
Location Shipped to Morrow, GA			—

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

Sincerely,

C. A. Winney
Quality Assurance Specialist

cc: MP-ATLANTA

Appendix I.2.2

GundSeal®

GSE™ GSE CLAY LINING TECHNOLOGY CO.
3150 1st Avenue
Spearfish, SD 57783
605-642-8531
Fax: 605-642-8539
(A Gundle/SLT Environmental, Inc. Company)

July 10, 1997

To: Envirocon, Inc.
Lawarence Livermore Nat'l
Laboratory Site 300
Corral Hollow Road
Tracy, Ca 94550

From: GSE Clay Lining Technology Co.
3150 1st Ave
Spearfish, SD 57783

Attached are your Quality Control/Assurance documents for your recent order of Gundseal.

These documents cover roll numbers:
8469,837,841,842,852,1068-1110.

Item 1) Pages 02-06 are the Bentonite Certificates from the Bentonite Supplier.

Item 2) Pages 07-10 are the Bentonite Quality Control Verification sheets done by PG Technology Co.

Item 3) Pages 11,12 is the listing of Gundseal roll numbers and HDPE supplier roll numbers.

Item 4) Pages 13-31 HDPE Quality Control Certificates.

Item 5) Pages 32-37 Gundseal Quality information.

Item 6) Pages 38-43 Bentonite Quality Control Verification Daily Production.

Thank you for choosing Gundseal for your project. Quality is important to us at GSE Clay Lining Technology Co. If you have questions regarding this order please call.

Ray Brosnahan

Date: 10 July 97

Ray Brosnahan
Manager
GSE Clay Lining Technology Co.

GSE TECHNOLOGIES

CERTIFICATE OF ANALYSIS 1996

PRODUCT: NATIONAL GRANULAR LD-16

ATTN: MR. RAY BROSNIHAN

SHIPPED FROM: BENTONITE CORPORATION
HCR 69, BOX 112
COLONY PLANT
BELLE FOURCHE, SO. DAK. 57717

TRUCK No.	LOAD DATE	% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	DRY FS	DRY PWA
S&S 122	06-27-96	8.2	18.2	0.97	1.31	0.62	32	1035
S&S 122	06-28-96	7.6	18.0	0.77	1.15	0.47	34	1066
S&S 122	06-28-96	8.3	19.0	0.63	0.87	0.24	33	1066

JUNE		% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	DRY FS	DRY PWA
No. of TRUCKS 35	M AVG	7.66	16.45	0.78	2.21	0.65	33.89	1027.74
	STD DEV	0.48	1.64	0.39	1.97	0.44	2.96	73.67

YTD		% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	DRY FS	DRY PWA
No. of TRUCKS 130	M AVG	7.87	16.98	0.77	2.59	0.76	32.72	1009.12
	STD DEV	0.88	1.58	0.38	2.39	0.54	2.61	72.17

GSE CLAY LINING TECHNOLOGY CO.
3150 FIRST AVENUE
SPEARFISH, SD 57783
ATTN: MR. RAY BROSNIHAN
FAX: (605) 642-8539

CC: CHARLES McAUGHAN
FILE

Q.A. SUPERVISOR
CARL J HEINERT
07/02/96

PREPARED BY: JH

GSE TECHNOLOGIES

RTIFICATE OF ANALYSIS 1997

ODUCT: NATIONAL GRANULAR LD-16

TN: MR. RAY BROSNIHAN

SHIPPED FROM: BENTONITE CORPORATION
HCR 69, BOX 112
COLONY PLANT
BELLE FOURCHE, SO. DAK. 57717

TRUCK No.	LOAD DATE	% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	SWELL INDEX	DRY PWA
&S 122-42	05-08-97	8.0	17.8	1.24	0.31	0.15	39	1098
&S 122-007	05-09-97	7.9	17.0	1.44	0.19	0.14	36	1058

MAY		% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	SWELL INDEX	DRY PWA
No. of TRUCKS 3	M AVG	7.71	17.07	1.32	0.22	0.14	35.00	1061.00
	STD DEV	0.36	0.57	0.09	0.06	0.01	3.74	29.06

YTD		% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	SWELL INDEX	DRY PWA
No. of TRUCKS 29	M AVG	7.70	16.43	0.99	0.55	0.25	33.24	1008.76
	STD DEV	0.44	1.44	0.50	0.47	0.20	2.34	120.89

GSE CLAY LINING TECHNOLOGY CO.
3150 FIRST AVENUE
SPEARFISH, SD 57783
ATTN: MR. RAY BROSNIHAN
FAX: (605) 642-8539

Q.A. SUPERVISOR
C J HEINERT
05/12/97

CC: CHARLES McAUGHAN
FILE

PREPARED BY: AWH

GSE TECHNOLOGIES

CERTIFICATE OF ANALYSIS 1997

PRODUCT: NATIONAL GRANULAR LD-16

ATTN: MR. RAY BROSNIHAN

SHIPPED FROM: BENTONITE CORPORATION
HCR 69, BOX 112
COLONY PLANT
BELLE FOURCHE, SO. DAK. 57717

TRUCK No.	LOAD DATE	% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	SWELL INDEX	DRY PWA
S&S 122-142	06-21-97	6.7	17.8	0.18	0.70	0.47	32	991

JUNE		% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	SWELL INDEX	DRY PWA
No. of TRUCKS	M AVG	7.24	15.38	0.16	1.57	0.76	30.75	969.50
8	STD DEV	0.50	1.74	0.06	0.94	0.40	0.97	46.13

YTD		% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	SWELL INDEX	DRY PWA
No. of TRUCKS	M AVG	7.60	16.10	0.72	0.79	0.36	32.67	998.56
43	STD DEV	0.49	1.55	0.57	0.69	0.31	2.41	102.88

GSE CLAY LINING TECHNOLOGY CO.
3150 FIRST AVENUE
SPEARFISH, SD 57783
ATTN: MR. RAY BROSNIHAN
FAX: (605) 642-8539

Q.A. SUPERVISOR
C J HEINERT
06/22/97

CC: CHARLES McAUGHAN
FILE

Prepared by: DRP

GSE TECHNOLOGIES

CERTIFICATE OF ANALYSIS 1997

PRODUCT: NATIONAL GRANULAR LD-16

ATTN: MR. RAY BROSNIHAN

SHIPPED FROM: BENTONITE CORPORATION
HCR 69, BOX 112
COLONY PLANT
BELLE FOURCHE, SO. DAK. 57717

TRUCK No.	LOAD DATE	% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	SWELL INDEX	DRY PWA
S&S 122-142	06-24-97	7.5	15.4	0.19	0.67	0.37	28	801

JUNE		% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	SWELL INDEX	DRY PWA
No. of TRUCKS	M AVG	7.27	15.38	0.16	1.47	0.71	30.44	950.78
9	STD DEV	0.47	1.64	0.05	0.93	0.39	1.26	68.53

YTD		% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	SWELL INDEX	DRY PWA
No. of TRUCKS	M AVG	7.60	16.09	0.71	0.79	0.36	32.57	994.07
44	STD DEV	0.48	1.53	0.57	0.68	0.31	2.48	105.88

GSE CLAY LINING TECHNOLOGY CO.
3150 FIRST AVENUE
SPEARFISH, SD 57783
ATTN: MR. RAY BROSNIHAN
FAX: (605) 642-8539

Q.A. SUPERVISOR
C J HEINERT
06/27/97

CC: CHARLES McAUGHAN
FILE

Prepared by: DRP

GSE TECHNOLOGIES

CERTIFICATE OF ANALYSIS 1997

PRODUCT: NATIONAL GRANULAR LD-16

ATTN: MR. RAY BROSNIHAN

TRUCK No.	LOAD DATE	% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	SWELL INDEX	DRY PWA
S&S 122-142	06-25-97	6.8	16.2	0.25	2.78	1.34	30	893

SHIPPED FROM: BENTONITE CORPORATION
HCR 69, BOX 112
COLONY PLANT
BELLE FOURCHE, SO. DAK. 57717

JUNE No. of TRUCKS		% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	SWELL INDEX	DRY PWA
14	M AVG	7.29	15.63	0.19	1.49	0.72	31.57	958.86
	STD DEV	0.51	1.38	0.08	0.93	0.40	2.41	68.83

YTD No. of TRUCKS		% MOIST 10 MAX	FL	MESH %+16 5 MAX	MESH %-70 10 MAX	MESH %-200 2 MAX	SWELL INDEX	DRY PWA
49	M AVG	7.57	16.09	0.66	0.86	0.40	32.67	991.96
	STD DEV	0.50	1.46	0.56	0.75	0.34	2.52	102.78

GSE CLAY LINING TECHNOLOGY CO.
3150 FIRST AVENUE
SPEARFISH, SD 57783
ATTN: MR. RAY BROSNIHAN
FAX: (605) 642-8539

Q.A. SUPERVISOR
C J HEINERT
06/30/97

CC: CHARLES McAUGHAN
FILE

Prepared by: RM

GSE CLAY LINING TECHNOLOGY CO.

3150 1ST AVENUE. SPEARFISH, SD 57783
605-642-8531.FAX 605-642-8539

BENTONITE QUALITY CONTROL VERIFICATION

DATE: 06-24-96

BENTONITE SUPPLIER: BENTONITE CORP.

TRUCK NO.: B/L# 271910

MOISTURE: 8.0%

FILTRATE LOSS: 13.2mL "as received"

PARTICLE SIZE:

MESH SIEVE SIZE	% RETAINED
20	26.77
40	72.30
80	0.70
100	0.03
+200	0.10
-200	0.15

PLATE WATER ABSORPTION: Dry 824.0

WASH 325 SIEVE: 6.2 %

FREE SWELL: Dry 30.0mL

Charles Taylor
TECHNICIAN

Ray Brosnahan
PRODUCTION MANAGER

GSE CLAY LINING TECHNOLOGY CO.

3150 1ST AVENUE. SPEARFISH, SD 57783
605-642-8531.FAX 605-642-8539

BENTONITE QUALITY CONTROL VERIFICATION

DATE: 05-01-97

BENTONITE SUPPLIER: BENTONITE CORP.

TRUCK NO.: B/L# 278583

MOISTURE: 7.3%

FILTRATE LOSS: 16.4mL "as received"

PARTICLE SIZE:

MESH SIEVE SIZE	% RETAINED
20	22.96
40	76.13
80	0.71
100	0.00
+200	0.03
-200	0.08

PLATE WATER ABSORPTION: Dry 919.0

WASH 325 SIEVE: 2.9 %

FREE SWELL: Dry 30.0mL

Charles Taylor
TECHNICIAN

Ray Brusnahan
PRODUCTION MANAGER

GSE CLAY LINING TECHNOLOGY CO.

3150 1ST AVENUE. SPEARFISH, SD 57783
605-642-8531.FAX 605-642-8539

BENTONITE QUALITY CONTROL VERIFICATION

DATE: 06-11-97

BENTONITE SUPPLIER: BENTONITE CORP.

TRUCK NO.: B/L# 279863

MOISTURE: 7.3%

FILTRATE LOSS: 13.6mL "as received"

PARTICLE SIZE:

MESH SIEVE SIZE	% RETAINED
20	17.81
40	79.00
80	2.48
100	0.14
+200	0.44
-200	0.27

PLATE WATER ABSORPTION: Dry 866.5

WASH 325 SIEVE: 3.4 %

FREE SWELL: Dry 32.5mL

Charles Taylor
TECHNICIAN

Ray Brannahan
PRODUCTION MANAGER

GSE CLAY LINING TECHNOLOGY CO.

3150 1ST AVENUE. .SPEARFISH, SD 57783
605-642-8531.FAX 605-642-8539

BENTONITE QUALITY CONTROL VERIFICATION

DATE: 06-23-97

BENTONITE SUPPLIER: BENTONITE CORP.

TRUCK NO.: B/L# 279922

MOISTURE: 8.5%

FILTRATE LOSS: 16.8mL "as received"

PARTICLE SIZE:

MESH SIEVE SIZE	% RETAINED
20	22.61
40	73.87
80	1.69
100	0.16
+200	0.72
-200	0.81

PLATE WATER ABSORPTION: Dry 930.0

WASH 325 SIEVE: 3.5 %

FREE SWELL: Dry 32.0mL

Charles Taylor
TECHNICIAN

Ray Brosnahan
PRODUCTION MANAGER

GSE CLAY LINING TECHNOLOGY CO
3150 1ST AVE. .SPEARFISH, SD 57783
605-642-8531. .FAX: 605-642-8539

To: ENVIROCON, INC.
LAWARENCE LIVERMORE NAT'L
LABORATORY SITE 300
CORRAL HOLLOW ROAD
TRACY, CA 94550

GUNDSEAL ROLL #'S:	GUNDLINER ROLL #'S:
8469	03040016
837	05036269
841	05036263
842	"
852	05036259
1068	03042480
1069	"
1070	"
1071	03042476
1072	"
1073	"
1074	03042479
1075	"
1076	"
1077	03043866
1078	"
1079	"
1080	03043864
1081	"
1082	"
1083	03038871
1084	"
1085	"
1086	03039991
1087	"
1088	"
1089	03038911
1090	"
1091	"
1092	03038913
1093	"
1094	"
1095	03038912
1096	"
1097	"
1098	03039989
1099	"
1100	"
1101	03039993
1102	"

1103	"
1104	03043865
1105	"
1106	"
1107	03034954
1108	"
1109	03040298
1110	"

GSE™

Quality Control Certificate

RAILCAR : PSPX6828
MATERIAL : HDT 030 MIL
BATCH # : 071096
ROLL # : 03040016

MANF. DATE : 07/10/1996
PROJECT NAME : P.G. TECHNOLOGY/PG
MR NUMBER : 2210-41 PROJECT # : DS1105
LOCATION : HOUSTON TX

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	EVERY ROLL	30.0 min	31.0	D 751 NSF Mod.
Minimum Thickness (mil)	EVERY ROLL	27.0 min	27.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.4	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.945	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	65	93	
Break Strength (ppi)	EVERY ROLL	38	126	D 638 Type IV
Yield Elongation (%)	EVERY ROLL	10	16	2 ipm
Break Elongation (%)	EVERY ROLL	120	421	
Puncture Resistance (lb)	EVERY ROLL	39	63	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	22	32	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.15	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED
#22
7/15/96
QA

GSE®

Quality Control Certificate

RAILCAR : ACFX36155
MATERIAL : HDT 030 MIL
BATCH # : 060397
ROLL # : 05036269

MANF. DATE : 06/03/1997
PROJECT NAME : PG TECH/PG TECH
MR NUMBER : 6716-04 PROJECT # : DS3887
LOCATION : HOUSTON TX

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	EVERY ROLL	30.0 min	30.0	D 751 NSF Mod.
Minimum Thickness (mil)	EVERY ROLL	27.0 min	28.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.5	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.946	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	65	87	
Break Strength (ppi)	EVERY ROLL	38	108	D 638 Type IV
Elongation @ Yield	EVERY ROLL	13	15	
Break Elongation (%)	EVERY ROLL	120	430	NSF 54 mod.
Puncture Resistance (lb)	EVERY ROLL	39	71	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	22	34	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.15	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED
#20
1/15/97
QA

GSE®

Quality Control Certificate

RAILCAR : ACFX36155
MATERIAL : HDT 030 MIL
BATCH # : 060397
ROLL # : 05036263

MANF. DATE : 06/03/1997
PROJECT NAME : PG TECH/PG TECH
MR NUMBER : 6716-04 PROJECT # : DS3887
LOCATION : HOUSTON TX

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	EVERY ROLL	30.0 min	30.0	D 751 NSF Mod.
Minimum Thickness (mil)	EVERY ROLL	27.0 min	27.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.8	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.946	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	65	91	
Break Strength (ppi)	EVERY ROLL	38	117	D 638 Type IV
Elongation @ Yield	EVERY ROLL	13	15	
Break Elongation (%)	EVERY ROLL	120	447	NSF 54 mod.
Puncture Resistance (lb)	EVERY ROLL	39	83	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	22	34	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.30	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED DP #20 6/5/97 QA

GSE®

Quality Control Certificate

RAILCAR : ACFX36155
MATERIAL : HDT 030 MIL
BATCH # : 060397
ROLL # : 05036259

MANF. DATE : 06/03/1997
PROJECT NAME : PG TECH/PG TECH
MR NUMBER : 6716-04 PROJECT # : DS3887
LOCATION : HOUSTON TX

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	EVERY ROLL	30.0 min	30.0	D 751 NSF Mod.
Minimum Thickness (mil)	EVERY ROLL	27.0 min	28.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.6	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.946	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	65	89	
Break Strength (ppi)	EVERY ROLL	38	130	D 638 Type IV
Elongation @ Yield	EVERY ROLL	13	15	
Break Elongation (%)	EVERY ROLL	120	490	NSF 54 mod.
Puncture Resistance (lb)	EVERY ROLL	39	75	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	22	32	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.35	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED DP #20 6/5/97 QA

GSE™

Quality Control Certificate

RAILCAR : PSPX9052
MATERIAL : HDT 060 MIL
BATCH # : 120496
ROLL # : 03042480

MANF. DATE : 12/04/1996
PROJECT NAME : P.G. TECHNOLOGY/PG
MR NUMBER : 2210-67 PROJECT # : DS1105
LOCATION : HOUSTON TX

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	EVERY ROLL	60.0 min	67.0	D 751 NSF Mod.
Minimum Thickness (mil)	EVERY ROLL	60.0 min	62.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.8	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.946	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	174	
Break Strength (ppi)	EVERY ROLL	75	207	D 638 Type IV
Elongation @ Yield	EVERY ROLL	13	17	NSF 54 modified
Break Elongation (%)	EVERY ROLL	120	468	
Puncture Resistance (lb)	EVERY ROLL	80	103	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	62	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	0.00	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED
#20
12/11/96
QA

GSE™

Quality Control Certificate

RAILCAR : PSPX9052
MATERIAL : HDT 060 MIL
BATCH # : 120496
ROLL # : 03042476

MANF. DATE : 12/04/1996
PROJECT NAME : P.G. TECHNOLOGY/PG
MR NUMBER : 2210-67 PROJECT # : DS1105
LOCATION : HOUSTON TX

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	EVERY ROLL	60.0 min	62.0	D 751 NSF Mod.
Minimum Thickness (mil)	EVERY ROLL	60.0 min	61.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.6	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.946	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	176	
Break Strength (ppi)	EVERY ROLL	75	216	D 638 Type IV
Elongation @ Yield	EVERY ROLL	13	16	NSF 54 modified
Break Elongation (%)	EVERY ROLL	120	476	
Puncture Resistance (lb)	EVERY ROLL	80	108	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	60	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.25	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED
#20
12/11/96
QA

GSE™

Quality Control Certificate

RAILCAR : PSPX9052
MATERIAL : HDT 060 MIL
BATCH # : 120496
ROLL # : 03042479

MANF. DATE : 12/04/1996
PROJECT NAME : P.G. TECHNOLOGY/PG
MR NUMBER : 2210-67 PROJECT # : DS1105
LOCATION : HOUSTON TX

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	EVERY ROLL	60.0 min	67.0	D 751 NSF Mod.
Minimum Thickness (mil)	EVERY ROLL	60.0 min	62.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.8	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.946	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	179	
Break Strength (ppi)	EVERY ROLL	75	202	D 638 Type IV
Elongation @ Yield	EVERY ROLL	13	17	NSF 54 modified
Break Elongation (%)	EVERY ROLL	120	444	
Puncture Resistance (lb)	EVERY ROLL	80	108	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	63	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	0.02	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED DP #20 12/11/96 QA

GSE®

Quality Control Certificate

RAILCAR : PSPX6212
MATERIAL : HDT 060 MIL
BATCH # : 022197
ROLL # : 03043866

MANF. DATE : 02/21/1997
PROJECT NAME : PG TECHNOLOGY
MR NUMBER : 2210-51 PROJECT # : DS1105
LOCATION : SPEARFISH, SD

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Minimum Thickness (mil)	EVERY ROLL	54.0 min	58.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.6	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.945	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	168	
Break Strength (ppi)	EVERY ROLL	75	178	D 638 Type IV
Elongation @ Yield	EVERY ROLL	10	15	
Break Elongation (%)	EVERY ROLL	120	398	NSF 54 mod.
Puncture Resistance (lb)	EVERY ROLL	80	117	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	61	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.18	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED
#20
4/6/97
QA

GSE®

Quality Control Certificate

RAILCAR : PSPX6212
MATERIAL : HDT 060 MIL
BATCH # : 022197
ROLL # : 03043864

MANF. DATE : 02/21/1997
PROJECT NAME : PG TECHNOLOGY
MR NUMBER : 2210-51 PROJECT # : DS1105
LOCATION : SPEARFISH, SD

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Minimum Thickness (mil)	EVERY ROLL	54.0 min	58.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.4	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.945	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	169	
Break Strength (ppi)	EVERY ROLL	75	189	D 638 Type IV
Elongation @ Yield	EVERY ROLL	10	15	
Break Elongation (%)	EVERY ROLL	120	409	NSF 54 mod.
Puncture Resistance (lb)	EVERY ROLL	80	107	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	58	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.25	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED DP #20 4/16/97 QA

GSE™

Quality Control Certificate

RAILCAR : PSPX6210
MATERIAL : HDT 060 MIL
BATCH # : 051296
ROLL # : 03038871

MANF. DATE : 05/12/1996
PROJECT NAME : P.G. TECHNOLOGY
MR NUMBER : 2210-49 PROJECT # : DS1105
LOCATION : SPEARFISH, SD

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Minimum Thickness (mil)	EVERY ROLL	54.0 min	57.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.7	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-1	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.944	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	154	
Break Strength (ppi)	EVERY ROLL	75	161	D 638 Type IV
Yield Elongation (%)	EVERY ROLL	10	15	2 ipm
Break Elongation (%)	EVERY ROLL	120	347	
Puncture Resistance (lbs)	40,000 SF	100	139	D 4833
Puncture Resistance (lb)	EVERY ROLL	80	95	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	53	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.25	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED DP #20 5/16/96 QA

