Pilot Program Testing
Results for PROPAT®
As Dredged Material Stabilizing Agent
Claremont Channel Deepening Project
Jersey City, New Jersey

HARTCROWSER
Delivering smarter solutions

Prepared for
Hugo Neu Schnitzer East

December 22, 2000
J-4924-18

CONTENTS

	Page
1.0 EXECUTIVE SUMMARY	1
2.0 INTRODUCTION	1
3.0 PROJECT DESCRIPTION AND BACKGROUND	2
3.1 History of Project	2
3.2 Previous Testing	3
4.0 PERFORMANCE GOALS	6
4.1 Geotechnical Criteria	6
4.2 Environmental Criteria	6
4.3 Performance Criteria	7
5.0 PILOT PROGRAM – FIELD ACTIVITIES	7
5.1 Dredged Material Collection	7
5.2 Dredged Material Processing	8
5.3 Field Sampling and Observations	12
5.4 Field Application of Dredged Material	13
5.5 Monitoring during Mixing and Placement	16
5.6 Monitoring and Site Cleanup	16
6.0 PILOT PROGRAM - MATERIAL TESTING	17
6.1 Sampling Preparation	17
6.2 Physical and Geotechnical Testing	18
6.3 Environmental Testing	23
7.0 PILOT PROGRAM CONCLUSIONS	26
8.0 RECOMMENDATIONS FOR FULL-SCALE PLACEMENT AND MONITORING	26
REFERENCES	28

CONTENTS (Continued)

Page

TABLES

1	Pilot Program Demonstration Area Field Densities for PROPAT®-Amended Sediment	30
2	Pilot Program Water Contents for Un-amended Sediment	31
3	Pilot Program Water Contents for PROPAT®-Amended Sediment	32
4	Pilot Program Summary of Cylinder Densities for PROPAT®-Amended Sediment	33
5	Pilot Program Unconfined Compressive Strengths for PROPAT®-Amended Sediment	34
6	Pilot Program Modified Proctor Tests for PROPAT®-Amended Sediment	35
7	Pilot Program Resilient Modulus Results for PROPAT®-Amended Sediment	36
8	Pilot Program Sample Specific Gravity for PROPAT®-Amended Sediment	37
9	Pilot Program Hydraulic Conductivity for PROPAT®-Amended Sediment	38
10	Analytical Results for MEP Leachate Samples	39
11	Analytical Results for MEP Leachate Samples	57
12	Pilot Program MEP Metal Leachate Means and Standard Deviations for PROPAT®-Amended Sediment	59
13	Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment	60
14	Pilot Program Dioxin Analytical Results for ANSI 16.1 Leachate Samples from PROPAT®-Amended Sediment	72
15	Pilot Program ANSI 16.1 Metal Leachate Means and Standard Deviations for PROPAT®-Amended Sediment	74

FIGURES

1 Location of Pilot Program Study Plots
2 Aluminum Leachate Concentration Versus Time
3 Arsenic Leachate Concentration Versus Time

CONTENTS (Continued) Page

APPENDIX A
CTI'S LETTERS

APPENDIX B
RESULTS OF PERSONNEL MONITORING

APPENDIX C
RESULTS OF GEOTECHNICAL ANALYSES

C-1
GRAIN SIZE

C-2
MODIFIED PROCTOR RESULTS

C-3
RESILIENT MODULUS TEST RESULTS

APPENDIX D
CHEMICAL DATA QUALITY REVIEW D-1

Modified MEP D-1
ANSI 16.1 D-3

PILOT PROGRAM TESTING RESULTS FOR PROPAT® AS DREDGED MATERIAL STABILIZING AGENT CLAREMONT CHANNEL DEEPENING PROJECT JERSEY CITY, NEW JERSEY

1.0 EXECUTIVE SUMMARY

The Pilot Program was designed to validate the performance of PROPAT®-amended sediment and pozzolanic additives in a small-scale field project. Sediment from the Claremont Channel in Jersey City, New Jersey, was collected and mixed with PROPAT® and pozzolanic additives. These materials were mixed in a pugmill and placed on a small plot (approximately 500 cubic yards) on Hugo Neu Schnitzer East's property. The PROPAT®-amended sediment was sampled to determine its geotechnical and environmental properties. The results of the Pilot Program demonstrate that PROPAT®-amended sediment generally meets the geotechnical and environmental criteria under field conditions.

2.0 INTRODUCTION

This report presents the results of the Pilot Program Testing of PROPAT® in combination with traditional additives as a dredged material stabilizing agent. This report is organized as follows:

- Project Description and Background;
- Performance Goals;
- Pilot Program - Field Activities;
- Pilot Program - Material Testing;
- Pilot Program Conclusions; and
- Recommendations for Full-Scale Placement and Monitoring.

The Pilot Program and Pilot Program Testing were performed in accordance with the work plan as detailed in "Bench Testing, Pilot Program and Field Monitoring for PROPAT® as Dredged Material Stabilizing Agent, Claremont Channel Deepening Project, Jersey City, New Jersey" (Hart Crowser, 1999a) and the "Revised Pilot Program Work Plan for PROPAT® as Dredged Material Stabilizing Agent, Claremont Channel Deepening Project, Jersey City, New Jersey" (Hart Crowser, 2000a).

3.0 PROJECT DESCRIPTION AND BACKGROUND

3.1 History of Project

In conjunction with the New Jersey Department of Transportation, Office of Maritime Resources, Hugo Neu Schnitzer East (HNSE) has received permits to dredge the state-owned Claremont Channel to provide access for deeper-draft vessels. Approximately 1.25 million cubic yards (cy) of sediment will be removed to provide the desired navigational depth of 34 feet below mean low water. Chemical analysis of the Claremont Channel sediment indicates the dredged material is unsuitable for ocean disposal and will require alternative placement locations (Hart Crowser, 1999b). Based on the large volume of material to be dredged, various upland placement sites are required.

One option is to place approximately 600,000 cy of amended dredged material at nearby Port Liberté, a brownfield site being redeveloped by the Liberty National Development Corporation (LNDC). The Port Liberté Remedial Action Work Plan (Enviro-Sciences, 1999) provides for the placement of non-structural bulk fill at the site. A golf course will be built on top of the fill, restoring a currently under-utilized area of the New Jersey coast. New Jersey Maritime Resources has suggested combining the Claremont Channel deepening project with the Port Liberté restoration project by using the dredged sediment as non-structural bulk fill at the Port Liberté site. LNDC and the design team that develop the remedial plan for Port Liberté can utilize the amended sediment on site and cover it with 2 to 4 feet of turf-supporting soil. The dredged material would undergo conditioning and stabilization to minimize the potential for leaching of contaminants from the sediment, to increase the strength of the sediment, and to lower hydraulic conductivity. Conditioning and stabilization of dredged materials using additives such as cement, kiln dust, fly ash, or lime kiln dust has been done successfully at other locations.

HNSE suggested consideration of PROPAT® as an alternative conditioning and stabilizing agent. HNSE has trademarked PROPAT®, which is a recycled product manufactured from automobile shredded residue (ASR) combined with a proprietary mix of chemicals. PROPAT® has been approved as interim daily landfill cover in several states and was approved in New Jersey for "cushion" material above a liner at the Pennsauken, New Jersey, landfill.

Preliminary laboratory testing suggested that PROPAT® would serve as an effective dehydrating agent for the dredged material, which is received at 60 to 70 percent water, thereby improving the handling characteristics of the amended dredged material and improving the strength of the material through the addition of fiber content (Hart Crowser, 1998a). Further Bench-Scale testing, a small-scale Pilot Program to place some material, and a large-scale demonstration program placing and monitoring a significant quantity of material were proposed to the New Jersey Department of Environmental Protection (NJDEP), Office of Innovative Technology and Market Development.

The proposal was approved and funding was authorized in the Spring of 1999. Two rounds of Bench-Scale testing were undertaken to identify an optimum mix range of sediment, PROPAT®, and other materials. Final results of the bench testing received in March 2000 indicate that PROPAT®-sediment mixes can meet the desired geotechnical and environmental criteria. Based on the initial review of the data, we anticipate that the NJDEP will issue an Acceptable Use Determination (AUD) for PROPAT®-amended dredged material, similar to the one already issued for sediment conditioned and stabilized with traditional admixtures without PROPAT®. Based on these positive results, the next phase of the proposed work, the Pilot Program, was undertaken.

3.2 Previous Testing

3.2.1 Initial Testing

The Phase 1 scope of work for this project included:

- Task 1 - Initial testing of sediment and PROPAT®;
- Task 2 - Mixture preparation and testing; and
- Task 3 - Reporting (Hart Crowser, 1998a).

Physical characteristics (grain size, moisture content, density, etc.) of samples of sediment from the Claremont Channel and PROPAT® were determined. Several initial mixes of PROPAT® and sediment were made at ratios of 1:1 PROPAT® to sediment up to 3:1, and physical properties of the mixes were evaluated.

These tests of the physical properties showed that PROPAT® improved the strength, reduced the moisture content, and improved the workability of the sediment. Based on these encouraging results, more rigorous testing of the physical and chemical properties of a sediment-PROPAT® mix was recommended following detailed characterization of the Claremont Channel sediment.

Sediment sampling and characterization were undertaken in the winter and spring of 1999. Results of that program were reported as part of the New Jersey Waterfront Development Permit Application (WDPA, 1999).

3.2.2 Bench-Scale Testing

Based on the promising results obtained from the Phase 1 testing and the characterization of the Claremont Channel sediment, a program of additional laboratory testing to refine the sediment-PROPAT® mixture and field testing of the refined mixes was proposed to the NJDEP Office of Innovative Technology and Market Development (Hart Crowser, 1999a).

Following NJDEP approval of the proposed program, the Bench-Scale testing was undertaken. This second phase of testing included:

- Task 4 – Initial leachability and geotechnical testing of numerous recipes of sediment amended with and without PROPAT®;
- Task 5 – Optimization of strength and leachability characteristics; and
- Task 6 – Reporting.

Task 4 results of the testing of sediment amended without PROPAT® were reported as part of the New Jersey WDPA (Appendix F, 1999). Based on the bulk chemistry and leachability of these sediments amended with pozzolanic materials only, an AUD allowing placement of Claremont Channel sediments at the Port Liberté site was issued by NJDEP at the same time they issued the Waterfront Development Permit, on January 31, 2000. The testing results also provided a benchmark of physical, chemical, and environmental performance against which the PROPAT®-amended sediment could be evaluated. If Task 4 and 5 testing demonstrated the performance of the PROPAT®-amended sediment was equal to or better than the performance of the sediment amended without PROPAT®, then it was likely an AUD would also be issued by NJDEP for the PROPAT®-amended sediment.

Task 4 results of the testing of sediment amended with PROPAT® and other additives indicated the PROPAT®-amended sediment should perform as well as the sediment amended without PROPAT® (Hart Crowser, 2000c). An optimum mix was selected for the more detailed Task 5 testing, but Task 4 results demonstrated that a relatively broad range of mixes with PROPAT® performed satisfactorily.

The Task 5 optimum mix, identified as the CTI mix, was:

- **PROPAT®.** 30 percent by weight of the wet weight of the sediment at its natural moisture content, and
- **Fly Ash and Alkaline Activators.** 30 to 40 percent by weight of the wet weight of the sediment and PROPAT® mix.

As reported in the Bench-Scale testing results (Hart Crowser, 2000c), this optimum mix was significantly stronger than the sediment amended without PROPAT®. Other geotechnical properties, such as density and moisture content, are also improved, making the PROPAT®-amended sediment more workable with standard earth moving equipment. Hydraulic conductivities were comparable to sediment amended with pozzolanic materials only.

The concentration of total PCBs in the PROPAT®-amended sediment, as well as the un-amended Claremont Channel sediment and the sediment amended with pozzolanic materials only, exceeds the bulk chemistry levels for New Jersey non-residential soil cleanup criteria (NRSCC). The PROPAT®-amended sediment also contains arsenic at concentrations that slightly exceed the NRSCC (1.2 times the NRSCC). The PROPAT®-amended sediment will be placed underneath 2 to 4 feet of turf-supporting soil, and contact with the amended sediment is not expected once it has been placed. The risk of exposure to the amended sediment is unlikely. Leaching of PCBs and arsenic does not occur above the GWQS, as indicated by analytical results from Bench-Scale testing. The PROPAT®-amended sediment should be suitable for placement at any site accepting sediment amended with pozzolanic materials only.

The PROPAT®-amended sediment performs similarly to sediment amended without PROPAT® in regards to leaching characteristics. In Task 5, the concentration of two metals (aluminum and sodium) exceeded the GWQS in the optimum mix leachate both with and without PROPAT®. The PROPAT®-amended sediment performs better in physical tests than the sediment without PROPAT®. The physical and environmental performance of the PROPAT®-amended sediment is equivalent to or better than sediment amended with pozzolanic materials alone. Since various upland redevelopment projects have successfully used dredged material as fill we expect it to be acceptable to place PROPAT®-amended sediment in upland environments in the near future.

An objective of the Bench-Scale testing was to identify the optimum mix of amendments that could be validated by the Pilot Program and carried forward to the full-scale field demonstration. While an optimum Task 5 mix was developed, the testing showed that a relatively broad range of mixes with PROPAT® will perform in a satisfactory manner. Demonstrating that a range of mixes with PROPAT® will perform well is an important conclusion from this phase of the testing. Sediment characteristics, mixing equipment, additive availability, additive economics, site-specific requirements, and other project-specific factors may dictate different mixes on future projects. Results from this Bench-Scale testing indicate that the mix recipe can be modified with a degree of assurance that geotechnical and environmental criteria will still be satisfied.

4.0 PERFORMANCE GOALS

Performance goals specific to the Liberty National site were established at the outset of the program. These goals include providing material protective of the environment that can be handled with standard earth-moving equipment. The laboratory testing described above evaluated the performance of the material against these goals and demonstrated that laboratory samples could meet or exceed them. The Pilot Testing also evaluated the performance of the material placed in the field against these same goals.

4.1 Geotechnical Criteria

Liberty National plans to use the material as a substitute for non-structural bulk fill to create topography for the golf course planned at Port Liberté. The amended material will be covered by 2 to 4 feet of turf-supporting soil. The Liberty National design team that is developing the Remedial Action Work Plan for Port Liberté provided the following preliminary geotechnical specifications for the non-structural bulk fill material to be used on their site:

- Unconfined compressive strength greater than 2,000 pounds per square foot (14 pounds per square inch); and
- Unit weight greater than 85 pounds per cubic foot.

The strength and weight criteria listed above are the minimum criteria for this specific use. The ability of the material to exceed these criteria may indicate its suitability for other geotechnical applications. Likewise, permeability and elasticity may be important geotechnical properties for other applications. They were also evaluated as part of the Pilot Program. Certain mixes with and without PROPAT® meet the above criteria.

The additional geotechnical criteria evaluated in the Pilot Program were:

- Workable and manageable by standard earth-moving equipment; and
- Sufficient strength and elasticity to be suitable as backfill.

4.2 Environmental Criteria

Bench testing results indicated early on how well PROPAT®-amended sediment met established environmental criteria including:

- Appropriate soil standards;
- Groundwater standards; and
- Surface water standards.

General soil, groundwater, and surface water quality standards for the management of dredged materials are specified in the Management and Regulation of Dredging Activities and Dredged Material in New Jersey Tidal Waters (NJDEP, 1997). Performance relative to soil standards was evaluated by measuring bulk chemistry of the amended materials and comparing the results to the NJDEP NRSCC. Leachability of the materials was evaluated relative to the NJDEP GWQS. Since the material will be placed as part of a site remediation and will be covered with a turf-supporting layer for the golf course, bench testing results indicate the environmental criteria for soil can be satisfied.

A final environmental criteria established at the start of the program was fugitive dust emissions. This could not be evaluated during the bench testing, but was monitored during the Pilot Program.

4.3 Performance Criteria

The PROPAT®-amended material must continue to meet the geotechnical and environmental criteria consistently as demonstrated statistically during the Pilot Program. During the Pilot Program, a sufficient number of samples were collected to establish the performance and operational limits for full-scale application. Bench testing provided initial data on the variability of each criteria and guidance on the sample frequency required to develop statistically acceptable results.

5.0 PILOT PROGRAM – FIELD ACTIVITIES

The Pilot Program consisted of the field application that required placement of approximately 500 cy of PROPAT®-amended dredged material on a prepared plot. The material was dredged from the Claremont Channel, amended using full-scale mixing methods, and placed using standard earth moving equipment and techniques.

5.1 Dredged Material Collection

Approximately 645 tons of dredged material were collected from the Claremont Channel on April 27, 2000, by HNSE. A barge-mounted crane with a 10 cy clamshell bucket was used to dredge the material. The material was collected from an area near the HNSE bulkhead to minimize disturbance within the channel (Figure 1).

The area dredged was also positioned near the sediment characterization sample points CC-PA-09 and CC-PA-10. The earlier analytical results indicated that these samples and the material dredged during the Pilot are representative of the sediment to be dredged and placed upland at the Port Liberté golf course. Physical characteristics and bulk chemistry of CC-PA-09 and CC-PA-10 are similar to the other cores and composites analyzed during the sediment characterization (see WDPA, 1999, Appendix D).

Dredged material was loaded onto a HNSE barge (Schiabo No. 130) and transported to the Consolidated Technologies, Inc. (CTI) facilities located toward the landward end of HNSE's bulkhead (Figure 1). CTI performed all material processing and placement.

After being docked at the CTI facility for a day to allow the dredged material to settle, the material in the barge was dewatered in accordance with CTI's approved dewatering procedures. Approximately 1,500 gallons of water were removed from the barge, with discharge directed back into Claremont Channel after settlement, as approved in discussions with NJDEP.

A displacement survey of the barge was made by Alex Stewart (Assayers) following dewatering but before any materials were offloaded. Based on this displacement survey and the empty barge displacement, 645.4 short tons of sediment were in the barge. Based on the dimensions of the cargo box and the estimated depth of material in the barge, 537 cy of sediment were placed in the barge. Based on the method used to estimate the depth of sediment, the estimated volume of sediment may range from 503 to 571 cy. The ratio of weight to estimated volume correlates to an approximate value for sediment density of 89 pounds per cubic foot (pcf).

5.2 Dredged Material Processing

5.2.1 Amending Materials

Results from the Bench-Scale testing indicate that a relatively broad range of recipes using pozzolanic materials mixed with PROPAT® would perform satisfactorily. Using the optimum mix from the Bench-Scale as a starting point, mixes for the Pilot Program were developed in consultation with CTI. Equipment constraints, material availability, and scale-up characteristics of the sediment and PROPAT® were factors in the selection of a mix to use during the Pilot Program.

The elimination of the addition of 5% alkaline activator (lime) was recommended by CTI because of concerns over the total volume of additives and the operational limits for the batch plant stabilization. Instead, they recommended replacing their KS40 proprietary reagent with another proprietary reagent, KS60. CTI reported the KS60 contained additional alkaline activator, thereby offsetting the elimination of the alkaline activator. Other ingredients in KS60 would also improve the pozzolanic reaction as compared to the KS40, allowing a reduced percentage addition of overall additives (see Appendix A).

It was also concluded that several mixes should be tried during the Pilot Program. PROPAT® was held at 30 percent of the wet weight of the sediment; the ratio used in the Task 5 Bench-Scale testing. Fly ash and KS60 would be added to the mix at two ratios, 16 percent each and 20 percent each. This range of 32 to 40 percent non- PROPAT® additives by wet weight of the sediment was comparable to the percent additives used in the Bench-Scale testing.

5.2.2 Mixing Procedures

Modifications to Work Plan Mixing Methods. The original work plan (Hart Crowser, 1999a) proposed evaluating three mixing methods:

- In-Barge Mixing;
- Pug Mill Mixing; and
- *In situ* Mixing.

Subsequently, two of these mixing methods were dropped from the Pilot Program because of Bench-Scale testing results, additional practical experience with mixing, equipment availability, and regulatory concerns.

***In Situ* Mixing.** Although mixing of the dewatered dredged material and amending additives using *in situ* techniques was initially proposed, that procedure was no longer considered practical. During the Bench-Scale testing, it became clear from the observations and analytical results of the dredged material and PROPAT® that thorough blending of all additives was a critical requirement. With standard *in situ* techniques, it would not be practical to achieve the degree of mixing needed. Additionally, placing and mixing the dry fly ash and dry alkaline activator in the field while maintaining adequate control of the dust emissions from these powdery materials would be problematic. Therefore, it seemed unlikely this mixing method could be implemented effectively without environmental air quality concerns, and it was not tested.

In-Barge Mixing. In-barge mixing is the technique that has been used at several sites within the harbor to amend dredged material with cements and other agents prior to upland placement. It has been used successfully and NJDEP considers it an accepted amending method for dredged material in New Jersey. Evaluation of this method using PROPAT® and the other standard additives was initially proposed. When the proposal was prepared, use of a mixing head located at another facility was considered a possibility. Mixing in a truck bed or roll-off container with a bucket loader was considered another option if a mixing head was not available.

A mixing head suitable for the quantity of material and the additives required was not available for use when the Pilot Program occurred. Concerns regarding the air emissions in the proximity of the mixing head had also become an issue to be addressed as part of any operating permits. Addressing these concerns systematically without knowing the specific equipment and within the timeframe of the Pilot Program was not possible. Consequently, in-barge mixing with a mixing head was not tested.

Likewise, mixing in a truck bed or roll-off container did not appear to be a viable option because of the dust concerns. Just as controlling airborne emissions that sometimes occur when handling the powdery fly ash and alkaline activator would be difficult for *in situ* mixing, the emissions would be more difficult to control when mixing with a bucket loader in a truck bed. In addition, achieving the thorough mixing needed with only a bucket loader was considered problematic and the degree to which it would simulate a mixing head was questioned.

For these reasons, and for the technical difficulties for the small-scale Pilot Program discussed above, it was concluded by Hart Crowser, HNSE, CTI, and NJDEP Office of Dredging and Sediment Technology that in-barge mixing should not be pursued for the Pilot Program. However, these parties agree it remains a viable and proven mixing option that could be used with PROPAT®, given the favorable results reported in the following sections of this report.

Pilot Program Mixing Procedures – Pug Mill Mixing. It was concluded that workability and performance of the placed material could be adequately evaluated from the one mixing method to be used. A modified work plan (Hart Crowser, 2000a) was prepared and accepted by NJDEP to include only pug mill mixing.

After large pieces of wood, metal, and other debris were removed from the barge with a grapple mounted on a hydraulic excavator and placed in a roll-off container, the dewatered dredged material was removed from the barge with a hydraulic material handler/excavator and placed in the feed hopper at the top of the separation unit. The sediment fell though a 4- by 4-inch grizzly that separated any remaining large debris into a second feed hopper. A series of augers moved the sediment through the hopper and onto a conveyor belt at a relatively uniform rate. The conveyor carried the sediment to the PROPAT® feeder conveyor and on to the pug mill.

Load cells on the process system monitored the weight of the sediment. The weight data were used by the computerized controls to adjust the quantity of PROPAT® being added and maintained the 30 percent ratio by weight of wet sediment ratio. Variable speed screw augers fed the PROPAT® from hoppers via conveyor onto the main conveyor where the PROPAT® spread over the sediment.

Together the sediment-PROPAT® was conveyed into a pug mill for mixing. The dry ingredients, fly ash and KS60, were added to the mixture within and at the head of the pug mill. These dry components were delivered pneumatically from adjacent storage silos. Delivery rates were metered and adjusted based on the measured weight of the sediment on the conveyor. As the mixture passed through the pug mill, the mixing blades thoroughly blended the components. The blended mixture was conveyed from the pug mill onto a radial stacker conveyor. Load cells on this conveyor recorded the weight of PROPAT®-amended sediment produced.

For the Pilot Program, the material was then stacked on the paved storage area for testing and loading. During full-scale production, the mixed material could also go directly into trucks or rail cars.

Mixing of the material began on May 2, 2000, four days after dewatering of the barge. Moisture content of the sediment remained stable during this period. The average moisture content was 165.6 percent. Several trial batches of material were mixed initially to test the components of the mixing system and to calibrate the equipment. Production of 16-mix (16% fly ash, 16% KS60, and 30% PROPAT® by weight of wet sediment) began late in the day. Approximately 125 cy of the 16-mix were mixed on May 2, 2000. The remainder of the 16-mix, approximately 125 cy more, was mixed on May 3, 2000. Mix rations were then adjusted, and approximately 250 cy of the 20-mix (20% fly ash, 20% KS60, and 30% PROPAT® by weight of wet sediment) were blended.

Based on weight readings from the conveyor load cells, CTI reported that 496 tons of unamended sediment was processed and 817 tons of PROPAT®-amended material were produced during the two days of Pilot Program mixing. The volume of sediment processed can be estimated based on the estimated density (89 pcf) of the sediment in the barge. Using this estimated density and the measured weight of the sediment processed, the volume of unamended sediment processed is 413 cy. Given the uncertainty in the estimated volume of sediment placed in the barge, this estimate of the volume of unamended sediment processed may range from 386 to 438 cy.

5.3 Field Sampling and Observations

Visual observations of the final mix as it came off of the radial stacker were made throughout the mixing process. Moisture content, material stiffness, and apparent thoroughness of the mixing were monitored. Several of the initial batches (several cubic yards each) produced on start-up were clearly not well-mixed and were not sampled. CTI adjusted their process until systems were working properly and uniform material was being delivered from the pug mill. At that time, sampling of the material began.

Bulk samples and 2- and 3-inch-diameter cylinder test samples of the material were collected on the May 2, 2000. Material was taken randomly from the pile of mixed material as it was delivered from the radial stacker. Bulk samples were placed in plastic bags or jars for shipment to the laboratory. For the cylinder samples, material was placed in the cylinder in several "lifts." Each "lift" was compacted in the field as densely as possible with a tamping rod following procedures similar to those used when forming cylinders in the Bench-Scale testing (Hart Crowser, 2000c). The cylinders were sealed, labeled, and stored for shipment. Standard documentation and chain of custody paperwork were completed for each sample (Hart Crowser, 1998b).

Additional cylinders and bulk samples of the 16-mix were collected on May 3, 2000. Samples were taken from random locations in the stacked material. Slump tests were also taken to document the slump and workability of the material. Slump of the 16-mix was minimal (less than 1 inch), confirming the visual observations that the moisture content of the mix had been significantly reduced as compared to the unamended sediment. Slump testing also confirmed that the material should be workable with standard earth moving equipment.

After approximately half of the sediment had been processed using the 16-mix, the mixing ratio was changed to the 20-mix. Slump tests of the 20-mix were the same as those for the 16-mix. Cylinders and bulk samples of the 20-mix were collected following the same procedures as used for the 16-mix. All cylinder sampling and preparation for the physical and chemical testing described below was completed on May 3, 2000. Additional bulk samples of the 20-mix to be used in the resilient modulus testing were collected on May 4, 2000.

5.4 Field Application of Dredged Material

5.4.1 Demonstration Area

A location on the HNSE property near the CTI facilities (Figure 1) was selected for the demonstration area. Prior to placing any amended materials, CTI stripped the demonstration area test plot of vegetation and graded it. Soil graded from the test plot was used to construct containment dikes around the area. The containment dikes were placed to minimize any rainwater running onto the site from adjacent areas and to control any runoff coming from the placed materials. Silt fencing was also placed around the outside of the dikes and at the point where rainwater exits the placement area to prevent the runoff of fine materials from the dikes and placed material. A route for equipment access was established and covered with gravel to reduce tracking of material onto adjacent roads.

The prepared test plot consisted of light brown, silty sand that appeared to be well-compacted. No additional compaction of the prepared surface, other than the weight of the construction equipment, was undertaken. Several randomly located nuclear density tests taken of the adjoining subgrade during placement of the PROPAT-amended material indicated the dry density of the subgrade was approximately 120 pcf.

5.4.2 Material Placement

The 16-mix material amended during the afternoon of May 2, 2000, was allowed to cure overnight at the CTI facility. During the Bench-Scale testing, it was noted that the workability of the material improved over time after mixing as the pozzolanic reaction of the amending agents and curing/hydration process progressed, reducing moisture content and increasing strength. By allowing the initial mix to sit overnight, it was possible to compare the workability of partially cured material with the fresh material mixed on May 3, 2000.

The PROPAT®-amended material was delivered to the test plot in trucks, off-loaded, and placed in 10- to 12-inch-thick loose lifts with a front end loader. Once the lift was graded, it was compacted with a rubber-tired vibratory drum roller (CAT C5-563C). A pad with dimensions of approximately 55 by 85 feet with 3 to 1 side slopes was built up in this manner. Ultimately, the compacted thickness of the pad was approximately 2.5 feet.

Most of the material was placed on the test pad throughout the day of May 3, 2000. The workability of the 16-mix material amended the afternoon before did not appear to be significantly different from the 16-mix material amended on

May 3. The 20-mix seemed only marginally stiffer than the 16-mix, and there also seemed to be no significant difference in the workability of the two mixes as they were placed on the pad. Some of the 20-mix amended during the afternoon of May 3, about 50 cy, was left at the processing facility to cure overnight. When it was placed the next day, there appeared to be no change in workability.

When the material was initially placed on the test pads, it was too soft to allow the dump trucks to drive on it. The vibratory roller, however, was able to travel across the placed material without sinking into it as the trucks did. Slight pumping of the material was observed as the roller compacted it. On the second day of material placement, when the final material was placed, the compacted material had cured and hardened enough overnight to allow the trucks to drive across it without sinking.

5.4.3 Field Tests

Sand cone and nuclear densometer tests were performed in the field on the placed and compacted material on May 3 and 4, 2000. Both tests measure the in-place density of the placed material. Because of the heterogeneous nature of the PROPAT®, the ability of the nuclear density testing equipment to perform accurately in PROPAT®-amended sediment was uncertain. Therefore, the sand cone method of determining field density was also used.

In-place wet density of the amended material ranged from 112 to 124 pcf with an average of 117 pcf when measured by the sand cone method (Table 1). Based on water contents measured in the laboratory, in-place dry density of the material ranged from 74.2 to 80.5 pcf. These results compare favorably with the maximum dry densities obtained during modified Proctor testing as described in the following sections. This supports the field observations that the material could be easily worked and compacted with standard earth-moving equipment. During full-scale placement of PROPAT®-amended sediment, it will be possible to obtain near optimum compaction, densities, and strengths using standard earth-moving equipment and employing routine soil placement and compaction procedures.

Nuclear density test results ranged from 74.3 to 79.2 pcf. These values compare well to the dry densities measured by the sand cone method. However, water contents as measured by the nuclear density testing equipment were significantly underestimated. Laboratory water contents of material removed for the sand cone tests were approximately 45 to 50 percent while the nuclear densometer measurements were on the order of 35 percent. These results indicate that the nuclear densometer can be used during full-scale placement to track compaction of the material. However, a correction curve will need to be developed if water contents are also tracked with the nuclear densometer. In addition, periodic sand cone measurements should be made as a check on the nuclear densometer.

5.4.4 Surveying and Volume Determinations

Local survey control for the test plot was established by CTI and Hart Crowser following plot preparation. The test plot area elevations were surveyed with a self-leveling level on May 2, 2000, prior to the placement of any material. An area 115 by 85 feet was surveyed in a grid pattern to establish pre-placement elevations to be used in the determination of the volume of material placed.

On May 11, 2000, the completed test plot was resurveyed by CTI and Hart Crowser. Post-placement elevations were determined on the placed material at the top of slope and at the toe of slope of the placed material. Survey data were reduced by CTI, and the volume of compacted material placed was computed. The measured quantity of compacted material placed was 485 cy.

The material processed from the pug mill was placed at the demonstration area. Based on conveyor load cell measurements, 817 tons of material were processed and subsequently placed. Using this measured weight and the surveyed volume of placed material, the in-place wet density can be calculated to be approximately 125 pcf. This calculated value compares favorably to the in-place wet densities (an average of 117 pcf) measured in the field with the sand cone.

As expected, the quantity of PROPAT®-amended sediment placed on the test plot is greater than the quantity of un-amended sediment that went into the processing stream. Based on the average ratio of the mixes, 30% PROPAT® and 18% fly ash and 18% KS60, the total weight of the PROPAT®-amended sediment produced can be calculated based on the weight of the sediment processed, 496 tons. This theoretical weight of PROPAT®-amended sediment, 823 tons, is within 1% of the measured amount produced, 817 tons.

The volume of PROPAT®-amended sediment produced was also greater than the estimated volume of un-amended sediment added to the process stream. However, the relationship between the two volumes is not as easily determined as the relationship between the two weights. The uncertainty associated with the estimated volume of un-amended sediment is one complicating factor (see Section 5.1). However, the interaction of the additives with the water associated with the sediment, the changes in pore volume resulting from those reactions, and the amount of compaction applied as the material was placed also complicate the volume relationships.

For this test program which produced in-place material with wet densities averaging 117 pcf, the volume of material on the test pad, 485 cy, is approximately 1.17 times greater than the estimated volume of un-amended sediment (413 cy) added to the process stream. Due to the uncertainty in the estimated volume of sediment added to the process, as discussed above, the ratio of the increase in volume for this test program may vary from 1.11 to 1.25, The estimated increase of volume of the dredged material for this particular recipe of additives, including 30 percent PROPAT®, is approximately 1.17.

5.5 Monitoring during Mixing and Placement

Dust monitoring using a MIE Miniram Real-Time Aerosol Monitor was undertaken during the mixing and placing of the PROPAT®-amended material. Routine measurements of dust levels were taken using this portable equipment. All readings remained well below the action level of 7.5 mg/m^3 established in the Health and Safety Plan (Hart Crowser, 2000b). No significant dust was noted in the vicinity of the processing equipment or at the demonstration area.

Personal monitoring for possible airborne contaminants of concern was also undertaken. On May 3, 2000, during the mixing and placement operations, a calibrated sampling pump was worn by the Hart Crowser field representative and samples were collected following established protocols. After the prescribed period of monitoring, the filters were removed from the sampling pump and sent to laboratory for analysis for selected metals and PCBs. The analytical results showed that none of these constituents were detected in the samples (see Appendix B).

These monitoring results, and the field observations of the mixing and placing operations, demonstrate that pug-mill mixing and placement using standard earth-moving equipment can be accomplished without exposing workers or surrounding properties to dust above levels of concern. Consequently, airborne exposure to any of the potential contaminants of concern is also unlikely as demonstrated from the results of the personal air monitoring undertaken.

5.6 Monitoring and Site Cleanup

Hart Crowser and HNSE personnel continue to inspect the demonstration area and test plot on a routine basis. The PROPAT®-amended sediment remains hard and compacted. Pieces of PROPAT® exposed at the surface of the test plot appear to have remained in place. There is no evidence of erosion of sediment or PROPAT® from the surface or slopes of the test plot by rain runoff and no accumulations of sediment or PROPAT® have been observed where the silt fencing filters runoff. During dry and windy periods, no dust or materials have been observed blowing from the exposed surface of the test plot. There does not appear to have been any changes in the elevation of the test plot.

The pilot plot will remain in-place until placement of material at the Port Liberté site begins. Then the pilot project material will be removed and placed with the full-scale PROPAT® placement. Currently, it is anticipated this will occur in the spring of 2001. Site cleanup will include removal of all amended material and construction debris. The site will be graded and restored to pre-project conditions.

6.0 PILOT PROGRAM - MATERIAL TESTING

Physical and environmental testing of the PROPAT®-amended sediment was undertaken as part of the Pilot Program. In addition to the field tests described in the preceding section, a number of laboratory tests were completed to evaluate the performance of the material, to document its ability to satisfy the specific criteria established by LNDC for material placed at Port Liberté, and to support the LNDC and future AUD applications to the NJDEP. In addition, a number of replicate samples were subjected to each test so that variability in performance of the final product could be established with some level of statistical confidence.

6.1 Sampling Preparation

As described in Section 5.3, the PROPAT®-amended material was conveyed on the radial stacking conveyor from the pug mill and stacked in piles prior to being loaded in trucks and taken to the demonstration area. All samples were collected from the stacked material. The samples were collected at random locations within the piles throughout the processing period. Samples were divided equally between the 16-mix material and the 20-mix material.

Bag samples were collected by placing the processed material into sample containers with no compaction. These samples were used for the modified Proctor testing, the resilient modulus testing, and for water content determinations. Jar samples were also collected for the environmental testing. Some compaction took place as the jar was filled to capacity, but no attempt was made to obtain a high level of sample compaction.

Standard 2- and 3-inch-diameter concrete test-cylinders were collected for compressive strength and permeability testing. Material was placed in the cylinders in "lifts." Each "lift" was compacted in the field with a tamping rod following procedures similar to those used when forming cylinders in the Bench-Scale testing. The cylinders were sealed, labeled, and stored for shipment.

Standard documentation and chain of custody paperwork were completed for the samples (Hart Crowser, 1998b). The 2- and 3-inch-diameter cylinders, jar samples, and selected bag samples were sent to the Hart Crowser laboratory in Seattle, Washington, for geotechnical analyses. Samples that were subjected to the environmental analyses were also sent to the Hart Crowser laboratory where they were allowed to cure for at least 28 days before they were shipped for environmental analyses to Severn Trent Laboratory (formerly Quanterra) in Pittsburgh, Pennsylvania. Bulk samples of material were also taken to the Valley Forge Laboratories, Inc. in Devon, Pennsylvania, where modified Proctor and resilient modulus testing was performed.

6.2 Physical and Geotechnical Testing

6.2.1 Grain Size

A sample of the un-amended sediment was collected from the barge after dewatering and submitted for grain size analysis (Appendix C). The sample was predominantly silt, 79.3 percent, with 14 percent clay and 6.6 percent sand. This is similar to the samples analyzed during the 1999 characterization of the Claremont Channel sediments (WDPA, 1999, Appendix D). Characterization samples CC-PA-09 and CC-PA-10, the samples collected nearest the area dredged for the Pilot Program, were reported to have similar clay contents (9 to 13 percent) but slightly greater silt contents (82 to 86 percent).

6.2.2 Water Content

Water contents of the un-amended sediment as well as the 16-mix and 20-mix of PROPAT®-amended sediment were measured (ASTM D 1557). Water content as reported throughout this report is the weight of water in the sample divided by the weight of dry soil, expressed as a percent.

Field measurements were also made using a microwave to dry the soils. However, these readings resulted in water contents systematically lower than the laboratory measurements, indicating drying in the microwave was not as complete as necessary during the field effort. The favorable performance of the 16-mix and 20-mix did not require changes in the mix proportions to improve workability as the Pilot Program was underway. Consequently, determining water contents in the field was not critical to the outcome of the field activities.

Un-amended Sediment. Two samples of sediment were collected from the dredge bucket as the material was placed in the scow. Water contents were 187 and 194 percent. While the field notes do not indicate that free water was collected along with the sediment samples, there was no attempt to decant free water from the samples.

Following dewatering of the sediment at the CTI facility, 11 additional samples of the un-amended sediment were collected and submitted for water content analysis (Table 2). Water content ranged from 178 to 157 percent with an average of 166 percent. These results indicate that there was some reduction in the water content as a result of the material standing in the barge for over 24 hours and then the removal of 1,500 gallons of free water at the top of the barge.

PROPAT®-amended Sediment. Table 3 presents the results of water content measurements at the time of mixing for 16-mix and 20-mix samples. The addition of relatively dry PROPAT® and the amending agents significantly reduced the water content of the mixes as expected. This large reduction in water content is a major factor in improving the workability of the material. Similar variability is seen in the water content of both the 16-mix and the 20-mix samples after they have cured for 28 days. This likely reflects the range in water content seen in the un-amended sediment (Table 2) as well as the somewhat heterogeneous nature of the PROPAT®. However, in all samples there is the large reduction in water content needed to make the PROPAT®-amended sediment workable.

Water contents were measured at varying times after the initial mixing of the samples to determine if there was a systematic change in water content as the samples cured. No clear trend can be seen in either mix over time.

When the 16-mix is compared to the 20-mix, no clear difference in the water content is seen. The average water content of the 20-mix is marginally higher than that for the 16-mix even though more dry materials have been added. However, there is significant variability within each mix, and a Student's t-test of the means indicates no significant difference. Similar ranges in water content should be expected during the full-scale demonstration.

6.2.3 Unconfined Compressive Strength

Unconfined compressive strength was measured for both 16-mix and 20-mix 3-inch cylinders in the Hart Crowser geotechnical laboratory. Standard procedures for unconfined compressive strength testing of concrete cylinders were followed (ASTM D 2166).

Wet densities of the cylinders were determined when received at the laboratory (Table 4). While a standard procedure was followed for filling and compacting each cylinder in the field (Section 5.3), some variability due to field conditions was expected. This would be especially true if the degree of tamping had been especially more or less. Cylinders with wet densities near the average were felt to be more representative than a cylinder at either extreme. Since unconfined compressive strength is, in part, dependent on the amount of material compaction, cylinders with wet densities near the mean were selected for testing.

Five 16-mix cylinders and five 20-mix cylinders were tested. These cylinders were cured at ambient temperatures for 28 days, the typical curing period used in concrete testing. The 28-day curing criteria is also specified in the PADEP Beneficial Use Order issued to CTI for the placement of amended dredged materials at the PA Mines Demonstration Site, "Bark Camp."

Table 5 presents the results of the compressive strength testing. The samples exceeded the minimum compressive strength criteria (30 psi) established by LNDC. Samples of the 16-mix had strengths ranging from 46 to 70 psi. Average strength of the 16-mix was 60 psi. The 20-mix samples ranged in strength from 54 to 110 psi with an average of 75 psi. The PADEP Beneficial Use Order criteria is less than or equal to 35 psi.

The 20-mix is stronger than the 16-mix, and the difference in the averages is statistically significant at the 90% level. This suggests the additional KS60 and fly ash improves strength, but there remains a substantial amount of variability. Both mixes surpass the strength criteria for the LNDC; however, if higher strengths are needed for other applications, the observed variability must be taken into account in addition to the average strength attained.

6.2.4 Modified Proctor Tests

Modified Proctor compaction tests (ASTM D 1557) were performed on bulk samples of the 16-mix and 20-mix sent to Valley Forge Laboratories. Five tests were performed on each mix over time to determine if the curing process significantly changed the optimum moisture or maximum dry density (Table 6). Individual modified Proctor curves are presented in Appendix C.

No trend in optimum moisture or maximum dry density is seen in either mix with time. While the average maximum dry density achieved by the 16-mix is slightly greater than for the 20-mix, the differences are not statistically significant.

Optimum moisture (as it relates to the Modified proctor tests), approximately 31 percent for both mixes, is lower than the water contents measured in the compacted cylinders (approximately 46 percent) or seen in the compacted material in the field (49 percent). This indicates PROPAT®-amended sediment will be placed wet of optimum during the full-scale demonstration. Hence, it may be prudent to allow the amended material to cure for an adequate period of time, since as the material cures, the moisture content decreases and becomes closer to the modified Proctor optimum moisture content determined for a given sediment recipe.

Dry densities (74 to 81 pcf) in the field, as measured by the sand cone and nuclear densometer, are similar to maximum dry densities (73 to 81 pcf) from the modified Proctor testing. These results, when combined with the strength results, indicate placing the material wet of optimum will not adversely affect performance of the fill.

6.2.5 Resilient Modulus Testing

The resilient modulus was determined for the PROPAT®-amended sediment at the request of the NJDEP. The resilient modulus of the material is used for the design of flexible pavements subjected to moving wheel loads. The test to determine the resilient modulus consists of applying a repeated axial deviator stress of fixed magnitude, duration, and frequency to a specimen. The resilient modulus is defined as the dynamic deviator stress (the repeated axial stress) divided by the resilient (recovered) strain. It is the dynamic stress strain relationship.

The 16-mix and 20-mix samples were tested in accordance with AASHTO TP-46-94. Results are presented in Table 7. Significant variability is seen between individual samples. This is likely related to the heterogeneity of the PROPAT®. The relatively small size of the molded sample when compared to the size of some of the PROPAT® pieces was observed to contribute to this variability (Appendix C). In those samples with the lowest resilient modulus values, cracking appeared to develop along the larger or longer pieces of PROPAT®. Overall, there appears to be no significant difference between material cured for 7 or 28 days. There is little difference between the 16-mix and the 20-mix.

Subgrade soils are classified as fair for roadbed support of flexible pavements for low-volumes roads by AASHTO when the resilient modulus is 4,500 psi. If a subgrade soil is considered fair, a thicker pavement section will be needed than if the soil was classified as good or very good. Our results show an average value (7- and 28-day cured samples) of 4,552 psi for the 16-mix and 4,267 psi for the 20-mix. These values fall within the range of fair for roadbed soil in US Climatic Region II, which includes New Jersey.

6.2.6 Specific Gravity

Table 8 presents the results of specific gravity tests on the 16-mix and 20-mix. Testing followed ASTM D 854. The range in specific gravity for each mix is similar and the means are the same, 2.41. The increased percentages of fly ash and KS60 appear to have no impact on specific gravity.

6.2.7 Hydraulic Conductivity

Hydraulic conductivity results for 16-mix and 20-mix 3-inch cylinders are presented in Table 9. Testing was done at the Hart Crowser geotechnical laboratory and at Valley Forge Laboratories following ASTM D 5084. Cylinders were selected for testing with wet densities near mean values, as described in Section 6.2.3. The test cylinders had cured for at least 28 days prior to testing.

Hydraulic conductivity for the 16-mix ranged from a high of 5.1×10^{-6} cm/sec to a low of 1.1×10^{-6} cm/sec. The average hydraulic conductivity for the 16-mix cylinders was 2.7×10^{-6} cm/sec. The range for 20-mix was from 6.8×10^{-6} to 6.1×10^{-7} cm/sec, and the average was 2.9×10^{-6} cm/sec. Based on the Student's t-test, the mean values are not different. Therefore, the average hydraulic conductivity is only slightly higher than LNDC's requirement for bulk fill or a cap.

The Pilot Program results indicate that the greater variability seen during the Bench-Scale testing is atypical. When the amending recipe remains relatively consistent and equipment that can achieve thorough mixing is available, variability in hydraulic conductivity is reduced and results are consistently in the low 10^{-6} cm/sec range.

6.3 Environmental Testing

Leachate and bulk chemistry are the two key environmental characteristics used to evaluate the suitability of amended sediments for beneficial reuse. Bulk chemistry of PROPAT®-amended sediment as well as of the individual constituents (sediment, PROPAT®, and additives) was reported in the Bench-Scale testing report (Hart Crowser, 2000c). Since the bulk chemistry of the sediment (both amended and un-amended) has been sampled and analyzed repeatedly, it was not resampled and reanalyzed as part of the Pilot Program. The results of the amended sediment obtained during the previous work are considered representative of the pilot phase amended sediment. While the concentration of the majority of the chemical constituents analyzed were below the NRSCC, arsenic and total PCBs did exceed the NRSCC in the PROPAT-amended samples. The concentration of arsenic slightly exceeded the NRSCC (1.2 times the NRSCC). The concentration of total PCBs was 3.5 times the NRSCC. The PROPAT®-amended sediment will be placed underneath 2 to 4 feet of turf-supporting soil, and contact with the amended sediment is not expected once it has been placed. The risk of exposure to the amended sediment is unlikely. Leaching of PCBs, as indicated by analytical results from bench-scale testing, does not occur above the GWQS. Leaching of arsenic at concentrations above the GWQS does occur, but appears to occur in a limited time frame.

Two leaching tests were performed, the modified Multiple Extraction Procedure (MEP) and the ANSI 16.1 leaching test (ANS, 1986). The resulting leachate was submitted for the following chemical analysis.

- Total suspended solids (TSS) (EPA Method 160.2);
- Total organic carbon (EPA Method 9060);
- Total metals (EPA Method 200 series);
- Pesticides/PCBs (EPA Method 8081/8082);
- Semivolatile organics (EPA Method 8270); and
- Polychlorinated dibenzo-p-dioxins and dibenzofurans (dioxins/furans) (only in leaches 1 and 7) (EPA Method 8290).

The data quality review is presented in Appendix D.

6.3.1 Modified MEP Testing

The leaching procedure used by the NJDEP Office of Dredging and Sediment Technology in its evaluation of dredged material is the modified MEP test. Three samples of PROPAT®-amended sediment were subjected to this test. Multiple samples were tested to establish the level of variability to be expected during the full-scale placement based upon a statistical degree of confidence.

Only one mix, the 16-mix, was used for the modified MEP testing. Because of the lower percentage of fly ash and KS60, it was expected that, if there were any difference, the 16-mix, which has fewer amending agents and is, therefore, probably not as solidified as the 20-mix, would be more likely to leach chemical constituents than the 20-mix. The geotechnical testing reported in Section 6.2 confirms there is little physical difference between the two mixes. Consequently, the results for the 16-mix should adequately characterize results anticipated for the 20-mix and similar mixes.

Table 10 presents the analytical results for the modified MEP leachate samples. Total PCBs are not detected in any samples. Semivolatiles and pesticides are also undetected except in several rare instances where concentrations are well below the GWQS.

Of the metals detected, aluminum, arsenic, and sodium are detected at concentrations above the GWQS. Aluminum is detected at high concentrations in the sediment, PROPAT®, and additives (Hart Crowser, 2000c). Aluminum solubility increases with pH above neutral due to the formation of AlO_2^-. The addition of more alkaline additives, which helps reduce the solubility of most metals, likely contributes to the higher solubility of aluminum. The concentrations of arsenic exceed the GWQS in Days 6 and 7 with a maximum exceedence of 1.3 times the GWQS for arsenic. Arsenic is a mobile metal that frequently leaches out of sediment. The analytical results of the ANSI test (Section 6.3.1) indicate that arsenic may leach out of the amended sediment at concentrations above the GWQS but at concentrations that only slightly exceed the GWQS and only for a limited period. The high concentrations of sodium are a result of saltwater wash out, as the sediments are from an estuary. The concentrations of sodium only exceed in the Day 1 leach and are not expected to be an environmental risk.

Dioxin results for the first and seventh leach are presented in Table 11. Except for one estimated value, the dioxins were non-detect.

Table 12 presents the mean values for metals in the modified MEP leaches and the standard deviations. Measurement of central tendency and variability of the other parameters is of little value when most results were non-detect.

6.3.2 ANSI 16.1 Leaching Test

The NJDEP Office of Innovative Technology and Market Development has adopted the ANSI 16.1 leaching test as the standard for evaluating materials that will be placed in the environment. This standard has been adopted by a number of states and is used routinely by the international community. The ANSI 16.1 method quantifies the leaching characteristics of dredged material when exposed to deionized water (ANS, 1986). This method calculates the release of contaminants of concern from dredged material on a long-term basis (3 months) in a defined leachant. The NJDEP will use the analytical results to model the leachability index of the PROPAT®-amended sediment.

In the ANSI 16.1 test, deionized water is used as the leachant rather than the acidic leachant of the modified MEP test. The amended sediment sample being subjected to the leachant is left intact rather than being crushed as it is prior to the modified MEP test. Finally, the leaching period is much longer. Extracts of the leachate are taken at eight times over a total of 90 days rather than the seven times over a total of seven days for the modified MEP test.

As discussed in Section 6.3.2, only 16-mix samples were subjected to the ANSI 16.1 test. Three samples were tested to examine potential variability in the rates of leaching.

Table 13 presents the analytical results for the ANSI 16.1 leachate samples. For these three samples and their leaches, total PCBs are not detected. Semivolatiles and pesticides are also undetected except in several rare instances where their concentrations are well below the GWQS. Because of this trend in the first seven leaches, as agreed to with NJDEP, these parameters were not analyzed for in the last leach.

Of the metals detected in the leachates, aluminum, antimony, arsenic, and sodium were at concentrations exceeding the GWQS. Aluminum is detected at high concentrations in the sediment, PROPAT®, and additives (Hart Crowser, 2000c). Aluminum solubility increases with pH above neutral due to the formation of AlO_2^-. The addition of more alkaline additives, which helps reduce the solubility of most metals, likely contributes to the higher solubility of aluminum. Although the concentration of aluminum is greater than the GWQS in all samples, the concentration does decrease in leaches 7 and 8, the last two leaches (Figure 2). The concentrations of arsenic exceed the GWQS in leaches 6 and 7 for all samples and leach 8 for one sample, with a maximum exceedence of 1.5 times the GWQS for arsenic. Arsenic is a mobile metal that frequently leaches out of sediment. The general trend of the ANSI arsenic data shows an initial increase in arsenic concentrations and a decrease at the end of the test (Figure 3). These results indicate that arsenic may leach out of the amended sediment at concentrations above the GWQS but at concentrations that only slightly exceed the GWQS and only for a limited period.

The concentration of antimony tends to increase until leach 6 and then decreases. Antimony was detected in the procedure blank as a result of laboratory contamination. The high concentrations of sodium are a result of saltwater wash out, as the sediments are from an estuary. The concentrations of sodium generally decrease from leach 1 to 8 and are not expected to pose an environmental risk.

Dioxin results for the first and seventh leach are presented in Table 14. Dioxins were not detected in any of the samples.

Table 15 presents the mean values for metals in the ANSI 16.1 leaches and the standard deviations. Measurement of central tendency and variability of the other parameters is of little value as most results were non-detect.

7.0 PILOT PROGRAM CONCLUSIONS

Results of the Pilot Program demonstrate that PROPAT®-amended sediment generally meets the geotechnical and environmental criteria in the field. Both the unconfined compressive strength and unit weight of the PROPAT®-amended sediment met the criteria. The PROPAT®-amended sediment was also workable and manageable by standard earth-moving equipment and appears to have sufficient strength and elasticity to be suitable as backfill.

PROPAT®-amended sediment contains total PCBs and arsenic at concentrations above the NRSCC, although PCBs do not exceed the GWQS in the PROPAT®-amended sediment leachate. However, since the PROPAT®-amended sediment will be placed underneath a 2 to 4 feet of soil, direct contact is not expected and these constituent concentrations should not pose a risk. The concentration of some metals (aluminum, antimony, arsenic, and sodium) exceed the GWQS in the PROPAT®-amended sediment leachate.

8.0 RECOMMENDATIONS FOR FULL-SCALE PLACEMENT AND MONITORING

Two mixes, a 16-mix and a 20-mix, were tested in the Pilot Program. Both mixes performed comparably and generally met the geotechnical and environmental criteria. *We recommend use of the 16-mix in the full-scale project.* The 16-mix will be more economically feasible than the 20-mix.

During this program, we observed that initially rubber-tired dump trucks could not go onto the amended sediment when it was placed. The material was too soft and the truck would sink. After a 24-hour period, the trucks operated normally on the material. This is an important factor in temporary road designs for construction purposes. Trucks will not be able to travel on the material when the material is wet and just placed. Time for the curing process to occur will be necessary. The amount of time that the material will need to cure for vehicle traffic will depend on a variety of factors, such as the actual mix used, whether the material has been in a stockpile for awhile, and the weight and type of the vehicle.

F:\docs\jobs\492418\PROPAT12-13-00.doc

REFERENCES

ANS, 1986. "Measurement of the leachability of solidified low-level radioactive wastes by a short-term procedure." Prepared by American Nuclear Society, April 14, 1986.

Enviro-Sciences, 1999. "Remedial Action Work Plan, Liberty National Development Project." Prepared by Enviro-Sciences, Inc., July 1999.

Hart Crowser, 1998a. "PROPAT®/Sediment Phase I Bench-Scale Testing." Prepared by Hart Crowser, June 18, 1998.

Hart Crowser, 1998b, "Sampling and Analysis Plan, Claremont Channel Deepening Project, Hugo Neu Schnitzer East, Jersey City, New Jersey." Prepared by Hart Crowser, December 31, 1998.

Hart Crowser, 1999a. "Bench Testing, Pilot Program and Field Monitoring for PROPAT® as Dredged Material Stabilizing Agent, Claremont Channel Deepening Project, Jersey City, New Jersey." Prepared by Hart Crowser, May 1999.

Hart Crowser, 1999b. "Sediment Report, Claremont Channel Deepening Project, Hugo Neu Schnitzer East, Jersey City, New Jersey." Prepared by Hart Crowser, 1999.

Hart Crowser, 2000a. "Revised Pilot Program Work Plan for PROPAT® as a Dredged Material Stabilizing Agent." Prepared by Hart Crowser, April 20, 2000.

Hart Crowser, 2000b. "Health and Safety Plan - Pilot Program Work Plan for PROPAT® as a Dredged Material Stabilizing Agent." Prepared by Hart Crowser, April 2000.

Hart Crowser, 2000c. "Bench-Scale Testing Results PROPAT® as Dredged Material Stabilizing Agent, Claremont Channel Deepening Project, Jersey City, New Jersey." Prepared by Hart Crowser, June 2000.

NJDEP, 1997. "The Management and Regulation of Dredging Activities and Dredged Material in New Jersey's Tidal Waters." Prepared by New Jersey Department of Environmental Protection, October 1997.

WDPA, 1999. "Waterfront Development Permit Application. Claremont Channel Dredging Project." Prepared by Hugo Neu Schnitzer East, May 18, 1999.