GSE™

Quality Control Certificate

RAILCAR : PSPX5942
MATERIAL : HDT 060 MIL
BATCH # : 070996
ROLL # : 03039991

MANF. DATE : 07/09/1996
PROJECT NAME : PG TECHNOLOGY
MR NUMBER : 2210-48 PROJECT # : DS1105
LOCATION : SPEARFISH SD

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Minimum Thickness (mil)	EVERY ROLL	54.0 min	58.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.5	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.945	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	181	
Break Strength (ppi)	EVERY ROLL	75	199	D 638 Type IV
Yield Elongation (%)	EVERY ROLL	10	14	2 ipm
Break Elongation (%)	EVERY ROLL	120	395	
Puncture Resistance (lb)	EVERY ROLL	80	99	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	60	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.22	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED
#22
7/11/96
QA

GSE™

Quality Control Certificate

RAILCAR : PSPX6894
MATERIAL : HDT 060 MIL
BATCH # : 051496
ROLL # : 03038911

MANF. DATE : 05/14/1996
PROJECT NAME : P.G. TECHNOLOGY
MR NUMBER : 2210-49 PROJECT # : DS1105
LOCATION : SPEARFISH, SD

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Minimum Thickness (mil)	EVERY ROLL	54.0 min	57.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.7	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-1	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.945	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	159	
Break Strength (ppi)	EVERY ROLL	75	190	D 638 Type IV
Yield Elongation (%)	EVERY ROLL	10	16	2 ipm
Break Elongation (%)	EVERY ROLL	120	427	
Puncture Resistance (lbs)	40,000 SF	100	148	D 4833
Puncture Resistance (lb)	EVERY ROLL	80	110	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	54	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.05	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED
#20
5/16/96
QA

GSE™

Quality Control Certificate

RAILCAR : PSPX6894
MATERIAL : HDT 060 MIL
BATCH # : 051496
ROLL # : 03038913

MANF. DATE : 05/14/1996
PROJECT NAME : P.G. TECHNOLOGY
MR NUMBER : 2210-49 PROJECT # : DS1105
LOCATION : SPEARFISH, SD

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Minimum Thickness (mil)	EVERY ROLL	54.0 min	57.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.7	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-1	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.945	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	158	
Break Strength (ppi)	EVERY ROLL	75	196	D 638 Type IV
Yield Elongation (%)	EVERY ROLL	10	16	2 ipm
Break Elongation (%)	EVERY ROLL	120	440	
Puncture Resistance (lbs)	40,000 SF	100	149	D 4833
Puncture Resistance (lb)	EVERY ROLL	80	104	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	54	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.10	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED DP #20 5/16/96 QA

GSE™

Quality Control Certificate

RAILCAR : PSPX6894
MATERIAL : HDT 060 MIL
BATCH # : 051496
ROLL # : 03038912

MANF. DATE : 05/14/1996
PROJECT NAME : P.G. TECHNOLOGY
MR NUMBER : 2210-49 PROJECT # : DS1105
LOCATION : SPEARFISH, SD

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Minimum Thickness (mil)	EVERY ROLL	54.0 min	57.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.7	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-1	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.945	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	160	
Break Strength (ppi)	EVERY ROLL	75	199	D 638 Type IV
Yield Elongation (%)	EVERY ROLL	10	16	2 ipm
Break Elongation (%)	EVERY ROLL	120	438	
Puncture Resistance (lbs)	40,000 SF	100	143	D 4833
Puncture Resistance (lb)	EVERY ROLL	80	113	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	49	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	0.25	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED DT #20 3/16/96 QA

GSE™

Quality Control Certificate

RAILCAR : PSPX5942
MATERIAL : HDT 060 MIL
BATCH # : 070896
ROLL # : 03039989

MANF. DATE : 07/08/1996
PROJECT NAME : PG TECHNOLOGY
MR NUMBER : 2210-48 PROJECT # : DS1105
LOCATION : SPEARFISH SD

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Minimum Thickness (mil)	EVERY ROLL	54.0 min	55.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.5	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.945	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	171	
Break Strength (ppi)	EVERY ROLL	75	206	D 638 Type IV
Yield Elongation (%)	EVERY ROLL	10	17	2 ipm
Break Elongation (%)	EVERY ROLL	120	430	
Puncture Resistance (lb)	EVERY ROLL	80	107	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	58	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.28	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED
#22
7/11/96
QA

GSE™

Quality Control Certificate

RAILCAR : PSPX5942
MATERIAL : HDT 060 MIL
BATCH # : 070996
ROLL # : 03039993

MANF. DATE : 07/09/1996
PROJECT NAME : PG TECHNOLOGY
MR NUMBER : 2210-48 PROJECT # : DS1105
LOCATION : SPEARFISH SD

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Minimum Thickness (mil)	EVERY ROLL	54.0 min	57.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.5	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.945	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	164	
Break Strength (ppi)	EVERY ROLL	75	202	D 638 Type IV
Yield Elongation (%)	EVERY ROLL	10	16	2 ipm
Break Elongation (%)	EVERY ROLL	120	453	
Puncture Resistance (lb)	EVERY ROLL	80	102	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	58	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	0.08	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED #22 7/11/96 QA

GSE®

Quality Control Certificate

RAILCAR : PSPX6212
MATERIAL : HDT 060 MIL
BATCH # : 022197
ROLL # : 03043865

MANF. DATE : 02/21/1997
PROJECT NAME : PG TECHNOLOGY
MR NUMBER : 2210-51 PROJECT # : DS1105
LOCATION : SPEARFISH, SD

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Minimum Thickness (mil)	EVERY ROLL	54.0 min	59.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.4	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.945	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	169	
Break Strength (ppi)	EVERY ROLL	75	183	D 638 Type IV
Elongation @ Yield	EVERY ROLL	10	15	
Break Elongation (%)	EVERY ROLL	120	402	NSF 54 mod.
Puncture Resistance (lb)	EVERY ROLL	80	119	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	60	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.25	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED
#20
4/16/97
QA

GSE™

Quality Control Certificate

RAILCAR : PSPX6118
MATERIAL : HDT 060 MIL
BATCH # : 091195
ROLL # : 03034954

MANF. DATE : 09/11/1995
PROJECT NAME : PG TECHNOLOGY
MR NUMBER : 2210-47 PROJECT # : DS1105
LOCATION : SPEARFISH SD

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Minimum Thickness (mil)	EVERY ROLL	54.0 min	60.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.5	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-1	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.947	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	130	190	
Break Strength (ppi)	EVERY ROLL	75	167	D 638 Type IV
Yield Elongation (%)	EVERY ROLL	10	16	2 ipm
Break Elongation (%)	EVERY ROLL	120	430	
Puncture Resistance (lb)	EVERY ROLL	80	123	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	57	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.05	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED
DS
#20
5/8/96
QA

GSE™

Quality Control Certificate

RAILCAR : PSPX5818
MATERIAL : HST060N002
BATCH # : 072796
ROLL # : 03040298

MANF. DATE : 07/27/1996
PROJECT NAME : P.G. TECHNOLOGY/PG
MR NUMBER : 2210-56 PROJECT # : DS1105
LOCATION : HOUSTON TX

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Minimum Thickness (mil)	EVERY ROLL	54.0 min	57.0	D 751 NSF Mod.
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.4	D 1603
Carbon Black Dispersion	5TH ROLL	A-1/A-2/B-1	A-2	D 3015
Density (g/cc)	5TH ROLL	0.940 min	0.944	D 1505 (Meth.A)
Tensile Properties:				
Yield Strength (ppi)	EVERY ROLL	140	181	
Break Strength (ppi)	EVERY ROLL	75	219	D 638 Type IV
Yield Elongation (%)	EVERY ROLL	13	16	NSF 54 modified
Break Elongation (%)	EVERY ROLL	150	461	
Puncture Resistance (lb)	EVERY ROLL	80	97	FTMS 101, Meth. 2065
Tear Resistance (lb)	EVERY ROLL	45	55	D 1004
Dimensional Stability (%)	EVERY ROLL	-2.00 to 2.00	-0.35	D 1204 (1 hr, 100C)
ESCR (hrs)	1/RAILCAR	1500 min	Pending	D 1693 NSF MOD.

APPROVED
#22
8/12/96
QA

GSE CLAY LINING TECHNOLOGY CO.
3150 1ST AVE. .SPEARFISH,SD 57783
605-642-8531.FAX: 605-642-8539

GUNDSEAL
FINAL PRODUCT WEIGHT

Manufacturing Date: JULY 23,96

Test Results

a. Average Thickness..... .23 in.

b. Average Total Weight 1.31 Lbs. sq.ft.

Nominal Geomembrane Weight .18 Lbs. sq.ft.

Bentonite Coating Weight 1.13 Lbs.sq.ft.

Test Results For

Roll #: 8454 which covers rolls from

#: 8448 to # 8473

GSE CLAY LINING TECHNOLOGY CO.
3150 1ST AVE. .SPEARFISH,SD 57783
605-642-8531.FAX: 605-642-8539

GUNDSEAL
FINAL PRODUCT WEIGHT

Manufacturing Date: JUNE 10, '97

Test Results

a.	Average Thickness.....	.25 in.
b.	Average Total Weight	1.36 Lbs. sq.ft.
	Nominal Geomembrane Weight	.175 Lbs. sq.ft.
	Bentonite Coating Weight	1.185 Lbs.sq.ft.

Test Results For

Roll #: 830 which covers rolls from

#: 825 to # 849

GSE CLAY LINING TECHNOLOGY CO.
3150 1ST AVE. .SPEARFISH,SD 57783
605-642-8531.FAX: 605-642-8539

GUNDSEAL
FINAL PRODUCT WEIGHT

Manufacturing Date: JUNE 10, '97

Test Results

a. Average Thickness..... .25 in.

b. Average Total Weight 1.34 Lbs. sq.ft.

Nominal Geomembrane Weight .175 Lbs. sq.ft.

Bentonite Coating Weight 1.165 Lbs.sq.ft.

Test Results For

Roll #: 855 which covers rolls from

#: 850 to # 862

GSE CLAY LINING TECHNOLOGY CO.
3150 1ST AVE. .SPEARFISH,SD 57783
605-642-8531.FAX: 605-642-8539

GUNDSEAL
FINAL PRODUCT WEIGHT

Manufacturing Date: JULY 07, '97

Test Results

a. Average Thickness..... .3 in.

b. Average Total Weight 1.72 Lbs. sq.ft.

Nominal Geomembrane Weight .34 Lbs. sq.ft.

Bentonite Coating Weight 1.38 Lbs.sq.ft.

Test Results For

Roll #: 1070 which covers rolls from

#: 1068 to # 1085

GSE CLAY LINING TECHNOLOGY CO.
3150 1ST AVE. .SPEARFISH,SD 57783
605-642-8531.FAX: 605-642-8539

GUNDSEAL
FINAL PRODUCT WEIGHT

Manufacturing Date: JULY 07, '97

Test Results

a. Average Thickness..... .29 in.

b. Average Total Weight 1.56 Lbs. sq.ft.

Nominal Geomembrane Weight .34 Lbs. sq.ft.

Bentonite Coating Weight 1.22 Lbs.sq.ft.

Test Results For

Roll #: 1088 which covers rolls from

#: 1086 to # 1103

GSE CLAY LINING TECHNOLOGY CO.
3150 1ST AVE. .SPEARFISH,SD 57783
605-642-8531.FAX: 605-642-8539

GUNDSEAL
FINAL PRODUCT WEIGHT

Manufacturing Date: JULY 07, '97

Test Results

a. Average Thickness..... .29 in.

b. Average Total Weight 1.61 Lbs. sq.ft.

Nominal Geomembrane Weight .34 Lbs. sq.ft.

Bentonite Coating Weight 1.27 Lbs.sq.ft.

Test Results For

Roll #: 1103 which covers rolls from

#: 1104 to # 1110

GSE CLAY LINING TECHNOLOGY CO.
3150 1ST AVE. .SPEARFISH, SD 57783
605-642-8531.FAX: 605-642-8539

BENTONITE QUALITY CONTROL VERIFICATION
DAILY PRODUCTION

Date: 07-23-96

Time: AM

Moisture Content: 8.0%

Filtrate Loss: 21.6 mL"as received"

Free Swell: Dry 34.0 mL/2g.

Gundseal Moisture: 20.87%

Charles Taylor
Technician

Roy Brosnahan
Production Manager

GSE CLAY LINING TECHNOLOGY CO.
3150 1ST AVE. .SPEARFISH, SD 57783
605-642-8531.FAX: 605-642-8539

BENTONITE QUALITY CONTROL VERIFICATION
DAILY PRODUCTION

Date: 07-23-96

Time: PM

Moisture Content: 7.8%

Filtrate Loss: 16.4 mL"as received"

Free Swell: Dry 31.0 mL/2g.

Gundseal Moisture: 21.08%

Charles Taylor
Technician

Ray Brannahan
Production Manager

GSE CLAY LINING TECHNOLOGY CO.
3150 1ST AVE. .SPEARFISH, SD 57783
605-642-8531.FAX: 605-642-8539

BENTONITE QUALITY CONTROL VERIFICATION
DAILY PRODUCTION

Date: 06-10-97

Time: AM

Moisture Content: 7.7%

Filtrate Loss: 18.4 mL"as received"

Free Swell: Dry 33.5 mL/2g.

Gundseal Moisture: 22.2%

Charles Taylor
Technician

Ray Brumbaugh
Production Manager

GSE CLAY LINING TECHNOLOGY CO.
3150 1ST AVE. .SPEARFISH, SD 57783
605-642-8531.FAX: 605-642-8539

BENTONITE QUALITY CONTROL VERIFICATION
DAILY PRODUCTION

Date: 06-10-97

Time: PM

Moisture Content: 8.0%

Filtrate Loss: 17.6 mL"as received"

Free Swell: Dry 34.0 mL/2g.

Gundseal Moisture: 20.1%

Charles Taylor
Technician

Ray Brosnahan
Production Manager

GSE CLAY LINING TECHNOLOGY CO.
3150 1ST AVE. .SPEARFISH, SD 57783
605-642-8531.FAX: 605-642-8539

BENTONITE QUALITY CONTROL VERIFICATION
DAILY PRODUCTION

Date: 07-07-97

Time: AM

Moisture Content: 7.5%

Filtrate Loss: 18.4 mL"as received"

Free Swell: Dry 32.0 mL/2g.

Gundseal Moisture: 23.0%

Charles Taylor
Technician

Ray Buosnahan
Production Manager

GSE CLAY LINING TECHNOLOGY CO.
3150 1ST AVE. .SPEARFISH, SD 57783
605-642-8531.FAX: 605-642-8539

BENTONITE QUALITY CONTROL VERIFICATION
DAILY PRODUCTION

Date: 07-07-97

Time: PM

Moisture Content: 7.7%

Filtrate Loss: 17.6 mL"as received"

Free Swell: Dry 31.5 mL/2g.

Gundseal Moisture: 20.9%

Charles Taylor
Technician

Ray Brosnahan
Production Manager

GSE®
GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
281-443-8564
Fax 281-875-6010

14 JULY 1997

JEFFREY BROWN
ENVIROCON INC.
LABORATORY SITE 300
CORRAL HOLLOW ROAD
TRACY CA 94550

RE: LAWRENCE LIVERMORE NATIONAL LABORATORY
GSE JOB NO. L1241

CERTIFICATION

GSE hereby certifies that no reclaimed polymer will be used in the production of materials for the above referenced project. Recycled material reworked from GSE's manufacturing process may be added, but will not exceed 2% by weight.

GSE hereby certifies the 60 mil backing of the GSE Gundseal® is manufactured exclusively from TR-400GS resin manufactured by Phillips for GSE.

GSE hereby certifies the extrudate is made from the same resin as the HDPE geomembrane liner.

GSE HDPE geomembranes meet all requirements for NSF 54. Please see attached official listing.

NATHAN IVY
TECHNICAL SUPPORT ENGINEER

PHILLIPS CHEMICAL COMPANY
A DIVISION OF PHILLIPS PETROLEUM COMPANY
BOX 792 • PHONE: 713 475-3666
PASADENA, TEXAS 77501-0792

PHILLIPS PLASTICS RESINS
Houston Chemical Complex

May 01, 1997

JHV# 8639-97

FAX: 713-230-8640

GSE Lining Technology, Inc.
19103 Gundle Road
Houston, TX 77073

Rick Schaefer

This letter will certify that the Marlex* resin shown below, as supplied by Phillips Chemical Company, conforms to our manufacturing specification.

Type:	HHM TR-400GS
Lot Number:	7170422
P.O. Number:	VERBAL
Date Shipped:	04/30/97
Package:	PSPX 6046
Quantity:	185700 LBS.
Melt Index, ASTM D1238:	.090 G/10 MIN
HLMI Flow Rate, ASTM D1238:	11.2 G/10 MIN
Density, ASTM D1505:	.938 G/CC
HLMI/MI Ratio:	124. GM/10 MIN
Production Date:	04/01/97
ESCR, F/50, Cond. B:	1500 HOURS **
Brittleness Temperature:	<-70 C **
Color:	101.750

J. H. Vaden
Quality Assurance Manager

For COA questions call Sharon Robinette, 713-475-3625

* Reg. U.S. Pat. Off.
** Nominal Value (not tested on each lot)

cc: QA-File-RC

GSE

Report Date
08-Jul-97

Welding Rod Test Results

Test Date:	07-Jul-97
Rail Car No.	PSPX6046
Resin Type:	TR 400GS
Lot No.	7170422

Property	Test Method	Result
Average Thickness, in.	measurement by caliper	0.199
Melt Flow Index, g/10 min.	ASTM D 1238, (190/2.16)	0.09
Density, g/cc	ASTM D 1505	0.945
Carbon Black Content, %	ASTM D 1603	2.4

APPROVED
DP
#20
7/8/97
QA

GSE™
GSE Lining Technology, Inc.

19103 Gundle Road
Houston, Texas 77073
800-435-2008
713-443-8564
Fax: 713-875-6010

July 25, 1997

Mr. Jeffrey Brown
Construction Manager
Envirocon, Inc.
5200 Little Brush Road
Placerville, California 95667

Re: Lawrence Livermore National Laboratory Closure; GSE Job L1241

Dear Mr. Brown,

This letter will serve as the certification that the 60 mil texture Gundseal installed at the Lawrence Livermore National Laboratory Pit 6 Landfill Closure Cover Site 300 in Tracy, California by GSE Lining Technology is in accordance to the manufactors instructions. GSE installed this product in July 1997.

If there are any questions, please call.

Sincerely;

Larry Glowacky
Sr. Project Manager

Appendix I.2.3

Geocomposites

GSE®

Quality Control Certificate

RAILCAR : ACFX59181
MATERIAL : FA2080080J
BATCH # : 070697
ROLL # : 10071824

MANF. DATE : 07/06/1997
PROJECT NAME : LIVERMORE LABS CLOS
MR NUMBER : 1680-01 PROJECT # : L1241
LOCATION : PLACERVILLE CA 001

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	5TH ROLL	200.0 min	204.0	D 1777
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.3	D 1603
Density (g/cc)	5TH ROLL	0.940 min	0.957	D 1505 (Meth.A)
Wt/Unit Area (net) lb/sf	5TH ROLL	0.160 min	0.195	D 3776
Tensile Properties:				
T.S. @ Break, MD (ppi)	5TH ROLL	25	114	D 5034/D 5035
T.S. @ Break, FAB (ppf)	5TH ROLL	480	1662	D 5034/D 5035
Peel Strength (g/in):				
Min MD Top (g/in)	5TH ROLL	227 min	612	F 904
Min MD Bottom (g/in)	5TH ROLL	227 min	601	F 904
Avg. MD Top (g/in)	5TH ROLL	454 min	794	F 904
Avg. MD Bottom (g/in)	5TH ROLL	454 min	761	F 904

* The above test results assure the quality of the following roll #:
10071825 10071826 10071827 10071828

APPROVED DP #20 7/9/97 QA

GSE®

Quality Control Certificate

RAILCAR : ACFX59181
MATERIAL : FA2080080J
BATCH # : 070697
ROLL # : 10071829

MANF. DATE : 07/06/1997
PROJECT NAME : LIVERMORE LABS CLOS
MR NUMBER : 1680-01 PROJECT # : L1241
LOCATION : PLACERVILLE CA 001

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	5TH ROLL	200.0 min	202.0	D 1777
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.3	D 1603
Density (g/cc)	5TH ROLL	0.940 min	0.957	D 1505 (Meth.A)
Wt/Unit Area (net) lb/sf	5TH ROLL	0.160 min	0.196	D 3776
Tensile Properties:				
T.S. @ Break, MD (ppi)	5TH ROLL	25	56	D 5034/D 5035
Peel Strength (g/in):				
Min MD Top (g/in)	5TH ROLL	227 min	987	F 904
Min MD Bottom (g/in)	5TH ROLL	227 min	1243	F 904
Avg. MD Top (g/in)	5TH ROLL	454 min	1361	F 904
Avg. MD Bottom (g/in)	5TH ROLL	454 min	1565	F 904

* The above test results assure the quality of the following roll #:
10071830 10071831 10071832 10071833

APPROVED DP #20 9/9/97 QA

GSE®

Quality Control Certificate

RAILCAR : ACFX59181
MATERIAL : FA2080080J
BATCH # : 070797
ROLL # : 10071830

MANF. DATE : 07/07/1997
PROJECT NAME : LIVERMORE LABS CLOS
MR NUMBER : 1680-01 PROJECT # : L1241
LOCATION : PLACERVILLE CA 001

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	5TH ROLL	200.0 min	202.0	D 1777
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.3	D 1603
Density (g/cc)	5TH ROLL	0.940 min	0.957	D 1505 (Meth.A)
Wt/Unit Area (net) lb/sf	5TH ROLL	0.160 min	0.192	D 3776
Tensile Properties:				
T.S. @ Break, MD (ppi)	5TH ROLL	25	53	D 5034/D 5035
Peel Strength (g/in):				
Min MD Top (g/in)	5TH ROLL	227 min	714	F 904
Min MD Bottom (g/in)	5TH ROLL	227 min	560	F 904
Avg. MD Top (g/in)	5TH ROLL	454 min	951	F 904
Avg. MD Bottom (g/in)	5TH ROLL	454 min	747	F 904

* The above test results assure the quality of the following roll #:
10071831 10071832 10071833 10071834

APPROVED DP #20 7/9/97 QA

GSE®

Quality Control Certificate

RAILCAR : ACFX59181
MATERIAL : FA2080080J
BATCH # : 070797
ROLL # : 10071835

MANF. DATE : 07/07/1997
PROJECT NAME : LIVERMORE LABS CLOS
MR NUMBER : 1680-01 PROJECT # : L1241
LOCATION : PLACERVILLE CA 001

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	5TH ROLL	200.0 min	205.0	D 1777
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.3	D 1603
Density (g/cc)	5TH ROLL	0.940 min	0.957	D 1505 (Meth.A)
Wt/Unit Area (net) lb/sf	5TH ROLL	0.160 min	0.195	D 3776
Tensile Properties:				
T.S. @ Break, MD (ppi)	5TH ROLL	25	54	D 5034/D 5035
Peel Strength (g/in):				
Min MD Top (g/in)	5TH ROLL	227 min	882	F 904
Min MD Bottom (g/in)	5TH ROLL	227 min	743	F 904
Avg. MD Top (g/in)	5TH ROLL	454 min	1141	F 904
Avg. MD Bottom (g/in)	5TH ROLL	454 min	974	F 904

* The above test results assure the quality of the following roll #:
10071836 10071837 10071838 10071839

APPROVED #20 7/9/97 QA

GSE®

Quality Control Certificate

RAILCAR : ACFX59181
MATERIAL : FA2080080J
BATCH # : 070797
ROLL # : 10071840

MANF. DATE : 07/07/1997
PROJECT NAME : LIVERMORE LABS CLOS
MR NUMBER : 1680-01 PROJECT # : L1241
LOCATION : PLACERVILLE CA 001

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	5TH ROLL	200.0 min	203.0	D 1777
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.3	D 1603
Density (g/cc)	5TH ROLL	0.940 min	0.958	D 1505 (Meth.A)
Wt/Unit Area (net) lb/sf	5TH ROLL	0.160 min	0.199	D 3776
Tensile Properties:				
T.S. @ Break, MD (ppi)	5TH ROLL	25	50	D 5034/D 5035
Peel Strength (g/in):				
Min MD Top (g/in)	5TH ROLL	227 min	925	F 904
Min MD Bottom (g/in)	5TH ROLL	227 min	1011	F 904
Avg. MD Top (g/in)	5TH ROLL	454 min	1177	F 904
Avg. MD Bottom (g/in)	5TH ROLL	454 min	1259	F 904

* The above test results assure the quality of the following roll #:
10071841 10071842 10071843 10071844

APPROVED DP #20 7/9/97 QA

GSE®

Quality Control Certificate

RAILCAR : ACFX59181
MATERIAL : FA2080080J
BATCH # : 070797
ROLL # : 10071845

MANF. DATE : 07/07/1997
PROJECT NAME : LIVERMORE LABS CLOS
MR NUMBER : 1680-01 PROJECT # : L1241
LOCATION : PLACERVILLE CA 001

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	5TH ROLL	200.0 min	202.0	D 1777
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.4	D 1603
Density (g/cc)	5TH ROLL	0.940 min	0.958	D 1505 (Meth.A)
Wt/Unit Area (net) lb/sf	5TH ROLL	0.160 min	0.190	D 3776
Tensile Properties:				
T.S. @ Break, MD (ppi)	5TH ROLL	25	57	D 5034/D 5035
Peel Strength (g/in):				
Min MD Top (g/in)	5TH ROLL	227 min	593	F 904
Min MD Bottom (g/in)	5TH ROLL	227 min	674	F 904
Avg. MD Top (g/in)	5TH ROLL	454 min	724	F 904
Avg. MD Bottom (g/in)	5TH ROLL	454 min	782	F 904

* The above test results assure the quality of the following roll #:
10071846 10071847 10071848 10071849

APPROVED
#20
7/9/97
QA

GSE®

Quality Control Certificate

RAILCAR : ACFX59181
MATERIAL : FA2080080J
BATCH # : 070797
ROLL # : 10071848

MANF. DATE : 07/07/1997
PROJECT NAME : LIVERMORE LABS CLOS
MR NUMBER : 1680-01 PROJECT # : L1241
LOCATION : PLACERVILLE CA 001

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	5TH ROLL	200.0 min	203.0	D 1777
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.4	D 1603
Density (g/cc)	5TH ROLL	0.940 min	0.958	D 1505 (Meth.A)
Wt/Unit Area (net) lb/sf	5TH ROLL	0.160 min	0.192	D 3776
Tensile Properties:				
T.S. @ Break, MD (ppi)	5TH ROLL	25	122	D 5034/D 5035
T.S. @ Break, FAB (ppf)	5TH ROLL	480	1787	D 5034/D 5035
Peel Strength (g/in):				
Min MD Top (g/in)	5TH ROLL	227 min	849	F 904
Min MD Bottom (g/in)	5TH ROLL	227 min	815	F 904
Avg. MD Top (g/in)	5TH ROLL	454 min	1073	F 904
Avg. MD Bottom (g/in)	5TH ROLL	454 min	1080	F 904

* The above test results assure the quality of the following roll #:
10071849 10071850 10071851 10071852

APPROVED
#20
7/9/97
QA

GSE®

Quality Control Certificate

RAILCAR : ACFX59181
MATERIAL : FA2080080J
BATCH # : 070797
ROLL # : 10071852

MANF. DATE : 07/07/1997
PROJECT NAME : LIVERMORE LABS CLOS
MR NUMBER : 1680-01 PROJECT # : L1241
LOCATION : PLACERVILLE CA 001

TEST PARAMETER	TESTING FREQUENCY	TYPICAL SPECIFICATIONS	TEST RESULTS	ASTM METHOD
Average Thickness (mil)	5TH ROLL	200.0 min	205.0	D 1777
Carbon Black (%)	5TH ROLL	2.0 to 3.0	2.2	D 1603
Density (g/cc)	5TH ROLL	0.940 min	0.958	D 1505 (Meth.A)
Wt/Unit Area (net) lb/sf	5TH ROLL	0.160 min	0.193	D 3776
Tensile Properties:				
T.S. @ Break, MD (ppi)	5TH ROLL	25	57	D 5034/D 5035
Peel Strength (g/in):				
Min MD Top (g/in)	5TH ROLL	227 min	734	F 904
Min MD Bottom (g/in)	5TH ROLL	227 min	639	F 904
Avg. MD Top (g/in)	5TH ROLL	454 min	953	F 904
Avg. MD Bottom (g/in)	5TH ROLL	454 min	845	F 904

* The above test results assure the quality of the following roll #:
10071853 10071854 10071855 10071856

APPROVED DP #20 7/9/97 QA

STAR... Safety Through Accountability and Recognition

Mobil Polyethylene

Certificate of Analysis

"QUALITY PEOPLE MAKING QUALITY PRODUCTS"

Bill Walling
GSE
19103 Gundle Road
Houston, TX 77073-3515

June 27, 1997

Mobil Chemical, a major supplier of quality polyethylene, has shipped a lot of Material to your facility. The lot identification and analysis are listed below. This data has been supplied by our Quality Control Laboratory located here in Beaumont. If you should need further information or another copy of this report please call your sales office in Irving, TX 214-580-1040.

Resin Identification		Resin Analysis Test	Lot Data
Product Type	HDA-025	Melt Index (gms/10 min) Is	0.65
Lot Number	Y-50877	Density (gms/cc)	0.953
Hopper Car Number	ACFX-59181		
Quantity Shipped	193,850		
Date of Manufacture	02-Jun-97		
P.O. Number	0080002172		
Location Shipped to Westfield, TX			

Thank you for your business. If you need additional assistance, please do not hesitate to contact our Sales Representative in your area.

Sincerely,

C. A. Winney
Quality Assurance Specialist

GSE

Report Date
07/30/97

Hydraulic Transmissivity Test Results
ASTM D 4716

Job Information

Job Name : Envirocon
MR No. : 1680-01
Job No. : L1241

Sample Information

Roll No. : 10072010
Resin Lot No. : Y-50875

Product I.D. : XL4000N001

Test Information

Boundary Conditions: SS Plate
HyperNet
SS Plate

Test Conditions : 10000 psf normal load(s)
0.1 gradient(s)

Results :

Transmissivity, m^2/sec

	Gradient
Pressure (psf)	**0.1**
10000	2.92E-03

APPROVED #22 MD 7/30/97 QA

Technician: Mike Emery
Test Date: 7/16/97

GSE

Report Date
07/30/97

Hydraulic Transmissivity Test Results
ASTM D 4716

Job Information

Job Name : Envircon
MR No. : 1680-01
Job No. : L1241

Sample Information

Roll No. : 10071846
Resin Lot No. : Y-50877

Product I.D. : XL4000N001

Test Information

Boundary Conditions: SS Plate
HyperNet
SS Plate

Test Conditions : 10000 PSF normal load(s)
0.1 gradient(s)

Results :

Transmissivity, m^2/sec

	Gradient
Pressure (psf)	**0.1**
10000	2.76E-03

APPROVED #22 MD 7/30/97 QA

Technician: Mike Emery
Test Date: 7/10/97

GSE

Report Date
07/30/97

Hydraulic Transmissivity Test Results
ASTM D 4716

Job Information

Job Name : Envircon
MR No. : 1680-01
Job No. : L1241

Sample Information

Roll No. : 10071823
Resin Lot No. : Y-50877

Product I.D. : XL4000N001

Test Information

Boundary Conditions: SS Plate
HyperNet
SS Plate

Test Conditions : 10000 PSF normal load(s)
0.1 gradient(s)

Results :

Transmissivity, m^2/sec

	Gradient
Pressure (psf)	**0.1**
10000	3.28E-03

Technician: Mike Emery
Test Date: 7/10/97

APPROVED #22 MD 7/30/97 QA

GSE

Report Date
07/30/97

Hydraulic Transmissivity Test Results
ASTM D 4716

Job Information

Job Name : Envirocon
MR No. : 1680-01
Job No. : L1241

Sample Information

Roll No. : 10071848
Resin Lot No. : Y-50877

Product I.D. : FA2080080J
Geotextile (A) : 8 oz.
Geotextile (B) : 8 oz.

Test Information

Boundary Conditions: SS Plate
Composite
SS Plate

Test Conditions : 500 psf normal load(s)
0.1 gradient(s)

Results :

Transmissivity, m^2/sec

	Gradient
Pressure (psf)	**0.1**
500	4.67E-04

Technician: Mike Emery
Test Date: 7/10/97

APPROVED
#22
MD 7/30/97
QA

GSE

Report Date
07/30/97

Hydraulic Transmissivity Test Results
ASTM D 4716

Job Information

Job Name : Envirocon
MR No. : 1680-01
Job No. : L1241

Sample Information

Roll No. : 10071988
Resin Lot No. : Y-50875

Product I.D. : FA2080080J
Geotextile (A) : 8 oz.
Geotextile (B) : 8 oz.

Test Information

Boundary Conditions: SS Plate
Composite
SS Plate

Test Conditions : 500 psf normal load(s)
0.1 gradient(s)

Results :

Transmissivity, m^2/sec

	Gradient
Pressure (psf)	**0.1**
500	5.76E-04

Technician: Mike Emery
Test Date: 7/16/97

APPROVED
#22
MD 7/30/97
QA

GSE

Report Date
07/30/97

Hydraulic Transmissivity Test Results
ASTM D 4716

Job Information

Job Name :	Envirocon
MR No. :	1680-01
Job No. :	L1241

Sample Information

Roll No. :	10071824
Resin Lot No. :	Y-50877
Product I.D. :	FA2080080J
Geotextile (A) :	8 oz.
Geotextile (B) :	8 oz.

Test Information

Boundary Conditions:	SS Plate
	Composite
	SS Plate

Test Conditions : 500 psf normal load(s)
0.1 gradient(s)

Results :

Transmissivity, m^2/sec

	Gradient
Pressure (psf)	**0.1**
500	5.94E-04

Technician: Mike Emery
Test Date: 7/10/97

APPROVED #22 MD 7/30/97 QA

07/09/1997

MR number	Sample ID	Rail Car Number	product code	manufacturing date	date roll shipped	Roll length ft.
1680-01	10071824	ACFX59181	FA20800806	07/06/1997	07/09/1997	200
1680-01	10071825	ACFX59181	FA20800806	07/06/1997	07/09/1997	200
1680-01	10071826	ACFX59181	FA20800806	07/06/1997	07/09/1997	200
1680-01	10071827	ACFX59181	FA20800806	07/06/1997	07/09/1997	200
1680-01	10071828	ACFX59181	FA20800806	07/06/1997	07/09/0797	200
1680-01	10071829	ACFX59181	FA20800806	07/06/1997	07/09/1997	200
1680-01	10071830	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071831	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071832	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071833	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071834	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071835	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071836	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071837	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071838	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071839	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071840	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071841	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071842	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071843	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071844	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071845	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071848	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071849	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071850	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071851	ACFX59181	FA20800806	07/07/1997	07/09/1997	200
1680-01	10071852	ACFX59181	FA20800806	07/07/1997	07/09/1997	200

Count 27

End &CHR(27)@&100

SYNTHETIC INDUSTRIES

Geosynthetic Products Division

June 20, 1997

GSE Lining Technology
Karen Louie
19103 Gundle Road
Houston , TX 77073
BoL: 620001 PO S054327-00

This is to certify that Product GEOTEX™ 861, a nonwoven polypropylene geotextile produced by Synthetic Industries will meet the following certifiable minimum average roll values when tested in accordance with the proper ASTM test methods. A minimum average roll value is calculated as the mean minus two standard deviations, yielding a 97.5 percent confidence level. This geotextile has been continuously inspected for the presence of needles and none were detected.

PHYSICAL PROPERTY	TEST METHOD	U.S. UNITS	S.I. UNITS
Weight	ASTM D-5261	8.0 oz/yd^2	270 g/m^2
Thickness	ASTM D-5199	90 mils	2.2 mm
Tensile Strength	ASTM D-4632	220 lbs	975 N
Elongation	ASTM D-4632	50 %	50 %
Trapezoidal Tear	ASTM D-4533	95 lbs	420 N
Mullen Burst	ASTM D-3786	420 psi	2895 Kpa
Puncture Strength	ASTM D-4833	135 lbs	600 N
AOS	ASTM D-4751	80 US Standard Sieve	0.180 mm
Permittivity	ASTM D-4491	1.5 sec^{-1}	1.5 sec^{-1}
Permeability	ASTM D-4491	0.38 cm/sec	0.38 cm/sec
Flow Rate	ASTM D-4491	110 gpm/ft	4480 lpm/m^2
U V Resistance	ASTM D-4355	70 %	70 %

Strength Retained after 500 hours exposure in Xenon Arc Weatherometer

Sincerely,

Sid Weiser
Technical Manager
Performance Nonwovens Division

Synthetic Industries, Inc.
4019 Industry Drive • Chattanooga, Tennessee • 37416 • USA
Telephone • 423-899-0444 • Fax • 423-899-7619 • 1-800-621-0444

Synthetic Industries
Individual Roll Data
Bill of Lading:620172

Roll Number	Style	Batch Number	Mass/ Area	Lab Thick	Tensile (MD)	Tensile (XMD)	Elongation (MD)	Elongation (XMD)	Trap Tear (MD)	Trap Tear (XMD)	Mullen Burst	Punct Resist	AOS	Permit
			Osy	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs	mm	sec-1
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833	D4751	D4491
5090859A	861	50551	8.6	120	239	323	69	77	106	140	494	163		
5090893A	861	50551	8.7	123	268	346	71	79	114	160	476	177		
5090902A	861	50551	8.3	118	255		69		108		471	173		
5090906A	861	50551	9.0	127	276	358	74	81	124	161	491	164		
5090947A	861	50551	8.6	115										

Sid Weiser

Synthetic Industries
Individual Roll Data
Bill of Lading:619942

Roll Number	Style	Batch Number	Mass/ Area	Lab Thick	Tensile (MD)	Tensile (XMD)	Elongation (MD)	Elongation (XMD)	Trap Tear (MD)	Trap Tear (XMD)	Mullen Burst	Punct Resist	ACS	Permit
			Osy	mils	lbs	lbs	%	%	lbs	lbs	psi	lbs	mm	sec-1
			D5261	D5199	D4632	D4632	D4632	D4632	D4533	D4533	D3786	D4833	D4751	D4491
5090954A	861	50551	8.9	126	248	359	70	76	108	159	486	159		
5090964A	861	50551	8.7	126	268		71		122		475	170		
5090968A	861	50551	8.4	121	259	337	69	76	121	152	477	161		
5090972A	861	50551	8.3	116	249		68		122		504	161		
5090980A	861	50551	8.5	119	269	335	70	79	113	147	475	164		

Sid Wessin

Synthetic Industries
Individual Roll Data
Bill of Lading:620001

Roll Number	Style	Batch Number	Mass/ Area Oay D5261	Lab Thick mils D5199	Tensile (MD) lbs D4632	Tensile (XMD) lbs D4632	Elongation (MD) % D4632	Elongation (XMD) % D4632	Trap Tear (MD) lbs D4533	Trap Tear (XMD) lbs D4533	Mullen Burst psi D3786	Punct Resist lbs D4833	AOS mm D4751	Permit sec-1 D4491
S090910A	861	50551	8.3	116	264	320	71	76	119	161	520	164		
S090920A	861	50551	8.6	120	261	328	69	77	105	146	481	167		
S090936A	861	50551	8.8	124	269	339	70	78	117	151	476	171		
S090940A	861	50551	8.4	116	238		68		99		468	155		
S090944A	861	50551	8.1	117	247	325	70	76	116	148	434	161		

Sid Wesser

Date: 07/08/97 FABRIC ROLL REPORT BY GSE ROLL # Page: 2
Time: 17:15:23.53 From:07/06/97 To:07/07/97

Date Mfg	Fabrinet Roll No	Fabrinet Prod Code	Fabric Prod Code	Fabric Description & Mfg	GSE Top No.	Mfg No.	Gundle Bot No.	Mfg No.
07/06/97	10071826	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856764	5090918	18856762	5090940
07/06/97	10071827	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856764	5090918	18856762	5090940
07/06/97	10071828	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856764	5090918	18856762	5090940
07/06/97	10071828	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856766	5090910	18856762	5090940
07/06/97	10071829	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856766	5090910	18856761	5090920
07/06/97	10071829	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856766	5090910	18856761	5090920
07/07/97	10071830	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856766	5090910	18856761	5090920
07/07/97	10071831	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856766	5090910	18856761	5090920
07/07/97	10071832	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856766	5090910	18856761	5090920
07/07/97	10071833	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856709	5090921	18856761	5090920
07/07/97	10071833	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856709	5090921	18856711	5090964
07/07/97	10071833	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856766	5090910	18856761	5090920
07/07/97	10071834	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856709	5090921	18856711	5090964
07/07/97	10071835	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856709	5090921	18856711	5090964
07/07/97	10071836	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856709	5090921	18856711	5090964
07/07/97	10071837	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856709	5090921	18856711	5090964
07/07/97	10071838	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856709	5090921	18856711	5090964
07/07/97	10071838	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856712	5090970	18856711	5090964
07/07/97	10071838	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856712	5090970	18856715	5060955
07/07/97	10071839	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856712	5090970	18856715	5060955
07/07/97	10071840	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856712	5090970	18856715	5060955
07/07/97	10071841	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856712	5090970	18856715	5060955
07/07/97	10071842	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856712	5090970	18856715	5060955
07/07/97	10071843	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856710	5090972	18856715	5060955
07/07/97	10071843	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856710	5090972	18856714	5090957
07/07/97	10071843	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856712	5090970	18856715	5060955
07/07/97	10071844	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856710	5090972	18856714	5090957
07/07/97	10071845	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856710	5090972	18856714	5090957
07/07/97	10071846	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856710	5090972	18856714	5090957
07/07/97	10071849	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856710	5090972	18856714	5090957
07/07/97	10071850	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18856710	5090972	18856714	5090957
07/07/97	10071851	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18857012	5090891	18857006	5090909
07/07/97	10071852	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18857012	5090891	18857006	5090909
07/07/97	10071853	FA20800B0J	FBR0808200	FABRIC 8 OZ. S.I.,861,15	18857012	5090891	18857006	5090909
07/07/97	10071854	FA20801B0J			REGRIND			

GSE®

07/09/1997

MR Number	Sample ID	Rail Car Number	product code	manufacturing date	date roll shipped	Roll length ft.
1680-01	10071824	ACFX59181	FA2080080J	07/06/1997	07/09/1997	200
1680-01	10071825	ACFX59181	FA2080080J	07/06/1997	07/09/1997	200
1680-01	10071826	ACFX59181	FA2080080J	07/06/1997	07/09/1997	200
1680-01	10071827	ACFX59181	FA2080080J	07/06/1997	07/09/1997	200
1680-01	10071828	ACFX59181	FA2080080J	07/06/1997	07/09/1997	200
1680-01	10071829	ACFX59181	FA2080080J	07/06/1997	07/09/1997	200
1680-01	10071830	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071831	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071832	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071833	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071834	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071835	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071836	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071837	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071838	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071839	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071840	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071841	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071842	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071843	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071844	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071845	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071848	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071849	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071850	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071851	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200
1680-01	10071852	ACFX59181	FA2080080J	07/07/1997	07/09/1997	200

27

Count
End &CHR(27)@&100

Appendix I.2.4

Geotextile

EVERGREEN
TECHNOLOGIES, INC.

TG 700

This letter is given to you as an advisement of our typical properties and is not a certification of the property values with respect to any given roll.