F:\docs\jobs\492418\PROPAT12-13-00.doc

Table 1 - Pilot Program Demonstration Area Field Densities for PROPAT®-Amended Sediment

Test Date	Instrument	Dry Density in pcf	Water Content in %
5/3/2000	Sand Cone	79.4	48.4
5/3/2000	Sand Cone	75.4	48.4
5/4/2000	Sand Cone	80.5	50.0
5/4/2000	Sand Cone	74.2	50.0
5/3/2000	Nuclear Density	75.6	34.7
5/3/2000	Nuclear Density	77.8	33.2
5/3/2000	Nuclear Density	78.3	32.6
5/3/2000	Nuclear Density	74.3	34.0
5/4/2000	Nuclear Density	76.2	35.9
5/4/2000	Nuclear Density	76.7	35.9
5/4/2000	Nuclear Density	76.1	35.3
5/4/2000	Nuclear Density	79.2	30.6
5/4/2000	Nuclear Density	75.8	33.9
5/4/2000	Nuclear Density	77.1	33.5
5/4/2000	Nuclear Density	79.2	40.2

492418\Pilot Table 1 Field Densities.xls

Table 2 - Pilot Program Water Contents for Un-amended Sediment

Sample ID				Mix	Water Content in %
S	0503	T	1	Un-amended Sediment	158.0
S	0503	T	2	Un-amended Sediment	163.0
S	0503	T	3	Un-amended Sediment	178.0
S	0503	R	1	Un-amended Sediment	176.0
S	0503	T	4	Un-amended Sediment	162.0
S	0503	T	5	Un-amended Sediment	164.0
S	0503	T	6	Un-amended Sediment	158.0
S	0503	T	7	Un-amended Sediment	165.0
S	0502	T	8	Un-amended Sediment	157.0
S	0502	T	9	Un-amended Sediment	167.0
S	0502	T	10	Un-amended Sediment	174.0

Total Number of Samples	11
Average	16563.6%
Median	16400.0%
Standard Deviation	7.393

Note: 1. Water content = Weight of water/Weight of dry soil

492418\PilotTables2&3WaterContent.xls

Table 3 - Pilot Program Water Contents for PROPAT®-Amended Sediment

Sample ID				Mix	Days Cured	Water Content in %
P	0503	B		30:16:16	1	43.3
P	0503	B		30:16:16	4	45.2
P	0503	B		30:16:16	7	54.9
P	0503	B		30:16:16	22	44.7
P	0503	B		30:16:16	28	31.5
P	0502	C3	1	30:16:16	28	43.0
P	0502	C3	2	30:16:16	29	46.0
P	0502	C3	3	30:16:16	28	47.0
P	0503	C3	4	30:16:16	39	50.0
P	0503	C3	5	30:16:16	28	49.4
P	0503	C3	7	30:16:16	28	49.2
P	0503	C3	8	30:16:16	77	42.3
P	0503	C3	9	30:16:16	28	45.7
P	0503	C3	10	30:16:16	36	41.9
P	0503	C3	11	30:16:16	39	50.0
P	0503	P	1	30:16:16	4	48.4
P	0503	P	2	30:16:16	4	49.8

Sample ID				Mix	Days Cured	Water Content in %
P	0503	B		30:20:20	1	48.0
P	0503	B		30:20:20	4	50.2
P	0503	B		30:20:20	7	65.9
P	0503	B		30:20:20	22	43.6
P	0503	B		30:20:20	28	51.9
P	0503	C3	16	30:20:20	77	45.5
P	0503	C3	18	30:20:20	79	41.0
P	0503	C3	19	30:20:20	79	50.0
P	0503	C3	20	30:20:20	28	48.5
P	0503	C3	21	30:20:20	28	49.5
P	0503	C3	22	30:20:20	28	50.2
P	0503	C3	24	30:20:20	39	47.0
P	0503	C3	26	30:20:20	28	49.8
P	0503	C3	28	30:20:20	77	36.9
P	0503	C3	30	30:20:20	77	29.1
P	0503	C3	31	30:20:20	28	46.0
P	0504	P	1	30:20:20	4	50.6
P	0504	P	2	30:20:20	4	50.0

Number of 16 Mix Samples	17
Average	46.0
Median	46.0
Standard Deviation	5.1

Number of 20 Mix Samples	18
Average	47.4
Median	49.0
Standard Deviation	7.6

Probability Associated with a Student's t-Test = 0.258

Total Number of Samples	35
Average	46.7
Median	48.0
Standard Deviation	6.3

Notes:
1. 30:16:16 - 30% PROPAT® by weight of sediment
   16% KS60 by weight of sediment
   16% Fly ash by weight of sediment
2. 30:20:20 - 30% PROPAT® by weight of sediment
   20% KS60 by weight of sediment
   20% Fly ash by weight of sediment
3. Water content = Weight of water/Weight of dry soil

492418\PilotTables2&3WaterContent.xls

Table 4 - Pilot Program Summary of Cylinder Densities for PROPAT®-Amended Sediment

2-inch Cylinders				
Sample ID		Mix	Sample Weight in lb	Wet Density in pcf
P-0502-C2	1	16	0.65	88.8
P-0502-C2	2	16	0.64	87.4
P-0502-C2	3	16	0.67	91.7
P-0502-C2	4	16	0.66	90.3
P-0502-C2	5	16	0.63	86.4
P-0502-C2	6	16	0.68	93.1
P-0502-C2	7	16	0.69	95.3
P-0503-C2	1	16	0.73	99.9
P-0503-C2	2	16	0.68	92.9
P-0503-C2	3	16	0.72	98.9
P-0503-C2	4	16	0.71	97.8
P-0503-C2	5	16	0.68	93.3
P-0503-C2	6	16	0.70	96.6
P-0503-C2	7	16	0.68	93.5
P-0503-C2	8	16	0.64	88.4
P-0503-C2	9	16	0.66	91.4
P-0503-C2	10	16	0.66	90.5
P-0503-C2	11	16	0.68	93.8
P-0503-C2	12	16	0.68	93.5
P-0503-C2	13	16	0.68	94.1
P-0503-C2	15	16	0.68	93.6
P-0503-C2	17	16	0.66	90.3
P-0503-C2	18	20	0.65	89.7
P-0503-C2	19	20	0.67	92.4
P-0503-C2	20	20	0.63	86.0
P-0503-C2	21	20	0.67	92.6
P-0503-C2	22	20	0.64	88.4
P-0503-C2	23	20	0.69	94.8
P-0503-C2	24	20	0.67	92.7
P-0503-C2	25	20	0.64	87.4
P-0503-C2	26	20	0.64	88.4
P-0503-C2	27	20	0.67	92.4
P-0503-C2	28	20	0.66	91.3
P-0503-C2	29	20	0.68	94.1
P-0503-C2	30	20	0.67	91.6
P-0503-C2	31	20	0.67	91.5
P-0503-C2	32	20	0.68	93.8

Average Wet Density, pcf:	92.1
Std. Dev.	3.26
Number of Samples	37
Median	92.4
16 Mix - Average, pcf:	92.8
Std. Dev.	3.55
Number of Samples	22
Median	93.2
20 Mix - Average, pcf:	91.2
Std. Dev.	2.61
Number of Samples	15
Median	91.6

3-inch Cylinders				
Sample ID		Mix	Sample Weight in lb	Wet Density in pcf
P-0502-C3	1	16	2.22	90.3
P-0502-C3	2	16	2.14	87.4
P-0502-C3	3	16	2.11	85.8
P-0502-C3	4	16	2.24	91.2
P-0502-C3	5	16	2.18	88.7
P-0503-C3	1	16	2.24	91.4
P-0503-C3	2	16	2.22	90.6
P-0503-C3	3	16	2.22	90.6
P-0503-C3	4	16	2.25	91.7
P-0503-C3	5	16	2.33	95.1
P-0503-C3	6	16	2.22	90.4
P-0503-C3	7	16	2.27	92.4
P-0503-C3	8	16	2.47	100.8
P-0503-C3	9	16	2.31	94.1
P-0503-C3	10	16	2.28	93.0
P-0503-C3	11	16	2.25	91.6
P-0503-C3	12	16	2.43	99.0
P-0503-C3	13	16	2.24	91.1
P-0503-C3	14	16	2.13	86.8
P-0503-C3	15	16	2.35	95.8
P-0503-C3	16	16	2.22	90.6
P-0503-C3	17	16	2.44	99.5
P-0503-C3	18	20	2.38	96.9
P-0503-C3	19	20	2.31	94.0
P-0503-C3	20	20	2.32	94.6
P-0503-C3	21	20	2.30	93.8
P-0503-C3	22	20	2.31	94.0
P-0503-C3	23	20	2.36	96.0
P-0503-C3	24	20	2.31	94.2
P-0503-C3	25	20	2.29	93.4
P-0503-C3	26	20	2.32	94.3
P-0503-C3	27	20	2.30	93.7
P-0503-C3	28	20	2.36	96.2
P-0503-C3	29	20	2.35	95.5
P-0503-C3	30	20	2.23	90.7
P-0503-C3	31	20	2.32	94.4

Average Wet Density, pcf:	93.0
Std. Dev.	3.35
Number of Samples	36
Median	93.5
16 Mix - Average, pcf:	92.2
Std. Dev.	3.91
Number of Samples	22
Median	91.3
20 Mix - Average. pcf:	94.4
Std. Dev.	1.50
Number of Samples	14
Median	94.3

492418\Pilot Table 4 Cylinder Densities.xls

Table 5 - Pilot Program Unconfined Compressive Strengths for PROPAT®-Amended Sediment

Sample ID	Mix	Mix Date	Test Date	Days Cured	Strength in psi	Dry Density in pcf	Wet Density in pcf	Water Content in %
P 0502 C3 1	30:16:16	5/2/2000	5/30/2000	28	70.0	64.4	92.1	43.0
P 0502 C3 3	30:16:16	5/2/2000	5/30/2000	28	46.2	60.0	88.2	47.0
P 0503 C3 5	30:16:16	5/3/2000	5/31/2000	28	60.1	59.1	88.3	49.4
P 0503 C3 7	30:16:16	5/3/2000	5/31/2000	28	53.7	62.4	93.1	49.2
P 0503 C3 9	30:16:16	5/3/2000	5/31/2000	28	70.3	65.7	95.7	45.7
P 0503 C3 20	30:20:20	5/3/2000	5/31/2000	28	81.6	63.1	93.7	48.5
P 0503 C3 21	30:20:20	5/3/2000	5/31/2000	28	66.3	62.6	93.6	49.5
P 0503 C3 22	30:20:20	5/3/2000	5/31/2000	28	64.3	62.6	94.0	50.2
P 0503 C3 26	30:20:20	5/3/2000	5/31/2000	28	54.3	62.7	93.9	49.8
P 0503 C3 31	30:20:20	5/3/2000	5/31/2000	28	109.6	63.7	93.0	46.0

	16 Mix	20 Mix
Average Strength, psi	60.1	75.2
Standard Deviation	10.4	21.6
Probability Associated with a Student's t-Test =	0.097	

Notes:

1. 30:16:16 - 30% PROPAT® by weight of sediment
   16% KS60 by weight of sediment
   16% Fly ash by weight of sediment

2. 30:20:20 - 30% PROPAT® by weight of sediment
   20% KS60 by weight of sediment
   20% Fly ash by weight of sediment

3. Water Content = Weight of water/Weight of dry soil

492418\Pilot Table 5 Compresive Strength.xls

Table 6 - Pilot Program Modified Proctor Tests for PROPAT®-Amended Sediment

Sample ID	Mix	Days Cured	Optimum Moisture in %	Maximum Dry Density in pcf	Natural Water Content in %
P 0504 B	30:16:16	1	29.6	81.3	43.3
P 0504 B	30:16:16	4	28.0	80.4	45.2
P 0504 B	30:16:16	7	31.0	78.4	54.9
P 0504 B	30:16:16	22	35.0	73.1	44.7
P 0504 B	30:16:16	28	28.4	79.6	31.5
			0.0		0.0
P 0504 B	30:20:20	1	33.8	77.8	48.0
P 0504 B	30:20:20	4	27.6	78.7	50.2
P 0504 B	30:20:20	7	34.1	74.7	65.9
P 0504 B	30:20:20	22	29.4	77.2	43.6
P 0504 B	30:20:20	28	36.3	73.8	51.9

	16 Mix	20 mix
Average Optimum Moisture	3040.0%	3224.0%
Standard Deviation	2.8249	3.6046
Average Maximum Dry Density	78.56	76.44
Standard Deviation	3.23	2.09

Notes:
1. 30:16:16 - 30% PROPAT® by weight of sediment
   16% KS60 by weight of sediment
   16% Fly ash by weight of sediment

2. 30:20:20 - 30% PROPAT® by weight of sediment
   20% KS60 by weight of sediment
   20% Fly ash by weight of sediment

3. Water Content = Weight of water/Weight of dry soil

492418\Pilot Table 6 Proctor Tests.xls

Table 7 - Pilot Program Resilient Modulus Results for PROPAT®-Amended Sediment

7-Day Cure - Oven dried

Sample ID	Mix	Days Cured	Resilient Mod.	Wet Density in pcf	Dry Density in pcf
P 0502 B 1	30:16:16	7	6,400	66.4	96.3
P 0502 B 2	30:16:16	7	2,400	76.0	96.2
P 0502 B 3	30:16:16	7	6,200	77.7	97.9
P 0503 B 6	30:20:20	7	1,600	71.1	84.8
P 0503 B 7	30:20:20	7	5,900	76.5	90.4
P 0503 B 8	30:20:20	7	3,800	78.8	91.3
		Average:	4,383		
		Std Dev.	2,083		

28-Day Cure

Sample ID	Mix	Days Cured	Resilient Mod.	Wet Density in pcf	Dry Density in pcf
P 0502 B 1	30:16:16	28	5,088	70.8	84.7
P 0502 B 2	30:16:16	28	3,838	78.7	88.1
P 0502 B 3	30:16:16	28	3,384	78.8	85.7
P 0503 B 6	30:20:20	28	5,864	76.1	90.0
P 0503 B 7	30:20:20	28	4,720	72.0	88.3
P 0503 B 8	30:20:20	28	3,717	77.9	91.9
		Average:	4,435		
		Std Dev.	951		

Notes: 1. 30:16:16 - 30% PROPAT® by weight of sediment
16% KS40 by weight of PROPAT® and Sediment
16% Fly ash by weight of PROPAT® and Sediment

2. 30:20:20 - 30% PROPAT® by weight of sediment
20% KS60 by weight of PROPAT® and Sediment
20% Fly ash by weight of PROPAT® and Sediment

492418\Pilot Table 7 Resilient Modulus.xls

Table 8 - Pilot Program Sample Specific Gravity for PROPAT®-Amended Sediment

Sample ID				Mix	Mix Date	Test Date	Days Cured	Specific Gravity
P	0503	C3	11	16	5/3/2000	8-Jun	35	2.42
P	0502	C2	2	16	5/2/2000	8-Jun	36	2.37
P	0503	C3	4	16	5/3/2000	8-Jun	35	2.45
P	0503	C3	24	20	5/3/2000	8-Jun	35	2.42
P	0503	C2	27	20	5/3/2000	8-Jun	35	2.48
P	0503	C2	25	20	5/3/2000	8-Jun	35	2.33

	16 Mix	20 Mix
Average Specific Gravity	2.41	2.41
Standard Deviation	0.040	0.075

Notes: 1. 30:16:16 - 30% PROPAT® by weight of sediment
16% KS60 by weight of sediment
16% Fly ash by weight of sediment

2. 30:20:20 - 30% PROPAT® by weight of sediment
20% KS60 by weight of sediment
20% Fly ash by weight of sediment

492418\Pilot Table 8 Specific Gravity.xls

Table 9 - Pilot Program Hydraulic Conductivity for PROPAT®-Amended Sediment

Sample ID				Mix	Test Date	Days Cured	Hydraulic Conductivity in cm/sec
P	0503	C3	4	30:16:16	6/1	29	1.10E-06
P	0503	C3	8	30:16:16	7/27	85	1.78E-06
P	0503	C3	10	30:16:16	6/1	29	2.90E-06
P	0503	C3	11	30:16:16	6/8	36	5.10E-06
P	0503	C3	16	30:20:20	7/27	85	6.77E-06
P	0503	C3	18	30:20:20	8/2	90	6.10E-07
P	0503	C3	19	30:20:20	7/27	85	1.40E-06
P	0503	C3	24	30:20:20	6/6	34	2.40E-06
P	0503	C3	28	30:20:20	7/27	85	3.16E-06
P	0503	C3	30	30:20:20	7/27	85	3.28E-06

	16 Mix	20 Mix
Average Hydraulic Conductivity, cm/sec	2.72E-06	2.94E-06
Standard Deviation	1.75E-06	2.14E-06

Probability Associated with a Student's t-Test = 0.436

Average Hydraulic Conductivity, cm/sec	2.85E-06
Standard Deviation	1.89E-06

Notes: 1. 30:16:16 - 30% PROPAT® by weight of sediment
16% KS60 by weight of sediment
16% Fly ash by weight of sediment

2. 30:20:20 - 30% PROPAT® by weight of sediment
20% KS60 by weight of sediment
20% Fly ash by weight of sediment