TG 700 is a U.V. stabilized, spunbonded, continuous filament, needlepunched, nonwoven, polypropylene geotextile. Special additives are incorporated in our Geotextiles to provide high chemical resistance. Specific chemical resistance data is available upon request for chemicals with pH values which range from 2-13. Test results from our laboratory conducted in accordance with ASTM D 4354 sampling and testing frequencies have found the following representative average roll properties:

Property	Test Procedure	Minimum Average Values	
Weight	ASTM D 5261	8.0	oz/yd^2
Thickness	ASTM D 5199	85	mil
Grab Strength	ASTM D 4632	215	lbs
Grab Elongation	ASTM D 4632	50	%
Tear Strength	ASTM D 4533	85	lbs
Mullen Burst	ASTM D 3786	375	psi
Puncture Resistance	ASTM D 4833	100	lbs
A.O.S.	ASTM D 4751	.212*	mm
		(70)	US Sieve
Permittivity	ASTM D 4491	1.3*	sec-1
Water Permeability	ASTM D 4491	0.3*	cm/sec
Water Flow Rate	ASTM D 4491	100*	gpm/ft^2
U.V. Resistance (500 hrs)	ASTM D 4355	70(2)	%

(1) Values in weaker principle direction. Unless noted otherwise, these values represent minimum average roll values (i.e., test results from any sample roll in a lot, tested in accordance with ASTM D 4759-88 shall meet or exceed the minimum values listed).

(2) UV resistance testing is based on results from independent conformance testing conducted at South Florida Test Service.

*Determined at time of manufacturing; storage and handling conditions which differ from those found in ASTM D 4873-88 may influence these properties.

ETI

5775-B Glenridge Drive / Lakeside Center, Suite 450 / Atlanta, Georgia 30328-5363
Tel. 404-250-1290 / Fax 404-705-9650 / 800-984-9784

200 Miller Sellers Drive / Evergreen, Alabama 36401
Tel. 334-578-9003 / Fax 334-578-6141

A subsidiary of The Tensar Corporation

3/24/97

EVERGREEN TECHNOLOGIES, INC.

June 10, 1997

Tensar Corporation
1210 Citizens Parkway
Morrow, GA 30260

Subj: TG700 Geotextile Certificate of Compliance

Re : Order 1575 PO # 7-9127

Dear Sir/Madam:

This letter certifies that TG700, a 100 percent needle free fabric, shipped FOB Evergreen, Alabama, manufactured by Evergreen Technologies, meets or exceeds the minimum requirements listed below and was shipped from Lot #60050 and 60048.

PROPERTY	TEST PROCEDURE	VALUE(1)		
Weight	ASTM D 5261	8		oz/yd2
Thickness	ASTM D 5199	85	*	Mil
Grab Strength	ASTM D 4632	215		lbs
Grab Elongation	ASTM D 4632	50		%
Tear Strength	ASTM D 4533	85		lbs
Mullen Burst	ASTM D 3786	375		psi
Puncture Resistance	ASTM D 4833	100		lbs
A.O.S. (2)	ASTM D 4751	.212	*	mm
		(70)	*	US Std Sieve
Permittivity	ASTM D 4491	1.3	*	1/sec
Water Permeability	ASTM D 4491	0.3	*	cm/sec
Water Flow Rate	ASTM D 4491	100	*	gpm/sq ft
U.V. Resistance (500 hours)	ASTM G53	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 shall meet or exceed the minimum values listed).

(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.

Sincerely,

Manoj Tyagi
QA Manager

5775-B Glenridge Drive / Lakeside Center, Suite 450 / Atlanta, Georgia 30328-5363
Tel. 404-250-1290 / Fax 404-705-9650 / 800-984-9714

200 Miller Sellers Drive / Evergreen, Alabama 36401
Tel. 334-578-9003 / Fax 334-578-6141

Evergreen Technologies
Evergreen Alabama

Quality Assurance Lab

Test Name	*ASTM*	*Test Frequency (square feet)*
Mass Per Unit Area	*d 5261*	*100,000*
Thickness	*d 5199*	*100,000*
Grab Tensile / Elongation	*d 4632*	*100,000*
Mullen Burst	*d 3786*	*100,000*
Puncture Resistance	*d 4833*	*100,000*
Trapezoidal Tear	*d 4533*	*100,000*
Permeability	*d 4491*	*500,000*
Apparent Opening Size	*d 4751*	*500,000*

06/10/97

PRODUCT GRADE: TG 700
LOT NUMBER: 60040
COLOR: BLACK
ROLL DIM.: 15ft 5in x 1400ft

EVERGREEN TECHNOLOGIES INC.

QA/QC LABORATORY
EVERGREEN, ALABAMA

TEST ROLLS LOT SUMMARY

REVIEWED BY:
QA _____
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 ASTM D4533 CD (lbs)	THICKNESS ASTM D5199 (mils)	HYDRAULIC TESTS ASTM D4491 PERMIT. (sec-1)	HYDRAULIC TESTS ASTM D4491 PERM. (cm/sec)	WATER FLOW (gpm/ft2)	A.O.S. ASTM D4751 (mm)
5021007	09/24/96	8.5	255.6	160.0	290.7	61.5	414.7	124.2	107.1	125.9	113				
5021010	09/24/96	8.7	257.6	159.3	289.5	63.6	414.3								
5021011	09/25/96	8.8	260.1	156.5	276.5	74.0	422.9								
	AVERAGE =	8.6	257.8	159.1	285.9	66.3	417.3	124.2	107.1	125.9	113	0.00	0.000	0.0	0.000
	STD. DEVIATION =	0.1	2.3	2.8	9.0	4.8	4.9	0.0	0.0	0.0	0	0.00	0.000	0.0	0.000

06/10/97

PRODUCT GRADE: TG700
LOT NUMBER: 60050
COLOR: BLACK
ROLL DIM.: 15ft 5in x 930ft

EVERGREEN TECHNOLOGIES INC.

MQA/MQC LABORATORY
EVERGREEN, ALABAMA

REVIEWED BY:
QA _____
ENGINEER _____

TEST ROLLS LOT SUMMARY

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 ASTM D4533 CD (lbs)	THICKNESS ASTM D5199 (mils)	HYDRAULIC TESTS ASTM D4491 PERMIT. (sec-1)	HYDRAULIC TESTS ASTM D4491 PERM. (Kv) (cm/sec)	WATER FLOW (gpm/ft2)	A.O.S. ASTM D4751 (mm)
5021175	10/01/96	11.0	297.0	129.0	318.2	64.0	408.4								
5021176	10/01/96	11.1	346.4	189.3	378.1	75.4	426.6								
5021178	10/01/96	11.3	373.9	160.0	402.3	65.8	464.7								
5021179	10/01/96	11.4	373.0	169.3	412.8	67.9	488.6	157.4							
5021180	10/01/96	11.0	349.7	159.9	409.6	75.0	470.8	150.5	141.2	159.1	121				0.159
AVERAGE =		11.2	367.8	161.5	394.4	69.8	455.6	153.9	141.2	159.1	121	0.00	0.000	0.0	0.159
STD. DEVIATION =		0.2	31.3	21.8	39.3	5.9	36.4	4.8	0.0	0.0	0	0.00	0.000	0.0	0.000

EVERGREEN
TECHNOLOGIES, INC.

August 13, 1997

Jeff Brown
Environcon - National Labs
Site 300
Tracy, CA 95376

Subj: TG700 Geotextile Certificate of Compliance

Re : Order 1733 PO # 15421

Dear Sir/Madam:

This letter certifies that TG700, a 100 percent needle free fabric, shipped FOB Evergreen, Alabama, manufactured by Evergreen Technologies, meets or exceeds the minimum requirements listed below and was shipped from Lot # 70033.

PROPERTY	TEST PROCEDURE	VALUE(1)		
Weight	ASTM D 5261	8		oz/yd2
Thickness	ASTM D 5199	95	*	Mil
Grab Strength	ASTM D 4632	215		lbs
Grab Elongation	ASTM D 4632	50		%
Tear Strength	ASTM D 4533	85		lbs
Mullen Burst	ASTM D 3786	375		psi
Puncture Resistance	ASTM D 4833	100		lbs
A.O.S. (2)	ASTM D 4751	.212	*	mm
		(70)	*	US Std Sieve
Permittivity	ASTM D 4491	1.3	*	1/sec
Water Permeability	ASTM D 4491	0.3	*	cm/sec
Water Flow Rate	ASTM D 4491	100	*	gpm/sq ft
U.V. Resistance (500 hours)	ASTM G53	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 shall meet or exceed the minimum values listed).

(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.

Sincerely,

Manoj Tyagi
QA Manager

ETI

5775-B Glenridge Drive / Lakeside Center, Suite 450 / Atlanta, Georgia 30328-5363
Tel. 404-250-1290 / Fax 404-705-9650 / 800-984-9784

200 Miller Sellers Drive / Evergreen, Alabama 36401
Tel. 334-578-9003 / Fax 334-578-6141

A subsidiary of The Tensar Corporation

06/25/97

PRODUCT GRADE: TG 700

LOT NUMBER: 70033

COLOR: BLACK

ROLL DIM.: 15ft x 360ft

EVERGREEN TECHNOLOGIES INC.
MQA/MQC LABORATORY
EVERGREEN, ALABAMA

TEST ROLLS LOT SUMMARY

REVIEWED BY:
QA Margaret Cooper
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 ASTM D4533 CD (lbs)	THICKNESS ASTM D5199 (mils)	HYDRAULIC TESTS ASTM D4491 PERMIT. (sec-1)	HYDRAULIC TESTS ASTM D4491 PERM. (K) (cm/sec)	WATER FLOW (gpm/ft2)	A.O.S. ASTM D4751 (mm)
7005645	04/07/97	9.1	251.8	163.7	280.7	74.2	381.3	107.4	108.9	131.4	105				
7005646	04/07/97	9.1	256.1	165.3	287.5	78.5	398.2	100.5	114.8	136.2	90	1.40	0.340	104.9	0.212
7005647	04/07/97	9.1	251.0	114.5	289.4	73.1	385.2								
7005664	04/07/97	8.9	260.9	156.3	277.0	66.8	412.0	118.0	117.4	108.9	91				
7005670	04/07/97	9.0	254.9	154.0	294.2	68.9	440.3	116.1	112.4	131.2	96				
7005678	04/07/97	8.4	253.0	163.8	287.6	66.4	412.0	109.8	106.9	130.1	90				
7005689	04/07/97	8.6	240.9	154.7	292.2	68.6	416.4	108.0	106.1	129.6	90				
7005703	04/07/97	8.9	259.6	167.7	295.0	71.3	413.1	118.5	111.6	118.4	97				
7005711	04/07/97	8.5	248.0	145.2	282.1	72.6	410.3								
7005719	04/07/97	8.5	259.4	159.2	294.9	72.7	409.5	109.7	111.7	126.1	87				
7005726	04/07/97	8.7	285.7	130.9	295.3	80.5	412.9								
7005725	04/07/97	8.6	253.1	173.8	304.7	66.8	400.5	114.3	114.9	130.3	95	1.58	0.341	118.4	0.212
7005735	04/07/97	8.7	258.9	175.1	303.5	79.9	429.7								
7005740	04/07/97	8.7	266.6	174.8	294.2	78.9	413.2	115.0	108.2	121.7	89				
7005750	04/07/97	8.5	257.9	167.7	291.2	70.7	419.6								
7005755	04/07/97	8.8	272.8	174.2	308.1	73.4	435.3	116.7	107.7	128.1	94				
7005760	04/08/97	9.1	266.2	171.6	307.5	76.9	443.2								
7005770	04/07/97	8.9	273.6	178.4	290.9	75.3	413.1	121.9	111.9	126.9	100				
7005778	04/08/97	8.7	268.4	170.4	310.0	80.8	416.7								
7005779	04/08/97	8.9	287.7	174.1	318.7	76.6	420.2	124.8	123.6	132.3	92				
7005784	04/08/97	8.6	261.7	162.2	299.0	73.3	399.0								
7005790	04/08/97	8.8	269.5	172.9	307.1	75.2	423.5								
7005796	04/08/97	8.6	270.0	169.1	294.2	74.6	418.9	118.0	111.6	129.2	90				
7005804	04/08/97	8.6	267.5	172.8	313.7	77.4	426.3								
7005809	04/08/97	8.5	268.7	163.1	305.3	74.4	412.4	112.1	117.6	118.2	90	1.52	0.386	113.9	0.212
7005813	04/08/97	8.6	279.8	166.4	285.0	64.4	429.1								
7005822	04/08/97	8.4	271.4	165.8	288.7	69.5	411.7								
7005826	04/08/97	8.3	257.5	166.8	304.0	75.5	413.5	120.8	107.0	121.2	89				
7005836	04/08/97	8.6	268.1	165.8	298.5	64.3	425.2								
7005837	04/08/97	8.3	263.0	170.5	272.8	78.6	399.4	114.7	106.4	118.7	88				

LOT NUMBER: 70033

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 ASTM D4533 CD (lbs)	THICKNESS ASTM D5199 (mils)	HYDRAULIC TESTS ASTM D4491 PERMIT. (sec-1)	HYDRAULIC TESTS ASTM D4491 PERM. (Kv) (cm/sec)	WATER FLOW (gpm/ft2)	A.O.S. ASTM D4751 (mm)
7005842	04/08/97	8.5	254.7	169.9	281.6	78.1	414.8								
7005847	04/08/97	8.8	273.8	183.8	284.6	77.1	418.9								
7005852	04/08/97	9.0	265.6	172.9	300.7	80.4	441.1	107.8	109.3	126.9	88				
7005857	04/08/97	8.8	273.6	177.2	291.2	78.3	419.8								
7005867	04/08/97	8.7	263.7	167.1	301.1	81.3	426.0	111.6	109.9	128.2	88				
7005872	04/09/97	8.4	256.3	170.7	277.0	72.8	414.1								
7005877	04/09/97	8.5	267.8	179.3	315.5	78.1	424.0								
7005882	04/09/97	8.5	257.2	168.0	279.1	69.8	435.5	126.8	96.8	125.0	97				
7005887	04/09/97	8.4	251.9	169.3	273.9	76.8	411.9								
7005891	04/09/97	8.3	250.3	172.0	285.0	75.0	413.8								
7005895	04/09/97	8.4	256.7	159.9	281.7	65.0	428.3	118.3	102.7	126.7	85	1.65	0.423	123.4	0.212
7005900	04/09/97	8.8	273.6	186.3	292.4	71.1	442.2								
7005905	04/09/97	8.3	257.2	163.3	290.4	72.0	410.6								
7005913	04/09/97	8.5	257.0	150.5	279.5	67.3	426.6	113.5	107.8	128.5	95				
7005914	04/09/97	16.4	453.2	185.3	532.7	76.7	733.5								
	AVERAGE =	8.8	267.0	165.9	298.6	74.2	424.3	114.7	110.2	126.1	92	1.54	0.375	115.2	0.212
	STD. DEVIATION =	1.2	30.0	12.5	37.5	5.0	49.0	6.2	5.6	6.1	4	0.11	0.041	7.9	0.000

Appendix I.3

Conformance Testing

Appendix I.3.1

Geogrid

JUNE 1997

977-5116

SUMMARY OF GEOGRID CONFORMANCE TEST RESULTS

LAWRENCE LIVERMORE NATIONAL LAB
PIT 6 LANDFILL CLOSURE
CALIFORNIA

ROLL NO.	REFERENCE VALUE	15347-49	15347-49R	15448-50	15452-38	15464-16	-	-	-	-	-
SPACING BETWEEN STRANDS (in) CALIPER METHOD	-	0.656	-	0.662	0.658	0.655	-	-	-	-	-
CARBON BLACK CONTENT (%) ASTM D 1603	> =2.00	2.73	-	2.23	2.41	2.56	-	-	-	-	-
WIDE WIDTH TENSILE STRENGTH (lbs/ft) ASTM D 4595	> =9,000	8955	-	9243	9326	9209	-	-	-	-	-
WIDE WIDTH TENSILE ELONGATION (lbs/ft) ASTM D 4595	-	11.0	-	12.8	12.2	11.9	-	-	-	-	-
RIB TENSILE STRENGTH (lbs/ft) GRI GG1	> =9,000	-	9773	-	-	-	-	-	-	-	-

5116GG

GEOGRID TEST RESULTS

PROJECT NAME: LLNL / PIT 6 LF CLOSURE / CA
PROJECT NUMBER: 977-5116.200

ROLL DESIGNATION: 15452-38

	SPACING BETWEEN STRANDS Caliper Method (in)	CARBON BLACK CONTENT (%)	WIDE WIDTH TENSILE STRENGTH (lbs/ft)	WIDE WIDTH TENSILE ELONGATION (%)
1.	0.615	2.47	9130	12.3
2.	0.633	2.35	9480	12.5
3.	0.663		9176	11.4
4.	0.665		9399	12.7
5.	0.680		9357	12.1
6.	0.681		9412	12.3
7.	0.700			
8.	0.687			
9.	0.641			
10.	0.618			
AVG	0.658	2.41	9326	12.2

ROLL DESIGNATION: 15464-16

	SPACING BETWEEN STRANDS Caliper Method (in)	CARBON BLACK CONTENT (%)	WIDE WIDTH TENSILE STRENGTH (lbs/ft)	WIDE WIDTH TENSILE ELONGATION (%)
1.	0.625	2.59	8919	11.2
2.	0.655	2.53	9020	11.4
3.	0.670		9276	12.4
4.	0.625		9399	12.3
5.	0.650		9407	12.5
6.	0.697		9233	11.8
7.	0.664			
8.	0.663			
9.	0.665			
10.	0.640			
AVG	0.655	2.56	9209	11.9

GEOGRID TEST RESULTS

PROJECT NAME: LLNL / PIT 6 LF CLOSURE / CA
PROJECT NUMBER: 977-5116.200

ROLL DESIGNATION: 15347-49

	SPACING BETWEEN STRANDS Caliper Method (in)	CARBON BLACK CONTENT (%)	WIDE WIDTH TENSILE STRENGTH (lbs/ft)	WIDE WIDTH TENSILE ELONGATION (%)
1.	0.640	2.74	8836	9.4
2.	0.625	2.71	9077	11.9
3.	0.665		8966	11.1
4.	0.659		9530	12.6
5.	0.665		8761	11.1
6.	0.674		8561	9.9
7.	0.685			
8.	0.664			
9.	0.656			
10.	0.625			
AVG	0.656	2.73	8955	11.0

ROLL DESIGNATION: 15448-50

	SPACING BETWEEN STRANDS Caliper Method (in)	CARBON BLACK CONTENT (%)	WIDE WIDTH TENSILE STRENGTH (lbs/ft)	WIDE WIDTH TENSILE ELONGATION (%)
1.	0.605	2.15	9240	12.9
2.	0.610	2.30	9296	12.9
3.	0.690		9266	13.2
4.	0.685		9191	12.4
5.	0.680		9361	12.0
6.	0.699		9105	13.1
7.	0.673			
8.	0.690			
9.	0.666			
10.	0.620			
AVG	0.662	2.23	9243	12.8

GEOGRID TEST RESULTS

PROJECT NAME: LLNL / PIT 6 LF CLOSURE / CA
PROJECT NUMBER: 977-5116.200

ROLL DESIGNATION: 15347-49 R

	SPACING BETWEEN STRANDS Caliper Method (in)	CARBON BLACK CONTENT (%)	RIB TENSILE STRENGTH (lbs/ft)
1.	0.640	2.74	9487
2.	0.625	2.71	9771
3.	0.665		10040
4.	0.659		9397
5.	0.665		9875
6.	0.674		9935
7.	0.685		10129
8.	0.664		9741
9.	0.656		9995
10.	0.625		9362
AVG	0.656	2.73	9773

Appendix I.3.2

GundSeal®

July 1997 977-5116

GEOMEMBRANE TEST RESULTS

PROJECT NUMBER: 977-5116
PROJECT NAME: LLNL / PIT 6 CLOSURE / CA
ROLL DESIGNATION: 1106

	THICKNESS (mils)	DENSITY (g/cc)	PUNCTURE RESISTANCE (lbs)		CARBON BLACK CONTENT (%)	CARBON BLACK DISPERSION (rating)
1.	60.4	0.945	141.6	139.0	2.42	A3
2.	59.2	0.944	144.1	147.7	2.43	A3
3.	60.8	0.944	143.6	142.0		A3
4.	60.0		142.0	141.3		A3
5.	61.5		140.8	142.0		A2
6.	60.0		143.0			A2
7.	61.9		143.1			
8.	57.9		137.5			
9.	59.9		138.7			
10.	61.4		140.1			
AVG	60.3	0.944	141.8		2.43	A3

	YIELD STRENGTH (lb/in. width)		ELONGATION AT YIELD (%)		BREAK STRENGTH (lb/in. width)		ELONGATION AT BREAK (%)	
	MD	TD	MD	TD	MD	TD	MD	TD
1.	156.3	159.0	18.7	17.0	177.8	182.9	375	421
2.	155.5	164.5	19.3	14.9	211.5	204.1	466	464
3.	162.4	163.0	19.2	17.2	189.5	152.4	405	337
4.	151.8	161.4	17.7	17.0	204.3	173.6	442	383
5.	156.2	160.9	19.0	17.2	170.1	180.3	350	400
AVG	156.4	161.8	18.8	16.6	190.6	178.7	407	401

July 1997 977-5116

GEOMEMBRANE TEST RESULTS

PROJECT NUMBER: 977-5116
PROJECT NAME: LLNL / PIT 6 CLOSURE / CA
ROLL DESIGNATION: 1106 R

	THICKNESS (mils)	DENSITY (g/cc)	PUNCTURE RESISTANCE (lbs)	CARBON BLACK CONTENT (%)	CARBON BLACK DISPERSION (rating)
1.	-	-	- -	-	A2
2.	-	-	- -	-	A1
3.	-	-	- -		A1
4.	-		- -		B3
5.	-		- -		A1
6.	-		-		A1
7.	-		-		
8.	-		-		
9.	-		-		
10.	-		-		
AVG	0.0	0.000	0.0	0.00	A2

	YIELD STRENGTH (lb/in. width)		ELONGATION AT YIELD (%)		BREAK STRENGTH (lb/in. width)		ELONGATION AT BREAK (%)	
	MD	TD	MD	TD	MD	TD	MD	TD
1.	-	-	-	-	-	-	-	-
2.	-	-	-	-	-	-	-	-
3.	-	-	-	-	-	-	-	-
4.	-	-	-	-	-	-	-	-
5.	-	-	-	-	-	-	-	-
AVG	0.0	0.0	0.0	0.0	0.0	0.0	0	0