492418\Pilot Table 9 Hydraulic Conductivity.xls

Table 10 - Analytical Results for MEP Leachate Samples

Lab ID:		C0F130163001	C0F130163002	C0F130163003	C0F140259001
Sample ID:	GWQS	P-0503-G-1	P-0503-G-5	P-0503-G-8	P-0503-G-1
Sample Date:		5/3/00	5/3/00	5/3/00	5/3/00
		Day 1	Day 1	Day 1	Day 2
Conventionals					
Total Organic Carbon in mg/L		41.1	50.3	45.6	9.7
Total Suspended Solids in mg/L		4 U	4 U	4 U	4 U
Total Cyanide in µg/L		10 U	10 U	10 U	10 U
Metals in µg/L					
Aluminum	200	5940	2510	3720	4690
Antimony	20	9.6	8.6	10.1	7.7
Arsenic	8	4.5	4.9	3.9	2.9
Barium	2000	223	138	184	81.7
Beryllium	20	5 U	5 U	5 U	5 U
Cadmium	4	5 U	5 U	5 U	5 U
Calcium		125000	102000	109000	89900
Chromium	100	34.9	49.5	40.6	29.3
Cobalt		50 U	50 U	50 U	50 U
Copper	1000	384	423	564	167
Iron	300	100 U	8.8	10.3	10.8
Lead	10	3 U	3 U	3 U	3 U
Magnesium		22	45.3	29.3	5000 U
Manganese	50	15 U	1.2	15 U	15 U
Mercury	2	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	100	68.9	77.8	92.2	9.9
Potassium		69200	64500	73600	9170
Selenium	50	10.7	8.7	11	9.2
Silver		0.97	10 U	1 U	10 U
Sodium	50000	161000	156000	186000	17600
Thallium	10	10 U	10 U	10 U	10 U
Vanadium		26.3	42.5	36.8	29.5
Zinc	5000	7.3 U	8.4 U	3.1 U	5.3
Pesticide/PCBs in µg/L					
4,4'-DDD	0.1	0.022 J	0.05 UJ	0.05 UJ	0.05 U
4,4'-DDE	0.1	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
4,4'-DDT	0.1	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
Aldrin	0.04	0.05 UJ	0.024 J	0.032 J	0.017 J
alpha-BHC	0.02	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
alpha-Chlordane		0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
Aroclor 1016		1 UJ	1 UJ	1 UJ	1 U
Aroclor 1221		1 UJ	1 UJ	1 UJ	1 U
Aroclor 1232		1 UJ	1 UJ	1 UJ	1 U
Aroclor 1242		1 UJ	1 UJ	1 UJ	1 U
Aroclor 1248		1 UJ	1 UJ	1 UJ	1 U
Aroclor 1254		1 UJ	1 UJ	1 UJ	1 U
Aroclor 1260		1 UJ	1 UJ	1 UJ	1 U
Total PCBs	0.5	1 UJ	1 UJ	1 UJ	1 U
beta-BHC	0.2	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
delta-BHC		0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
Dieldrin	0.03	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Sample ID:	GWQS	P-0503-G-1	P-0503-G-5	P-0503-G-8	P-0503-G-1
Sample Date:		5/3/00	5/3/00	5/3/00	5/3/00
		Day 1	Day 1	Day 1	Day 2
Endosulfan I	0.4	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
Endosulfan II	0.4	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
Endosulfan sulfate	0.4	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
Endrin	2	0.067 J	0.09 J	0.078 J	0.05 U
Endrin aldehyde		0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
Endrin ketone		0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
gamma-BHC (Lindane)	0.2	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
gamma-Chlordane		0.0087 J	0.05 UJ	0.05 UJ	0.05 U
Heptachlor	0.4	0.05 UJ	0.037 J	0.05 UJ	0.05 U
Heptachlor epoxide	0.2	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U
Methoxychlor	40	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U
Toxaphene	3	2 UJ	2 UJ	2 UJ	2 U
Semivolatiles in µg/L					
1,2,4-Trichlorobenzene	9	*10 UJ*	*10 UJ*	*10 UJ*	*10 U*
1,2-Dichlorobenzene	600	10 UJ	10 UJ	10 UJ	10 U
1,3-Dichlorobenzene	600	10 UJ	10 UJ	10 UJ	10 U
1,4-Dichlorobenzene	75	10 UJ	10 UJ	10 UJ	10 U
2,2'-oxybis(1-Chloropropane)	300	10 UJ	10 UJ	10 UJ	10 U
2,4,5-Trichlorophenol	700	10 UJ	10 UJ	10 UJ	10 U
2,4,6-Trichlorophenol	20	10 UJ	10 UJ	10 UJ	10 U
2,4-Dichlorophenol	20	10 UJ	10 UJ	10 UJ	10 U
2,4-Dimethylphenol	100	10 UJ	10 UJ	10 UJ	10 U
2,4-Dinitrophenol	40	50 UJ	50 UJ	50 UJ	50 U
2,4-Dinitrotoluene	10	10 UJ	10 UJ	10 UJ	10 U
2,6-Dinitrotoluene	10	10 UJ	10 UJ	10 UJ	10 U
2-Chloronaphthalene		10 UJ	10 UJ	10 UJ	10 U
2-Chlorophenol	40	10 UJ	10 UJ	10 UJ	10 U
2-Methylnaphthalene		10 UJ	10 UJ	10 UJ	10 U
2-Methylphenol		10 UJ	10 UJ	10 UJ	10 U
2-Nitroaniline		50 UJ	50 UJ	50 UJ	50 U
2-Nitrophenol		10 UJ	10 UJ	10 UJ	10 U
3,3'-Dichlorobenzidine	60	50 UJ	50 UJ	50 UJ	50 U
3-Nitroaniline		50 UJ	50 UJ	50 UJ	50 U
4,6-Dinitro-2-methylphenol		50 UJ	50 UJ	50 UJ	50 U
4-Bromophenyl phenyl ether		10 UJ	10 UJ	10 UJ	10 U
4-Chloro-3-methylphenol		10 UJ	10 UJ	10 UJ	10 U
4-Chloroaniline		10 UJ	10 UJ	10 UJ	10 U
4-Chlorophenyl phenyl ether		10 UJ	10 UJ	10 UJ	10 U
4-Methylphenol		10 UJ	10 UJ	10 UJ	10 U
4-Nitroaniline		50 UJ	50 UJ	50 UJ	50 U
4-Nitrophenol		50 UJ	50 UJ	50 UJ	50 U
Acenaphthene	400	10 UJ	10 UJ	10 UJ	10 U
Acenaphthylene		10 UJ	10 UJ	10 UJ	10 U
Anthracene	2000	10 UJ	10 UJ	10 UJ	10 U
Benzo(a)anthracene		10 UJ	10 UJ	10 UJ	10 U
Benzo(a)pyrene		10 UJ	10 UJ	10 UJ	10 U
Benzo(b)fluoranthene		10 UJ	10 UJ	10 UJ	10 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Sample ID:	GWQS	P-0503-G-1	P-0503-G-5	P-0503-G-8	P-0503-G-1
Sample Date:		5/3/00	5/3/00	5/3/00	5/3/00
		Day 1	Day 1	Day 1	Day 2
Benzo(ghi)perylene		10 UJ	10 UJ	10 UJ	10 U
Benzo(k)fluoranthene		10 UJ	10 UJ	10 UJ	10 U
bis(2-Chloroethoxy)methane		10 UJ	10 UJ	10 UJ	10 U
bis(2-Chloroethyl) ether	10	10 UJ	10 UJ	10 UJ	10 U
bis(2-Ethylhexyl) phthalate	30	10 UJ	10 UJ	10 UJ	10 U
Butyl benzyl phthalate	100	10 UJ	10 UJ	10 UJ	10 U
Carbazole		10 UJ	10 UJ	10 UJ	10 U
Chrysene		10 UJ	10 UJ	10 UJ	10 U
Dibenz(a,h)anthracene		10 UJ	10 UJ	10 UJ	10 U
Dibenzofuran		10 UJ	10 UJ	10 UJ	10 U
Diethyl phthalate	5000	10 UJ	10 UJ	10 UJ	10 U
Dimethyl phthalate		10 UJ	10 UJ	10 UJ	10 U
Di-n-butyl phthalate	900	10 UJ	10 UJ	10 UJ	10 U
Di-n-octyl phthalate	100	10 UJ	10 UJ	10 UJ	10 U
Fluoranthene	300	10 UJ	10 UJ	10 UJ	10 U
Fluorene	300	10 UJ	10 UJ	10 UJ	10 U
Hexachlorobenzene	10	10 UJ	10 UJ	10 UJ	10 U
Hexachlorobutadiene	1	*10 UJ*	*10 UJ*	*10 UJ*	*10 U*
Hexachlorocyclopentadiene	50	50 UJ	50 UJ	50 UJ	50 U
Hexachloroethane	10	10 UJ	10 UJ	10 UJ	10 U
Indeno(1,2,3-cd)pyrene		10 UJ	10 UJ	10 UJ	10 U
Isophorone	100	10 UJ	10 UJ	10 UJ	10 U
Naphthalene	300	10 UJ	3.3 J	10 UJ	10 U
Nitrobenzene	10	10 UJ	10 UJ	10 UJ	10 U
N-Nitrosodi-n-propylamine	20	10 UJ	10 UJ	10 UJ	10 U
N-Nitrosodiphenylamine	20	10 UJ	10 UJ	10 UJ	10 U
Pentachlorophenol	1	*50 UJ*	*50 UJ*	*50 UJ*	*50 U*
Phenanthrene		10 UJ	10 UJ	10 UJ	10 U
Phenol	4000	13 J	13 J	10 J	10 U
Pyrene	200	10 UJ	10 UJ	10 UJ	10 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Lab ID:	C0F140259002	C0F140259003	C0F150298001	C0F150298002
Sample ID:	P-0503-G-5	P-0503-G-8	P-0503-G-1	P-0503-G-5
Sample Date:	5/3/00	5/3/00	5/3/00	5/3/00
	Day 2	Day 2	Day 3	Day 3
Conventionals				
Total Organic Carbon in mg/L	8.9	10.5	6	5.3
Total Suspended Solids in mg/L	4 U	4 U	4 U	4 U
Total Cyanide in µg/L	10 U	10 U	10 U	10 U
Metals in µg/L				
Aluminum	$\boxed{5300}$	$\boxed{2930}$	$\boxed{4370}$	$\boxed{5750}$
Antimony	9	9.5	8.1 U	9.6
Arsenic	2.8	4.2	4.6	10 U
Barium	64.3	88.3	67.7 U	50 U
Beryllium	5 U	5 U	5 U	5 U
Cadmium	5 U	5 U	5 U	5 U
Calcium	76300	81900	83500	69300
Chromium	21.6	23.1	22	16.1
Cobalt	50 U	50 U	50 U	50 U
Copper	105	140	107	62
Iron	16.9	100 U	100 U	100 U
Lead	3 U	3 U	3 U	3 U
Magnesium	36.7	24	25.3 U	31.3 U
Manganese	15 U	15 U	15 U	15 U
Mercury	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	6.9	14.1	40 U	40 U
Potassium	7060	7780	2210	1450
Selenium	4.7	7.7	9.4	8.3
Silver	10 U	10 U	10 U	10 U
Sodium	14800	22100	7940 U	6910 U
Thallium	10 U	10 U	10 U	10 U
Vanadium	35.1	32.9	30.3	31.5
Zinc	3.3	8.8	26.6 U	10.5 U
Pesticide/PCBs in µg/L				
4,4'-DDD	0.05 U	0.05 UJ	0.05 U	0.05 U
4,4'-DDE	0.05 U	0.05 UJ	0.05 U	0.05 U
4,4'-DDT	0.05 U	0.05 UJ	0.05 U	0.05 U
Aldrin	0.021 J	0.024 J	0.021 J	0.019 J
alpha-BHC	0.05 U	0.0059 J	0.05 U	0.05 U
alpha-Chlordane	0.05 U	0.05 UJ	0.05 U	0.05 U
Aroclor 1016	1 U	1 UJ	1 U	1 U
Aroclor 1221	1 U	1 UJ	1 U	1 U
Aroclor 1232	1 U	1 UJ	1 U	1 U
Aroclor 1242	1 U	1 UJ	1 U	1 U
Aroclor 1248	1 U	1 UJ	1 U	1 U
Aroclor 1254	1 U	1 UJ	1 U	1 U
Aroclor 1260	1 U	1 UJ	1 U	1 U
Total PCBs	1 U	1 UJ	1 U	1 U
beta-BHC	0.05 U	0.05 UJ	0.05 U	0.05 U
delta-BHC	0.05 U	0.05 UJ	0.0039 J	0.05 U
Dieldrin	0.05 U	0.05 UJ	0.05 U	0.05 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Sample ID:	P-0503-G-5	P-0503-G-8	P-0503-G-1	P-0503-G-5
Sample Date:	5/3/00	5/3/00	5/3/00	5/3/00
	Day 2	Day 2	Day 3	Day 3
Endosulfan I	0.05 U	0.05 UJ	0.05 U	0.05 U
Endosulfan II	0.05 U	0.05 UJ	0.05 U	0.05 U
Endosulfan sulfate	0.05 U	0.05 UJ	0.05 U	0.05 U
Endrin	0.05 U	0.01 J	0.05 U	0.05 U
Endrin aldehyde	0.05 U	0.038 J	0.05 U	0.05 U
Endrin ketone	0.05 U	0.05 UJ	0.05 U	0.05 U
gamma-BHC (Lindane)	0.05 U	0.05 UJ	0.05 U	0.05 U
gamma-Chlordane	0.05 U	0.05 UJ	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 UJ	0.05 U	0.05 U
Heptachlor epoxide	0.05 U	0.05 UJ	0.05 U	0.05 U
Methoxychlor	0.5 U	0.5 UJ	0.5 U	0.5 U
Toxaphene	2 U	2 UJ	2 U	2 U
Semivolatiles in µg/L				
1,2,4-Trichlorobenzene	*10 U*	*10 U*	*10 U*	*10 U*
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U
2-Nitrophenol	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	50 U	50 U	50 U	50 U
3-Nitroaniline	50 U	50 U	50 U	50 U
4,6-Dinitro-2-methylphenol	50 U	50 U	50 U	50 U
4-Bromophenyl phenyl ether	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U
4-Chlorophenyl phenyl ether	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U
4-Nitroaniline	50 U	50 U	50 U	50 U
4-Nitrophenol	50 U	50 U	50 U	50 U
Acenaphthene	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Sample ID:	P-0503-G-5	P-0503-G-8	P-0503-G-1	P-0503-G-5
Sample Date:	5/3/00	5/3/00	5/3/00	5/3/00
	Day 2	Day 2	Day 3	Day 3
Benzo(ghi)perylene	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U
bis(2-Chloroethyl) ether	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl) phthalate	10 U	10 U	10 U	10 U
Butyl benzyl phthalate	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U
Diethyl phthalate	10 U	10 U	10 U	10 U
Dimethyl phthalate	10 U	10 U	10 U	10 U
Di-n-butyl phthalate	10 U	10 U	10 U	10 U
Di-n-octyl phthalate	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U
Hexachlorobutadiene	*10 U*	*10 U*	*10 U*	*10 U*
Hexachlorocyclopentadiene	50 U	50 U	50 U	50 U
Hexachloroethane	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U
N-Nitrosodi-n-propylamine	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U
Pentachlorophenol	*50 U*	*50 U*	*50 U*	*50 U*
Phenanthrene	10 U	10 U	10 U	10 U
Phenol	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Lab ID:	C0F150298003	C0F160278001	C0F160278002	C0F160278003
Sample ID:	P-0503-G-8	P-0503-G-1	P-0503-G-5	P-0503-G-8
Sample Date:	5/3/00	5/3/00	5/3/00	5/3/00
	Day 3	Day 4	Day 4	Day 4
Conventionals				
Total Organic Carbon in mg/L	6.4	5.5	4.9	5.6
Total Suspended Solids in mg/L	4 U	4 U	4 U	4 U
Total Cyanide in µg/L	10 U	10 U	10 U	10 U
Metals in µg/L				
Aluminum	2990	3880	5220	2700
Antimony	10.2	9.5	10.2	11.9
Arsenic	4.1	4.8	3.4	4.7
Barium	53.9 U	61	44.4	53.5
Beryllium	5 U	5 U	5 U	5 U
Cadmium	5 U	5 U	5 U	5 U
Calcium	76100	78500	63600	69400
Chromium	18.2	20.3	15.7	17.1
Cobalt	50 U	50 U	50 U	50 U
Copper	89	109	60.7	84.8
Iron	100 U	45.6	100 U	100 U
Lead	3 U	3 U	3 U	3 U
Magnesium	34.7 U	30	36.7	30
Manganese	15 U	0.89	15 U	15 U
Mercury	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	40 U	7.3 U	40 U	40 U
Potassium	2520	1400	797	1110
Selenium	8.1	8.2	9.2	9.8
Silver	10 U	10 U	10 U	10 U
Sodium	9540	9040	6500	8090
Thallium	10 U	10 U	10 U	10 U
Vanadium	33.8	34.8	30.4 U	36.3
Zinc	9.1 U	10.3	5.7	4
Pesticide/PCBs in µg/L				
4,4'-DDD	0.05 U	0.05 U	0.05 U	0.05 U
4,4'-DDE	0.05 U	0.05 U	0.05 U	0.05 U
4,4'-DDT	0.05 U	0.05 U	0.05 U	0.05 U
Aldrin	0.0035 J	0.043 J	0.032 J	0.031 J
alpha-BHC	0.05 U	0.0065 J	0.0035 J	0.05 U
alpha-Chlordane	0.05 U	0.05 U	0.05 U	0.05 U
Aroclor 1016	1 U	1 U	1 U	1 U
Aroclor 1221	1 U	1 U	1 U	1 U
Aroclor 1232	1 U	1 U	1 U	1 U
Aroclor 1242	1 U	1 U	1 U	1 U
Aroclor 1248	1 U	1 U	1 U	1 U
Aroclor 1254	1 U	1 U	1 U	1 U
Aroclor 1260	1 U	1 U	1 U	1 U
Total PCBs	1 U	1 U	1 U	1 U
beta-BHC	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	0.05 U	0.05 U	0.05 U	0.05 U
Dieldrin	0.05 U	0.05 U	0.05 U	0.05 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Sample ID:	P-0503-G-8	P-0503-G-1	P-0503-G-5	P-0503-G-8
Sample Date:	5/3/00	5/3/00	5/3/00	5/3/00
	Day 3	Day 4	Day 4	Day 4
Endosulfan I	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan II	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan sulfate	0.05 U	0.05 U	0.05 U	0.05 U
Endrin	0.05 U	0.05 U	0.05 U	0.05 U
Endrin aldehyde	0.05 U	0.05 U	0.05 U	0.05 U
Endrin ketone	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC (Lindane)	0.05 U	0.05 U	0.05 U	0.05 U
gamma-Chlordane	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor epoxide	0.05 U	0.05 U	0.05 U	0.05 U
Methoxychlor	0.5 U	0.5 U	0.5 U	0.5 U
Toxaphene	2 U	2 U	2 U	2 U
Semivolatiles in µg/L				
1,2,4-Trichlorobenzene	*10 U*	*10 U*	*10 U*	*10 U*
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U
2-Nitrophenol	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	50 U	50 U	50 U	50 U
3-Nitroaniline	50 U	50 U	50 U	50 U
4,6-Dinitro-2-methylphenol	50 U	50 U	50 U	50 U
4-Bromophenyl phenyl ether	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U
4-Chlorophenyl phenyl ether	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U
4-Nitroaniline	50 U	50 U	50 U	50 U
4-Nitrophenol	50 U	50 U	50 U	50 U
Acenaphthene	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Sample ID:	P-0503-G-8	P-0503-G-1	P-0503-G-5	P-0503-G-8
Sample Date:	5/3/00	5/3/00	5/3/00	5/3/00
	Day 3	Day 4	Day 4	Day 4
Benzo(ghi)perylene	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U
bis(2-Chloroethyl) ether	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl) phthalate	10 U	10 U	10 U	10 U
Butyl benzyl phthalate	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U
Diethyl phthalate	10 U	10 U	10 U	10 U
Dimethyl phthalate	10 U	10 U	10 U	10 U
Di-n-butyl phthalate	10 U	10 U	10 U	10 U
Di-n-octyl phthalate	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U
Hexachlorobutadiene	*10 U*	*10 U*	*10 U*	*10 U*
Hexachlorocyclopentadiene	50 U	50 U	50 U	50 U
Hexachloroethane	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U
N-Nitrosodi-n-propylamine	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U
Pentachlorophenol	*50 U*	*50 U*	*50 U*	*50 U*
Phenanthrene	10 U	10 U	10 U	10 U
Phenol	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Lab ID:	C0F190178001	C0F190178002	C0F190178003	C0F210276001
Sample ID:	P-0503-G-1	P-0503-G-5	P-0503-G-8	P-0503-G-1
Sample Date:	5/3/00	5/3/00	5/3/00	5/3/00
	Day 5	Day 5	Day 5	Day 6
Conventionals				
Total Organic Carbon in mg/L	3.4	3.2	3.5	5.1
Total Suspended Solids in mg/L	4 U	4 U	4 U	4 U
Total Cyanide in µg/L	10 UJ	10 UJ	10 UJ	10 UJ
Metals in µg/L				
Aluminum	3520	4480	2420	1830
Antimony	8.1	9.8	13.3	9.1
Arsenic	4.3	5.5	5	7.1
Barium	47.6	33.5	39.2	35
Beryllium	5 U	5 U	5 U	5 U
Cadmium	5 U	5 U	5 U	5 U
Calcium	64200	50600	57600	55400
Chromium	14.8	12.5	13.9	19
Cobalt	50 U	50 U	50 U	50 U
Copper	56.9	30.8	47.5	104
Iron	9.8	100 U	100 U	100 U
Lead	3 U	3 U	3 U	3 U
Magnesium	36.7	34.7	56	57.3
Manganese	15 U	15 U	15 U	15 U
Mercury	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	40 U	40 U	40 U	40 U
Potassium	641	5000 U	585	5000 U
Selenium	10.9	10.1	10.3	9.7
Silver	10 U	10 U	1	10 U
Sodium	11200	4860	6730	9660
Thallium	10 U	10 U	10 U	10 U
Vanadium	35.6	28.8	37.1	41.7
Zinc	4.4 U	3.5 U	3.7 U	5.6 U
Pesticide/PCBs in µg/L				
4,4'-DDD	0.05 U	0.05 U	0.05 U	0.05 U
4,4'-DDE	0.05 U	0.05 U	0.05 U	0.05 U
4,4'-DDT	0.05 U	0.05 U	0.05 U	0.05 U
Aldrin	*0.015 J*	*0.014 J*	*0.024 J*	*0.014 J*
alpha-BHC	0.05 U	0.05 U	0.05 U	0.05 U
alpha-Chlordane	0.05 U	0.05 U	0.05 U	0.05 U
Aroclor 1016	1 U	1 U	1 U	1 U
Aroclor 1221	1 U	1 U	1 U	1 U
Aroclor 1232	1 U	1 U	1 U	1 U
Aroclor 1242	1 U	1 U	1 U	1 U
Aroclor 1248	1 U	1 U	1 U	1 U
Aroclor 1254	1 U	1 U	1 U	1 U
Aroclor 1260	1 U	1 U	1 U	1 U
Total PCBs	1 U	1 U	1 U	1 U
beta-BHC	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	0.0052 J	0.0031 J	0.05 U	0.05 U
Dieldrin	0.05 U	0.0089 J	0.05 U	0.05 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Sample ID:	P-0503-G-1	P-0503-G-5	P-0503-G-8	P-0503-G-1
Sample Date:	5/3/00	5/3/00	5/3/00	5/3/00
	Day 5	Day 5	Day 5	Day 6
Endosulfan I	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan II	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan sulfate	0.05 U	0.05 U	0.0091 J	0.05 U
Endrin	0.05 U	0.05 U	0.052	0.05 U
Endrin aldehyde	0.05 U	0.05 U	0.05 U	0.05 U
Endrin ketone	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC (Lindane)	0.05 U	0.05 U	0.05 U	0.05 U
gamma-Chlordane	0.0045 J	0.05 U	0.05 U	0.0062 J
Heptachlor	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor epoxide	0.05 U	0.05 U	0.05 U	0.05 U
Methoxychlor	0.5 U	0.5 U	0.5 U	0.5 U
Toxaphene	2 U	2 U	2 U	2 U
Semivolatiles in µg/L				
1,2,4-Trichlorobenzene	*10 U*	*10 U*	*10 U*	*10 U*
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U
2-Nitrophenol	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	50 U	50 U	50 U	50 U
3-Nitroaniline	50 U	50 U	50 U	50 U
4,6-Dinitro-2-methylphenol	50 U	50 U	50 U	50 U
4-Bromophenyl phenyl ether	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U
4-Chlorophenyl phenyl ether	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U
4-Nitroaniline	50 U	50 U	50 U	50 U
4-Nitrophenol	50 U	50 U	50 U	50 U
Acenaphthene	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Sample ID:	P-0503-G-1	P-0503-G-5	P-0503-G-8	P-0503-G-1
Sample Date:	5/3/00	5/3/00	5/3/00	5/3/00
	Day 5	Day 5	Day 5	Day 6
Benzo(ghi)perylene	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U
bis(2-Chloroethyl) ether	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl) phthalate	10 U	18	10 U	9.6 J
Butyl benzyl phthalate	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U
Diethyl phthalate	10 U	10 U	10 U	10 U
Dimethyl phthalate	10 U	10 U	10 U	10 U
Di-n-butyl phthalate	10 U	10 U	10 U	10 U
Di-n-octyl phthalate	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U
Hexachlorobutadiene	*10 U*	*10 U*	*10 U*	*10 U*
Hexachlorocyclopentadiene	50 U	50 U	50 U	50 U
Hexachloroethane	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U
N-Nitrosodi-n-propylamine	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U
Pentachlorophenol	*50 U*	*50 U*	*50 U*	*50 U*
Phenanthrene	10 U	10 U	10 U	10 U
Phenol	6.5 J	10 U	4.8 J	10 U
Pyrene	10 U	10 U	10 U	10 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Lab ID:	C0F210276002	C0F210276003	C0F230315001	C0F230315002
Sample ID:	P-0503-G-5	P-0503-G-8	P-0503-G-1	P-0503-G-5
Sample Date:	5/3/00 Day 6	5/3/00 Day 6	5/3/00 Day 7	5/3/00 Day 7
Conventionals				
Total Organic Carbon in mg/L	4.6	5.4	3.3	3
Total Suspended Solids in mg/L	4 U	4 U	4 U	4 U
Total Cyanide in µg/L	10 UJ	10 UJ	10 UJ	10 UJ
Metals in µg/L				
Aluminum	$\boxed{2790}$	$\boxed{1250}$	$\boxed{1730}$	$\boxed{2640}$
Antimony	7.6	9.9	9.1	12
Arsenic	7.2	$\boxed{8.6}$	$\boxed{9}$	$\boxed{9.3}$
Barium	22.8	33.6	30.5	20.6
Beryllium	5 U	5 U	5 U	5 U
Cadmium	5 U	5 U	5 U	5 U
Calcium	43400	50500	51200	39500
Chromium	16	17.8	13.8	11.7
Cobalt	50 U	50 U	50 U	50 U
Copper	60.3	91.5	61.1	35
Iron	100 U	100 U	9.3	100 U
Lead	3 U	3 U	3 U	3 U
Magnesium	72	76	76	82.6
Manganese	0.9	15 U	0.93	0.91
Mercury	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	40 U	40 U	40 U	40 U
Potassium	5000 U	1120 U	5000 U	647
Selenium	8.8	8.5	11.4	9.5
Silver	10 U	10 U	1.4 U	10 U
Sodium	8270	13200	11900	12200
Thallium	10 U	10 U	10 U	10 U
Vanadium	30	45.3	38.3	33.6
Zinc	20 U	20 U	20 U	20 U
Pesticide/PCBs in µg/L				
4,4'-DDD	0.05 U	0.05 U	0.05 U	0.05 U
4,4'-DDE	0.05 U	0.05 U	0.05 U	0.05 U
4,4'-DDT	0.05 U	0.05 U	0.05 U	0.05 U
Aldrin	0.013 J	0.011 J	0.021 J	0.019 J
alpha-BHC	0.004 J	0.05 U	0.05 U	0.05 U
alpha-Chlordane	0.05 U	0.05 U	0.05 U	0.05 U
Aroclor 1016	1 U	1 U	1 U	1 U
Aroclor 1221	1 U	1 U	1 U	1 U
Aroclor 1232	1 U	1 U	1 U	1 U
Aroclor 1242	1 U	1 U	1 U	1 U
Aroclor 1248	1 U	1 U	1 U	1 U
Aroclor 1254	1 U	1 U	1 U	1 U
Aroclor 1260	1 U	1 U	1 U	1 U
Total PCBs	1 U	1 U	1 U	1 U
beta-BHC	0.05 U	0.05 U	0.05 U	0.05 U
delta-BHC	0.05 U	0.05 U	0.05 U	0.05 U
Dieldrin	0.05 U	0.05 U	0.05 U	0.05 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Sample ID:	P-0503-G-5	P-0503-G-8	P-0503-G-1	P-0503-G-5
Sample Date:	5/3/00	5/3/00	5/3/00	5/3/00
	Day 6	Day 6	Day 7	Day 7
Endosulfan I	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan II	0.05 U	0.05 U	0.05 U	0.05 U
Endosulfan sulfate	0.05 U	0.05 U	0.05 U	0.05 U
Endrin	0.05 U	0.05 U	0.05 U	0.05 U
Endrin aldehyde	0.05 U	0.05 U	0.05 U	0.05 U
Endrin ketone	0.05 U	0.05 U	0.05 U	0.05 U
gamma-BHC (Lindane)	0.05 U	0.05 U	0.05 U	0.05 U
gamma-Chlordane	0.05 U	0.05 U	0.05 U	0.05 U
Heptachlor	0.011 J	0.017 J	0.014 J	0.019 J
Heptachlor epoxide	0.05 U	0.05 U	0.05 U	0.05 U
Methoxychlor	0.5 U	0.5 U	0.5 U	0.5 U
Toxaphene	2 U	2 U	2 U	2 U
Semivolatiles in µg/L				
1,2,4-Trichlorobenzene	*10 U*	*10 U*	*10 U*	*10 U*
1,2-Dichlorobenzene	10 U	10 U	10 U	10 U
1,3-Dichlorobenzene	10 U	10 U	10 U	10 U
1,4-Dichlorobenzene	10 U	10 U	10 U	10 U
2,2'-oxybis(1-Chloropropane)	10 U	10 U	10 U	10 U
2,4,5-Trichlorophenol	10 U	10 U	10 U	10 U
2,4,6-Trichlorophenol	10 U	10 U	10 U	10 U
2,4-Dichlorophenol	10 U	10 U	10 U	10 U
2,4-Dimethylphenol	10 U	10 U	10 U	10 U
2,4-Dinitrophenol	50 U	50 U	50 U	50 U
2,4-Dinitrotoluene	10 U	10 U	10 U	10 U
2,6-Dinitrotoluene	10 U	10 U	10 U	10 U
2-Chloronaphthalene	10 U	10 U	10 U	10 U
2-Chlorophenol	10 U	10 U	10 U	10 U
2-Methylnaphthalene	10 U	10 U	10 U	10 U
2-Methylphenol	10 U	10 U	10 U	10 U
2-Nitroaniline	50 U	50 U	50 U	50 U
2-Nitrophenol	10 U	10 U	10 U	10 U
3,3'-Dichlorobenzidine	50 U	50 U	50 U	50 U
3-Nitroaniline	50 U	50 U	50 U	50 U
4,6-Dinitro-2-methylphenol	50 U	50 U	50 U	50 U
4-Bromophenyl phenyl ether	10 U	10 U	10 U	10 U
4-Chloro-3-methylphenol	10 U	10 U	10 U	10 U
4-Chloroaniline	10 U	10 U	10 U	10 U
4-Chlorophenyl phenyl ether	10 U	10 U	10 U	10 U
4-Methylphenol	10 U	10 U	10 U	10 U
4-Nitroaniline	50 U	50 U	50 U	50 U
4-Nitrophenol	50 U	50 U	50 U	50 U
Acenaphthene	10 U	10 U	10 U	10 U
Acenaphthylene	10 U	10 U	10 U	10 U
Anthracene	10 U	10 U	10 U	10 U
Benzo(a)anthracene	10 U	10 U	10 U	10 U
Benzo(a)pyrene	10 U	10 U	10 U	10 U
Benzo(b)fluoranthene	10 U	10 U	10 U	10 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Sample ID:	P-0503-G-5	P-0503-G-8	P-0503-G-1	P-0503-G-5
Sample Date:	5/3/00	5/3/00	5/3/00	5/3/00
	Day 6	Day 6	Day 7	Day 7
Benzo(ghi)perylene	10 U	10 U	10 U	10 U
Benzo(k)fluoranthene	10 U	10 U	10 U	10 U
bis(2-Chloroethoxy)methane	10 U	10 U	10 U	10 U
bis(2-Chloroethyl) ether	10 U	10 U	10 U	10 U
bis(2-Ethylhexyl) phthalate	8.2 J	8.8 J	23	10 U
Butyl benzyl phthalate	10 U	10 U	10 U	10 U
Carbazole	10 U	10 U	10 U	10 U
Chrysene	10 U	10 U	10 U	10 U
Dibenz(a,h)anthracene	10 U	10 U	10 U	10 U
Dibenzofuran	10 U	10 U	10 U	10 U
Diethyl phthalate	10 U	10 U	10 U	10 U
Dimethyl phthalate	10 U	10 U	10 U	10 U
Di-n-butyl phthalate	10 U	10 U	10 U	10 U
Di-n-octyl phthalate	10 U	10 U	10 U	10 U
Fluoranthene	10 U	10 U	10 U	10 U
Fluorene	10 U	10 U	10 U	10 U
Hexachlorobenzene	10 U	10 U	10 U	10 U
Hexachlorobutadiene	*10 U*	*10 U*	*10 U*	*10 U*
Hexachlorocyclopentadiene	50 U	50 U	50 U	50 U
Hexachloroethane	10 U	10 U	10 U	10 U
Indeno(1,2,3-cd)pyrene	10 U	10 U	10 U	10 U
Isophorone	10 U	10 U	10 U	10 U
Naphthalene	10 U	10 U	10 U	10 U
Nitrobenzene	10 U	10 U	10 U	10 U
N-Nitrosodi-n-propylamine	10 U	10 U	10 U	10 U
N-Nitrosodiphenylamine	10 U	10 U	10 U	10 U
Pentachlorophenol	*50 U*	*50 U*	*50 U*	*50 U*
Phenanthrene	10 U	10 U	10 U	10 U
Phenol	10 U	10 U	10 U	10 U
Pyrene	10 U	10 U	10 U	10 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Lab ID:	C0F230315003
Sample ID:	P-0503-G-8
Sample Date:	5/3/00
	Day 7
Conventionals	
Total Organic Carbon in mg/L	3.7
Total Suspended Solids in mg/L	4 U
Total Cyanide in µg/L	10 UJ
Metals in µg/L	
Aluminum	$\boxed{1060}$
Antimony	11.9
Arsenic	$\boxed{10.4}$
Barium	37.9
Beryllium	5 U
Cadmium	5 U
Calcium	42800
Chromium	13.2
Cobalt	50 U
Copper	50.7
Iron	100 U
Lead	3 U
Magnesium	84.6
Manganese	15 U
Mercury	0.2 U
Nickel	40 U
Potassium	5000 U
Selenium	9.3
Silver	10 U
Sodium	14600
Thallium	10 U
Vanadium	43
Zinc	4.5
Pesticide/PCBs in µg/L	
4,4'-DDD	0.05 U
4,4'-DDE	0.05 U
4,4'-DDT	0.05 U
Aldrin	0.017 J
alpha-BHC	0.05 U
alpha-Chlordane	0.05 U
Aroclor 1016	1 U
Aroclor 1221	1 U
Aroclor 1232	1 U
Aroclor 1242	1 U
Aroclor 1248	1 U
Aroclor 1254	1 U
Aroclor 1260	1 U
Total PCBs	1 U
beta-BHC	0.05 U
delta-BHC	0.05 U
Dieldrin	0.05 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Sample ID:	P-0503-G-8
Sample Date:	5/3/00
	Day 7
Endosulfan I	0.05 U
Endosulfan II	0.05 U
Endosulfan sulfate	0.05 U
Endrin	0.05 U
Endrin aldehyde	0.05 U
Endrin ketone	0.05 U
gamma-BHC (Lindane)	0.05 U
gamma-Chlordane	0.05 U
Heptachlor	0.023 J
Heptachlor epoxide	0.05 U
Methoxychlor	0.5 U
Toxaphene	2 U
Semivolatiles in µg/L	
1,2,4-Trichlorobenzene	*10 U*
1,2-Dichlorobenzene	10 U
1,3-Dichlorobenzene	10 U
1,4-Dichlorobenzene	10 U
2,2'-oxybis(1-Chloropropane)	10 U
2,4,5-Trichlorophenol	10 U
2,4,6-Trichlorophenol	10 U
2,4-Dichlorophenol	10 U
2,4-Dimethylphenol	10 U
2,4-Dinitrophenol	50 U
2,4-Dinitrotoluene	10 U
2,6-Dinitrotoluene	10 U
2-Chloronaphthalene	10 U
2-Chlorophenol	10 U
2-Methylnaphthalene	10 U
2-Methylphenol	10 U
2-Nitroaniline	50 U
2-Nitrophenol	10 U
3,3'-Dichlorobenzidine	50 U
3-Nitroaniline	50 U
4,6-Dinitro-2-methylphenol	50 U
4-Bromophenyl phenyl ether	10 U
4-Chloro-3-methylphenol	10 U
4-Chloroaniline	10 U
4-Chlorophenyl phenyl ether	10 U
4-Methylphenol	10 U
4-Nitroaniline	50 U
4-Nitrophenol	50 U
Acenaphthene	10 U
Acenaphthylene	10 U
Anthracene	10 U
Benzo(a)anthracene	10 U
Benzo(a)pyrene	10 U
Benzo(b)fluoranthene	10 U

492418\HART11.xls

Table 10 - Analytical Results for MEP Leachate Samples

Sample ID:	P-0503-G-8
Sample Date:	5/3/00
	Day 7
Benzo(ghi)perylene	10 U
Benzo(k)fluoranthene	10 U
bis(2-Chloroethoxy)methane	10 U
bis(2-Chloroethyl) ether	10 U
bis(2-Ethylhexyl) phthalate	10 U
Butyl benzyl phthalate	10 U
Carbazole	10 U
Chrysene	10 U
Dibenz(a,h)anthracene	10 U
Dibenzofuran	10 U
Diethyl phthalate	10 U
Dimethyl phthalate	10 U
Di-n-butyl phthalate	10 U
Di-n-octyl phthalate	10 U
Fluoranthene	10 U
Fluorene	10 U
Hexachlorobenzene	10 U
Hexachlorobutadiene	*10 U*
Hexachlorocyclopentadiene	50 U
Hexachloroethane	10 U
Indeno(1,2,3-cd)pyrene	10 U
Isophorone	10 U
Naphthalene	10 U
Nitrobenzene	10 U
N-Nitrosodi-n-propylamine	10 U
N-Nitrosodiphenylamine	10 U
Pentachlorophenol	*50 U*
Phenanthrene	10 U
Phenol	10 U
Pyrene	10 U

U Not detected at indicated detection limit.
J Estimated value.
☐ Value exceeds the screening criteria.
Detection limits that exceed the screening criteria are italicized.

492418\HART11.xls

Table 11 - Analytical Results for MEP Leachate Samples

	Toxicity Equivalency Factor							
Lab ID:	Toxicity	C0F130163001		C0F130163002		C0F130163003		C0F230315001
Sample ID:	Equivalency	P-0503-G-1 Day 1		P-0503-G-5 Day 1		P-0503-G-8 Day 1		P-0503-G-1 Day 7
Sample Date:	Factor	5/3/2000		5/3/2000		5/3/2000		5/3/2000
			TEF		TEF		TEF	
Dioxins in pg/L								
1,2,3,4,6,7,8-HpCDD	0.01	3.8 U	0.038	11 U	0.11	9.1 U	0.091	4.5 U
1,2,3,4,6,7,8-HpCDF	0.01	2.5 U	0.025	7.5 U	0.075	5.5 U	0.055	2.6 U
1,2,3,4,7,8,9-HpCDF	0.01	2.8 U	0.028	8.4 U	0.084	3 U	0.03	3.2 U
1,2,3,4,7,8-HxCDD	0.1	3.3 U	0.33	8.2 U	0.82	3.2 U	0.32	3.6 U
1,2,3,6,7,8-HxCDD	0.1	3.4 U	0.34	8.5 U	0.85	3.3 U	0.33	3.8 U
1,2,3,7,8,9-HxCDD	0.1	3 U	0.3	7.7 U	0.77	3 U	0.3	3.4 U
1,2,3,4,7,8-HxCDF	0.1	2.2 U	0.22	6 U	0.6	2.2 U	0.22	2.8 U
1,2,3,6,7,8-HxCDF	0.1	2 U	0.2	5.4 U	0.54	2 U	0.2	2.7 U
1,2,3,7,8,9-HxCDF	0.1	2.3 U	0.23	6.2 U	0.62	2.2 U	0.22	3.1 U
2,3,4,6,7,8-HxCDF	0.1	2.3 U	0.23	6.1 U	0.61	2.2 U	0.22	2.9 U
1,2,3,7,8-PeCDD	0.5	5.4 U	2.7	17 U	8.5	5.9 U	2.95	5 U
1,2,3,7,8-PeCDF	0.05	2.8 U	0.14	8.1 U	0.405	2.8 U	0.14	2.8 U
2,3,4,7,8-PeCDF	0.5	2.9 U	1.45	8.4 U	4.2	3 U	1.5	2.7 U
2,3,7,8-TCDD	1	2.4 U	2.4	6.7 U	6.7	2.4 U	2.4	2.8 U
2,3,7,8-TCDF	0.1	1.7 U	0.17	4.5 U	0.45	1.7 U	0.17	2 U
OCDD	0.001	5.2 U	0.0052	10 U	0.01	83 J	0.083	8.1 U
OCDF	0.001	4.1 U	0.0041	12 U	0.012	16 U	0.016	6.5 U
Total HpCDD		3.8 U		11 U		9.1 U		4.5 U
Total HpCDF		2.8 U		8.4 U		5.5 U		3.2 U
Total HxCDD		4 U		8.5 U		3.3 U		3.8 U
Total HxCDF		2.3 U		6.2 U		2.2 U		3.1 U
Total PeCDD		5.4 U		17 U		5.9 U		6.5 U
Total PeCDF		3.8 U		11 U		3.9 U		3.4 U
Total TCDD		2.4 U		6.7 U		2.4 U		2.8 U
Total TCDF		1.7 U		4.5 U		1.7 U		2 U
Total TCDD Equivalent (1/2 NDs)		4.41		12.68		4.62		4.67

Table 11 - Analytical Results for MEP Leachate Samples

Lab ID:		C0F230315002		C0F230315003	
Sample ID:		P-0503-G-5 Day 7		P-0503-G-8 Day 7	
Sample Date:		5/3/2000		5/3/2000	
	TEF		TEF		TEF
Dioxins in pg/L					
1,2,3,4,6,7,8-HpCDD	0.045	4.1 U	0.041	3.7 U	0.037
1,2,3,4,6,7,8-HpCDF	0.026	3.6 U	0.036	2.7 U	0.027
1,2,3,4,7,8,9-HpCDF	0.032	4.4 U	0.044	3.4 U	0.034
1,2,3,4,7,8-HxCDD	0.36	4.1 U	0.41	3.3 U	0.33
1,2,3,6,7,8-HxCDD	0.38	4.3 U	0.43	3.5 U	0.35
1,2,3,7,8,9-HxCDD	0.34	3.9 U	0.39	3.2 U	0.32
1,2,3,4,7,8-HxCDF	0.28	3.2 U	0.32	2.4 U	0.24
1,2,3,6,7,8-HxCDF	0.27	3.1 U	0.31	2.3 U	0.23
1,2,3,7,8,9-HxCDF	0.31	3.6 U	0.36	2.7 U	0.27
2,3,4,6,7,8-HxCDF	0.29	3.3 U	0.33	2.5 U	0.25
1,2,3,7,8-PeCDD	2.5	5.4 U	2.7	4.5 U	2.25
1,2,3,7,8-PeCDF	0.14	3.2 U	0.16	2.8 U	0.14
2,3,4,7,8-PeCDF	1.35	3.2 U	1.6	2.8 U	1.4
2,3,7,8-TCDD	2.8	3.4 U	3.4	2.7 U	2.7
2,3,7,8-TCDF	0.2	2.2 U	0.22	1.9 U	0.19
OCDD	0.0081	7.8 U	0.0078	4.8 U	0.0048
OCDF	0.0065	7.2 U	0.0072	6.2 U	0.0062
Total HpCDD		4.1 U		3.7 U	
Total HpCDF		4.4 U		3.4 U	
Total HxCDD		4.3 U		3.5 U	
Total HxCDF		3.6 U		2.7 U	
Total PeCDD		11 U		14 U	
Total PeCDF		3.8 U		3 U	
Total TCDD		3.4 U		2.7 U	
Total TCDF		2.2 U		1.9 U	
Total TCDD Equivalent		5.38		4.39	

Table 12 - Pilot Program MEP Metal Leachate Means and Standard Deviations for PROPAT®-Amended Sediment

		Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7	
	GWQS	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Metals in µg/L															
Aluminum	200	4057	1740	4307	1231	4370	1380	3933	1261	3473	1031	1957	778	1810	793
Antimony	20	9.43	0.76	8.73	0.93	9.30	1.08	10.5	1.23	10.4	2.65	8.87	1.17	11.0	1.65
Arsenic	8	4.43	0.50	3.30	0.78	6.23	3.27	4.30	0.78	4.93	0.60	7.63	0.84	9.57	0.74
Barium	2000	182	42.5	78.1	12.4	57.2	9.30	53.0	8.31	40.1	7.09	30.5	6.68	29.7	8.68
Beryllium	20	5	0	5	0	5	0	5	0	5	0	5	0	5	0
Cadmium	4	5	0	5	0	5	0	5	0	5	0	5	0	5	0
Calcium		112000	11790	82700	6835	76300	7102	70500	7511	57467	6801	49767	6034	44500	6032
Chromium	100	41.7	7.36	24.7	4.08	18.8	2.99	17.7	2.36	13.7	1.16	17.6	1.51	12.9	1.08
Cobalt		50	0	50	0	50	0	50	0	50	0	50	0	50	0
Copper	1000	457	94.7	137	31.1	86.0	22.6	84.8	24.2	45.1	13.2	85.3	22.5	48.9	13.1
Iron	300	23.0	23.4	25.9	21.1	100	0	48.5	2.54	36.6	23.2	100	0	36.4	23.5
Lead	10	3	0	3	0	3	0	3	0	3	0	3	0	3	0
Magnesium		32.2	11.9	1687	2869	30.4	4.76	32.2	3.87	42.5	11.8	68.4	9.85	81.1	4.50
Manganese	50	5.40	7.97	15	0	15	0	5.30	3.82	15	0	5.30	3.81	3.11	3.80
Mercury	2	0.2	0	0.2	0	0.2	0	0.2	0	0.2	0	0.2	0	0.2	0
Nickel	100	79.6	11.8	10.3	3.62	40	0	29.1	18.9	40	0	40	0	40	0
Potassium		69100	4551	8003	1073	2060	551	1102	302	2075	2533	3707	2240	3549	2513
Selenium	50	10.1	1.25	7.20	2.29	8.60	0.70	9.07	0.81	10.4	0.42	9.00	0.62	10.1	1.16
Silver		2.16	2.47	10	0	10	0	10	0	3.67	2.31	10	0	7.13	4.97
Sodium	50000	167667	16073	18167	3683	8130	1325	7877	1283	7597	3258	10377	2542	12900	1480
Thallium	10	10	0	10	0	10	0	10	0	10	0	10	0	10	0
Vanadium		35.2	8.22	32.5	2.82	31.9	1.78	28.8	11.8	33.8	4.42	39	8.00	38.3	4.70
Zinc	5000	3.13	1.40	5.80	2.78	15.4	9.72	6.67	3.26	3.87	0.47	15.2	8.31	8.17	3.18

492418\Pilot Table 12 MEP Metals Statistics.xls

Table 13 - Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment

Lab ID:		C0F280120004	C0F270174001	C0F280120001	C0F300221001	C0F300221004	C0G010138001	C0G180137001	C0H160223001	C0I260217001
Sample ID:	GWQS	C4-PB	C1-L1	C1-L2	C1-L3	C1-L4	C1-L5	C1-L6	C1-L7	C1-L8
Sample Date:		6/27/00	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Conventionals in mg/L										
Total Organic Carbon		1.5	19.7 J	21.4	12.4	9.8	7.4	38.4	15.4 J	8
Total Suspended Solids		4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Metals in µg/L										
Aluminum	200	200 U	265	792	1310	771	764	2690	2240	1360
Antimony	20	13.3	14.4 B	35.3 B	42.9 B	25.3 B	20.8 B	221	115	77.6
Arsenic	8	*10 U*	*10 U*	3.7	5.9	4.1	3.1	11.8	9.7	6.7
Barium	2000	135	241 B	103 B	64.4 B	47.6 B	40.3 B	153 B	71.1 B	54.4 B
Beryllium	20	5 U	0.08 U	5 U	0.08	5 U	5 U	5 U	5 U	0.22 U
Cadmium	4	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	5 U	*5 U*
Calcium		193 U	42300	49700	36000	14100	12000	40700	31200	34000
Chromium	100	1.2	8.3	12.9	8.6	3.8 B	2.7 B	2.2 B	2.4 B	3.9 U
Cobalt		50 U	3.5	3.9	4.6	50 U	50 U	3.6	50 U	3.8
Copper	1000	25 U	106	141	123	46.2	35.9	259	125	49.3
Iron	300	100 U	19 U	67.3	18.2 U	11.2 U	13.9 U	19.3	13	100 U
Lead	10	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Magnesium		5000 U	339	334	174	56.4	67.2	25.3	120	314
Manganese	50	1.3	2.3 B	2.1 B	1 B	15 U	1 B	0.98 B	0.97 B	15 U
Mercury	2	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.047 U	0.2 U	0.2 U
Nickel	100	40 U	23	24.8 U	25.2	7.6	7.3	73.5	45.5	33.6
Potassium		5000 U	49300	69700	64600	25000	18800	70300	34100	21900
Selenium	50	5 U	3.3	10	11.7	4.9	4.1	17.7	5.5	4.7
Silver		10 U	1.2 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Sodium	50000	162	104000	151000	126000	47000	33700	136000	38700	14100
Thallium	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vanadium		2.6	6.9 B	17.8	31.2	13.3	17	71.1	60	43.8
Zinc	5000	24.8 U	26.4 U	25.6 U	10.8 U	6.9 U	9 U	7.6	4	20 U

Table 13 - Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment

Lab ID:		C0F280120004	C0F270174001	C0F280120001	C0F300221001	C0F300221004	C0G010138001	C0G180137001	C0H160223001	C0I260217001
Sample ID:	GWQS	C4-PB	C1-L1	C1-L2	C1-L3	C1-L4	C1-L5	C1-L6	C1-L7	C1-L8
Sample Date:		6/27/00	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Pesticide/PCBs in µg/L										
4,4'-DDD	0.1	0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
4,4'-DDE	0.1	0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
4,4'-DDT	0.1	0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Aldrin	0.04	*0.05* UR	*0.05 U*	0.0053 J	0.0066 J	0.011 J	0.006 J	0.0046 J	0.05 U	
alpha-BHC	0.02	*0.05* UR	*0.05 U*	0.0046 J	0.0046 J	0.0046 J	0.0041 J	*0.05 U*	*0.05 U*	
alpha-Chlordane		0.029 J	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Aroclor 1016		1 UR	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1221		1 UR	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1232		1 UR	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1242		1 UR	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1248		1 UR	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1254		1 UR	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1260		1 UR	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Total PCBs	0.5	*1* UR	*1 U*	*1* UR	*1* UJ	*1* UJ	*1* UJ	*1 U*	*1 U*	
beta-BHC	0.2	0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
delta-BHC		0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Dieldrin	0.03	0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	*0.05 U*	*0.05 U*	
Endosulfan II	0.4	0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endosulfan I	0.4	0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endosulfan sulfate	0.4	0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endrin aldehyde		0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endrin ketone		0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endrin	2	0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
gamma-BHC (Lindane)	0.2	0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.0057 J	0.05 U	
gamma-Chlordane		0.05 UR	0.0055 J	0.016 J	0.021 J	0.025 J	0.025 J	0.089	0.024 J	
Heptachlor epoxide	0.4	0.05 UR	0.05 U	0.05 UR	0.003 J	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Heptachlor	0.2	0.05 UR	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Methoxychlor	40	0.5 UR	0.5 U	0.5 UR	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	
Toxaphene	3	2 UR	2 U	2 UR	2 UJ	2 UJ	2 UJ	2 U	2 U	

Table 13 - Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment

Lab ID:		C0F280120004	C0F270174001	C0F280120001	C0F300221001	C0F300221004	C0G010138001	C0G180137001	C0H160223001	C0I260217001
Sample ID:	GWQS	C4-PB	C1-L1	C1-L2	C1-L3	C1-L4	C1-L5	C1-L6	C1-L7	C1-L8
Sample Date:		6/27/00	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Semivolatiles in µg/L										
1,2,4-Trichlorobenzene	9	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
1,2-Dichlorobenzene	600	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
1,3-Dichlorobenzene	600	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
1,4-Dichlorobenzene	75	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,2'-oxybis(1-Chloropropane)	300	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4,5-Trichlorophenol	700	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4,6-Trichlorophenol	20	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4-Dichlorophenol	20	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4-Dimethylphenol	100	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4-Dinitrophenol	40	*50* UR	*50 U*	*50* UR	*50* UJ	*50* UJ	*50* UJ	*100 U*	*50 U*	
2,4-Dinitrotoluene	10	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
2,6-Dinitrotoluene	10	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
2-Chloronaphthalene		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2-Chlorophenol	40	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2-Methylnaphthalene		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2-Methylphenol		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	23	10 U	
2-Nitroaniline		50 UR	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
2-Nitrophenol		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
3,3'-Dichlorobenzidine	60	50 UR	50 U	50 UR	50 UJ	50 UJ	50 UJ	*100 U*	50 U	
3-Nitroaniline		50 UR	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
4,6-Dinitro-2-methylphenol		50 UR	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
4-Bromophenyl phenyl ether		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Chloro-3-methylphenol		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Chloroaniline		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Chlorophenyl phenyl ether		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Methylphenol		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	8.6 J	10 U	
4-Nitroaniline		50 UR	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
4-Nitrophenol		50 UR	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
Acenaphthene	400	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Acenaphthylene		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	

Table 13 - Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment

Lab ID:		C0F280120004	C0F270174001	C0F280120001	C0F300221001	C0F300221004	C0G010138001	C0G180137001	C0H160223001	C0I260217001
Sample ID:	GWQS	C4-PB	C1-L1	C1-L2	C1-L3	C1-L4	C1-L5	C1-L6	C1-L7	C1-L8
Sample Date:		6/27/00	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Anthracene	2000	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(a)anthracene		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(a)pyrene		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(b)fluoranthene		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(ghi)perylene		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(k)fluoranthene		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
bis(2-Chloroethoxy)methane		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
bis(2-Chloroethyl) ether	10	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
bis(2-Ethylhexyl) phthalate	30	10 UR	10 U	5.5 J	10 UJ	10 UJ	10 UJ	6 J	10 U	
Butyl benzyl phthalate	100	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Carbazole		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Chrysene		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Dibenz(a,h)anthracene		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Dibenzofuran		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Diethyl phthalate	5000	4.7 J	8.2 JB	4.6 JB	10 UJ	10 UJ	10 UJ	20 U	10 U	
Dimethyl phthalate		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Di-n-butyl phthalate	900	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Di-n-octyl phthalate	100	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Fluoranthene	300	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Fluorene	300	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Hexachlorobenzene	10	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
Hexachlorobutadiene	1	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
Hexachlorocyclopentadiene	50	50 UR	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
Hexachloroethane	10	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
Indeno(1,2,3-cd)pyrene		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Isophorone	100	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Naphthalene	300	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Nitrobenzene	10	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
N-Nitrosodi-n-propylamine	20	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
N-Nitrosodiphenylamine	20	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Pentachlorophenol	1	50 UR	50 U	50 UR	50 UJ	50 UJ	50 UJ	38 J	8.6 J	
Phenanthrene		10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Phenol	4000	13 J	29 B	26 JB	22 JB	18 JB	11 JB	160	57 B	
Pyrene	200	10 UR	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	

Table 13 - Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment

Lab ID:	C0F270174002	C0F280120002	C0F300221002	C0F300221005	C0G010138002	C0G180137002	C0H160223002	C0I260217002
Sample ID:	C2-L1	C2-L2	C2-L3	C2-L4	C2-L5	C2-L6	C2-L7	C2-L8
Sample Date:	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Conventionals in mg/L								
Total Organic Carbon	17.3 J	20.9	14.2	10.8	7.9	39.9	15.3 J	7.8
Total Suspended Solids	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Metals in µg/L								
Aluminum	335	461	455	438	553	1590	1410	853
Antimony	18.7 B	24 B	19.6 B	15.7 B	15.6 B	85.1	74.3	71
Arsenic	3.8	3.5	2.7	2.9	4.3	8.2	9.9	9.5
Barium	251 B	100 B	61.2 B	50.9 B	40.1 B	215 B	76.4 B	50.7 B
Beryllium	0.13	5 U	0.09 U	5 U	5 U	5 U	5 U	0.17 U
Cadmium	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*
Calcium	85700	42400	20900	12900	12400	32800	26100	36200
Chromium	14.2	8.4	4.4 B	2.7 B	3.2 B	1.9 B	1.4 B	2.4 U
Cobalt	7.4	50 U	3.9	3.6	50 U	3.9	50 U	50 U
Copper	203	94	53.4	34.8	38.4	204	82.9	20.4
Iron	26.1 U	54.1 U	100 U	100 U	13.4 U	23.6	13.1	17.1 U
Lead	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Magnesium	858	370	170	87.6	76	63.1	135	325
Manganese	2.6 B	1 B	1.3 B	15 U	15 U	0.98 B	1.2 B	0.99 B
Mercury	0.047 U	0.2 U	0.2 U	0.2 U	0.2 U	0.049 U	0.2 U	0.07 U
Nickel	38.3	10.7 U	40 U	6.2	40 U	51.8	36.3	20.9
Potassium	70500	46600	26800	17000	15200	43900	23700	15700
Selenium	5.3	4.3	2.4	3.7	5 U	11.9	4.9	4.4
Silver	1.7	10 U	10 U	10 U	0.94	10 U	10 U	10 U
Sodium	172000	110000	57800	37300	33100	97700	26700	9650
Thallium	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vanadium	9.5 B	11.8 B	13.4	11.5 B	10.5 B	52.6	52.7	38.9
Zinc	17.9 U	10.1 U	9.8 U	4.9 U	8.7 U	5	3.7	20 U

Table 13 - Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment

Lab ID:	C0F270174002	C0F280120002	C0F300221002	C0F300221005	C0G010138002	C0G180137002	C0H160223002	C0I260217002
Sample ID:	C2-L1	C2-L2	C2-L3	C2-L4	C2-L5	C2-L6	C2-L7	C2-L8
Sample Date:	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Pesticide/PCBs in µg/L								
4,4'-DDD	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
4,4'-DDE	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
4,4'-DDT	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Aldrin	*0.05 U*	0.0044 J	0.0054 J	0.0081 J	*0.05* UJ	*0.05 U*	0.05 U	
alpha-BHC	0.003 J	0.0033 J	0.0043 J	0.0041 J	0.0035 J	0.006 J	*0.05 U*	
alpha-Chlordane	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Aroclor 1016	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1221	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1232	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1242	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1248	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1254	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1260	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Total PCBs	*1 U*	*1* UR	*1* UJ	*1* UJ	*1* UJ	*1 U*	*1 U*	
beta-BHC	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
delta-BHC	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Dieldrin	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	*0.05 U*	*0.05 U*	
Endosulfan II	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endosulfan I	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endosulfan sulfate	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endrin aldehyde	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endrin ketone	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endrin	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
gamma-BHC (Lindane)	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
gamma-Chlordane	0.05 U	0.0071 J	0.017 J	0.02 J	0.019 J	0.053	0.017 J	
Heptachlor epoxide	0.05 U	0.05 UR	0.0025 J	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Heptachlor	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Methoxychlor	0.5 U	0.5 UR	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	
Toxaphene	2 U	2 UR	2 UJ	2 UJ	2 UJ	2 U	2 U	

Table 13 - Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment

Lab ID:	C0F270174002	C0F280120002	C0F300221002	C0F300221005	C0G010138002	C0G180137002	C0H160223002	C0I260217002
Sample ID:	C2-L1	C2-L2	C2-L3	C2-L4	C2-L5	C2-L6	C2-L7	C2-L8
Sample Date:	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Semivolatiles in µg/L								
1,2,4-Trichlorobenzene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
1,2-Dichlorobenzene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
1,3-Dichlorobenzene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
1,4-Dichlorobenzene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,2'-oxybis(1-Chloropropane)	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4,5-Trichlorophenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4,6-Trichlorophenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4-Dichlorophenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4-Dimethylphenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4-Dinitrophenol	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
2,4-Dinitrotoluene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,6-Dinitrotoluene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2-Chloronaphthalene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2-Chlorophenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2-Methylnaphthalene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2-Methylphenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	16 J	10 U	
2-Nitroaniline	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
2-Nitrophenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
3,3'-Dichlorobenzidine	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
3-Nitroaniline	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
4,6-Dinitro-2-methylphenol	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
4-Bromophenyl phenyl ether	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Chloro-3-methylphenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Chloroaniline	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Chlorophenyl phenyl ether	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Methylphenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Nitroaniline	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
4-Nitrophenol	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
Acenaphthene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Acenaphthylene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	

Table 13 - Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment

Lab ID:	C0F270174002	C0F280120002	C0F300221002	C0F300221005	C0G010138002	C0G180137002	C0H160223002	C0I260217002
Sample ID:	C2-L1	C2-L2	C2-L3	C2-L4	C2-L5	C2-L6	C2-L7	C2-L8
Sample Date:	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Anthracene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(a)anthracene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(a)pyrene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(b)fluoranthene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(ghi)perylene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(k)fluoranthene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
bis(2-Chloroethoxy)methane	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
bis(2-Chloroethyl) ether	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
bis(2-Ethylhexyl) phthalate	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	4.6 J	
Butyl benzyl phthalate	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Carbazole	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Chrysene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Dibenz(a,h)anthracene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Dibenzofuran	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Diethyl phthalate	4.5 JB	3.2 JB	10 UJ	10 UJ	10 UJ	20 U	10 U	
Dimethyl phthalate	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Di-n-butyl phthalate	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Di-n-octyl phthalate	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Fluoranthene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Fluorene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Hexachlorobenzene	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
Hexachlorobutadiene	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
Hexachlorocyclopentadiene	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
Hexachloroethane	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
Indeno(1,2,3-cd)pyrene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Isophorone	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Naphthalene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Nitrobenzene	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
N-Nitrosodi-n-propylamine	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
N-Nitrosodiphenylamine	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Pentachlorophenol	50 U	50 UR	50 UJ	50 UJ	50 UJ	*100 U*	50 U	
Phenanthrene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Phenol	35 B	26 JB	26 JB	20 JB	13 JB	88 B	40 B	
Pyrene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	

Table 13 - Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment

Lab ID:	C0F270174003	C0F280120003	C0F300221003	C0F300221006	C0G010138003	C0G180137003	C0H160223003	C0I260217003
Sample ID:	C3-L1	C3-L2	C3-L3	C3-L4	C3-L5	C3-L6	C3-L7	C3-L8
Sample Date:	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Conventionals in mg/L								
Total Organic Carbon	22.6 J	23.3	15.2	10.7	8.3	45.1	19.1 J	9.9
Total Suspended Solids	4 U	4 U	4 U	4 U	4 U	4 U	4 U	4 U
Metals in µg/L								
Aluminum	437	359	550	582	631	2150	1710	1290
Antimony	17.8 B	21.5 B	24.1 B	21.2 B	17.9 B	149	170	110
Arsenic	3.4	*10 U*	3.8	4.2	4.1	10	8.7	6.5
Barium	254 B	95 B	61.7 B	52.8 B	42.2 B	223 B	97.2 B	52.9 B
Beryllium	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.16 U
Cadmium	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*
Calcium	82500	23200	18500	12700	10800	31900	21800	30700
Chromium	18.6	7.6	5 B	2.7 B	3.2 B	2.3 B	2.3 B	2.4 U
Cobalt	6	50 U	50 U	50 U	50 U	3.2	50 U	50 U
Copper	198	53.6	50.9	37.9	34.6	208	92.6	35.1
Iron	14.4 U	11.7 U	12 U	100 U	11.7 U	18.7	29.8	9.5 U
Lead	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Magnesium	889	200	118	70.6	63.8	40.5	126	234
Manganese	3.9 B	1 B	1 B	1.3 B	15 U	0.98 B	2.2 B	15 U
Mercury	0.059 U	0.2 U	0.2 U	0.2 U	0.2 U	0.068 U	0.2 U	0.12 U
Nickel	51.8	40 U	40 U	40 U	40 U	61.8	33.7	27.1
Potassium	85800	32600	29500	21300	17100	61200	30400	19600
Selenium	5.8	2.5	5	3.6	3.8	14.4	5	5 U
Silver	1.3	0.96	10 U	10 U	1 U	10 U	10 U	10 U
Sodium	184000	64000	57100	39900	31500	122000	34100	12200
Thallium	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vanadium	10.1 B	6.2 B	12.5 B	10.7 B	13.2	61	51.6	44.1
Zinc	12.2 U	10.1 U	17.2 U	6.1 U	4.5 U	20	8.6	20 U

Table 13 - Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment

Lab ID:	C0F270174003	C0F280120003	C0F300221003	C0F300221006	C0G010138003	C0G180137003	C0H160223003	C0I260217003
Sample ID:	C3-L1	C3-L2	C3-L3	C3-L4	C3-L5	C3-L6	C3-L7	C3-L8
Sample Date:	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Pesticide/PCBs in µg/L								
4,4'-DDD	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
4,4'-DDE	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
4,4'-DDT	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Aldrin	*0.05 U*	0.0075 J	0.0066 J	*0.05* UJ	*0.05* UJ	*0.05 U*	0.05 U	
alpha-BHC	0.0034 J	0.0038 J	0.0036 J	0.0036 J	0.0034 J	0.013 J	*0.05 U*	
alpha-Chlordane	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Aroclor 1016	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1221	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1232	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1242	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1248	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1254	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Aroclor 1260	1 U	1 UR	1 UJ	1 UJ	1 UJ	1 U	1 U	
Total PCBs	*1 U*	*1* UR	*1* UJ	*1* UJ	*1* UJ	*1 U*	*1 U*	
beta-BHC	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
delta-BHC	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Dieldrin	0.0037 J	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	*0.05 U*	*0.05 U*	
Endosulfan II	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endosulfan I	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endosulfan sulfate	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endrin aldehyde	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endrin ketone	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Endrin	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
gamma-BHC (Lindane)	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
gamma-Chlordane	0.05 U	0.014 J	0.018 J	0.02 J	0.021 J	0.06	0.025 J	
Heptachlor epoxide	0.05 U	0.05 UR	0.0025 J	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Heptachlor	0.05 U	0.05 UR	0.05 UJ	0.05 UJ	0.05 UJ	0.05 U	0.05 U	
Methoxychlor	0.5 U	0.5 UR	0.5 UJ	0.5 UJ	0.5 UJ	0.5 U	0.5 U	
Toxaphene	2 U	2 UR	2 UJ	2 UJ	2 UJ	2 U	2 U	

Table 13 - Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment

Lab ID:	C0F270174003	C0F280120003	C0F300221003	C0F300221006	C0G010138003	C0G180137003	C0H160223003	C0I260217003
Sample ID:	C3-L1	C3-L2	C3-L3	C3-L4	C3-L5	C3-L6	C3-L7	C3-L8
Sample Date:	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Semivolatiles in µg/L								
1,2,4-Trichlorobenzene	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
1,2-Dichlorobenzene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
1,3-Dichlorobenzene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
1,4-Dichlorobenzene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,2'-oxybis(1-Chloropropane)	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4,5-Trichlorophenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4,6-Trichlorophenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4-Dichlorophenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4-Dimethylphenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2,4-Dinitrophenol	*50 U*	*50* UR	*50* UJ	*50* UJ	*50* UJ	*100 U*	*50 U*	
2,4-Dinitrotoluene	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
2,6-Dinitrotoluene	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
2-Chloronaphthalene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2-Chlorophenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2-Methylnaphthalene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
2-Methylphenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	21	10 U	
2-Nitroaniline	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
2-Nitrophenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
3,3'-Dichlorobenzidine	50 U	50 UR	50 UJ	50 UJ	50 UJ	*100 U*	50 U	
3-Nitroaniline	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
4,6-Dinitro-2-methylphenol	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
4-Bromophenyl phenyl ether	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Chloro-3-methylphenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Chloroaniline	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Chlorophenyl phenyl ether	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Methylphenol	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
4-Nitroaniline	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
4-Nitrophenol	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
Acenaphthene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Acenaphthylene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	

Table 13 - Pilot Program Analytical Results for ANSI 16.1 Leachate Samples of PROPAT®-Amended Sediment

Lab ID:	C0F270174003	C0F280120003	C0F300221003	C0F300221006	C0G010138003	C0G180137003	C0H160223003	C0I260217003
Sample ID:	C3-L1	C3-L2	C3-L3	C3-L4	C3-L5	C3-L6	C3-L7	C3-L8
Sample Date:	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Anthracene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(a)anthracene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(a)pyrene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(b)fluoranthene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(ghi)perylene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Benzo(k)fluoranthene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
bis(2-Chloroethoxy)methane	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
bis(2-Chloroethyl) ether	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
bis(2-Ethylhexyl) phthalate	10 U	12 J	10 UJ	10 UJ	10 UJ	20 U	10 U	
Butyl benzyl phthalate	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Carbazole	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Chrysene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Dibenz(a,h)anthracene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Dibenzofuran	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Diethyl phthalate	6.2 JB	4.2 JB	10 UJ	10 UJ	10 UJ	20 U	10 U	
Dimethyl phthalate	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Di-n-butyl phthalate	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Di-n-octyl phthalate	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Fluoranthene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Fluorene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Hexachlorobenzene	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
Hexachlorobutadiene	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
Hexachlorocyclopentadiene	50 U	50 UR	50 UJ	50 UJ	50 UJ	100 U	50 U	
Hexachloroethane	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
Indeno(1,2,3-cd)pyrene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Isophorone	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Naphthalene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Nitrobenzene	10 U	10 UR	10 UJ	10 UJ	10 UJ	*20 U*	10 U	
N-Nitrosodi-n-propylamine	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
N-Nitrosodiphenylamine	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Pentachlorophenol	50 U	50 UR	50 UJ	50 UJ	50 UJ	*100 U*	50 U	
Phenanthrene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	
Phenol	32 B	26 JB	24 JB	19 JB	12 JB	120 B	52 B	
Pyrene	10 U	10 UR	10 UJ	10 UJ	10 UJ	20 U	10 U	

U Not detected at indicated detection limit.
J Estimated value.
R Data rejected as a result of extraction holding time exceedence.
B Concentration less than five times (ten times for phthalates) concentration in procedure blank.
Value exceeds the screening criteria.
Detection limits that exceed the screening criteria are italicized.