July 1997 977-5116

GEOMEMBRANE TEST RESULTS

PROJECT NUMBER: 977-5116
PROJECT NAME: LLNL / PIT 6 CLOSURE / CA
ROLL DESIGNATION: 1076 R

	THICKNESS (mils)	DENSITY (g/cc)	PUNCTURE RESISTANCE (lbs)		CARBON BLACK CONTENT (%)	CARBON BLACK DISPERSION (rating)
1.	-	-	-	-	-	A1
2.	-	-	-	-	-	A3
3.	-	-	-	-		A2
4.	-		-	-		A3
5.	-		-	-		A3
6.	-		-			A2
7.	-		-			
8.	-		-			
9.	-		-			
10.	-		-			
AVG	0.0	0.000	0.0		0.00	A2

	YIELD STRENGTH (lb/in. width)		ELONGATION AT YIELD (%)		BREAK STRENGTH (lb/in. width)		ELONGATION AT BREAK (%)	
	MD	TD	MD	TD	MD	TD	MD	TD
1.	-	-	-	-	-	-	-	-
2.	-	-	-	-	-	-	-	-
3.	-	-	-	-	-	-	-	-
4.	-	-	-	-	-	-	-	-
5.	-	-	-	-	-	-	-	-
AVG	0.0	0.0	0.0	0.0	0.0	0.0	0	0

July 1997 977-5116

GEOMEMBRANE TEST RESULTS

PROJECT NUMBER: 977-5116
PROJECT NAME: LLNL / PIT 6 CLOSURE / CA
ROLL DESIGNATION: 1092

	THICKNESS (mils)	DENSITY (g/cc)	PUNCTURE RESISTANCE (lbs)		CARBON BLACK CONTENT (%)	CARBON BLACK DISPERSION (rating)
1.	61.2	0.945	160.1	147.7	2.82	A2
2.	59.6	0.945	152.6	151.7	2.71	A1
3.	59.4	0.945	151.4	151.3		A2
4.	62.5		147.3	151.3		A3
5.	62.4		149.4	149.3		A1
6.	62.4		148.2			A2
7.	63.0		152.4			
8.	59.3		151.2			
9.	60.8		146.0			
10.	61.1		147.5			
AVG	61.2	0.945	150.5		2.77	A2

	YIELD STRENGTH (lb/in. width)		ELONGATION AT YIELD (%)		BREAK STRENGTH (lb/in. width)		ELONGATION AT BREAK (%)	
	MD	TD	MD	TD	MD	TD	MD	TD
1.	184.0	173.0	19.1	15.3	226.0	202.0	451	443
2.	178.0	178.0	17.9	19.0	213.0	221.0	414	469
3.	181.0	177.0	18.5	16.8	186.6	199.0	358	421
4.	181.0	176.0	18.7	15.3	211.0	199.0	416	422
5.	182.0	182.0	19.9	16.7	203.0	136.7	400	82
AVG	181.2	177.2	18.8	16.6	207.9	191.5	408	367

JULY 1997

977-5116

SUMMARY OF TEXTURED GEOMEMBRANE CONFORMANCE TEST RESULTS

LAWRENCE LIVERMORE NATIONAL LAB
PIT 6 LANDFILL CLOSURE
CALIFORNIA

ROLL DESIGNATION	Reference Value	1076	1076R(4)	1092	1106	1106R(4)	-	-	-	-
THICKNESS (mils) ASTM D 5994	>=60	64.4	-	61.2	60.3	-	-	-	-	-
DENSITY (g/cc) ASTM D 1505	0.936-0.950	0.946	-	0.945	0.944	-	-	-	-	-
CARBON BLACK CONTENT (%) ASTM D 1603	2 - 3	2.81	-	2.77	2.43	-	-	-	-	-
CARBON BLACK DISPERSION (1) ASTM D 3015	A1 or A2	A2	A2	A2	A3	A2	-	-	-	-
PUNCTURE RESISTANCE (lbs) ASTM D 4833	>=108	158.6	-	150.5	141.8	-	-	-	-	-
STRENGTH AT YIELD (ppi)	>=132	189.8	-	181.2	156.4	-	-	-	-	-
MD/TD (2)(3) ASTM D 638	>=132	188.1	-	177.2	161.8	-	-	-	-	-
STRENGTH AT BREAK (ppi)	>=75	222.3	-	207.9	190.6	-	-	-	-	-
MD/TD (2) ASTM D 638	>=75	196.7	-	191.5	178.7	-	-	-	-	-
ELONGATION AT YIELD (%)	>=12	21.2	-	18.8	18.8	-	-	-	-	-
MD/TD (2) ASTM D 638	>=12	19.3	-	16.6	16.6	-	-	-	-	-
ELONGATION AT BREAK (%)	>=120	429	-	408	407	-	-	-	-	-
MD/TD (2) ASTM D 638	>=120	371	-	367	401	-	-	-	-	-

(1) Carbon black dispersion was tested according to ASTM D3015 and reported according to the ASTM D2663 dispersion classification chart.

5116GM

(2) MD/TD corresponds to Machine Direction / Transverse Direction.
(3) Strength at Break was Modified per RFI#4; however Strength at Yield was not modified to reflect textured HDPE propertied.
(4) R denotes a repeated test. Roll # 1106 was accepted for Carbon Black Dispersion properties based on the results of the retest.

July 1997 977-5116

GEOMEMBRANE TEST RESULTS

PROJECT NUMBER: 977-5116
PROJECT NAME: LLNL / PIT 6 CLOSURE / CA
ROLL DESIGNATION: 1076

	THICKNESS (mils)	DENSITY (g/cc)	PUNCTURE RESISTANCE (lbs)		CARBON BLACK CONTENT (%)	CARBON BLACK DISPERSION (rating)
1.	65.1	0.946	159.0	157.2	2.89	A1
2.	66.8	0.946	159.5	157.9	2.73	A1
3.	64.8	0.945	160.6	162.7		B4
4.	61.2		156.4	161.6		B4
5.	63.9		154.5	156.6		A3
6.	64.4		154.9			A1
7.	64.7		155.4			
8.	64.5		159.4			
9.	65.1		160.5			
10.	63.7		162.4			
AVG	64.4	0.946	158.6		2.81	A2

	YIELD STRENGTH (lb/in. width)		ELONGATION AT YIELD (%)		BREAK STRENGTH (lb/in. width)		ELONGATION AT BREAK (%)	
	MD	TD	MD	TD	MD	TD	MD	TD
1.	189.1	186.0	20.8	18.7	240.8	131.7	483	53
2.	193.4	186.5	21.1	18.5	190.0	214.2	353	462
3.	189.9	191.1	21.1	19.1	230.5	211.0	452	445
4.	186.3	190.3	21.8	19.1	208.8	227.2	381	484
5.	190.1	186.5	21.3	21.1	241.2	199.6	476	412
AVG	189.8	188.1	21.2	19.3	222.3	196.7	429	371

JULY 1997

977-5116

SUMMARY OF GEOSYNTHETIC CLAY LINER CONFORMANCE TEST RESULTS

LAWRENCE LIVERMORE NATIONAL LAB
PIT 6 LANDFILL CLOSURE
CALIFORNIA

ROLL NO.	Reference Value	1076	1076R	1092	1106	-	-	-	-	-	-
BENTONITE CONTENT (lbs/ft²) (1) ASTM D 5993	1	1.1	-	1.0	1.1	-	-	-	-	-	-
FREE SWELL (ml) ASTM D 5890	24	20	24	27	26	-	-	-	-	-	-

(1) Based on 7% moisture content.

5116GCL

July 1997

977-5116

GEOSYNTHETIC CLAY LINER

Project Name: LLNL / PIT 6 LF CLOSURE / CA

ROLL DESIGNATION: 1076

	BENTONITE CONTENT (lbs/ft²)	FREE SWELL (ml)
1.	1.2	20
2.	1.1	
3.	1.1	
4.	1.0	
5.	1.2	
AVG	1.1	20

ROLL DESIGNATION: 1076 R

	BENTONITE CONTENT (lbs/ft²)	FREE SWELL (ml)
1.	-	24
2.	-	
3.	-	
4.	-	
5.	-	
AVG	0.0	24

Golder Construction Services, Inc.

July 1997 977-5116

GEOSYNTHETIC CLAY LINER

Project Name: LLNL / PIT 6 LF CLOSURE / CA

ROLL DESIGNATION: 1092

	BENTONITE CONTENT (lbs/ft²)	FREE SWELL (ml)
1.	1.1	27
2.	1.0	
3.	1.0	
4.	0.9	
5.	1.1	
AVG	1.0	27

ROLL DESIGNATION: 1106

	BENTONITE CONTENT (lbs/ft²)	FREE SWELL (ml)
1.	1.1	26
2.	1.0	
3.	1.0	
4.	1.1	
5.	1.1	
AVG	1.1	26

Appendix I.3.3

Geocomposite

JULY 1997

977-5116

SUMMARY OF GEOCOMPOSITE CONFORMANCE TEST RESULTS

LAWRENCE LIVERMORE NATIONAL LAB
PIT 6 LANDFILL CLOSURE
CALIFORNIA

ROLL NO.	Reference Value	1007-1824	1007-1842	1007-2001	1007-1842R						
ADHESION STRENGTH (ppi)	1.0 ppi	1.2	0.8	3.0	1.6	-	-	-	-	-	-
T/B (1) ASTM F 904	1.0 ppi	0.9	0.9	2.4	1.3	-	-	-	-	-	-
TRANSMISSIVITY (m^2/sec) ASTM D 4716	1.4 gpm/ft	2.56E-04	2.91E-04	6.03E-04	-	-	-	-	-	-	-

(1) T/B corresponds to Top Fabric and Bottom Fabric.

5116GC

July 1997 977-5116

GEOCOMPOSITE TEST RESULTS

PROJECT NAME: LLNL / PIT 6 LF CLOSURE / CA
PROJECT NUMBER: 977-5116

ROLL DESIGNATION: 10071824

	ADHESION STRENGTH (ppi) TOP	ADHESION STRENGTH (ppi) BOTTOM	TRANSMISSIVITY (m^2/sec)
1.	1.2	0.7	2.23E-04
2.	1.0	0.6	3.35E-04
3.	1.0	1.2	2.10E-04
4.	0.5	0.7	
5.	2.4	1.4	
AVG	1.2	0.9	2.56E-04

ROLL DESIGNATION: 10072001

	ADHESION STRENGTH (ppi) TOP	ADHESION STRENGTH (ppi) BOTTOM	TRANSMISSIVITY (m^2/sec)
1.	3.7	4.2	6.14E-04
2.	5.1	3.0	5.70E-04
3.	1.6	1.7	6.26E-04
4.	1.4	1.9	
5.	3.0	1.4	
AVG	3.0	2.4	6.03E-04

July 1997 977-5116

GEOCOMPOSITE TEST RESULTS

PROJECT NAME: LLNL / PIT 6 LF CLOSURE / CA
PROJECT NUMBER: 977-5116

ROLL DESIGNATION: 10071842

	ADHESION STRENGTH (ppi) TOP	ADHESION STRENGTH (ppi) BOTTOM	TRANSMISSIVITY (m^2/sec)
1.	0.7	0.6	2.23E-04
2.	1.2	1.2	3.67E-04
3.	0.9	1.2	2.82E-04
4.	1.1	1.1	
5.	0.3	0.4	
AVG	0.8	0.9	2.91E-04

ROLL DESIGNATION: 10071842R

	ADHESION STRENGTH (ppi) TOP	ADHESION STRENGTH (ppi) BOTTOM	TRANSMISSIVITY (m^2/sec)
1.	2.4	1.4	-
2.	2.3	1.6	-
3.	1.5	1.6	-
4.	0.8	1.1	
5.	0.8	0.7	
AVG	1.6	1.3	0.00E+00

Appendix I.3.4

Geotextile

JULY 1997

977-5116

SUMMARY OF GEOTEXTILE CONFORMANCE TEST RESULTS

LAWRENCE LIVERMORE NATIONAL LAB
PIT 6 LANDFILL CLOSURE
CALIFORNIA

ROLL DESIGNATION	REFERENCE VALUE	5021011	5021175	7005799	-	-	-	-	-	-	-
MASS/UNIT AREA (oz/yd²) ASTM D 5261	8 oz/yd²	8.9	11.3	8.5	-	-	-	-	-	-	-
APPARENT OPENING SIZE (mm)		0.168	0.168	0.193	-	-	-	-	-	-	-
(U.S. SIEVE NO.) ASTM D 4751	> = 70	80	80	70	-	-	-	-	-	-	-

5116GT

July 1997 977-5116

GEOTEXTILE TEST RESULTS

PROJECT NUMBER: 977-5116
PROJECT NAME: LLNL / PIT 6 LF CLOSURE / CA

ROLL DESIGNATION: 5021011

	MASS PER UNIT AREA (oz/yd²)	APPARENT OPENING SIZE (mm)
1.	9.22	0.180
2.	9.10	0.180
3.	8.29	0.150
4.	9.11	0.150
5.	9.39	0.180
6.	8.70	
7.	8.44	AVG 0.168
8.	9.10	
9.	9.12	EQUIVALENT SIEVE SIZE
10.	8.03	
AVG	8.9	80

ROLL DESIGNATION: 5021175

	MASS PER UNIT AREA (oz/yd²)	APPARENT OPENING SIZE (mm)
1.	9.55	0.180
2.	10.47	0.180
3.	10.94	0.150
4.	11.69	0.180
5.	11.77	0.150
6.	12.57	
7.	12.59	AVG 0.168
8.	12.19	
9.	10.71	EQUIVALENT SIEVE SIZE
10.	10.98	
AVG	11.3	80

August 1997 977-5116

GEOTEXTILE TEST RESULTS

PROJECT NUMBER: 977-5116
PROJECT NAME: LLNL / PIT 6 LF CLOSURE / CA

ROLL DESIGNATION: 7005799

	MASS PER UNIT AREA (oz/yd²)	APPARENT OPENING SIZE (mm)
1.	8.34	0.180
2.	8.42	0.180
3.	7.52	0.212
4.	8.73	0.180
5.	8.89	0.212
6.	7.86	
7.	8.30	AVG 0.193
8.	9.04	
9.	8.23	EQUIVALENT SIEVE SIZE
10.	9.23	
AVG	8.5	70

ROLL DESIGNATION:

	MASS PER UNIT AREA (oz/yd²)	APPARENT OPENING SIZE (mm)
1.	-	-
2.	-	-
3.	-	-
4.	-	-
5.	-	-
6.	-	
7.	-	AVG 0.000
8.	-	
9.	-	EQUIVALENT SIEVE SIZE
10.	-	
AVG	0.0	-

Appendix I.4

GundSeal® Installation Reports

Appendix I.4.1

Soil Acceptance Certificate

GCS
Golder Construction Services, Inc.

CERTIFICATE OF ACCEPTANCE OF SOIL SURFACE

COMPANY: GSE Lining Technology, Inc.
19103 Gundle Road
Houston, Texas 77073

LOCATION: Livermore, CA
PROJECT: LLNL/Site 300 - Pit 6
OWNER: Lawrence Livermore

I, the Undersigned, the duly authorized representative of GSE do hereby accept the area of soil surface bound by 254 feet east of the west end of the landfill cover to the east end, covering the entire area north to south. GSE shall be responsible for maintaining its integrity and suitability in accordance with the project specifications from this date to the completion of the installation.

Howard Myers	Howard Myers	GSE SUPERVISOR	7-19-97
NAME	SIGNATURE	TITLE	DATE

Harry Benstead	Harry Benstead	LLNL CM	7-21-97
NAME	SIGNATURE	TITLE	DATE

Nancy Evans	Nancy Evans	GCS CQA	7-19-97
NAME	SIGNATURE	TITLE	DATE

GCS
Golder Construction Services, Inc.

CERTIFICATE OF ACCEPTANCE OF SOIL SURFACE

COMPANY: GSE Lining Technology, Inc.
19103 Gundle Road
Houston, Texas 77073

LOCATION: Livermore, CA
PROJECT: LLNL/Site 300 - Pit 6
OWNER: Lawrence Livermore

I, the Undersigned, the duly authorized representative of GSE do hereby accept the area of soil surface bound by 168 feet east of the west end of the landfill cover to 254 feet east, covering the entire area north to south. GSE shall be responsible for maintaining its integrity and suitability in accordance with the project specifications from this date to the completion of the installation.

Howard Myers	Howard Myers	GSE SUPERVISOR	7-18-97
NAME	SIGNATURE	TITLE	DATE

Harry Benstead	Harry Benstead	LLNL CM	7/18/97
NAME	SIGNATURE	TITLE	DATE

Nancy Evans	Nancy Evans	GCS CQA	7-18-97
NAME	SIGNATURE	TITLE	DATE

GCS
Golder Construction Services, Inc.

CERTIFICATE OF ACCEPTANCE OF SOIL SURFACE

COMPANY: GSE Lining Technology, Inc.
19103 Gundle Road
Houston, Texas 77073

LOCATION: Livermore, CA
PROJECT: LLNL/Site 300 - Pit 6
OWNER: Lawrence Livermore

I, the Undersigned, the duly authorized representative of GSE do hereby accept the area of soil surface bound by 82 feet east of the west end of the landfill cover to 168 feet east, covering the entire area north to south. GSE shall be responsible for maintaining its integrity and suitability in accordance with the project specifications from this date to the completion of the installation.

Howard Myers	Howard Myers	GSE SUPERVISOR	7-17-97
NAME	SIGNATURE	TITLE	DATE

Harry Benstead	Harry Benstead	LLNL CM	7-17-97
NAME	SIGNATURE	TITLE	DATE

Nancy Evans	Nancy Evans	GCS CQA	7-17-97
NAME	SIGNATURE	TITLE	DATE

GCS
Golder Construction Services, Inc.

CERTIFICATE OF ACCEPTANCE OF SOIL SURFACE

COMPANY: GSE Lining Technology, Inc.
19103 Gundle Road
Houston, Texas 77073

LOCATION: Livermore, CA
PROJECT: LLNL/Site 300 - Pit 6
OWNER: Lawrence Livermore

I, the Undersigned, the duly authorized representative of GSE do hereby accept the area of soil surface bound by the west end of the landfill cover, 82 feet east covering the entire area north to south. GSE shall be responsible for maintaining its integrity and suitability in accordance with the project specifications from this date to the completion of the installation.

NAME	SIGNATURE	TITLE	DATE
Howard Myers	Howard Myers	GSE SUPERVISOR	7/16/97
Harry Benstead	Harry Benstead	LLNL CM	7/16/97
Nancy Evans	Nancy Evans	GCS CQA	7-16-97

Appendix I.4.2

Deployment Summary

GUNDSEAL
DEPLOYMENT OBSERVATION SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Panel Number (1)	Roll Number	Date Deployed	Length (feet)	Width (feet)	Ave. Sheet Thickness (mils)	Monitor (2)
P-01	B21021106	7/15/97	171	17.25	62	NE
P-02	B21021076	7/15/97	136	17.25	62	NE
P-03	B21021092	7/15/97	165	17.25	62	NE
P-04	B21021077	7/15/97	171	17.25	62	NE
P-05	B21021078	7/15/97	170	17.25	62	NE
P-06	B21021080	7/15/97	172	17.25	62	NE
P-07	B21021076	7/15/97	15	17.25	62	NE
P-08	B21021085	7/15/97	169	17.25	62	NE
P-09	B21021087	7/15/97	172	17.25	62	NE
P-10	B21021076	7/15/97	15	17.25	61	NE
P-11	B21021086	7/15/97	170	17.25	61	NE
P-12	B21021069	7/15/97	170	17.25	61	NE
P-13	B21021093	7/16/97	15	17.25	61	NE
P-14	B21021093	7/16/97	155	17.25	61	NE
P-15	B21021090	7/16/97	169	17.25	61	NE
P-16	B21021091	7/16/97	168	17.25	62	NE
P-17	B21021070	7/16/97	170	17.25	62	NE
P-18	B21021108	7/16/97	30	17.25	62	NE
P-19	B21021108	7/16/97	18	17.25	62	NE
P-20	B21021089	7/16/97	170	17.25	61	NE
P-21	B21021107	7/16/97	168	17.25	62	NE
P-22	B21021108	7/16/97	20	17.25	62	NE
P-23	B21021071	7/16/97	171	17.25	61	NE
P-24	B21021074	7/16/97	168	17.25	61	NE
P-25	B21021084	7/16/97	168	17.25	61	NE
P-26	B21021073	7/16/97	173	17.25	61	NE
P-27	B21021083	7/16/97	16	17.25	61	NE
P-28	B21021083	7/16/97	10	17.25	61	NE
P-29	B21021083	7/17/97	144	17.25	61	NE
P-30	B21021068	7/17/97	174	17.25	62	NE
P-31	B21021072	7/17/97	170	17.25	61	NE
P-32	B21021088	7/17/97	166	17.25	61	NE
P-33	B21021075	7/17/97	169	17.25	61	NE
P-34	B21021094	7/17/97	168	17.25	61	NE
P-35	B21021096	7/17/97	35	17.25	61	NE
P-36	B21021096	7/17/97	18	17.25	60	NE
P-37	B21021096	7/17/97	17	17.25	60	NE
P-38	B21021097	7/17/97	170	17.25	61	NE
P-39	B21021095	7/17/97	168	17.25	61	NE
P-40	B21021102	7/17/97	173	17.25	61	NE
P-41	B21021109	7/17/97	172	17.25	61	NE
P-42	B21021096	7/17/97	12	17.25	61	NE
P-43	B21021096	7/17/97	12	17.25	62	NE
P-44	B21021103	7/18/97	166	17.25	63	NE