Table 14 - Pilot Program Dioxin Analytical Results for ANSI 16.1 Leachate Samples from PROPAT®-Amended Sediment

Lab ID:	Toxicity	C0F270174001		C0H160223001		C0F270174002		C0H160223002	
Sample ID:	Equivalency	C1-L1		C1-L7		C2-L1		C2-L7	
Sample Date:	Factor	6/26/00		8/16/00		6/26/00		8/16/00	
			TEF		TEF		TEF		TEF
Dioxins in pg/L									
1,2,3,4,6,7,8-HpCDD	0.01	0.68 U	0.0068	1.9 U	0.019	0.61 U	0.0061	2.9 U	0.029
1,2,3,4,6,7,8-HpCDF	0.01	0.75 U	0.0075	1.2 U	0.012	0.9 U	0.009	1.7 U	0.017
1,2,3,4,7,8,9-HpCDF	0.01	0.9 U	0.009	1.6 U	0.016	1.1 U	0.011	1 U	0.01
1,2,3,4,7,8-HxCDD	0.1	1 U	0.1	2.1 U	0.21	1.1 U	0.11	1.4 U	0.14
1,2,3,6,7,8-HxCDD	0.1	0.91 U	0.091	1.9 U	0.19	0.99 U	0.099	1.3 U	0.13
1,2,3,7,8,9-HxCDD	0.1	0.9 U	0.09	1.8 U	0.18	0.97 U	0.097	1.2 U	0.12
1,2,3,4,7,8-HxCDF	0.1	0.68 U	0.068	1.2 U	0.12	0.57 U	0.057	0.96 U	0.096
1,2,3,6,7,8-HxCDF	0.1	0.6 U	0.06	1.1 U	0.11	0.48 U	0.048	0.85 U	0.085
1,2,3,7,8,9-HxCDF	0.1	0.74 U	0.074	1.3 U	0.13	0.59 U	0.059	1 U	0.1
2,3,4,6,7,8-HxCDF	0.1	0.68 U	0.068	1.4 U	0.14	0.54 U	0.054	1.1 U	0.11
1,2,3,7,8-PeCDD	0.5	1.7 U	0.85	2.7 U	1.35	1.6 U	0.8	1.8 U	0.9
1,2,3,7,8-PeCDF	0.05	1.1 U	0.055	1.6 U	0.08	0.96 U	0.048	1.2 U	0.06
2,3,4,7,8-PeCDF	0.5	1.1 U	0.55	1.5 U	0.75	0.93 U	0.465	1.1 U	0.55
2,3,7,8-TCDD	1	0.75 U	0.75	1.5 U	1.5	0.73 U	0.73	1.4 U	1.4
2,3,7,8-TCDF	0.1	0.69 U	0.069	1.2 U	0.12	0.77 U	0.077	0.91 U	0.091
OCDD	0.001	1.2 U	0.0012	4.3 U	0.0043	2.6 U	0.0026	11 U	0.011
OCDF	0.001	1.2 U	0.0012	3.4 U	0.0034	1.2 U	0.0012	2.5 U	0.0025
Total HpCDD		0.68 U		1.9 U		0.61 U		2.9 U	
Total HpCDF		0.9 U		1.4 U		1.1 U		1.7 U	
Total HxCDD		1 U		2.1 U		1.1 U		1.4 U	
Total HxCDF		0.74 U		1.4 U		0.59 U		1.1 U	
Total PeCDD		2.1 U		9.8 U		1.6 U		6.6 U	
Total PeCDF		1.1 U		1.8 U		0.96 U		1.4 U	
Total TCDD		0.75 U		1.5 U		0.73 U		1.4 U	
Total TCDF		0.69 U		1.2 U		0.77 U		0.91 U	
Total TCDD Equivalent (1/2 NDs)		1.43		2.47		1.34		1.93	

Table 14 - Pilot Program Dioxin Analytical Results for ANSI 16.1 Leachate Samples from PROPAT®-Amended Sediment

Lab ID:	C0F270174003		C0F280120004		C0H160223003	
Sample ID:	*C3-L1*		*C4-PB*		*C3-L7*	
Sample Date:	6/26/00		6/27/00		8/16/00	
		TEF		TEF		TEF
Dioxins in pg/L						
1,2,3,4,6,7,8-HpCDD	0.57 U	0.0057	0.6 U	0.006	2 U	0.02
1,2,3,4,6,7,8-HpCDF	0.84 U	0.0084	0.71 U	0.0071	1.2 U	0.012
1,2,3,4,7,8,9-HpCDF	1 U	0.01	0.85 U	0.0085	1.5 U	0.015
1,2,3,4,7,8-HxCDD	1 U	0.1	1.3 U	0.13	2.2 U	0.22
1,2,3,6,7,8-HxCDD	0.92 U	0.092	1.2 U	0.12	2 U	0.2
1,2,3,7,8,9-HxCDD	0.91 U	0.091	1.1 U	0.11	1.9 U	0.19
1,2,3,4,7,8-HxCDF	0.58 U	0.058	0.69 U	0.069	1.4 U	0.14
1,2,3,6,7,8-HxCDF	0.51 U	0.051	0.6 U	0.06	1.2 U	0.12
1,2,3,7,8,9-HxCDF	0.63 U	0.063	0.74 U	0.074	1.5 U	0.15
2,3,4,6,7,8-HxCDF	0.58 U	0.058	0.68 U	0.068	1.6 U	0.16
1,2,3,7,8-PeCDD	1.6 U	0.8	1.8 U	0.9	2.9 U	1.45
1,2,3,7,8-PeCDF	1 U	0.05	1.3 U	0.065	1.8 U	0.09
2,3,4,7,8-PeCDF	0.99 U	0.495	1.3 U	0.65	1.7 U	0.85
2,3,7,8-TCDD	0.68 U	0.68	1.1 U	1.1	2 U	2
2,3,7,8-TCDF	0.67 U	0.067	1 U	0.1	1.5 U	0.15
OCDD	1.2 U	0.0012	1.9 U	0.0019	3 U	0.003
OCDF	1.2 U	0.0012	1.3 U	0.0013	3.8 U	0.0038
Total HpCDD	0.57 U		0.6 U		2 U	
Total HpCDF	1 U		0.85 U		1.5 U	
Total HxCDD	1 U		1.3 U		2.2 U	
Total HxCDF	0.63 U		0.74 U		1.6 U	
Total PeCDD	1.6 U		2.8 U		11 U	
Total PeCDF	1 U		1.3 U		1.8 U	
Total TCDD	0.68 U		1.1 U		2 U	
Total TCDF	0.67 U		1 U		1.5 U	
Total TCDD Equivalent	1.32		1.74		2.89	

Table 15 - Pilot Program ANSI 16.1 Metal Leachate Means and Standard Deviations for PROPAT®-Amended Sediment

Lab ID:		C0F270174001	C0F280120001	C0F300221001	C0F300221004	C0G010138001	C0G180137001	C0H160223001	C0I260217001
Sample ID:	GWQS	C1-L1	C1-L2	C1-L3	C1-L4	C1-L5	C1-L6	C1-L7	C1-L8
Sample Date:		6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Metals in µg/L									
Aluminum	200	265	792	1310	771	764	2690	2240	1360
Antimony	20	14.4 B	35.3 B	42.9 B	25.3 B	20.8 B	221	115	77.6
Arsenic	8	*10 U*	3.7	5.9	4.1	3.1	11.8	9.7	6.7
Barium	2000	241 B	103 B	64.4 B	47.6 B	40.3 B	153 B	71.1 B	54.4 B
Beryllium	20	0.08 U	5 U	0.08	5 U	5 U	5 U	5 U	0.22 U
Cadmium	4	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	5 U	*5 U*
Calcium		42300	49700	36000	14100	12000	40700	31200	34000
Chromium	100	8.3	12.9	8.6	3.8 B	2.7 B	2.2 B	2.4 B	3.9 U
Cobalt		3.5	3.9	4.6	50 U	50 U	3.6	50 U	3.8
Copper	1000	106	141	123	46.2	35.9	259	125	49.3
Iron	300	19 U	67.3	18.2 U	11.2 U	13.9 U	19.3	13	100 U
Lead	10	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Magnesium		339	334	174	56.4	67.2	25.3	120	314
Manganese	50	2.3 B	2.1 B	1 B	15 U	1 B	0.98 B	0.97 B	15 U
Mercury	2	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.047 U	0.2 U	0.2 U
Nickel	100	23	24.8 U	25.2	7.6	7.3	73.5	45.5	33.6
Potassium		49300	69700	64600	25000	18800	70300	34100	21900
Selenium	50	3.3	10	11.7	4.9	4.1	17.7	5.5	4.7
Silver		1.2 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Sodium	50000	104000	151000	126000	47000	33700	136000	38700	14100
Thallium	10	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vanadium		6.9 B	17.8	31.2	13.3	17	71.1	60	43.8
Zinc	5000	26.4 U	25.6 U	10.8 U	6.9 U	9 U	7.6	4	20 U

Table 15 - Pilot Program ANSI 16.1 Metal Leachate Means and Standard Deviations for PROPAT®-Amended Sediment

Lab ID:	C0F270174003	C0F280120003	C0F300221003	C0F300221006	C0G010138003	C0G180137003	C0H160223003	C0I260217003
Sample ID:	C3-L1	C3-L2	C3-L3	C3-L4	C3-L5	C3-L6	C3-L7	C3-L8
Sample Date:	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Metals in µg/L								
Aluminum	437	359	550	582	631	2150	1710	1290
Antimony	17.8 B	21.5 B	24.1 B	21.2 B	17.9 B	149	170	110
Arsenic	3.4	*10 U*	3.8	4.2	4.1	10	8.7	6.5
Barium	254 B	95 B	61.7 B	52.8 B	42.2 B	223 B	97.2 B	52.9 B
Beryllium	5 U	5 U	5 U	5 U	5 U	5 U	5 U	0.16 U
Cadmium	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*
Calcium	82500	23200	18500	12700	10800	31900	21800	30700
Chromium	18.6	7.6	5 B	2.7 B	3.2 B	2.3 B	2.3 B	2.4 U
Cobalt	6	50 U	50 U	50 U	50 U	3.2	50 U	50 U
Copper	198	53.6	50.9	37.9	34.6	208	92.6	35.1
Iron	14.4 U	11.7 U	12 U	100 U	11.7 U	18.7	29.8	9.5 U
Lead	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Magnesium	889	200	118	70.6	63.8	40.5	126	234
Manganese	3.9 B	1 B	1 B	1.3 B	15 U	0.98 B	2.2 B	15 U
Mercury	0.059 U	0.2 U	0.2 U	0.2 U	0.2 U	0.068 U	0.2 U	0.12 U
Nickel	51.8	40 U	40 U	40 U	40 U	61.8	33.7	27.1
Potassium	85800	32600	29500	21300	17100	61200	30400	19600
Selenium	5.8	2.5	5	3.6	3.8	14.4	5	5 U
Silver	1.3	0.96	10 U	10 U	1 U	10 U	10 U	10 U
Sodium	184000	64000	57100	39900	31500	122000	34100	12200
Thallium	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vanadium	10.1 B	6.2 B	12.5 B	10.7 B	13.2	61	51.6	44.1
Zinc	12.2 U	10.1 U	17.2 U	6.1 U	4.5 U	20	8.6	20 U

Table 15 - Pilot Program ANSI 16.1 Metal Leachate Means and Standard Deviations for PROPAT®-Amended Sediment

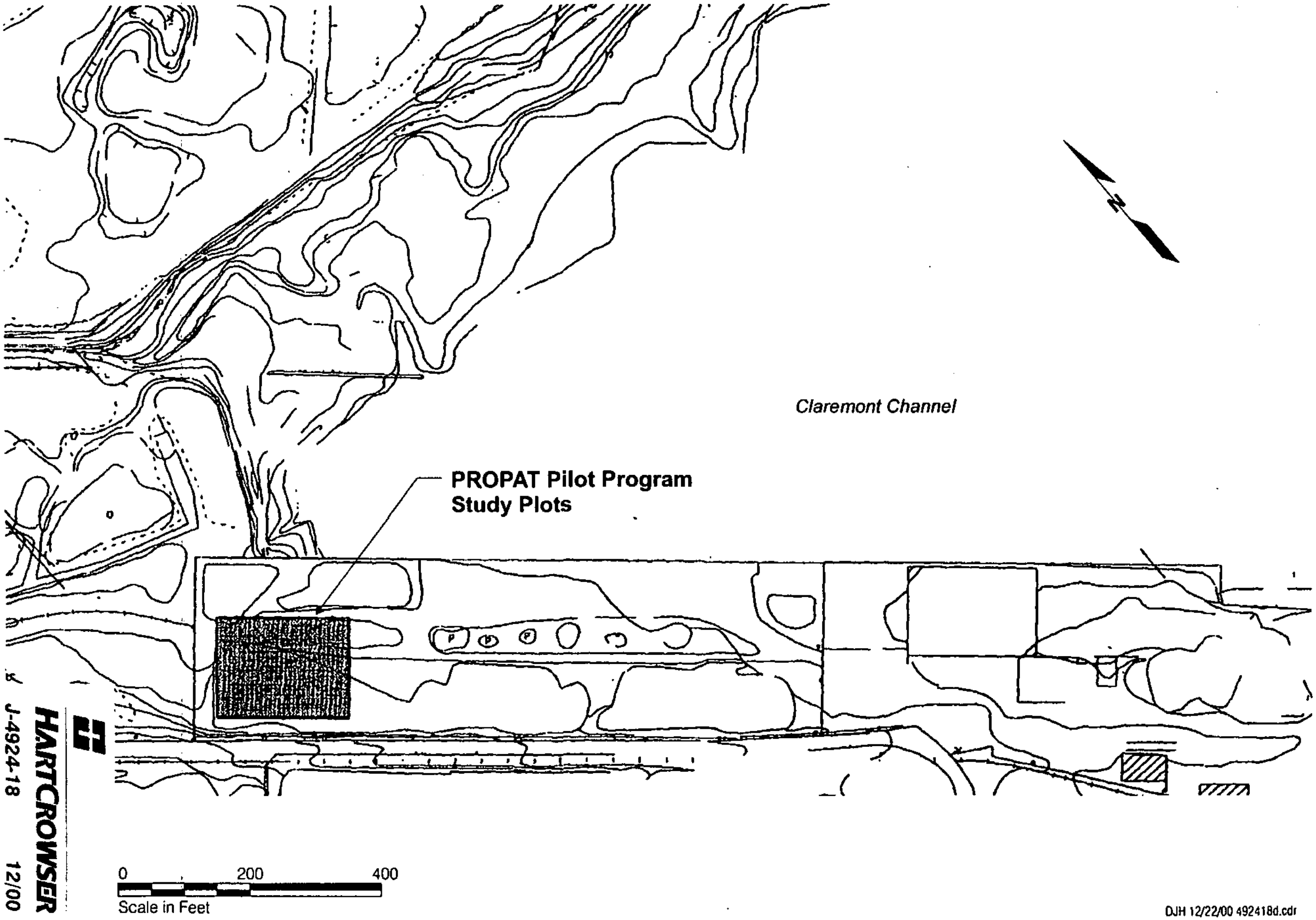
Lab ID:	C0F270174002	C0F280120002	C0F300221002	C0F300221005	C0G010138002	C0G180137002	C0H160223002	C0I260217002
Sample ID:	C2-L1	C2-L2	C2-L3	C2-L4	C2-L5	C2-L6	C2-L7	C2-L8
Sample Date:	6/26/00	6/27/00	6/28/00	6/29/00	6/30/00	7/17/00	8/16/00	9/25/00
Metals in µg/L								
Aluminum	335	461	455	438	553	1590	1410	853
Antimony	18.7 B	24 B	19.6 B	15.7 B	15.6 B	85.1	74.3	71
Arsenic	3.8	3.5	2.7	2.9	4.3	8.2	9.9	9.5
Barium	251 B	100 B	61.2 B	50.9 B	40.1 B	215 B	76.4 B	50.7 B
Beryllium	0.13	5 U	0.09 U	5 U	5 U	5 U	5 U	0.17 U
Cadmium	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*	*5 U*
Calcium	85700	42400	20900	12900	12400	32800	26100	36200
Chromium	14.2	8.4	4.4 B	2.7 B	3.2 B	1.9 B	1.4 B	2.4 U
Cobalt	7.4	50 U	3.9	3.6	50 U	3.9	50 U	50 U
Copper	203	94	53.4	34.8	38.4	204	82.9	20.4
Iron	26.1 U	54.1 U	100 U	100 U	13.4 U	23.6	13.1	17.1 U
Lead	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U
Magnesium	858	370	170	87.6	76	63.1	135	325
Manganese	2.6 B	1 B	1.3 B	15 U	15 U	0.98 B	1.2 B	0.99 B
Mercury	0.047 U	0.2 U	0.2 U	0.2 U	0.2 U	0.049 U	0.2 U	0.07 U
Nickel	38.3	10.7 U	40 U	6.2	40 U	51.8	36.3	20.9
Potassium	70500	46600	26800	17000	15200	43900	23700	15700
Selenium	5.3	4.3	2.4	3.7	5 U	11.9	4.9	4.4
Silver	1.7	10 U	10 U	10 U	0.94	10 U	10 U	10 U
Sodium	172000	110000	57800	37300	33100	97700	26700	9650
Thallium	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U
Vanadium	9.5 B	11.8 B	13.4	11.5 B	10.5 B	52.6	52.7	38.9
Zinc	17.9 U	10.1 U	9.8 U	4.9 U	8.7 U	5	3.7	20 U

Table 15 - Pilot Program ANSI 16.1 Metal Leachate Means and Standard Deviations for PROPAT®-Amended Sediment

Lab ID:																
Sample ID:	Leach 1		Leach 2		Leach 3		Leach 4		Leach 5		Leach 6		Leach 7		Leach 8	
Sample Date:	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Metals in µg/L																
Aluminum	346	86.5	537	226	772	469	597	167.006	649	106.688	2143	550.0	1787	420.2777	1168	274.7478
Antimony	17.0	2.27	26.9	7.35	28.9	12.4	20.7	4.816984	18.1	2.605763	152	68	120	48.0	86.2	20.87391
Arsenic	5.73	3.70	5.73	3.70	4.13	1.63	3.73	0.723418	3.83	0.64291	10.0	1.80	9.43	0.64291	7.57	1.677299
Barium	248.7	6.81	99.3	4.04	62.4	1.72	50.4	2.631223	40.9	1.159023	197	38.3	81.6	13.79577	52.7	1.861003
Beryllium	1.74	2.83	5	0	1.72	2.84	5	0	5	0	5	0	5	0	0.18	0.032146
Cadmium	5	0	5	0	5	0	5	0	5	0	5	0	5	0	5	0
Calcium	70167	24186.22	38433	13688.07	25133	9487.009	13233	757.1878	11733	832.6664	35133	4842	26367	4705.67	33633	2768.273
Chromium	13.7	5.17	9.63	2.86	6.00	2.27	3.07	0.635085	3.03	0.288675	2.13	0.21	2.03	0.550757	2.90	0.866025
Cobalt	5.63	1.98	34.6	26.6	19.5	26.4	34.5	26.78905	50	0	3.57	0.35	50	0	34.6	26.67358
Copper	169	54.6	96.2	43.7	75.8	40.9	39.6	5.894348	36.3	1.931321	224	30.7	100	22.0	34.9	14.45072
Iron	19.8	5.89	44.4	29.0	43.4	49.1	70.4	51.2687	13.0	1.153256	20.5	2.67	18.6	9.670746	42.2	50.2003
Lead	3	0	3	0	3	0	3	0	3	0	3	0	3	0	3	0
Magnesium	695	308.9827	301	89.6	154	31.2	71.5	15.62093	69.0	6.30	43.0	19.0	127	7.549834	291	49.6689
Manganese	2.93	0.85049	1.37	0.64	1.10	0.17	10.4	7.909699	10.3	8.082904	0.98	0.00	1.46	0.653937	10.3	8.088677
Mercury	0.10	0.09	0.2	0	0.2	0	0.2	0	0.2	0	0.05	0.01	0.20	0	0.13	0.065574
Nickel	37.7	14.4	25.2	14.7	35.1	8.54	17.9	19.12311	29.1	18.87935	62.4	10.9	38.5	6.20	27.2	6.350591
Potassium	68533	18329.3	49633	18735.08	40300	21087.67	21100	4003.748	17033	1800.926	58467	13410.57	29400	5271.622	19067	3134.22
Selenium	4.80	1.32	5.60	3.92	6.37	4.80	4.07	0.723418	4.30	0.6245	14.7	2.91	5.13	0.321455	4.70	0.30
Silver	1.40	0.26	6.99	5.22	10	0	10	0	3.98	5.213559	10	0	10	0	10	0
Sodium	153333	43143.17	108333	43523.94	80300	39578.91	41400	5020.956	32767	1137.248	118567	19379.46	33167	6054.2	11983	2232.898
Thallium	10	0	10	0	10	0	10	0	10	0	10	0	10	0	10	0
Vanadium	8.83	1.70	11.9	5.80	19.0	10.5	11.8	1.331666	13.6	3.265476	61.6	9.26	54.8	4.56545	42.27	2.919475
Zinc	18.8	7.15	15.3	8.95	12.6	4.01	5.97	1.006645	7.40	2.515949	10.87	8.02	5.43	2.746513	20	0

U Not detected at indicated detection limit.
J Estimated value.
R Data rejected as a result of extraction holding time exceedence.
B Concentration less than five times (ten times for phthalates) concentration in procedure blank.
Value exceeds the screening criteria.
Detection limits that exceed the screening criteria are italicized.

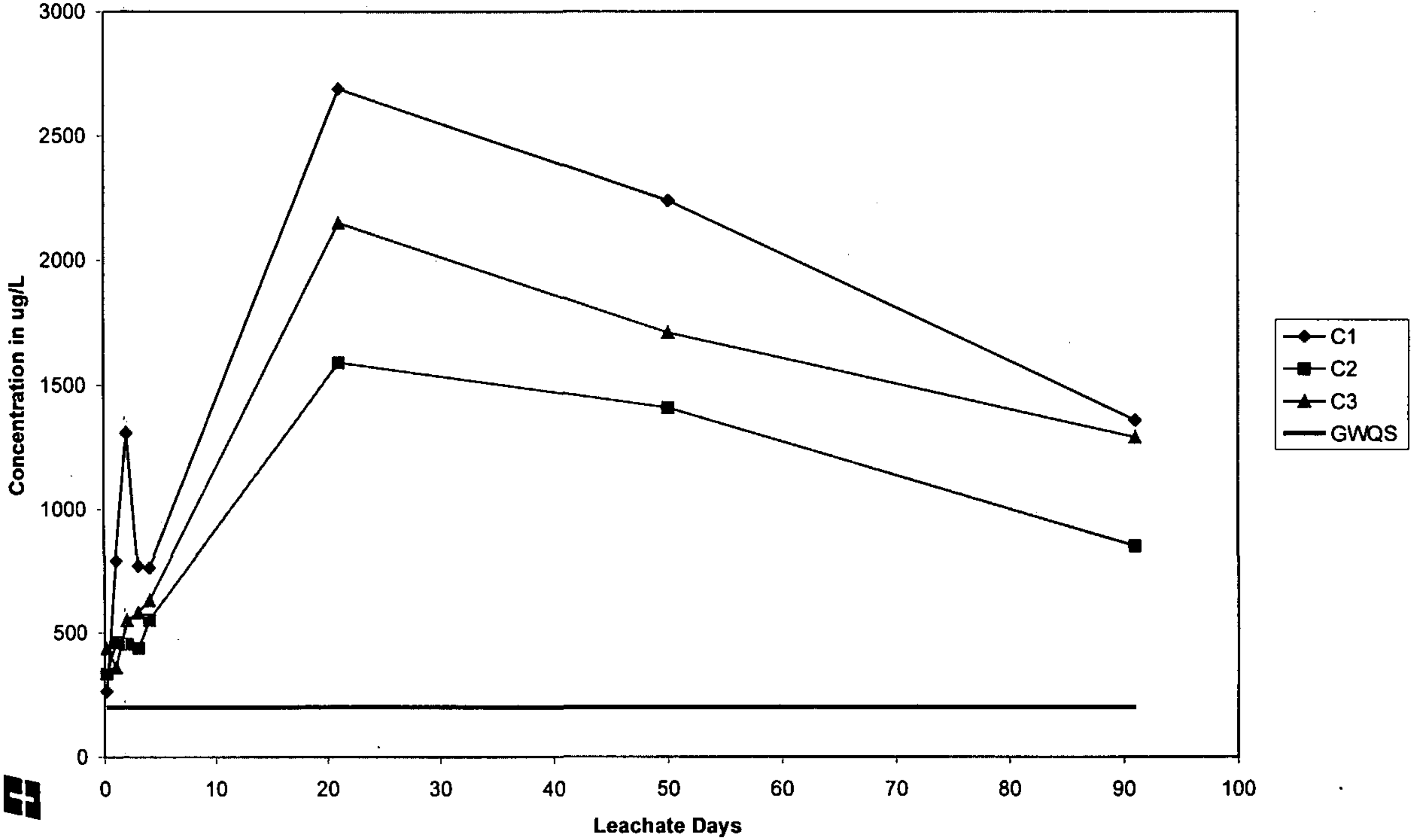
Location of Pilot Program Study Plots



HARTCROWSER
J-4924-18 12/00
Figure 1

DJH 12/22/00 492418d.cdr

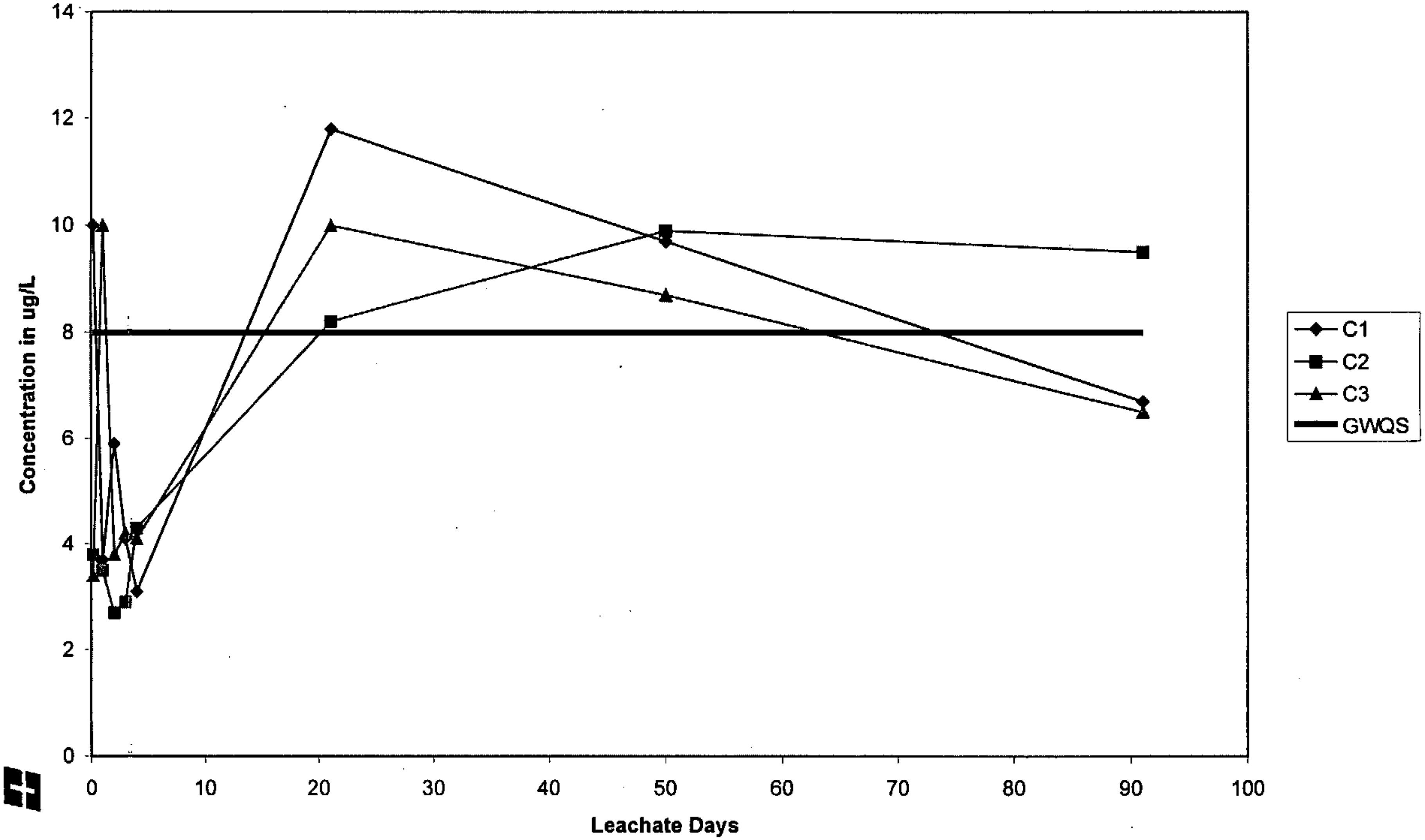
Aluminum Leachate Concentration Versus Time



HARTCROWSER
J-4924-18 12/00
Figure 2

hel 12/6/00 492418b.cdr

Arsenic Leachate Concentration Versus Time



HARTCROWSER
J-4924-18 12/00
Figure 3

hel 12/6/00 492418c.cdr

APPENDIX A
CTI'S LETTERS

April 21, 2000

John R. Ponton
Senior Associate
Hart Crowser, Inc.
75 Montgomery Street, 5th Floor
Jersey City, New Jersey 07302-3726

RE: CLAREMONT CHANNEL DEEPENING PROJECT
JERSEY CITY, NEW JERSEY
REVISED PROPAT PILOT STABILIZATION RECIPE
CTI PROJECT NO. 98-311

Dear Mr. Ponton:

Consolidated Technologies, Inc.'s (CTI) is submitting this correspondence in response to Hart Crowser, Inc.'s (Hart Crowser) review of CTI's proposal (see correspondence of April 17, 2000) to modify the stabilization recipe, or mix, for the PROPAT® Pilot Program. Hart Crowser has requested supplemental information supporting CTI's proposal to eliminate the "alkaline activator" component of the mix, and the associated replacement of the "KS40" component with a "KS60" component. Accordingly, CTI has consulted with O'Brien & Gere Laboratories, Inc., and collectively offers the following information for your consideration.

It is CTI's opinion that the HC "optimum mix" dosage levels are excessive and contains unnecessary redundancy with regard to the alkaline activator requirements of the mix (i.e. lime). From a volume increase perspective alone, reagent and/or additive rates of more than 40% are approaching the maximum practical operational limits for batch plant stabilization processes. Reagent costs can also be excessive at high field-scale dosages. For these reasons, CTI has proposed a modified mix that reduces the mix from three to two reagents, by eliminating one source of alkaline activator and replacement of the KS40 mix reagent with a KS60 reagent. The use of KS60 will supply additional alkaline activator offsetting the elimination of the single source alkaline activator (i.e. lime).

In both cement-based and lime/pozzolan-based techniques, the stabilizing process can be modified through the use of high-efficiency substitute additives, such as soluble silicates, that accelerate curing rates and enhance the stabilizing properties of the dredged material. CTI proprietary reagents KS40 and KS60, contain silicate rich components and excess lime, in combination with other pozzolanic ingredients. One of the proprietary active ingredients of the KS reagent is useful in that the it typically contains up to 15% lime or lime hydrate. In addition to lime, this ingredient often contains di-calcium silicate, which is also an alkaline component.

The KS60 reagent will provide both excess silicate (as calcium-silicate-hydrate, or CSH), as well as free lime as calcium hydroxide as the KS60 hydrates (combines with water). As the hydration process continues, the compounds that collectively make up about 75% of the anhydrous cementitious ingredient in KS60 (i.e., calcium silicates) gradually transform to their hydration products. Transformation of the KS60 silicate compounds occurs when the dry reagent is mixed with water. The chemistry involved is complex, but in effect the two calcium silicates present in the reactive reagent react with water to produce two new compounds, calcium hydroxide and a calcium silicate hydrate gel. This gel is the most important compound because it's the main cementing component of the KS60 reagent.

1717 Swede Road • Suite 109 • Blue Bell, Pennsylvania 19422
Phone 610/278-9678 • Fax 610/278-6985 • Website www.ecpl.com

It should be noted that chemically, KS60 contains significantly more (nominally 50%) active calcium silicates than does an equal weight of KS40 reagent. Similarly, excess alkali compounds (available lime hydrate) will be formed with the hydration of KS60 as well. These compounds contribute significantly to offsetting the elimination of the single source alkali activator.

Also noteworthy, the fly ash that will be used for the Pilot Program is a pozzolanic reactive material containing relatively high levels of sulfate or sulfite compounds, and calcium oxide (lime). These compounds will combine with hydration to form reactive calcium sulfoaluminates, which gradually get assimilated into a self-hardening CSH gel matrix (as found with the KS reagents).

When KS60 is used in combination with pozzolanic alkaline flyash, both reagents hydrate to form calcium hydrates (again lime) and cement gel (CSH) pastes. Any clay fraction in the dredged material can also be important, in that the clay phase may contribute to the stabilization process through solution in the high pH environment. Here, clay's cooperative reaction with the free lime from the KS60 will produce some additional calcium silicate hydrate (more CSH gel formation).

As we discussed previously, CTI has performed numerous stabilization projects utilizing flyash/alkali activator reagents alone, without a KS reagent. In the case of the Claremont Channel sediment bench-scale test program, CTI recommended the addition of the KS reagent as a measure of precaution, not necessity. Admittedly, this provided redundancy in the mix. However, as described above, replacing KS40 with KS60 does not eliminate the redundancy, but merely relies upon a different reagent that adequately offsets the elimination of the sole alkali activator ingredient. Also, utilization of a high quality, pozzolanic reactive flyash provides yet additional redundancy. Thus, CTI is confident that the alternate mix is appropriate and practical for the Pilot Program, and recommends its use accordingly.

As described in Hart Crowser's revised work plan for the Pilot Program, any modifications of the design mix and/or application dosages that will be evaluated in the field during the pilot program should be noted as qualifiers of the results of the Pilot Program. Again, CTI recommends that Hart Crowser determine the chemical and physical characterization of the dredged material used for the Pilot Program. Additionally, as qualifiers, the available lime content (ASTM C25, SEC 28) and the pH of each reagent should be determined and documented.

As you know, CTI is mobilizing to commence the Pilot Program next week. Consequently, <u>today</u> CTI is placing the order for the stabilization reagents for delivery next week. Please advise this office as soon as possible of any questions or comments potentially affecting this process. Please feel free to contact me at 610-278-9678, extension 201 to discuss your questions or comments.

Sincerely,
CONSOLIDATED TECHNOLOGIES, INC.

Craig R. Schantz

Craig R. Schantz
Senior Project Director

cc: Steve Shinn, HNSE
Steve Sands, Ken Sykes, CTI John Doerner, O'Brien & Gere

J:\1998main\Projects\8311\Correspondence\HartCrowser Propat pilot letter (4-21-00).doc

April 17, 2000

John R. Ponton
Senior Associate
Hart Crowser, Inc.
75 Montgomery Street, 5th Floor
Jersey City, New Jersey 07302-3726

RE: CLAREMONT CHANNEL DEEPENING PROJECT
JERSEY CITY, NEW JERSEY
DRAFT REVISED PROPAT PILOT PROGRAM WORK PLAN
CTI PROJECT NO. 98-311

Dear Mr. Ponton:

Consolidated Technologies, Inc.'s (CTI) appreciates the opportunity to review and comment on the draft revised (4/00) PROPAT® Pilot Program work plan prepared by Hart Crowser (HC). Pursuant to our recent discussions, two issues need to be addressed. First, is the plan for "in barge mixing", and secondly, is the stabilization reagent "mix" proposed for the Pilot Program.

In Barge Mixing

At this point in time, CTI does not own the preferred equipment required for in barge mixing. Consequently, as discussed with Steve Shinn last week, CTI proposes to simulate in barge mixing as follows. First, dewatered dredged materials will be mixed in the pugmill with the pneumatically delivered amending reagents (i.e. flyash) to create a "pre-amended product". This technique allows for proper measurement and delivery of each amending reagent, thorough mixing, and proper air emission control. The pre-amended product will be discharged from the pugmill onto a temporary stockpile. Next, having determined the weight of the raw dredged material from the pugmill processing system, the appropriate quantity of PROPAT® alone will be fed through the pugmill processing system and discharged onto the stockpiled pre-amended product. Finally, utilizing conventional material handling equipment (i.e. wheeled front-end loader and/or hydraulic excavator), the stockpiled pre-amended product and PROPAT® will be blended together to form a homogeneous "manufactured fill". The manufactured fill will be allowed to cure for 24-48 hours, and then will be transported to the pilot pad placement area.

Stabilization Reagent Mix

On April 9, 1999, HC advised CTI that HNSE directed HC to temporarily postpone the initial phases of the PROPAT® bench scale testing program, and to immediately proceed with the AUD and bench scale/MEP testing of the non-PROPAT® containing manufactured fill proposed for the Liberty National site. Accordingly, HC requested CTI to recommend a "mix" for the non-PROPAT® containing manufactured fill. On April 21, 1999, CTI submitted the following mix to HC:

- Coal flyash "North" @ **15%** by weight of the dredged material
- KS40 (proprietary CKD/silicate reagent) @ **10%** by weight of the dredged material
- "alkaline activator" @ **5%** by weight of the dredged material

1717 Swede Road • Suite 109 • Blue Bell, Pennsylvania 19422
Phone 610/278-9678 • Fax 610/278-6985 • Website www.ecpl.com

CTI was advised that HC conducted the bench scale/MEP testing of the non-PROPAT® containing manufactured fill utilizing the recommended mix, and that although not disclosed in the application, the NJDEP AUD for the non-PROPAT® containing manufactured fill was approved based upon this mix.

Subsequent to the non-PROPAT® bench scale testing, HC consulted with CTI regarding their concerns about the unconfined compressive strength results obtained during the initial bench scale testing (i.e. less than anticipated). Accordingly, HC and CTI representatives revisited mixing techniques and admixture ratios. Consequently, for purposes of its own edification, HC elected to re-run bench scale samples with a 10% increase of the proportion of KS40. CTI was advised that the revised mix used for the supplemental testing was as follows:

- Coal flyash "North" @ **15%** by weight of the dredged material
- KS40 (proprietary CKD/silicate reagent) @ **20%** by weight of the dredged material
- "alkaline activator" @ **5%** by weight of the dredged material

Consequently, on November 18, 1999, HC advised CTI that based upon the initial and supplemental bench scale testing for the non-PROPAT® containing manufactured fill, the HC Task 5 "CTI mix" for the PROPAT® containing manufactured fill bench scale testing would be as follows:

- PROPAT® @ **30%** by weight of the dredged material
- Coal flyash "North" @ **15%** by weight of the dredged material
- KS40 (proprietary CKD/silicate reagent) @ **20%** by weight of the dredged material
- "alkaline activator" @ **5%** by weight of the dredged material

It is our understanding that the bench scale/MEP testing of the PROPAT® containing manufactured fill proposed for the Liberty National site was conducted by HC using this mix, as well as a second mix consisting of 30% PROPAT®, 10% Portland Cement, and 20% LKD.

The draft revised (4/00) PROPAT® Pilot Program work plan states (p5) that the optimum mix used for the PROPAT® bench scale tests was 30% PROPAT® by weight of sediment, and flyash, lime and alkaline activators – 40% combined, by weight of the sediment/PROPAT® mix. Verbally, HC has advised CTI that the ratio of the components of the 40% flyash, lime and alkaline activator combination consisted of the mix conveyed to CTI on November 18, 1999. The draft revised work plan (p5) states that this mix will also be used for the Pilot demonstration.

As we've discussed recently, the "November 18th" mix design (HC optimum mix) used for the bench scale tests was, from a chemical stabilization perspective, a highly conservative mix design that provided a certain level of redundancy (i.e. available lime present in multiple reagents). For several reasons listed below, CTI does not feel it necessary, nor prudent, to utilize such a conservative mix design for the Pilot Program.

- Based upon our experiences, contaminated sediments from the NY Harbor can be chemically stabilized utilizing lessor proportions (i.e. weight of reagents to weight of sediment) of amending reagents. Typically, the total combined ratio of reagents to sediment, by weight is 20-30%. The HC optimum mix is 40%, not including PROPAT® (30%).

- Utilization of the HC optimum mix for the Pilot Program may set a precedent, or result in a regulatory mandated mix design for the full-scale demonstration. This would result in unnecessary and burdensome costs and prolonging of the HNSE, and potentially future projects.

  As stated in the AUD application prepared by HC for the non-PROPAT® containing manufactured fill, and as specified in CTI's Claremont facility AUD, future mix designs for dredged materials proposed for upland beneficial use are subject to certain proprietary protection, thus specific reagents and respective ratios to the raw sediments are not disclosed. Both AUD's merely cite potential amendment reagents. Thus, from a regulatory view, it is not necessary to specify the exact mix design for the Pilot Program.

- From an operational perspective, practically speaking, the use of three (3) dry additives and PROPAT® is not feasible. CTI's Claremont dredged material processing system is capable of handling two (2) pneumatically conveyed reagents (i.e. flyash), and two (2) dry bulk conveyed reagents (i.e. PROPAT®), simultaneously. The HC optimum mix consists of three pneumatically conveyed reagents and one dry bulk conveyed reagents.

Accordingly, pursuant to our recent conversations, CTI requests that a modified version of the HC optimum mix design be implemented for the Pilot Program. We have reviewed the HC optimum mix and propose the following alternate, or "**pilot program mix**".

- PROPAT® @ **30%** by weight of the dredged material
- Coal flyash @ **20%** by weight of the dredged material
- **KS60** (proprietary CKD/silicate reagent) @ **20%** by weight of the dredged material

As stated above, based on CTI's experiences the HC optimum mix, as well as the proposed pilot mix as presented above, consist of excessive proportions of reagents. Thus, CTI suggests that the pilot program mix is a "worse case" mix. Given that this is a field scale pilot test, to an extent, the true "optimum mix" will be field determined. The moisture content and grain size of the dredged sediments will affect the field optimum mix. Accordingly, CTI suggests that the initial pilot mix consist of (by weight of sediments) a minimum of 30% PROPAT®, 12% flyash, and 12% KS60. As necessary, the quantity of flyash/KS60 can be adjusted to render the moisture content of the final product suitable for handling and placement (i.e. near optimum moisture content based upon Proctor curve). Regardless of any adjustment, the proportion of flyash and KS60 will be equal, and the proportion of PROPAT® will be 30%.

CTI recognizes that Pilot Program samples of the manufactured fill will be subject to MEP analysis, and that HC intends to compare the results to the bench scale MEP results. Accordingly, HC has expressed its concern regarding any proposed modification of the HC optimum mix. Please be advised that CTI has reviewed and evaluated the chemical stabilization properties of the HC optimum mix, and based on these criteria recommend the alternate pilot program mix proposed herein. In essence, the use of KS60 in lieu of KS40 offsets the elimination of the 5% alkaline activator. CTI is confident that the proposed pilot program mix is comparable to the HC optimum mix, and will render a comparable final product, thus resulting in comparable MEP and strength results.

CTI understands that the PROPAT® bench-scale MEP results will be used for the NJDEP AUD application for the PROPAT® containing manufactured fill proposed for the Liberty National project. Additionally, we recognize that the Pilot Program MEP results will be shared with the NJDEP. As stated above, CTI does not anticipate that the results will differ significantly due to the proposed modified mix. In fact, we believe that there is an equal if not greater potential of obtaining differing results due to the potential differences in the bulk sediment chemistry of the sediment used for bench scale testing versus the Pilot Program. Accordingly, CTI suggests that HC and HNSE consider analyzing samples of the Pilot Program sediment for bulk sediment chemistry.

In conclusion, it is CTI's recommendation that for the reasons and rationale presented above, the proposed **pilot program mix** be used for the pilot and full-scale demonstrations.

Pending HNSE's authorization, CTI proposes the following schedule for the Pilot Program:

- April 24 - April 26 — Pugmill processing system calibration & shakedown
- April 25 — Dredging 500 CY
- April 26 — Dredged material dewatering
- April 27-29 — Dredged material processing (pugmill/in barge)
- April 29-30 — Stockpiled manufactured fill curing period
- May 1 — Test pad site preparation
- May 2-3 — Manufactured fill placement
- May 4-5 — Demobilization/site cleanup

Please feel free to contact me at 610-278-9678, extension 201 to discuss your questions or comments.

Sincerely,

CONSOLIDATED TECHNOLOGIES, INC.

Craig R. Schantz

Craig R. Schantz
Senior Project Director

Steve Shinn, HNSE
Steve Sands, Ken Sykes, CTI

APPENDIX B
RESULTS OF PERSONNEL MONITORING

INTERNAL MEMORANDUM

DATE: June 02, 2000

TO: Illiana Alvarado
John Ponton

CC: David Chawes, CIH
Employee Occupational Health File

FROM: Elisabeth Black

RE: Worker Exposure Monitoring
CTI Facility
Jersey City, New Jersey
J-4924-18

This memo summarizes the results of personal air monitoring during fieldwork at the CTI Dredged Material Stabilizing Agent pilot study site in Jersey City, New Jersey. Dredged sediments brought onto the project site may contain heavy metals, including arsenic (As), chromium (Cr), copper (Cu), nickel (Ni) and lead (Pb). In addition, Propat®, a material added to the sediment on site, is known to contain polychlorinated biphenyls (PCBs). Personal air monitoring was conducted on May 3, 2000 during mixing of dried sediments with Propat® and other additives. Mixing of dried sediments with additives created a potential for exposure to metal- and PCB-containing dusts while Iliana Alvarado of Hart Crowser was overseeing operations and testing mixture samples. The monitoring was performed in order to verify that airborne dust did not contain metals or PCBs above regulatory criteria for worker exposure.

Occupational Safety and Health Administration (OSHA) Method ID-125G was used to sample As, Cr, Cu, Ni, and Pb using a calibrated sampling pump with 37-mm cassette and mixed-cellulose ester (MCE) filter. National Institute of Occupational Safety and Health (NIOSH) Method 5503 was used to sample PCBs using a calibrated sampling pump with an OVS-2 sorbent tube with glass fiber filter.

1910 Fairview Avenue East
Seattle, Washington 98102-3699
Fax 206.328.5581
Tel 206.324.9530

At the completion of fieldwork, the sample media were submitted to Health Science Associates, an American Industrial Hygiene Association (AIHA) accredited laboratory, for analysis. The MCE fiber filter sample was analyzed for the five suspect metals by NIOSH Method 7082. The sorbent tube sample was analyzed for PCBs using NIOSH Method 5503. Laboratory certificates of analysis are attached to this memorandum. The monitoring results are summarized below.

				Metal Concentration in 8-hr TWA (mg/m³)					
Sample ID	Sample Time (min)	Flow Rate (L/min)	Sample Volume (L)	As	Cr	Cu	Ni	Pb	PCBs
4924-18-Air-1-Metals	503	2.021	1,016.56	<0.002	<0.001	<0.001	<0.002	<0.002	NA
4924-18-Air-1-PCBs	473	0.09882	46.74	NA	NA	NA	NA	NA	<0.004
Permissible Exposure Limit in 8 hr TWA (mg/m^3) 29 CFR 1910				0.01	1.0	1.0	1.0	0.05	1.0

NA Not Analyzed

ND Not Detectable by Analytical Method

TWA Time-Weighted Average, 8 hour TWA = (Concentration x Time/8 Hours)

Based on the results of personal exposure monitoring, airborne concentrations of the metals and PCBs analyzed were well below OSHA limits for air contaminants.

Attachment: Certificates of Analysis, Health Science Associates

Propatairmon.doc

Report No.: 103090
Purchase Order:
External No.: J-4924-18

ELIZABETH BLACK
HART CROWSER
1910 FAIRVIEW AVE EAST
SEATTLE WA 98102

Date Received : 17-MAY-00
Date Completed : 24-MAY-00
Date Sent : 24-MAY-00
Page # 1 of 1

Sample Description : 1- NW/PVC FILTER CASSETTE

Method of Analysis : Flame Atomic Absorption Spectroscopy (NIOSH 7082)
Inductively coupled argon plasma, atomic emission spectroscopy (NIOSH 7300)

Auto Sample No.	Submitter Sample No.	Air Volume	Test Description	ug	mg/m3	ug/m3	Reporting Limit
219779	4924-18-AIR-1-METALS	1016.56	Arsenic	<2	<0.002		2 ug
			Chromium	<1	<0.001		1 ug
			Copper	<1	<0.001		1 ug
			Nickel	<2	<0.002		2 ug
			Lead	<2	<0.002		2 ug

DRAFT REPORT
SUBJECT TO REVISION

Remarks : Sample(s) and sampling data as provided by ELIZABETH BLACK

Analyst : SH

Ref : SH_3090

California ELAP No.: 1406
AIHA Accreditation No.: 172
NVLAP Accreditation No.: 101384
ELLAP Accreditation No.: 10985
LACSD Lab No.: 10125

Reviewed by: ____________________
HOA BUI

Technical Approval: ____________________
Laboratory Director, Jaime Steedman-Lyde

Health Science Associates

LABORATORY REPORT

Report No.: 103091
Purchase Order:
External No.: J-4924-18

ELIZABETH BLACK
HART CROWSER
1910 FAIRVIEW AVE EAST
SEATTLE WA 98102

Date Received : 17-MAY-00
Date Completed : 25-MAY-00
Date Sent : 25-MAY-00
Page # 1 of 1

Sample Description : 1- OVS-2 TUBE

Method of Analysis : GAS CHROMATOGRAPHY (NIOSH 5503)

Sample Number	Submitter Number	Air Volume (Liters)	Media	Polychlorinated Biphenyls (ug)	Polychlorinated Biphenyls (ug/m3)
219780	4924-18-AIR-1-PCBS	46.74	Glass Fiber Filter	<0.2	<4
		46.74	XAD-2 Tube	<0.2	<4
Detection Limit				0.2	

Backs were analyzed separately and results were below the Detection Limit, unless otherwise reported.

Remarks : Sample(s) and sampling data as provided by ELIZABETH BLACK

Analyst : CTA

Ref :

DRAFT REPORT SUBJECT TO REVISION

California ELAP No.: 1406
AIHA Accreditation No.: 172
NVLAP Accreditation No.: 101384
AIHA ELLAP Accreditation No.: 10985

Reviewed by: ____________________
Mike Chapman

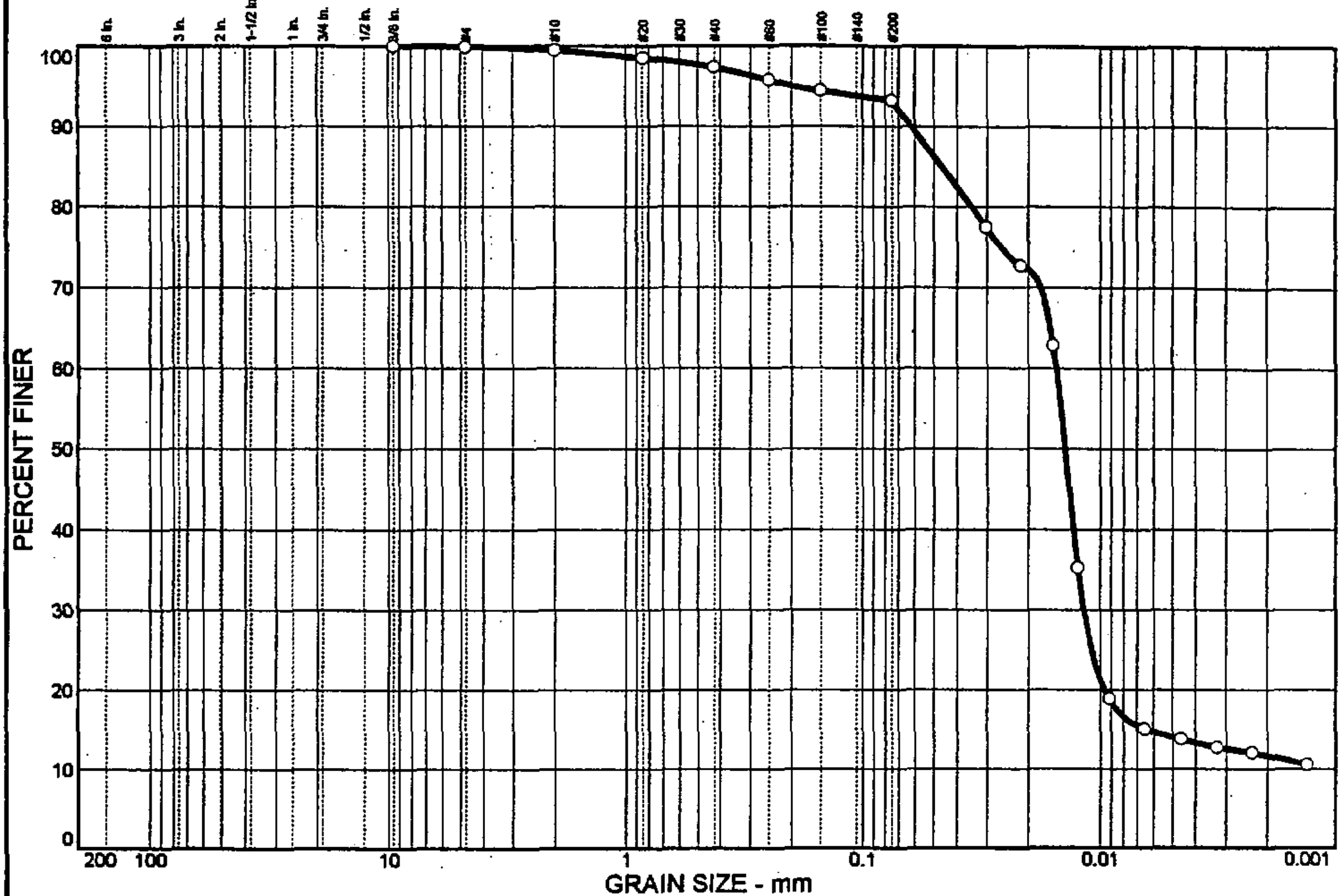
Technical Approval: ____________________
Laboratory Director, Jaime Steedman-Lyde

10771 Noel St., Los Alamitos, CA 90720 714/220-3922 FAX 714/220-2081 e-mail hsa@earthlink.net

APPENDIX C
RESULTS OF GEOTECHNICAL ANALYSES

C-1
GRAIN SIZE

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
o	0.0	0.0	0.1	0.4	2.1	4.1	79.3	14.0

X	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	-		0.0463	0.0153	0.0141	0.0118	0.0064			

MATERIAL DESCRIPTION	USCS	NAT. MOIST.
o Slightly sandy, clayey SILT	ML	176%

Remarks:
o

Project: Propat Pilot Study

Client: HNS

o **Source:** **Sample No.:** S-0503-P-1

HARTCROWSER

J-4924-18 6/22/2000

Figure No.

GRAIN SIZE DISTRIBUTION TEST DATA

Client: HNS
P--ject: Propat Pilot Study
P. ject Number: J-4924-18

Sample Data

Source:
Sample No.: S-0503-P-1
Elev. or Depth: Sample Length (in./cm.):
Location:
Description: Slightly sandy, clayey SILT
Liquid Limit: Plasticity Index:
Natural Moisture: 176% USCS Classification: ML
Testing Remarks:

Mechanical Analysis Data

		Initial
Dry sample and tare	=	81.10
Tare	=	0.00
Dry sample weight	=	81.10

Tare for cumulative weight retained= .00

Sieve	Cumul. Wt. retained	Percent finer
.375 inch	0.00	100.0
# 4	0.07	99.9
" 10	0.43	99.5
" 20	1.21	98.5
# 40	2.14	97.4
# 60	3.37	95.8
# 100	4.48	94.5
# 200	5.46	93.3

Hydrometer Analysis Data

Separation sieve is #200
Percent -#200 based upon complete sample= 93.3
Weight of hydrometer sample: 37.08
Calculated biased weight= 39.74
Table of composite correction values:

Temp, deg C:	20.7	20.8
Comp. corr:	-7.0	-7.0

Meniscus correction only= 1.0
Specific gravity of solids= 2.65
Specific gravity correction factor= 1.000
Hydrometer type: 152H
Effective depth L= 16.294964 - 0.164 x Rm

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
2.00	20.7	37.8	30.8	0.0135	38.8	9.9	0.0301	77.5
4.00	20.7	35.9	28.9	0.0135	36.9	10.2	0.0216	72.7
8.00	20.7	32.0	25.0	0.0135	33.0	10.9	0.0158	62.9
15.00	20.7	21.0	14.0	0.0135	22.0	12.7	0.0124	35.2
30.00	20.7	14.5	7.5	0.0135	15.5	13.8	0.0092	18.9

Elapsed time, min	Temp, deg C	Actual reading	Corrected reading	K	Rm	Eff. depth	Diameter mm	Percent finer
60.50	20.7	13.0	6.0	0.0135	14.0	14.0	0.0065	15.1
120.00	20.7	12.5	5.5	0.0135	13.5	14.1	0.0046	13.8
240.00	20.7	12.1	5.1	0.0135	13.1	14.1	0.0033	12.8
480.00	20.7	11.8	4.8	0.0135	12.8	14.2	0.0023	12.1
1440.00	20.7	11.2	4.2	0.0135	12.2	14.3	0.0013	10.6

Fractional Components

Gravel/Sand based on #4
Sand/Fines based on #200
% + 3" = % GRAVEL = 0.1 (% coarse = % fine = 0.1)
% SAND = 6.6 (% coarse = 0.4 % medium = 2.1 % fine = 4.1)
% SILT = 79.3 % CLAY = 14.0

D_{85}= 0.05 D_{60}= 0.02 D_{50}= 0.01
D_{30}= 0.01 D_{15}= 0.01

C-2
MODIFIED PROCTOR RESULTS

VALLEY
FORGE
LABORATORIES, INC.