GUNDSEAL
DEPLOYMENT OBSERVATION SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Panel Number (1)	Roll Number	Date Deployed	Length (feet)	Width (feet)	Ave. Sheet Thickness (mils)	Monitor (2)
P-45	B21021098	7/18/97	170	17.25	62	NE
P-46	B21021096	7/18/97	20	17.25	62	NE
P-47	B21021096	7/18/97	29	17.25	61	NE
P-48	B21021096	7/18/97	27	17.25	61	NE
P-49	B21021110	7/18/97	32	17.25	62	NE
P-50	B21021110	7/18/97	36	17.25	61	NE
P-51	B21021110	7/18/97	20	17.25	61	NE
P-52	B21021099	7/18/97	37	17.25	61	NE
P-53	B21021099	7/18/97	24	17.25	61	NE
P-54	B21021099	7/18/97	31	17.25	61	NE
P-55	B21021099	7/18/97	31	17.25	61	NE
P-56	B21021099	7/18/97	38	17.25	61	NE
P-57	B21021104	7/18/97	171	17.25	61	NE
P-58	B21021101	7/18/97	171	17.25	60	NE
P-59	B21021100	7/18/97	36	17.25	61	NE
P-60	B21021100	7/18/97	36	17.25	61	NE
P-61	B21021100	7/18/97	35	17.25	61	NE
P-62	B21021100	7/18/97	34	17.25	61	NE
P-63	B21021100	7/18/97	13	17.25	61	NE
P-64	B21021105	7/18/97	34	17.25	60	NE
P-65	B21021105	7/18/97	35	17.25	61	NE
P-66	B21021105	7/18/97	34	17.25	62	NE
P-67	B21021105	7/18/97	32	17.25	62	NE
P-68	B21021082	7/18/97	178	17.25	61	NE
P-69	B21021079	7/18/97	62	17.25	61	NE
P-70	B21021105	7/18/97	36	17.25	62	NE
P-71	B21021079	7/18/97	26	17.25	61	NE

Notes:

(1) A prefix of P indicates a panel of GundSeal

(2) NE = Nancy Evans

Appendix I.4.3

Trial Seam Summary

GUNDSEAL
TRIAL SEAM OBSERVATION SUMMARY
LAWRENCE LIVERMONE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Trial Seam Number (1)	Date	Machine Number	Seam Type (2)	Tech. (3)	Machine Temp. (F)	Trial Seam Test Observations (ppi)				(4)	Pass/ Fail	Monitor (5)
						Inside Track		Outside Track				
						Peel	Peel	Peel	Peel	Shear		
TS-01	7/15/97	#1165	Fus	CS	430	125	136	125	129	193	Pass	NE
TS-02	7/15/97	#1009	Fus	KS	430	114	131	119	115	145	Pass	NE
TS-03	7/15/97	#1009	Fus	KS	430	134	123	132	126	154	Pass	NE
TS-04	7/15/97	#1165	Fus	CS	430	138	135	126	132	154	Pass	NE
TS-05	7/16/97	#1009	Fus	KS	430	139	138	145	140	184	Pass	NE
TS-06	7/16/97	#1165	Fus	CS	430	142	143	138	142	194	Pass	NE
TS-07	7/16/97	#1165	Fus	CS	430	134	136	137	147	176	Pass	NE
TS-08	7/16/97	#1009	Fus	KS	430	140	136	126	115	166	Pass	NE
TS-09	7/16/97	#1165	Fus	CS	430	109	113	130	138	153	Pass	NE
TS-10	7/17/97	#1009	Fus	KS	430	162	168	142	143	212	Pass	NE
TS-11	7/17/97	#1165	Fus	CS	430	144	136	128	151	186	Pass	NE
TS-12	7/17/97	#1009	Fus	KS	430	129	135	119	111	151	Pass	NE
TS-13	7/17/97	#1165	Fus	CS	430	124	136	116	128	145	Pass	NE
TS-14	7/18/97	#1009	Fus	KS	430	157	155	144	134	206	Pass	NE
TS-15	7/18/97	#1165	Fus	CS	430	133	153	154	152	208	Pass	NE
TS-16	7/18/97	#1165	Fus	CS	430	132	147	132	142	175	Pass	NE
TS-17	7/18/97	#1009	Fus	KS	430	153	130	143	144	172	Pass	NE
TS-18	7/19/97	#281	Ext	KS	270	94	102	---	---	179	Pass	NE
TS-19	7/19/97	#281	Ext	KS	270	144	148	---	---	182	Pass	NE
TS-20	7/21/97	#281	Ext	KS	270	109	120	---	---	195	Pass	NE
TS-21	7/21/97	#281	Ext	KS	270	125	128	---	---	178	Pass	NE
TS-22	7/21/97	#88	Ext	AV	265	122	99	---	---	170	Pass	NE
TS-23	7/22/97	#281	Ext	KS	270	80	82	---	---	166	Pass	NE
TS-24	7/22/97	#88	Ext	AV	265	95	118	---	---	168	Pass	NE

Notes:

(1) A prefix of TS indicates a trial seam

(2) Fus = Fusion weld, Ext = Extrusion weld

(3) Technicians: KS = Keooudone Soundara
CS = Christine Soundara
AV = Anouvong Vongphachanh

(4) See Figure 3 and 4 for illustrations of pass and failure modes.

(5) NE = Nancy Evans

Appendix I.4.4

Seaming Summary

GUNDSEAL
SEAMING OBSERVATION SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Seam Number (1)	Date Welded	Seam Length (feet)	Seam Type (2)	Machine Number	Machine Temp. (F)	Tech. (3)	Destructive Test No. (4)	Monitor (5)
P-01/03	7/15/97	76	Fus	#1165	430	CS		NE
P-02/04	7/15/97	135	Fus	#1165	430	CS		NE
P-03/07	7/15/97	5	Fus	#1165	430	CS		NE
P-04/07	7/15/97	10	Fus	#1165	430	CS		NE
P-04/06	7/15/97	157	Fus	#1165	430	CS		NE
P-06/09	7/15/97	164	Fus	#1165	430	CS	DS-01	NE
P-09/12	7/15/97	160	Fus	#1165	430	CS		NE
P-01/03	7/15/97	75	Fus	#1009	430	KS		NE
P-01/04	7/15/97	14	Fus	#1009	430	KS		NE
P-03/05	7/15/97	162	Fus	#1009	430	KS		NE
P-05/08	7/15/97	164	Fus	#1009	430	KS		NE
P-07/10	7/15/97	10	Fus	#1009	430	KS	DS-02	NE
P-08/11	7/15/97	161	Fus	#1009	430	KS		NE
P-10/11	7/15/97	6	Fus	#1009	430	KS		NE
P-10/13	7/15/97	6	Fus	#1009	430	KS		NE
P-09/13	7/15/97	6	Fus	#1009	430	KS		NE
P-12/15	7/16/97	162	Fus	#1165	430	CS		NE
P-14/16	7/16/97	146	Fus	#1165	430	CS	DS-03	NE
P-15/17	7/16/97	164	Fus	#1165	430	CS		NE
P-17/21	7/16/97	160	Fus	#1165	430	CS		NE
P-21/24	7/16/97	161	Fus	#1165	430	CS	DS-05	NE
P-24/26	7/16/97	166	Fus	#1165	430	CS		NE
P-11/14	7/16/97	150	Fus	#1009	430	KS		NE
P-11/18	7/16/97	15	Fus	#1009	430	KS		NE
P-13/18	7/16/97	13	Fus	#1009	430	KS		NE
P-16/18	7/16/97	17	Fus	#1009	430	KS		NE
P-18/19	7/16/97	13	Fus	#1009	430	KS		NE
P-16/20	7/16/97	161	Fus	#1009	430	KS	DS-04	NE
P-19/20	7/16/97	5	Fus	#1009	430	KS		NE
P-19/22	7/16/97	10	Fus	#1009	430	KS		NE
P-17/22	7/16/97	7	Fus	#1009	430	KS		NE
P-20/23	7/16/97	162	Fus	#1009	430	KS		NE
P-23/25	7/16/97	162	Fus	#1009	430	KS		NE
P-22/27	7/16/97	13	Fus	#1009	430	KS		NE
P-27/28	7/16/97	8	Fus	#1009	430	KS		NE
P-26/30	7/17/97	168	Fus	#1165	430	CS	DS-07	NE
P-30/32	7/17/97	157	Fus	#1165	430	CS		NE
P-32/34	7/17/97	162	Fus	#1165	430	CS		NE
P-37/38	7/17/97	7	Fus	#1165	430	CS		NE
P-34/38	7/17/97	163	Fus	#1165	430	CS	DS-08	NE
P-38/40	7/17/97	165	Fus	#1165	430	CS		NE
P-25/29	7/17/97	142	Fus	#1009	430	KS	DS-06	NE
P-29/31	7/17/97	138	Fus	#1009	430	KS		NE
P-25/35	7/17/97	21	Fus	#1009	430	KS		NE

GUNDSEAL
SEAMING OBSERVATION SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Seam Number (1)	Date Welded	Seam Length (feet)	Seam Type (2)	Machine Number	Machine Temp. (F)	Tech. (3)	Destructive Test No. (4)	Monitor (5)
P-28/35	7/17/97	7	Fus	#1009	430	KS		NE
P-31/35	7/17/97	30	Fus	#1009	430	KS		NE
P-30/36	7/17/97	13	Fus	#1009	430	KS		NE
P-36/37	7/17/97	15	Fus	#1009	430	KS		NE
P-33/39	7/17/97	164	Fus	#1009	430	KS		NE
P-39/41	7/17/97	168	Fus	#1009	430	KS	DS-09	NE
P-40/45	7/18/97	164	Fus	#1165	430	CS		NE
P-41/51	7/18/97	7	Fus	#1165	430	CS		NE
P-43/51	7/18/97	12	Fus	#1165	430	CS		NE
P-45/58	7/18/97	165	Fus	#1165	430	CS	DS-10	NE
P-51/63	7/18/97	7	Fus	#1165	430	CS		NE
P-58/68	7/18/97	111	Fus	#1165	430	CS		NE
P-41/44	7/18/97	162	Fus	#1009	430	KS		NE
P-46/47	7/18/97	14	Fus	#1009	430	KS		NE
P-47/48	7/18/97	19	Fus	#1009	430	KS		NE
P-48/49	7/18/97	23	Fus	#1009	430	KS		NE
P-49/50	7/18/97	28	Fus	#1009	430	KS		NE
P-50/52	7/18/97	32	Fus	#1009	430	KS		NE
P-52/53	7/18/97	20	Fus	#1009	430	KS		NE
P-53/54	7/18/97	23	Fus	#1009	430	KS		NE
P-54/55	7/18/97	27	Fus	#1009	430	KS		NE
P-55/56	7/18/97	31	Fus	#1009	430	KS	DS-11	NE
P-44/57	7/18/97	157	Fus	#1009	430	KS		NE
P-51/57	7/18/97	10	Fus	#1009	430	KS		NE
P-56/59	7/18/97	32	Fus	#1009	430	KS		NE
P-59/60	7/18/97	31	Fus	#1009	430	KS		NE
P-60/61	7/18/97	31	Fus	#1009	430	KS		NE
P-61/62	7/18/97	30	Fus	#1009	430	KS		NE
P-62/64	7/18/97	30	Fus	#1009	430	KS		NE
P-64/65	7/18/97	29	Fus	#1009	430	KS		NE
P-65/66	7/18/97	29	Fus	#1009	430	KS		NE
P-66/67	7/18/97	28	Fus	#1009	430	KS		NE
P-57/68	7/18/97	53	Fus	#1009	430	KS		NE
P-63/68	7/18/97	10	Fus	#1009	430	KS	DS-12	NE
P-58/69	7/18/97	53	Fus	#1009	430	KS		NE
P-01/02	7/19/97	17	Ext	#281	270	KS		NE
P-05/07	7/19/97	17	Ext	#281	270	KS		NE
P-06/07	7/19/97	17	Ext	#281	270	KS	DS-13	NE
P-08/10	7/19/97	17	Ext	#281	270	KS		NE
P-09/10	7/19/97	17	Ext	#281	270	KS		NE
P-11/13	7/19/97	17	Ext	#281	270	KS		NE
P-12/13	7/19/97	17	Ext	#281	270	KS		NE
P-15/18	7/19/97	17	Ext	#281	270	KS		NE
P-14/18	7/19/97	17	Ext	#281	270	KS		NE

GUNDSEAL
SEAMING OBSERVATION SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Seam Number (1)	Date Welded	Seam Length (feet)	Seam Type (2)	Machine Number	Machine Temp. (F)	Tech. (3)	Destructive Test No. (4)	Monitor (5)
P-16/19	7/19/97	17	Ext	#281	270	KS		NE
P-17/19	7/19/97	17	Ext	#281	270	KS		NE
P-21/22	7/19/97	17	Ext	#281	270	KS		NE
P-20/22	7/19/97	17	Ext	#281	270	KS		NE
P-24/27	7/21/97	17	Ext	#281	270	KS		NE
P-22/23	7/21/97	3	Ext	#281	270	KS		NE
P-23/27	7/21/97	17	Ext	#281	270	KS		NE
P-26/27	7/21/97	2	Ext	#281	270	KS		NE
P-25/27	7/21/97	2	Ext	#281	270	KS		NE
P-25/28	7/21/97	17	Ext	#281	270	KS		NE
P-30/35	7/21/97	17	Ext	#281	270	KS		NE
P-35/36	7/21/97	3	Ext	#281	270	KS		NE
P-29/35	7/21/97	17	Ext	#281	270	KS		NE
P-31/36	7/21/97	17	Ext	#281	270	KS		NE
P-32/36	7/21/97	17	Ext	#281	270	KS		NE
P-33/37	7/21/97	17	Ext	#281	270	KS		NE
P-34/37	7/21/97	17	Ext	#281	270	KS		NE
P-38/42	7/21/97	17	Ext	#281	270	KS		NE
P-39/42	7/21/97	17	Ext	#281	270	KS		NE
P-38/43	7/21/97	6	Ext	#281	270	KS		NE
P-42/43	7/21/97	1	Ext	#281	270	KS		NE
P-67/69	7/21/97	17	Ext	#281	270	KS		NE
P-66/69	7/21/97	13	Ext	#281	270	KS		NE
P-66/68	7/21/97	4	Ext	#281	270	KS		NE
P-68/69	7/21/97	17	Ext	#281	270	KS		NE
P-65/68	7/21/97	17	Ext	#281	270	KS		NE
P-64/68	7/21/97	17	Ext	#281	270	KS		NE
P-62/68	7/21/97	17	Ext	#281	270	KS		NE
P-61/68	7/21/97	17	Ext	#281	270	KS		NE
P-60/68	7/21/97	17	Ext	#281	270	KS		NE
P-59/68	7/21/97	17	Ext	#281	270	KS		NE
P-56/68	7/21/97	17	Ext	#281	270	KS		NE
P-55/68	7/21/97	17	Ext	#281	270	KS		NE
P-54/68	7/21/97	17	Ext	#281	270	KS		NE
P-53/68	7/21/97	17	Ext	#281	270	KS		NE
P-52/57	7/21/97	17	Ext	#281	270	KS		NE
P-50/57	7/21/97	17	Ext	#281	270	KS		NE
P-40/43	7/21/97	17	Ext	#88	265	AV		NE
P-41/43	7/21/97	17	Ext	#88	265	AV	DS-14	NE
P-44/51	7/21/97	17	Ext	#88	265	AV		NE
P-45/51	7/21/97	17	Ext	#88	265	AV		NE
P-45/63	7/21/97	2	Ext	#88	265	AV		NE
P-58/63	7/21/97	17	Ext	#88	265	AV		NE
P-57/63	7/21/97	17	Ext	#88	265	AV		NE

GUNDSEAL
SEAMING OBSERVATION SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Seam Number (1)	Date Welded	Seam Length (feet)	Seam Type (2)	Machine Number	Machine Temp. (F)	Tech. (3)	Destructive Test No. (4)	Monitor (5)
P-49/57	7/21/97	17	Ext	#88	265	AV		NE
P-48/57	7/21/97	6	Ext	#88	265	AV		NE
P-58/69	7/22/97	57	Ext	#88	265	AV		NE
P-67/70	7/22/97	14	Ext	#88	265	AV		NE
P-67/71	7/22/97	17	Ext	#88	265	AV		NE
P-48/57	7/22/97	13	Ext	#281	270	KS		NE
P-47/57	7/22/97	17	Ext	#281	270	KS	DS-15	NE
P-46/57	7/22/97	17	Ext	#281	270	KS		NE
P-70/71	7/22/97	15	Ext	#281	270	KS		NE
								NE

Notes:

(1) A prefix of P indicates a panel of GundSeal

(2) Fus = Fusion weld, Ext = Extrusion weld

(3) Technicians: KS = Keooudone Soundara
CS = Christine Soundara
AV = Anouvong Vongphachanh

(4) A prefix of DS indicates a destructive sample

(5) NE = Nancy Evans

Appendix I.4.5

Repair Summary

GUNDSEAL
REPAIR SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Repair Number	Date Located	Reason for Repair (1)	Seam or Panel Number (2)	Location (3)	Date Repaired	Date Tested
1A	7/15/97	BO	P-01/03	75' N. of SEOS	7/19/97	7/21/97
1B	7/15/97	BO	P-02/04	43' S. of NEOS	7/19/97	7/21/97
1C	7/15/97	BO	P-05/08	92' S. of NEOS	7/19/97	7/21/97
1D	7/15/97	BO	P-03/05	12' N. of SEOS	7/19/97	7/21/97
1E	7/16/97	DS-01	P-06/09	100' S. of NEOS	7/19/97	7/21/97
1F	7/16/97	DS-02	P-08/11	75' S. of NEOS	7/19/97	7/21/97
1G	7/16/97	BO	P-11/14	70' S. of NEOS	7/19/97	7/21/97
1H	7/16/97	BO	P-14/16	71' N. of SEOS	7/19/97	7/21/97
1J	7/16/97	BO	P-15/17	101' S. of NEOS	7/21/97	7/21/97
1K	7/16/97	DS-03	P-14/16	50' S. of NEOS	7/19/97	7/21/97
1L	7/16/97	DS-04	P-16/20	3' N. of SEOS	7/19/97	7/21/97
1M	7/16/97	BO	P-20/23	3' S. of NEOS	7/19/97	7/21/97
1N	7/16/97	BO	P-20/23	90' S. of NEOS	7/19/97	7/21/97
1P	7/16/97	BO	P-17/21	29' S. of NEOS	7/21/97	7/21/97
1Q	7/17/97	BO	P-24/26	25' S. of NEOS	7/21/97	7/21/97
1R	7/17/97	BO	P-31/33	34' N. of SEOS	7/21/97	7/22/97
1S	7/17/97	BO	P-31/33	39' N. of SEOS	7/21/97	7/22/97
1T	7/17/97	DS-05	P-21/24	25' S. of NEOS	7/21/97	7/21/97
1U	7/17/97	DS-06	P-25/29	125' S. of NEOS	7/21/97	7/21/97
1W	7/18/97	DS-07	P-26/30	5' N. of SEOS	7/21/97	7/21/97
1X	7/18/97	DS-08	P-34/38	125' S. of NEOS	7/21/97	7/21/97
2A	7/18/97	DS-09	P-39/41	50' S. of NEOS	7/21/97	7/22/97
2B	7/18/97	BO	P-38/40	25' S. of NEOS	7/21/97	7/21/97
2C	7/18/97	BO	P-38/40	40' S. of NEOS	7/21/97	7/21/97
2D	7/18/97	BO	P-33/39	71' N. of SEOS	7/21/97	7/22/97
2E	7/19/97	DS-10	P-45/58	75' S. of NEOS	7/21/97	7/21/97
2F	7/19/97	DS-11	P-55/56	15' W. of EEOS	7/21/97	7/22/97
2G	7/19/97	DS-12	P-63/68	8' S. of NEOS	7/21/97	7/22/97
2H	7/19/97	AT	P-38/40	78' S. of NEOS	7/21/97	7/21/97
2J	7/19/97	AT	P-38/40	154' S. of NEOS	7/21/97	7/21/97
2K	7/19/97	BO	P-44/57	113' S. of NEOS	7/21/97	7/22/97
2L	7/19/97	IO	P-44/57	132' S. of NEOS	7/21/97	7/22/97
2M	7/19/97	BO	P-44/57	137' S. of NEOS	7/21/97	7/22/97
2N	7/19/97	AT	P-45/58	92' S. of NEOS	7/21/97	7/21/97
2P	7/19/97	IO	P-02/04	Intersection with P-02/04	7/19/97	7/21/97
2Q	7/19/97	T	P-01/02	Intersection with P-04	7/19/97	7/21/97
2R	7/19/97	T	P-01/03	Intersection with P-04	7/19/97	7/21/97
2S	7/19/97	Ext	P-03/04	Entire seam width	7/19/97	7/21/97
2T	7/19/97	T	P-03/04	Intersection with P-07	7/19/97	7/21/97
2U	7/19/97	T	P-03/05	Intersection with P-07	7/19/97	7/21/97
2W	7/19/97	T	P-04/06	Intersection with P-07	7/19/97	7/21/97
2X	7/19/97	T	P-06/07	Intersection with P-09/10	7/19/97	7/21/97
3A	7/19/97	T	P-05/07	Intersection with P-08/10	7/19/97	7/21/97
3B	7/19/97	T	P-09/10	Intersection with P-13	7/19/97	7/21/97

GUNDSEAL
REPAIR SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Repair Number	Date Located	Reason for Repair (1)	Seam or Panel Number (2)	Location (3)	Date Repaired	Date Tested
3C	7/19/97	FS	P-10/11	Entire Seam	7/19/97	7/21/97
3D	7/19/97	T	P-09/12	Intersection with P-13	7/19/97	7/21/97
3E	7/19/97	T	P-11/13	Intersection with P-18	7/19/97	7/21/97
3F	7/19/97	T	P-12/13	Intersection with P-15/18	7/19/97	7/21/97
3G	7/19/97	AT	P-45/58	20' S. of NEOS	7/21/97	7/22/97
3H	7/19/97	T	P-14/18	Intersection with P-11	7/19/97	7/21/97
3J	7/19/97	T	P-14/18	Intersection with P-16	7/19/97	7/21/97
3K	7/19/97	T	P-16/18	Intersection with P-19	7/19/97	7/21/97
3L	7/19/97	T	P-15/18	Intersection with P-17/19	7/19/97	7/21/97
3M	7/19/97	T	P-19/20	Intersection with P-22	7/19/97	7/21/97
3N	7/19/97	T	P-17/19	Intersection with P-22	7/19/97	7/21/97
3P	7/19/97	T	P-17/21	Intersection with P-22	7/19/97	7/21/97
3Q	7/19/97	T	P-21/22	Intersection with P-24/27	7/19/97	7/21/97
3R	7/19/97	T	P-20/22	Intersection with P-23	7/19/97	7/21/97
3S	7/21/97	AT	P-04/06	At crest of anchor trench	7/19/97	7/21/97
3T	7/21/97	AT	P-06/09	At crest of anchor trench	7/19/97	7/21/97
3U	7/21/97	AT	P-09/12	At crest of anchor trench	7/19/97	7/21/97
3W	7/21/97	AT	P-01/03	At crest of anchor trench	7/19/97	7/21/97
3X	7/21/97	AT	P-03/05	At crest of anchor trench	7/19/97	7/21/97
4A	7/21/97	AT	P-05/08	At crest of anchor trench	7/19/97	7/21/97
4B	7/21/97	AT	P-08/11	At crest of anchor trench	7/19/97	7/21/97
4C	7/21/97	AT	P-11/14	At crest of anchor trench	7/19/97	7/21/97
4D	7/21/97	AT	P-14/16	At crest of anchor trench	7/19/97	7/21/97
4E	7/21/97	AT	P-16/20	At crest of anchor trench	7/19/97	7/21/97
4F	7/21/97	T	P-22/23	Intersection with P-27	7/21/97	7/21/97
4G	7/21/97	T	P-23/25	Intersection with P-27	7/21/97	7/21/97
4H	7/21/97	T	P-25/27	Intersection with P-28	7/21/97	7/21/97
4J	7/21/97	T	P-26/27	Intersection with P-28	7/21/97	7/21/97
4K	7/21/97	T	P-24/26	Intersection with P-27	7/21/97	7/21/97
4L	7/21/97	T	P-25/28	Intersection with P-35	7/21/97	7/21/97
4M	7/21/97	T	P-26/28	Intersection with P-35	7/21/97	7/21/97
4N	7/21/97	T	P-26/30	Intersection with P-35	7/21/97	7/21/97
4P	7/21/97	T	P-31/33	Intersection with P-36	7/21/97	7/21/97
4Q	7/21/97	T	P-30/35	Intersection with P-36	7/21/97	7/21/97
4R	7/21/97	T	P-30/32	Intersection with P-36	7/21/97	7/21/97
4S	7/21/97	T	P-25/29	Intersection with P-35	7/21/97	7/21/97
4T	7/21/97	T	P-29/31	Intersection with P-35	7/21/97	7/21/97
4U	7/21/97	T	P-33/36	Intersection with P-37	7/21/97	7/21/97
4W	7/21/97	T	P-32/34	Intersection with P-36/37	7/21/97	7/21/97
4X	7/21/97	T	P-34/37	Intersection with P-38	7/21/97	7/21/97
5A	7/21/97	T	P-37/38	Intersection with P-42	7/21/97	7/21/97
5B	7/21/97	T	P-33/37	Intersection with P-39/42	7/21/97	7/21/97
5C	7/21/97	T	P-39/41	Intersection with P-42	7/21/97	7/21/97
5D	7/21/97	T	P-41/42	Intersection with P-43	7/21/97	7/21/97

GUNDSEAL
REPAIR SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Repair Number	Date Located	Reason for Repair (1)	Seam or Panel Number (2)	Location (3)	Date Repaired	Date Tested
5E	7/21/97	T	P-38/40	Intersection with P-43	7/21/97	7/21/97
5F	7/21/97	T	P-40/41	Intersection with P-45/51	7/21/97	7/21/97
5G	7/21/97	T	P-41/43	Intersection with P-51	7/21/97	7/21/97
5H	7/21/97	AT	P-12/15	At crest of anchor trench	7/21/97	7/21/97
5J	7/21/97	AT	P-15/17	At crest of anchor trench	7/21/97	7/21/97
5K	7/21/97	AT	P-17/21	At crest of anchor trench	7/21/97	7/21/97
5L	7/21/97	AT	P-21/24	At crest of anchor trench	7/21/97	7/21/97
5M	7/21/97	AT	P-24/26	At crest of anchor trench	7/21/97	7/21/97
5N	7/21/97	AT	P-26/30	At crest of anchor trench	7/21/97	7/21/97
5P	7/21/97	AT	P-30/32	At crest of anchor trench	7/21/97	7/21/97
5Q	7/21/97	AT	P-32/34	At crest of anchor trench	7/21/97	7/21/97
5R	7/21/97	AT	P-34/38	At crest of anchor trench	7/21/97	7/21/97
5S	7/21/97	AT	P-38/40	At crest of anchor trench	7/21/97	7/21/97
5T	7/21/97	AT	P-40/45	At crest of anchor trench	7/21/97	7/21/97
5U	7/21/97	AT	P-45/58	At crest of anchor trench	7/21/97	7/21/97
5W	7/21/97	T	P-41/44	Intersection with P-51	7/21/97	7/21/97
5X	7/21/97	T	P-44/57	Intersection with P-51	7/21/97	7/21/97
6A	7/21/97	T	P-58/68	Intersection with P-69	7/21/97	7/21/97
6B	7/21/97	T	P-51/57	Intersection with P-63	7/21/97	7/21/97
6C	7/21/97	AT	P-51/63	2' N. of SEOS	7/21/97	7/21/97
6D	7/21/97	T	P-45/58	Intersection with P-63	7/21/97	7/21/97
6E	7/21/97	T	P-58/63	Intersection with P-68	7/21/97	7/21/97
6F	7/21/97	T	P-57/63	Intersection with P-68	7/21/97	7/21/97
6G	7/21/97	T	P-52/53	Intersection with P-68	7/21/97	7/22/97
6H	7/21/97	T	P-52/57	Intersection with P-68	7/21/97	7/22/97
6J	7/22/97	AT	P-23/25	At crest of anchor trench	7/22/97	7/22/97
6K	7/22/97	AT	P-25/29	At crest of anchor trench	7/22/97	7/22/97
6L	7/22/97	AT	P-29/31	At crest of anchor trench	7/22/97	7/22/97
6M	7/22/97	AT	P-31/33	At crest of anchor trench	7/22/97	7/22/97
6N	7/22/97	AT	P-33/39	At crest of anchor trench	7/22/97	7/22/97
6P	7/22/97	AT	P-39/41	At crest of anchor trench	7/22/97	7/22/97
6Q	7/22/97	AT	P-41/44	At crest of anchor trench	7/22/97	7/22/97
6R	7/22/97	AT	P-44/57	At crest of anchor trench	7/22/97	7/22/97
6S	7/22/97	AT	P-46/57	At crest of anchor trench	7/22/97	7/22/97
6T	7/22/97	AT	P-46/47	At crest of anchor trench	7/22/97	7/22/97
6U	7/22/97	AT	P-47/48	At crest of anchor trench	7/22/97	7/22/97
6W	7/22/97	AT	P-48/49	At crest of anchor trench	7/22/97	7/22/97
6X	7/22/97	AT	P-49/50	At crest of anchor trench	7/22/97	7/22/97
7A	7/22/97	AT	P-50/52	At crest of anchor trench	7/22/97	7/22/97
7B	7/22/97	AT	P-52/53	At crest of anchor trench	7/22/97	7/22/97
7C	7/22/97	AT	P-53/54	At crest of anchor trench	7/22/97	7/22/97
7D	7/22/97	AT	P-54/55	At crest of anchor trench	7/22/97	7/22/97
7E	7/22/97	AT	P-55/56	At crest of anchor trench	7/22/97	7/22/97
7F	7/22/97	AT	P-56/59	At crest of anchor trench	7/22/97	7/22/97

GUNDSEAL
REPAIR SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Repair Number	Date Located	Reason for Repair (1)	Seam or Panel Number (2)	Location (3)	Date Repaired	Date Tested
7G	7/22/97	AT	P-59/60	At crest of anchor trench	7/22/97	7/22/97
7H	7/22/97	AT	P-60/61	At crest of anchor trench	7/22/97	7/22/97
7J	7/22/97	AT	P-61/62	At crest of anchor trench	7/22/97	7/22/97
7K	7/22/97	DS-13	P-06/07	4' E. of WEOS	7/22/97	7/22/97
7L	7/22/97	DS-14	P-41/43	8' E. of WEOS	7/22/97	7/22/97
7M	7/22/97	DS-15	P-47/57	5' N. of SEOS	7/22/97	7/22/97
7N	7/22/97	AT	P-62/64	At crest of anchor trench	7/22/97	7/22/97
7P	7/22/97	AT	P-64/65	At crest of anchor trench	7/22/97	7/22/97
7Q	7/22/97	AT	P-65/66	At crest of anchor trench	7/22/97	7/22/97
7R	7/22/97	AT	P-66/67	At crest of anchor trench	7/22/97	7/22/97
7S	7/22/97	D	P-13	4' E. of WEOP, 3' S. of NEOP	7/22/97	7/22/97
7T	7/22/97	T	P-31/35	Intersection with P-36	7/21/97	7/21/97

Notes:

(1) BO = burn out; DS = destructive sample; Ext = extension of a panel; CAP = cap of a failed seam; T = intersection; AT = air pressure test; D = damage; IO = insuffient overlap

(2) A prefix of P indicates a panel of GundSeal

(3) SEOS = south end of seam; NEOS = north end of seam; WEOS = west end of seam; EEOS = east end of seam; NEOP = north end of panel

Appendix I.4.6

Non-Destructive Testing Summary

GUNDSEAL
NONDESTRUCTIVE TESTING SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Seam Number (1)	Date Tested	Air Test (2)	Tech. (3)	Section of Seam (4)		Monitor (5)
				From	To	
P-02/04	7/16/97	AT	CS	NEOS	1B	NE
P-01/04	7/16/97	AT	CS	NEOS	SEOS	NE
P-01/03	7/16/97	AT	CS	SEOS	1A	NE
P-02/04	7/16/97	AT	CS	1B	SEOS	NE
P-04/06	7/16/97	AT	CS	NEOS	SEOS	NE
P-04/07	7/16/97	AT	CS	NEOS	SEOS	NE
P-03/07	7/16/97	AT	CS	NEOS	SEOS	NE
P-03/05	7/16/97	AT	CS	NEOS	SEOS	NE
P-01/03	7/16/97	AT	CS	1A	SEOS	NE
P-05/08	7/16/97	AT	CS	SEOS	1C	NE
P-05/08	7/16/97	AT	CS	1C	NEOS	NE
P-06/09	7/16/97	AT	CS	NEOS	SEOS	NE
P-10/11	7/16/97	CAP	CS	NEOS	SEOS	NE
P-10/13	7/16/97	AT	CS	NEOS	SEOS	NE
P-09/13	7/16/97	AT	CS	NEOS	SEOS	NE
P-09/12	7/16/97	AT	CS	NEOS	SEOS	NE
P-08/11	7/16/97	AT	CS	NEOS	SEOS	NE
P-12/15	7/16/97	AT	CS	NEOS	SEOS	NE
P-13/18	7/16/97	AT	CS	NEOS	SEOS	NE
P-11/18	7/16/97	AT	CS	NEOS	SEOS	NE
P-16/18	7/16/97	AT	CS	NEOS	SEOS	NE
P-18/19	7/16/97	AT	CS	NEOS	SEOS	NE
P-11/14	7/16/97	AT	CS	SEOS	1G	NE
P-11/14	7/16/97	AT	CS	1G	NEOS	NE
P-14/16	7/16/97	AT	CS	SEOS	1H	NE
P-14/16	7/16/97	AT	CS	1H	NEOS	NE
P-17/21	7/16/97	AT	CS	NEOS	1P	NE
P-07/10	7/16/97	AT	CS	NEOS	SEOS	NE
P-37/38	7/17/97	AT	CS	NEOS	SEOS	NE
P-15/17	7/17/97	AT	CS	NEOS	1J	NE
P-17/22	7/17/97	AT	CS	NEOS	SEOS	NE
P-19/22	7/17/97	AT	CS	NEOS	SEOS	NE
P-19/20	7/17/97	AT	CS	NEOS	SEOS	NE
P-16/20	7/17/97	AT	CS	NEOS	SEOS	NE
P-17/21	7/17/97	AT	CS	1P	SEOS	NE
P-15/17	7/17/97	AT	CS	1J	SEOS	NE
P-21/24	7/17/97	AT	CS	NEOS	SEOS	NE
P-22/27	7/17/97	AT	CS	NEOS	SEOS	NE
P-24/26	7/17/97	AT	CS	NEOS	1Q	NE
P-24/26	7/17/97	AT	CS	1Q	SEOS	NE
P-26/30	7/17/97	AT	CS	NEOS	SEOS	NE
P-30/36	7/17/97	AT	CS	NEOS	SEOS	NE
P-30/32	7/17/97	AT	CS	NEOS	SEOS	NE
P-32/34	7/17/97	AT	CS	NEOS	SEOS	NE

GUNDSEAL
NONDESTRUCTIVE TESTING SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Seam Number (1)	Date Tested	Air Test (2)	Tech. (3)	Section of Seam (4)		Monitor (5)
				From	To	
P-34/38	7/17/97	AT	CS	NEOS	SEOS	NE
P-38/40	7/17/97	AT	CS	NEOS	2B	NE
P-41/42	7/17/97	AT	CS	NEOS	SEOS	NE
P-40/45	7/18/97	AT	CS	NEOS	SEOS	NE
P-38/40	7/18/97	AT	CS	2J	SEOS	NE
P-20/23	7/18/97	AT	CS	1N	SEOS	NE
P-20/23	7/18/97	AT	CS	1N	NEOS	NE
P-25/28	7/18/97	AT	CS	NEOS	SEOS	NE
P-27/28	7/18/97	AT	CS	NEOS	SEOS	NE
P-28/35	7/18/97	AT	CS	NEOS	SEOS	NE
P-25/35	7/18/97	AT	CS	NEOS	SEOS	NE
P-38/40	7/18/97	AT	CS	2B	2C	NE
P-31/35	7/18/97	AT	CS	NEOS	SEOS	NE
P-36/37	7/18/97	AT	CS	NEOS	SEOS	NE
P-37/42	7/18/97	AT	CS	NEOS	SEOS	NE
P-25/29	7/18/97	AT	CS	NEOS	SEOS	NE
P-29/31	7/18/97	AT	CS	NEOS	SEOS	NE
P-31/33	7/18/97	AT	CS	1R	SEOS	NE
P-31/33	7/18/97	AT	CS	1R	1S	NE
P-31/33	7/18/97	AT	CS	NEOS	1S	NE
P-33/39	7/18/97	AT	CS	2D	SEOS	NE
P-33/39	7/18/97	AT	CS	NEOS	2D	NE
P-39/41	7/18/97	AT	CS	NEOS	SEOS	NE
P-41/44	7/18/97	AT	CS	NEOS	SEOS	NE
P-41/51	7/18/97	AT	CS	NEOS	SEOS	NE
P-43/51	7/18/97	AT	CS	NEOS	SEOS	NE
P-46/47	7/18/97	AT	CS	EEOS	WEOS	NE
P-47/48	7/18/97	AT	CS	EEOS	WEOS	NE
P-48/49	7/18/97	AT	CS	EEOS	WEOS	NE
P-49/50	7/18/97	AT	CS	EEOS	WEOS	NE
P-50/52	7/18/97	AT	CS	EEOS	WEOS	NE
P-52/53	7/18/97	AT	CS	EEOS	WEOS	NE
P-53/54	7/18/97	AT	CS	EEOS	WEOS	NE
P-54/55	7/18/97	AT	CS	EEOS	WEOS	NE
P-55/56	7/18/97	AT	CS	EEOS	WEOS	NE
P-56/59	7/18/97	AT	CS	EEOS	WEOS	NE
P-59/60	7/18/97	AT	CS	EEOS	WEOS	NE
P-60/61	7/18/97	AT	CS	EEOS	WEOS	NE
P-61/62	7/18/97	AT	CS	EEOS	WEOS	NE
P-62/64	7/18/97	AT	CS	EEOS	WEOS	NE
P-64/65	7/18/97	AT	CS	EEOS	WEOS	NE
P-65/66	7/18/97	AT	CS	EEOS	WEOS	NE
P-66/67	7/18/97	AT	CS	EEOS	WEOS	NE
P-45/58	7/18/97	AT	CS	2N	SEOS	NE

GUNDSEAL
NONDESTRUCTIVE TESTING SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Seam Number (1)	Date Tested	Air Test (2)	Tech. (3)	Section of Seam (4)		Monitor (5)
				From	To	
P-51/57	7/19/97	AT	CS	NEOS	SEOS	NE
P-51/63	7/19/97	AT	CS	NEOS	SEOS	NE
P-44/57	7/19/97	AT	CS	2M	SEOS	NE
P-44/57	7/19/97	AT	CS	2M	2L	NE
P-44/57	7/19/97	AT	CS	NEOS	2L	NE
P-57/68	7/19/97	AT	CS	NEOS	SEOS	NE
P-63/68	7/19/97	AT	CS	NEOS	SEOS	NE
P-58/68	7/19/97	AT	CS	NEOS	SEOS	NE
P-58/69	7/19/97	AT	CS	NEOS	SEOS	NE
P-45/58	7/19/97	AT	CS	3G	2N	NE
P-45/58	7/19/97	AT	CS	NEOS	3G	NE
P-38/40	7/19/97	AT	CS	2H	2J	NE
P-38/40	7/19/97	AT	CS	2C	2H	NE
P-01/02	7/21/97	VT	CM	EEOS	WEOS	NE
P-03/04	7/21/97	VT	CM	EEOS	WEOS	NE
P-05/07	7/21/97	VT	CM	EEOS	WEOS	NE
P-06/07	7/21/97	VT	CM	EEOS	WEOS	NE
P-08/10	7/21/97	VT	CM	EEOS	WEOS	NE
P-09/10	7/21/97	VT	CM	EEOS	WEOS	NE
P-11/13	7/21/97	VT	CM	EEOS	WEOS	NE
P-12/13	7/21/97	VT	CM	EEOS	WEOS	NE
P-15/18	7/21/97	VT	CM	EEOS	WEOS	NE
P-14/18	7/21/97	VT	CM	EEOS	WEOS	NE
P-16/19	7/21/97	VT	CM	EEOS	WEOS	NE
P-17/19	7/21/97	VT	CM	EEOS	WEOS	NE
P-21/22	7/21/97	VT	CM	EEOS	WEOS	NE
P-20/22	7/21/97	VT	CM	EEOS	WEOS	NE
P-24/27	7/21/97	VT	CM	EEOS	WEOS	NE
P-22/23	7/21/97	VT	CM	NEOS	SEOS	NE
P-23/27	7/21/97	VT	CM	EEOS	WEOS	NE
P-26/27	7/21/97	VT	CM	NEOS	SEOS	NE
P-25/27	7/21/97	VT	CM	NEOS	SEOS	NE
P-26/28	7/21/97	VT	CM	EEOS	WEOS	NE
P-25/28	7/21/97	VT	CM	EEOS	WEOS	NE
P-30/35	7/21/97	VT	CM	EEOS	WEOS	NE
P-35/36	7/21/97	VT	CM	NEOS	SEOS	NE
P-29/35	7/21/97	VT	CM	EEOS	WEOS	NE
P-31/36	7/21/97	VT	CM	NEOS	SEOS	NE
P-32/36	7/21/97	VT	CM	EEOS	WEOS	NE
P-33/37	7/21/97	VT	CM	EEOS	WEOS	NE
P-34/37	7/21/97	VT	CM	EEOS	WEOS	NE
P-38/42	7/21/97	VT	CM	EEOS	WEOS	NE
P-39/42	7/21/97	VT	CM	EEOS	WEOS	NE
P-38/43	7/21/97	VT	CM	NEOS	SEOS	NE

GUNDSEAL

977-5116

NONDESTRUCTIVE TESTING SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Seam Number (1)	Date Tested	Air Test (2)	Tech. (3)	Section of Seam (4)		Monitor (5)
				From	To	
P-42/43	7/21/97	VT	CM	NEOS	SEOS	NE
P-67/69	7/21/97	VT	CM	NEOS	SEOS	NE
P-66/69	7/21/97	VT	CM	NEOS	SEOS	NE
P-68/69	7/21/97	VT	CM	EEOS	WEOS	NE
P-65/68	7/21/97	VT	CM	NEOS	SEOS	NE
P-64/68	7/21/97	VT	CM	NEOS	SEOS	NE
P-62/68	7/21/97	VT	CM	NEOS	SEOS	NE
P-61/68	7/21/97	VT	CM	NEOS	SEOS	NE
P-60/68	7/21/97	VT	CM	NEOS	SEOS	NE
P-59/68	7/21/97	VT	CM	NEOS	SEOS	NE
P-56/68	7/21/97	VT	CM	NEOS	SEOS	NE
P-55/68	7/21/97	VT	CM	NEOS	SEOS	NE
P-54/68	7/21/97	VT	CM	NEOS	SEOS	NE
P-53/68	7/21/97	VT	CM	NEOS	SEOS	NE
P-40/43	7/21/97	VT	CM	NEOS	SEOS	NE
P-41/43	7/21/97	VT	CM	EEOS	WEOS	NE
P-44/51	7/21/97	VT	CM	EEOS	WEOS	NE
P-45/51	7/21/97	VT	CM	EEOS	WEOS	NE
P-45/63	7/21/97	VT	CM	EEOS	WEOS	NE
P-52/68	7/21/97	VT	CM	EEOS	WEOS	NE
P-52/57	7/21/97	VT	CM	NEOS	SEOS	NE
P-50/57	7/21/97	VT	CM	EEOS	WEOS	NE
P-58/63	7/21/97	VT	CM	EEOS	WEOS	NE
P-57/63	7/21/97	VT	CM	EEOS	WEOS	NE
P-49/57	7/21/97	VT	CM	NEOS	SEOS	NE
P-48/57	7/21/97	VT	CM	NEOS	SEOS	NE
P-69/70	7/21/97	VT	CM	NEOS	SEOS	NE
P-67/70	7/21/97	VT	CM	EEOS	WEOS	NE
P-67/71	7/21/97	VT	CM	EEOS	WEOS	NE
P-48/57	7/21/97	VT	CM	NEOS	SEOS	NE
P-47/57	7/21/97	VT	CM	NEOS	SEOS	NE
P-46/57	7/21/97	VT	CM	NEOS	SEOS	NE
P-70/71	7/21/97	VT	CM	EEOS	WEOS	NE

Notes:

(1) A prefix of P indicates the panel numbers of a seam

(2) AT = Air PressureTest, VT = Vacuume Test

(3) Technicians: CS = Christine Soundara, CM = Chris McCutcheon

(4) SEOS = south end of seam; NEOS = north end of seam; WEOS = west end of seam; EEOS = east end of seam
1A, 3G = repair locations on length of seam

(5) NE = Nancy Evans

Appendix I.4.7

Destructive Testing Summary

GUNDSEAL
DESTRUCTIVE TESTING SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Destructive No.: DS-01
Seam Number: P-06/09
Test Location: 100' S. of NEOS
Repair Number: 1E
Welding Tech.: CS
Gun Number: #1165
Seam Type (Fus/Ext): Fus
Date Tested: 7/17/97
Pass/Fail: Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	127	FTB	P1	140	FTB	S1	178	FTB
P2	133	FTB	P2	142	FTB	S2	170	FTB
P3	130	FTB	P3	144	FTB	S3	174	FTB
P4	131	FTB	P4	130	FTB	S4	172	FTB
P5	131	FTB	P5	138	FTB	S5	182	FTB

Destructive No.: DS-02
Seam Number: P-08/11
Test Location: 75' S. of NEOS
Repair Number: 1F
Welding Tech.: KS
Gun Number: #1009
Seam Type (Fus/Ext): Fus
Date Tested: 7/17/97
Pass/Fail: Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	114	FTB	P1	148	FTB	S1	164	FTB
P2	128	FTB	P2	146	FTB	S2	165	FTB
P3	104	FTB	P3	127	FTB	S3	168	FTB
P4	112	FTB	P4	142	FTB	S4	167	FTB
P5	110	FTB	P5	142	FTB	S5	172	FTB

Destructive No.: DS-03
Seam Number: P-14/16
Test Location: 50' S. of NEOS
Repair Number: 1K
Welding Tech.: CS
Gun Number: #1165
Seam Type (Fus/Ext): Fus
Date Tested: 7/17/97
Pass/Fail: Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	138	FTB	P1	145	FTB	S1	171	FTB
P2	127	FTB	P2	149	FTB	S2	174	FTB
P3	124	FTB	P3	131	FTB	S3	177	FTB
P4	138	FTB	P4	148	FTB	S4	182	FTB
P5	139	FTB	P5	137	FTB	S5	175	FTB

GUNDSEAL
DESTRUCTIVE TESTING SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Destructive No.:	DS-04
Seam Number:	P-16/20
Test Location:	3' N. of SEOS
Repair Number:	1L
Welding Tech.:	KS
Gun Number:	#1009
Seam Type (Fus/Ext):	Fus
Date Tested:	7/18/97
Pass/Fail:	Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	128	FTB	P1	141	FTB	S1	178	FTB
P2	141	FTB	P2	143	FTB	S2	171	FTB
P3	131	FTB	P3	140	FTB	S3	175	FTB
P4	126	FTB	P4	146	FTB	S4	177	FTB
P5	131	FTB	P5	137	FTB	S5	179	FTB

Destructive No.:	DS-05
Seam Number:	P-21/24
Test Location:	25' S. of NEOS
Repair Number:	1T
Welding Tech.:	CS
Gun Number:	#1165
Seam Type (Fus/Ext):	Fus
Date Tested:	7/18/97
Pass/Fail:	Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	128	FTB	P1	130	FTB	S1	194	FTB
P2	114	FTB	P2	137	FTB	S2	192	FTB
P3	139	FTB	P3	141	FTB	S3	193	FTB
P4	133	FTB	P4	143	FTB	S4	191	FTB
P5	151	FTB	P5	158	FTB	S5	192	FTB

Destructive No.:	DS-06
Seam Number:	P-25/29
Test Location:	125' S. of NEOS
Repair Number:	1U
Welding Tech.:	KS
Gun Number:	#1009
Seam Type (Fus/Ext):	Fus
Date Tested:	7/19/97
Pass/Fail:	Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	139	FTB	P1	128	FTB	S1	170	FTB
P2	131	FTB	P2	124	FTB	S2	167	FTB
P3	148	FTB	P3	123	FTB	S3	172	FTB
P4	142	FTB	P4	140	FTB	S4	174	FTB
P5	136	FTB	P5	136	FTB	S5	176	FTB

GUNDSEAL
DESTRUCTIVE TESTING SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Destructive No.: DS-07
Seam Number: P-26/30
Test Location: 5' N. of SEOS
Repair Number: 1W
Welding Tech.: CS
Gun Number: #1165
Seam Type (Fus/Ext): Fus
Date Tested: 7/19/97
Pass/Fail: Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	115	FTB	P1	157	FTB	S1	194	FTB
P2	125	FTB	P2	139	FTB	S2	193	FTB
P3	114	FTB	P3	136	FTB	S3	193	FTB
P4	127	FTB	P4	141	FTB	S4	196	FTB
P5	126	FTB	P5	139	FTB	S5	194	FTB

Destructive No.: DS-08
Seam Number: P-34/38
Test Location: 125' S. of NEOS
Repair Number: 1X
Welding Tech.: CS
Gun Number: #1165
Seam Type (Fus/Ext): Fus
Date Tested: 7/19/97
Pass/Fail: Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	132	FTB	P1	146	FTB	S1	172	FTB
P2	135	FTB	P2	141	FTB	S2	178	FTB
P3	130	FTB	P3	146	FTB	S3	176	FTB
P4	127	FTB	P4	143	FTB	S4	172	FTB
P5	132	FTB	P5	141	FTB	S5	171	FTB

Destructive No.: DS-09
Seam Number: P-39/41
Test Location: 50' S. of NEOS
Repair Number: 2A
Welding Tech.: KS
Gun Number: #1009
Seam Type (Fus/Ext): Fus
Date Tested: 7/19/97
Pass/Fail: Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	139	FTB	P1	138	FTB	S1	179	FTB
P2	121	FTB	P2	153	FTB	S2	187	FTB
P3	132	FTB	P3	149	FTB	S3	184	FTB
P4	117	FTB	P4	153	FTB	S4	183	FTB
P5	115	FTB	P5	157	FTB	S5	180	FTB

GUNDSEAL
DESTRUCTIVE TESTING SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Destructive No.:	DS-10
Seam Number:	P-45/58
Test Location:	75' S. of NEOS
Repair Number:	2E
Welding Tech.:	CS
Gun Number:	#1165
Seam Type (Fus/Ext)	Fus
Date Tested:	7/19/97
Pass/Fail:	Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	132	FTB	P1	148	FTB	S1	167	FTB
P2	119	FTB	P2	131	FTB	S2	169	FTB
P3	136	FTB	P3	135	FTB	S3	172	FTB
P4	135	FTB	P4	132	FTB	S4	173	FTB
P5	121	FTB	P5	145	FTB	S5	171	FTB

Destructive No.:	DS-11
Seam Number:	P-55/56
Test Location:	15' W. of EEOS
Repair Number:	2F
Welding Tech.:	KS
Gun Number:	#1009
Seam Type (Fus/Ext)	Fus
Date Tested:	7/19/97
Pass/Fail:	Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	113	FTB	P1	139	FTB	S1	171	FTB
P2	134	FTB	P2	126	FTB	S2	173	FTB
P3	116	FTB	P3	146	FTB	S3	171	FTB
P4	124	FTB	P4	141	FTB	S4	170	FTB
P5	109	FTB	P5	142	FTB	S5	165	FTB

Destructive No.:	DS-12
Seam Number:	P-63/68
Test Location:	8' S. of NEOS
Repair Number:	2G
Welding Tech.:	KS
Gun Number:	#1009
Seam Type (Fus/Ext)	Fus
Date Tested:	7/19/97
Pass/Fail:	Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	132	FTB	P1	132	FTB	S1	166	FTB
P2	135	FTB	P2	140	FTB	S2	166	FTB
P3	117	FTB	P3	145	FTB	S3	167	FTB
P4	122	FTB	P4	148	FTB	S4	167	FTB
P5	123	FTB	P5	150	FTB	S5	167	FTB

GUNDSEAL
DESTRUCTIVE TESTING SUMMARY
LAWRENCE LIVERMORE NATIONAL LABORATORY, SITE 300 - PIT 6
LIVERMORE, CA

Destructive No.: DS-13
Seam Number: P-06/07
Test Location: 4' E. of WEOS
Repair Number: 7K
Welding Tech.: KS
Gun Number: #281
Seam Type (Fus/Ext) Ext
Date Tested: 7/22/97
Pass/Fail: Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	94	FTB	P1	---	---	S1	174	FTB
P2	129	FTB	P2	---	---	S2	167	FTB
P3	119	FTB	P3	---	---	S3	178	FTB
P4	118	FTB	P4	---	---	S4	171	FTB
P5	129	FTB	P5	---	---	S5	171	FTB

Destructive No.: DS-14
Seam Number: P-41/43
Test Location: 8' E. of WEOS
Repair Number: 7L
Welding Tech.: AV
Gun Number: #88
Seam Type (Fus/Ext) Ext
Date Tested: 7/22/97
Pass/Fail: Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	123	FTB	P1	---	---	S1	156	FTB
P2	102	FTB	P2	---	---	S2	161	FTB
P3	107	FTB	P3	---	---	S3	160	FTB
P4	141	FTB	P4	---	---	S4	159	FTB
P5	121	FTB	P5	---	---	S5	156	FTB

Destructive No.: DS-15
Seam Number: P-47/57
Test Location: 5' N. OF SEOS
Repair Number: 7M
Welding Tech.: KS
Gun Number: #281
Seam Type (Fus/Ext) Ext
Date Tested: 7/22/97
Pass/Fail: Pass

PEEL						SHEAR		
Inside Track			Outside Track					
Number	Load	P/F Code	Number	Load	P/F Code	Number	Load	P/F Code
P1	115	FTB	P1	---	---	S1	165	FTB
P2	90	FTB	P2	---	---	S2	166	FTB
P3	118	FTB	P3	---	---	S3	161	FTB
P4	121	FTB	P4	---	---	S4	152	FTB
P5	102	FTB	P5	---	---	S5	152	FTB

Note: See Seaming Observation Summary and Trial Seam Summary for abbreviations.

Golder Construction Services, Inc.

Appendix J

Shotcrete Field & Lab Testing Records

INSPECTION CONSULTANTS INC.

Project Name: Pit Closure (Site 300)	Client or Owner: LLNL		Job No.
General Location of Work: Tracy	Owner or Clients Representative: Harry Benstead		Date-Day of Week: 8-25-97
General Contractor: Environcon	Subcontractor: Johnson & Western		Project Engineer
Type of Work: Shotcrete Inspection	Subcontractor's Superintendent or Foreman: Randy		Permit No.
Assignment Cancelled By: N/A	Page: 1 of 1	Weather: Sunny / windy	Technician: JEFF. O

Daily Field Report Privided Inspection for the Shotcrete placement for the drainage ditch AT the North End OF the Pit Closure. OBSERVED - sprayed applied Shotcrete & monitored trucks, Shotcrete was applied by nozzle man Ramoan Villobos, OBSERVED "hooking" of wire mesh To obtain proper clearance of Shotcrete cover. Confirmed that Rebar placement was per the specs. (4+06-12 on 0.11) Shotcrete sample was taken at (1698585 & 144750 of the plans) north end. All work performed was per the specs and to the UBC. (1922 Shotcrete)

Conformance

Non-compliance conditions noted were brought to the attention of _____ for corrective action. Work observed was to the best of my knowledge, in conformance with the (approved) project plans specification, and applicable standards of workmanship; with the exception of items noted above.

] Comments Attached

Inspector Jeff Arnett

2999 GOLD CANAL DRIVE, SUITE A ◆ RANCHO CORDOVA, CALIFORNIA 95670 ◆ (916) 635-2972 ◆ (916) 635-6457 FAX
844 66th AVENUE ◆ OAKLAND, CALIFORNIA 94621 ◆ (510) 635-9211 ◆ (510) 635-0988 FAX

INSPECTION CONSULTANTS INC.

Project Name: D.t. classes - Site 300	Client or Owner: LLNL		Job No.: 971-515
General Location of Work: TRACY	Owner or Clients Representative: HARRY Benstead		Date-Day of Week: 8-26-97 TUE.
General Contractor: ENVIROCON	Subcontractor: JOHNSON & WESTERN		Project Engineer:
Type of Work: Shotcrete Inspection	Subcontractor's Superintendent or Foreman: Randy		Permit No.:
Assignment Cancelled By: N/A	Page: 1 of 1	Weather: SUNNY & WINDY	Technician: JEFF. O

Daily Field Report OBSERVED & monitored sprayed applied Shotcrete. Work was performed by Johnson & Western gunite with Ramoan Villobos & Juan Villobos being the nozzleman for Todays work. OBtained Sample from Load #1 Truck #498 with mix design #3007, Sample was taken from the Lower drainage ditch on the North End. All work is on Going and will Continue in the morning. All work performed Today was per the Specs and To the Code. (UBC Section 1922)

Conformance

Non-compliance conditions noted were brought to the attention of _____ for corrective action. Work observed was to the best of my knowledge, in conformance with the (approved) project plans specification, and applicable standards of workmanship; with the exception of items noted above.

☐ Comments Attached

Inspector Jeff Orwitt

2999 GOLD CANAL DRIVE, SUITE A ◆ RANCHO CORDOVA, CALIFORNIA 95670 ◆ (916) 635-2972 ◆ (916) 635-6457 FAX
844 66th AVENUE ◆ OAKLAND, CALIFORNIA 94621 ◆ (510) 635-9211 ◆ (510) 635-0988 FAX

INSPECTION CONSULTANTS INC.

Project Name: Pit Closure Site 300	Client or Owner: LLNL		Job No.: 971-515
General Location of Work: TRACY	Owner or Clients Representative: HARRY Benstead		Date-Day of Week: 8-27-97 WED
General Contractor: Envirocon	Subcontractor: Johnson & Western		Project Engineer:
Type of Work: Shotcrete Inspections	Subcontractor's Superintendent or Foreman: RANDY		Permit No.:
Assignment Cancelled By: N/A	Page: 1 OF 1	Weather: SUNNY	Technician: JEFF. O

Daily Field Report Completed Shotcrete Inspection for Pit 6 drainage ditch, OBSERVED Shotcrete placement and Monitored Trucks. Shotcrete placed today was 7.5 Sack with 3/8 aggregate and mix design # 3007 OBtained Sample from the lower South End ditch. Test panel was 18" X 18" as per UBC, and Testing Frequency is approximently every 50 CUBIC YARDS. TEST panel will be field cured for 7 days prior to coring. Confirmed That Rebar placed Today (AT culvert openings) was per The detail on 4+06-12 on C.11. All work performed Today was To The Specs and To The Code. (UBC & ACI STANDARDS)

Conformance

Non-compliance conditions noted were brought to the attention of _____ for corrective action. Work observed was to the best of my knowledge, in conformance with the (approved) project plans specification, and applicable standards of workmanship; with the exception of items noted above.

☐ Comments Attached

Inspector Jeff Orcutt

2999 GOLD CANAL DRIVE, SUITE A ◆ RANCHO CORDOVA, CALIFORNIA 95670 ◆ (916) 635-2972 ◆ (916) 635-6457 FAX
844 66th AVENUE ◆ OAKLAND, CALIFORNIA 94621 ◆ (510) 635-9211 ◆ (510) 635-0988 FAX

INSPECTION CONSULTANTS, INC.

COMPRESSION TEST REPORT DATA SHEET

Date:	9/25/97	*ICI NO:*	971-515
Project:	Lawrence Livermore National Laboratory	*Permit No.:*	
	Pit Closure @ Site 300	*File NO:*	
Client:	Lawrence Livermore National Laboratory	*App. NO:*	
	P.O. Box 808, L-522		
	Livermore, CA 94550		

Specimen Sample From: South Drainage Ditch

SAMPLE INFORMATION

Set NO:	S3	*Ticket NO:*	6349703	*Sampled By:*	J. Orcutt
Material:	Shotcrete	*Truck NO:*	n/a	*Date Sampled:*	8/27/97
Supplier:	Shamrock	*Time:*	n/a	*Date Received:*	9/4/97

MATERIAL INFORMATION

Mix Design:	3007	*Slump In:*	n/a	*Mix Temp deg F:*	n/a
Specified PSI:	3,000	*Air Cont. %:*	n/a	*Air temp deg F:*	n/a

LABORATORY INFORMATION

SPECIMEN ID#	5802	5809	5810	5811
AGED DAYS	13	28	28	28
DATE TESTED	9/9/97	28	9/24/97	9/24/97
DIMENSION, IN.	1.75x3.63	1.75x3.63	1.75x3.75	1.75x3.6
AREA, SQ IN.	2.40	2.40	2.40	2.40
ULTIMATE LOAD, LBS	5,490	10,523	10,200	9,940
STRENGTH, PSI	2,290	4,380	4,250	4,140
TECHNICIAN	SS	ST	ST	ST

Test Methods: ASTM C-172, ASTM C-42 or; ASTM C-143, UBC 21-16; ASTM C-1064, as applicable; ASTM C - 39; ASTM E - 447

Does Not Meet Specifications ☐ Meets Project Specifications ☒

REVIEWED BY:

Tim A. Williams
Laboratory Manager
file: Cylinder

CC: Client
File

2999 GOLD CANAL DRIVE, SUITE A , RANCHO CORDOVA, CA 95670, (916) 635-2972
844 66TH AVENUE, OAKLAND, CA 94621 (510) 635-9211

INSPECTION CONSULTANTS, INC.

COMPRESSION TEST REPORT DATA SHEET

Date:	9/25/97	*ICI NO:*	971-515
Project:	Lawrence Livermore National Laboratory	*Permit No.:*	
	Pit Closure @ Site 300	*File NO:*	
Client:	Lawrence Livermore National Laboratory	*App. NO:*	
	P.O. Box 808, L-522		
	Livermore, CA 94550		

Specimen Sample From: Lower East Drainage Ditch

SAMPLE INFORMATION

Set NO:	S2	*Ticket NO:*	6349617	*Sampled By:*	J. Orcutt
Material:	Shotcrete	*Truck NO:*	n/a	*Date Sampled:*	8/26/97
Supplier:	Shamrock	*Time:*	n/a	*Date Received:*	9/4/97

MATERIAL INFORMATION

Mix Design:	3007	*Slump In:*	n/a	*Mix Temp deg F:*	n/a
Specified PSI:	3,000	*Air Cont. %:*	n/a	*Air temp deg F:*	n/a

LABORATORY INFORMATION

SPECIMEN ID#	5798	5799	5800	5801
AGED DAYS	14	28	28	28
DATE TESTED	9/9/97	9/23/97	9/23/97	9/23/97
DIMENSION, IN.	1.75x3.68	1.75x3.68	1.75x3.63	1.75x3.7
AREA, SQ IN.	2.40	2.40	2.40	2.40
ULTIMATE LOAD, LBS	6,210	9,310	12,480	11,640
STRENGTH, PSI	2,590	3,880	5,200	4,850
TECHNICIAN	SS	ST	ST	ST

Test Methods: ASTM C-172, ASTM C-42; ASTM C-143, UBC 21-16; ASTM C-1064 as applicable; ASTM C - 39; ASTM E - 447

Does Not Meet Specifications ☐ Meets Project Specifications ☒

REVIEWED BY:

Tim A. Williams
Laboratory Manager
file: Cylinder

CC: Client
File

2999 GOLD CANAL DRIVE, SUITE A , RANCHO CORDOVA, CA 95670, (916) 635-2972
844 66TH AVENUE, OAKLAND, CA 94621 (510) 635-9211

INSPECTION CONSULTANTS, INC.

COMPRESSION TEST REPORT DATA SHEET

Date:	9/25/97	*ICI NO:*	971-515
Project:	Lawrence Livermore National Laboratory	*Permit No.:*	
	Pit Closure @ Site 300	*File NO:*	
Client:	Lawrence Livermore National Laboratory	*App. NO:*	
	P.O. Box 808, L-522		
	Livermore, CA 94550		

Specimen Sample From: North Drainage Ditch

SAMPLE INFORMATION

Set NO:	S1	*Ticket NO:*	6349594	*Sampled By:*	J. Orcutt
Material:	Shotcrete	*Truck NO:*	n/a	*Date Sampled:*	8/25/97
Supplier:	Shamrock	*Time:*	n/a	*Date Received:*	9/4/97

MATERIAL INFORMATION

Mix Design:	3007	*Slump In:*	n/a	*Mix Temp deg F:*	n/a
Specified PSI:	3,000	*Air Cont. %:*	n/a	*Air temp deg F:*	n/a

LABORATORY INFORMATION

SPECIMEN ID#	5794	5795	5796	5797
AGED DAYS	15	28	28	28
DATE TESTED	9/9/97	9/22/97	9/22/97	9/22/97
DIMENSION, IN.	1.76x3.48	1.75x3.75	1.75x3.5	1.75x3.48
AREA, SQ IN.	2.43	2.40	2.40	2.40
ULTIMATE LOAD, LBS	6,430	7,390	11,680	10,630
STRENGTH, PSI	2,650	3,080	4,870	4,430
TECHNICIAN	SS	ST	ST	ST

Test Methods: ASTM C-172, ASTM C-42 or; ASTM C-143, UBC 21-16; ASTM C-1064, as applicable; ASTM C - 39; ASTM E - 447

Does Not Meet Specifications ☐ Meets Project Specifications ☒

REVIEWED BY:

Tim A. Williams
Laboratory Manager
file: Cylinder

CC: Client
File

2999 GOLD CANAL DRIVE, SUITE A , RANCHO CORDOVA, CA 95670, (916) 635-2972
844 66TH AVENUE, OAKLAND, CA 94621 (510) 635-9211