Engineering Consultants Since 1967

Geotechnical Engineering
Construction Quality Control
Laboratory Testing
NDT and Related Services
Research and Special Studies
Environmental Engineering
Transportation and Traffic Engineering

SOIL LABORATORY TEST REPORT 5-3 ADDENDUM

Project No. 00135
June 9, 2000

Attention: Ms. Iliana Alvarado
Hart Crowser, Inc.
75 Montgomery Street, Floor 5
Jersey City, NJ 07302

Re: Soil Laboratory Testing
PROPAT Pilot Program

Samples Received: Bulk samples and 4 jar samples containing mix 30-16-16 and mix 30-20-20.

Testing Completed: (Level C P.P.E.)

Test	ASTM Standard	No. of Tests
Modified Proctor	D1557	10
Natural Water Content	D2216	14

Results:

The results of the modified proctors are graphically depicted on the attached moisture density curves. The tabulated summaries of the testing are shown on Table 1 and Table 2. If you have any questions about this test report, please call.

Sincerely,

Jeffrey W. Rosengarten

Jeffrey W. Rosengarten
Geotechnical Engineer

For: Bashar S. Qubain, Ph.D., P.E.
Director of Geotechnical Engineering

JWR:lcw
Enclosures

Fax (610) 688-8143 • 6 Berkeley Road, Devon, PA 19333-1397 • (610) 688-8517
www.valleyforgelabs.com • engineers@valleyforgelabs.com

Modified Proctor and Natural Water Content Summary
Table 1.

Mix 30-16-16

No. of Days After Collection	Maximum Dry Density (pcf)	Optimum Moisture (%)	Natural Water Content (%)
1 Day	81.3	29.6	43.3
4 Days	80.4	28.0	45.2
7 Days	78.4	31.0	54.9
22 Days	73.1	35.0	44.7
28 Days	79.6	28.4	31.5
Average	78.6	30.4	43.9

Mix 30-20-20

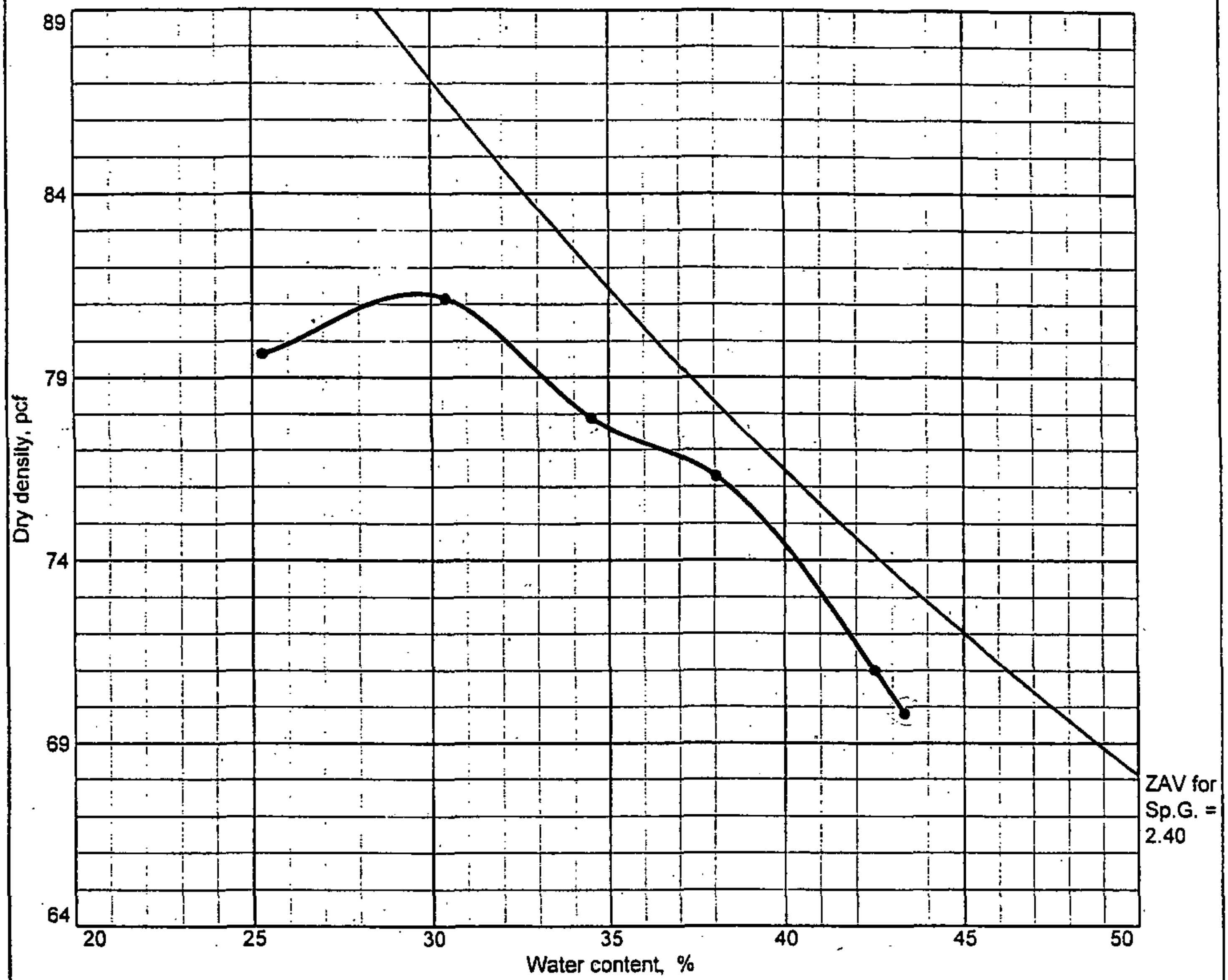
No. of Days After Collection	Maximy Dry Density (pcf)	Optimum Moisture (%)	Natural Water Content (%)
1 Day	77.8	33.8	48.0
4 Days	78.7	27.6	50.2
7 Days	74.7	34.1	65.9
22 Days	77.2	29.4	43.6
28 Days	73.8	36.3	51.9
Average	76.4	32.2	51.9

Natural Water Content (Jar Samples)

Table 2.

Sample ID No.	Mix Type	Natural Water Content (%)
P-0503 P1	30-16-16	48.4
P-0503 P2	30-16-16	49.8
P-0504 P1	30-20-20	50.6
P-0504 P2	30-20-20	50.0

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Procedure B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
			43.3	2.40				

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 81.3 pcf Optimum moisture = 29.6 %	Mixed 5/3/00, Collected 5/4/00 Tested 5/5/00

Project No. 00135 **Client:** Hart Crowser

Project: Hart Crowser

• **Source:** **Sample No.:** 1 Day Test, Mix 30-16-16

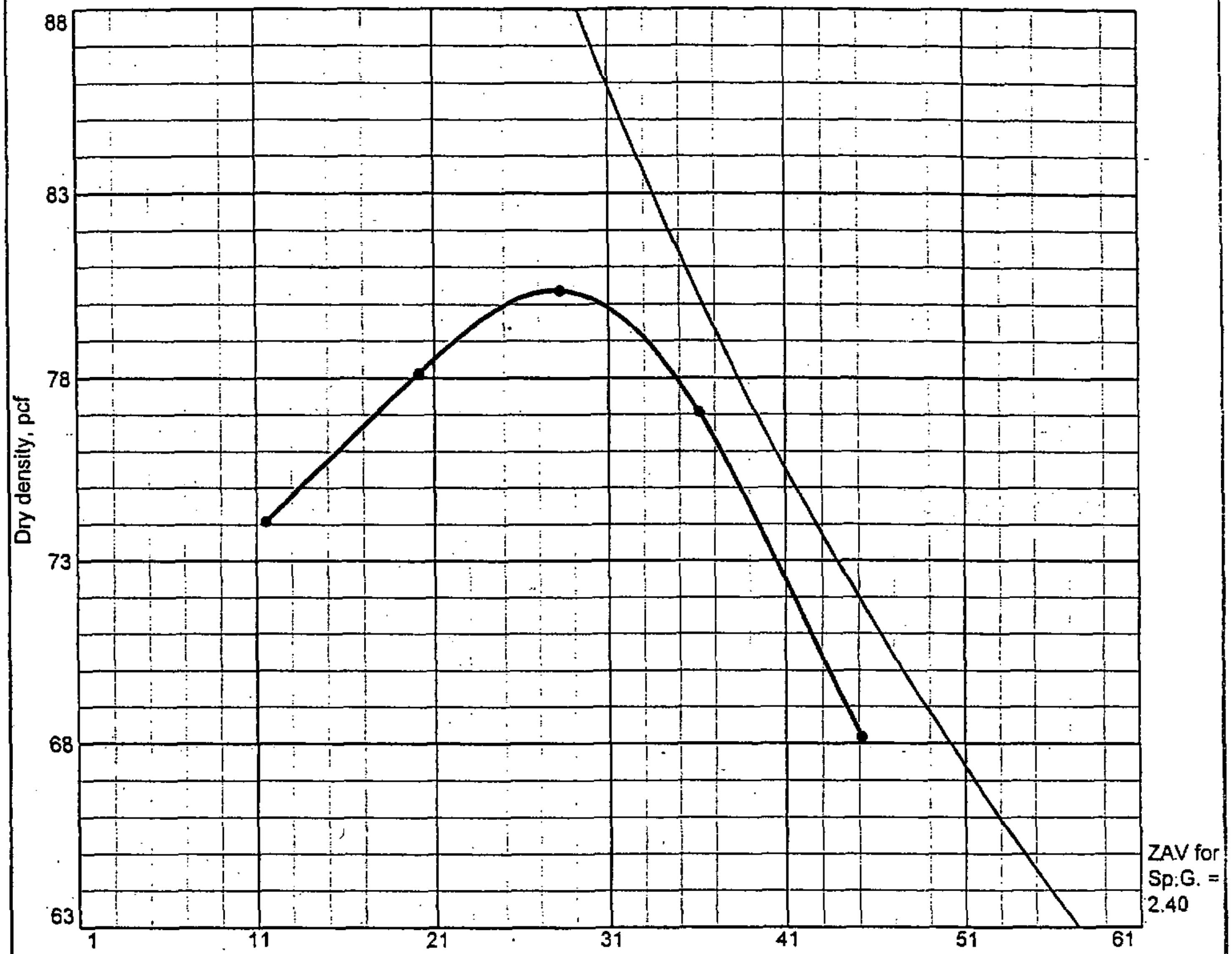
COMPACTION TEST REPORT

VALLEY FORGE LABORATORIES, INC.

Remarks:

Plate

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Procedure B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
			45.2	2.40				

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 80.4 pcf Optimum moisture = 28.0 %	Mixed 5/3/00, Collected 5/4/00 Tested 5/8/00, 5/9/00

Project No. 00135 **Client:** Hart Crowser

Project: Hart Crowser

• **Source:** **Sample No.:** 4 Day Test, Mix 30-16-16

COMPACTION TEST REPORT

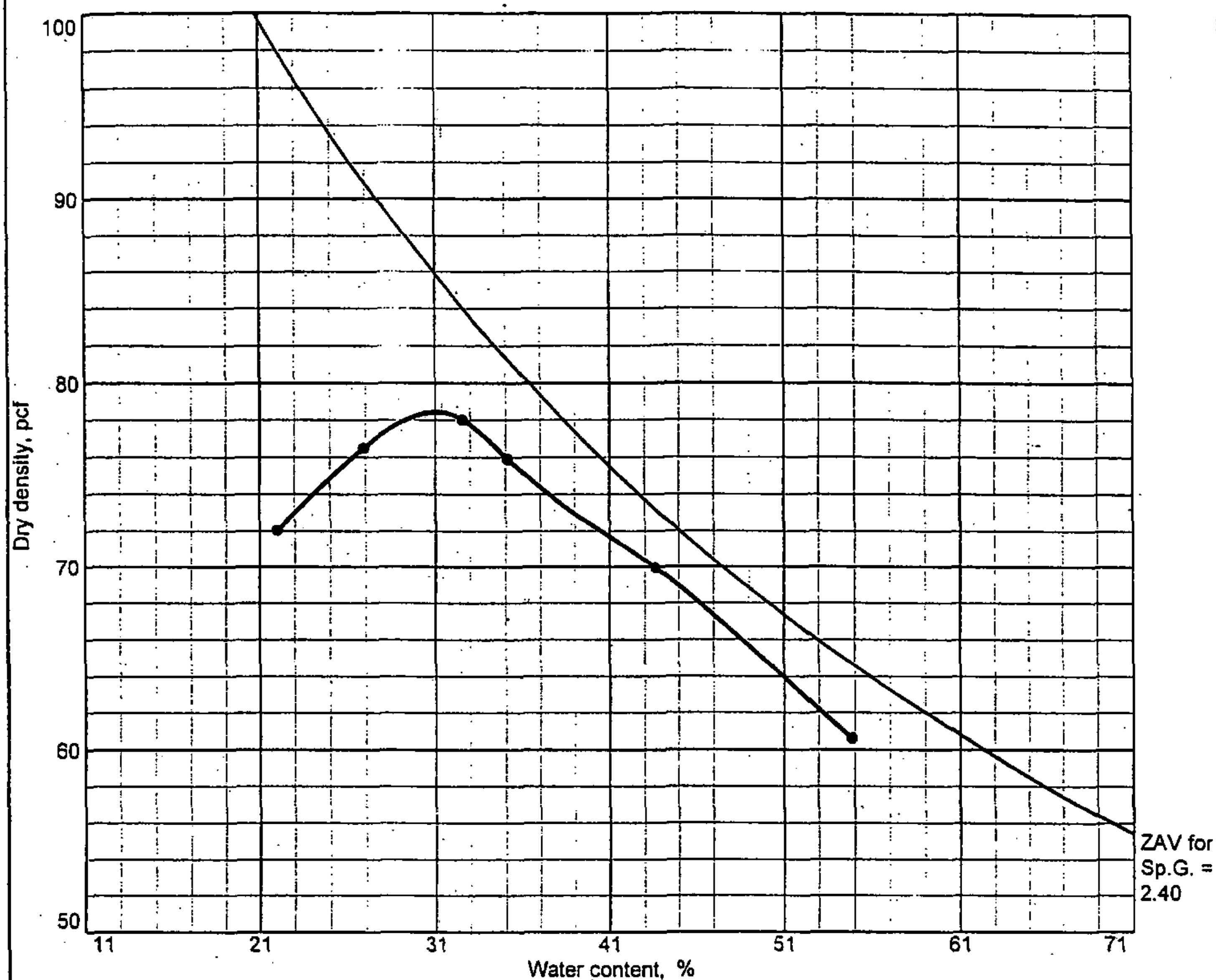
VALLEY FORGE LABORATORIES, INC.

Remarks:

Dry Point perform on 5/9/00.

Plate

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Procedure B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
			54.9	2.40				

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 78.4 pcf Optimum moisture = 31.0 %	Mixed 5/2/00, Collected 5/3/00 Tested 5/10/00, 5/11/00

Project No. 00135 **Client:** Hart Crowser

Project: Hart Crowser

• **Source:** **Sample No.:** 7 Day Test, Mix 30-16-16

COMPACTION TEST REPORT

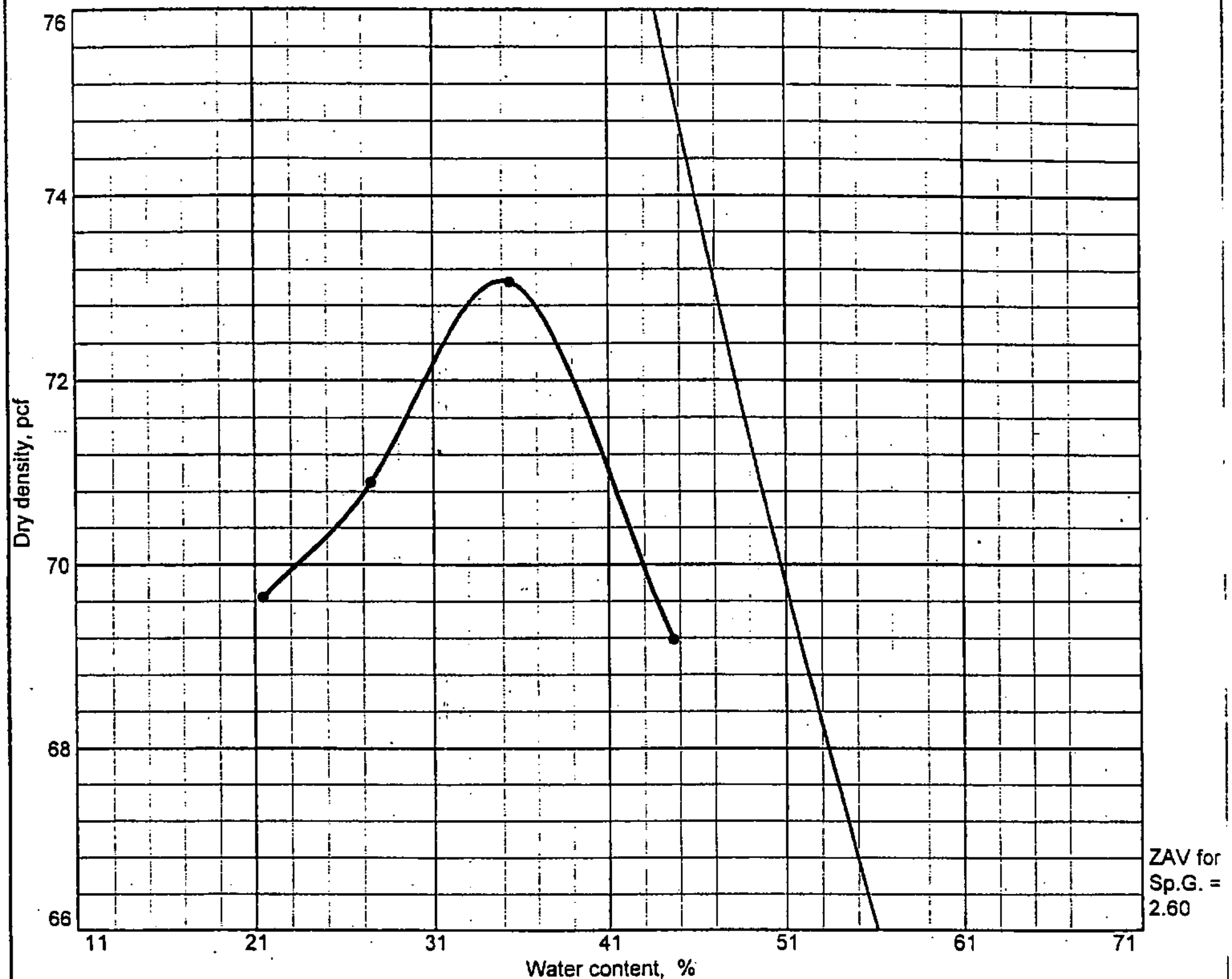
VALLEY FORGE LABORATORIES, INC.

Remarks:

2 Dry Points performed on 5/11/00

Plate

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
			44.7	2.60				

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 73.1 pcf Optimum moisture = 35.0 %	Mixed 5/3/00, Collected 5/4/00 Tested 5/26/00

Project No. 00135 **Client:** Hart Crowser

Project: Hart Crowser

Source: **Sample No.:** 22 Day Test, Mix 30-16-16

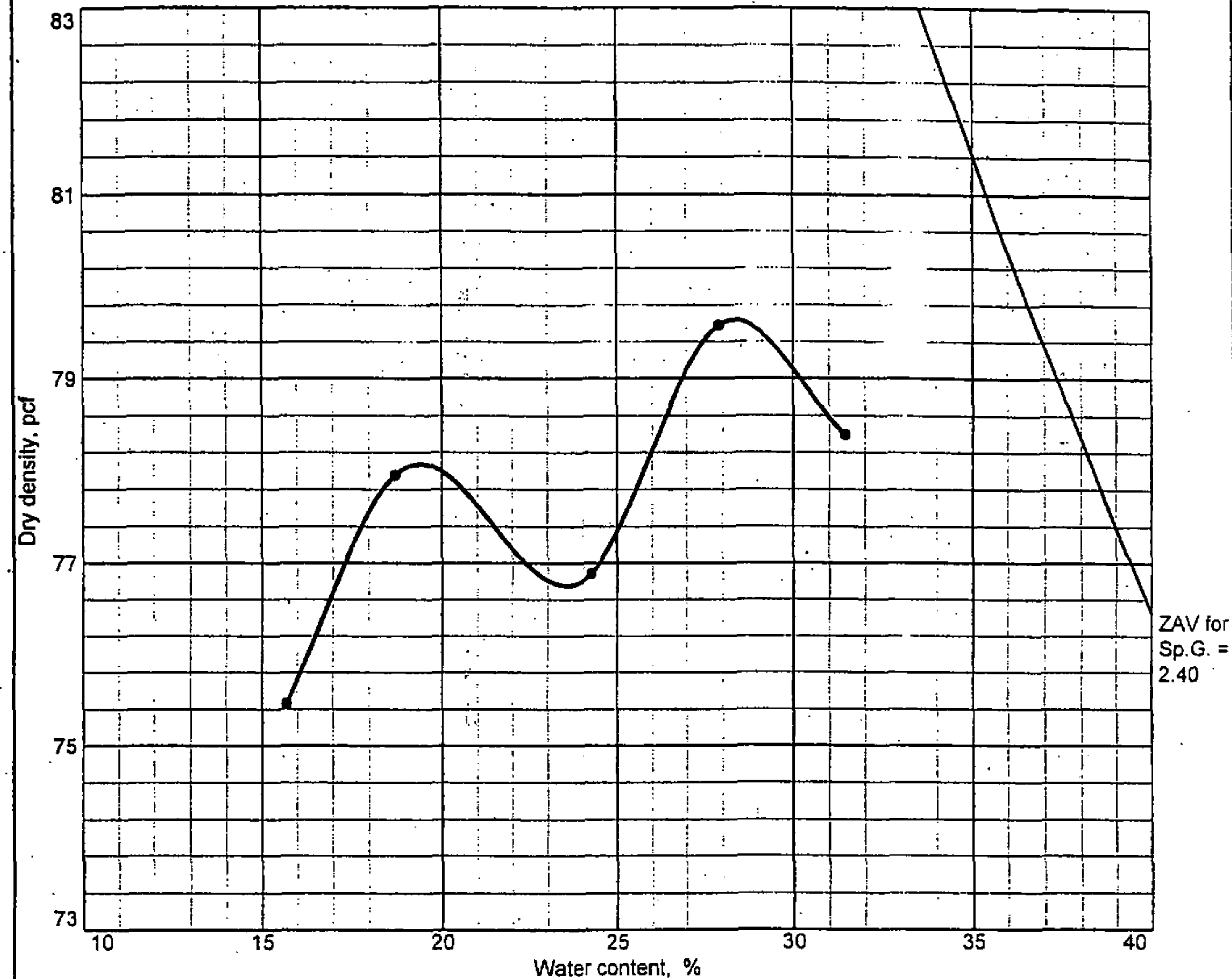
COMPACTION TEST REPORT

VALLEY FORGE LABORATORIES, INC.

Remarks:

Plate

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Procedure B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
			31.5	2.40				

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 79.6 pcf Optimum moisture = 28.4 %	Mixed 5/3/00, Collected 5/4/00 Tested 6/1/00, 6/2/00

Project No. 00135 **Client:** Hart Crowser

Project: Hart Crowser

• **Source:** **Sample No.:** 28 Day Test, Mix 30-16-16

Remarks:

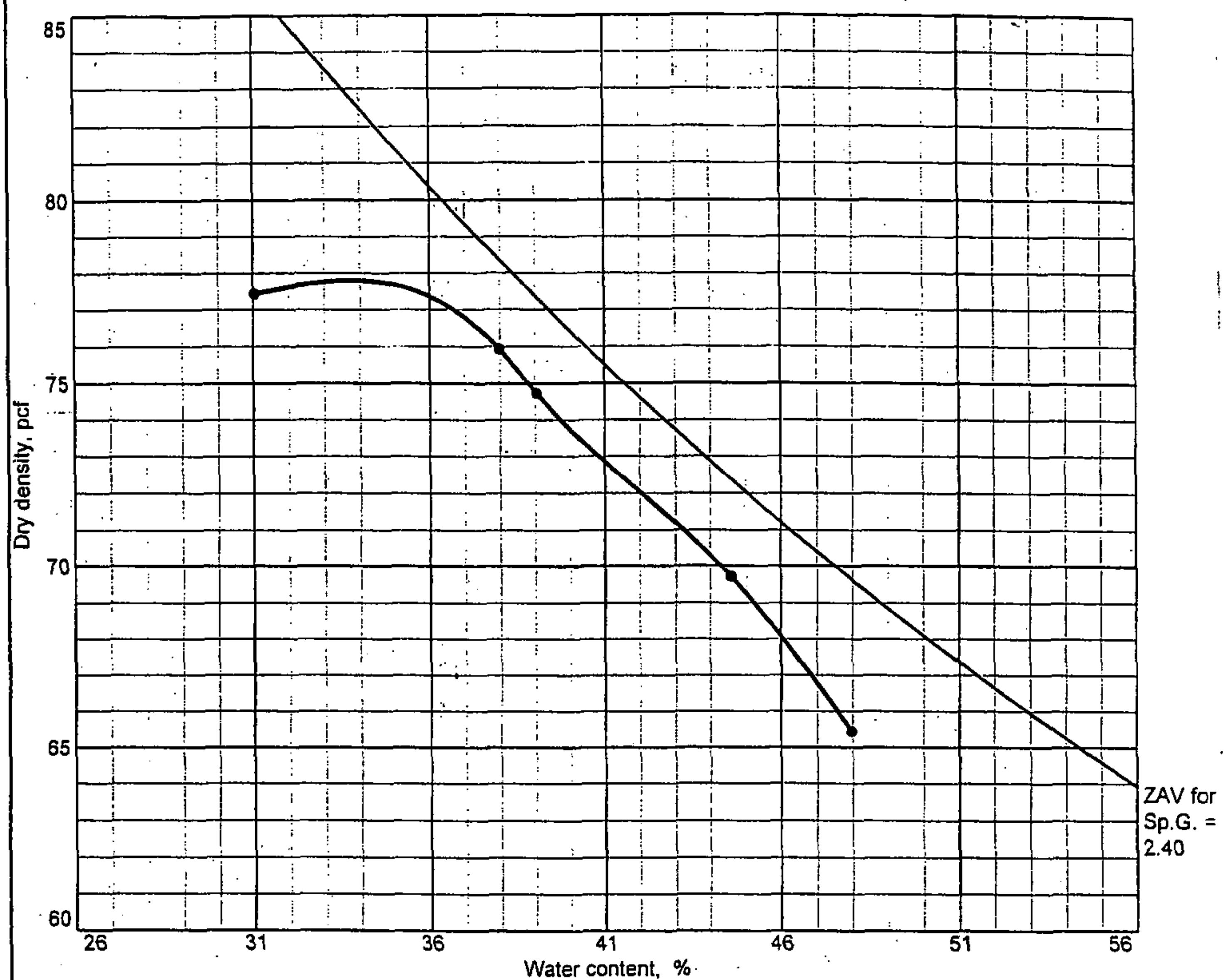
Dry point performed on 6/2/00.

COMPACTION TEST REPORT

VALLEY FORGE LABORATORIES, INC.

Plate

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Procedure B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
			48.0	2.40				

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 77.8 pcf Optimum moisture = 33.8 %	Mixed 5/3/00, Collected 5/4/00 Tested 5/5/00

Project No. 00135 **Client:** Hart Crowser

Project: Hart Crowser

• **Source:** **Sample No.:** 1 Day Test, Mix 30-20-20

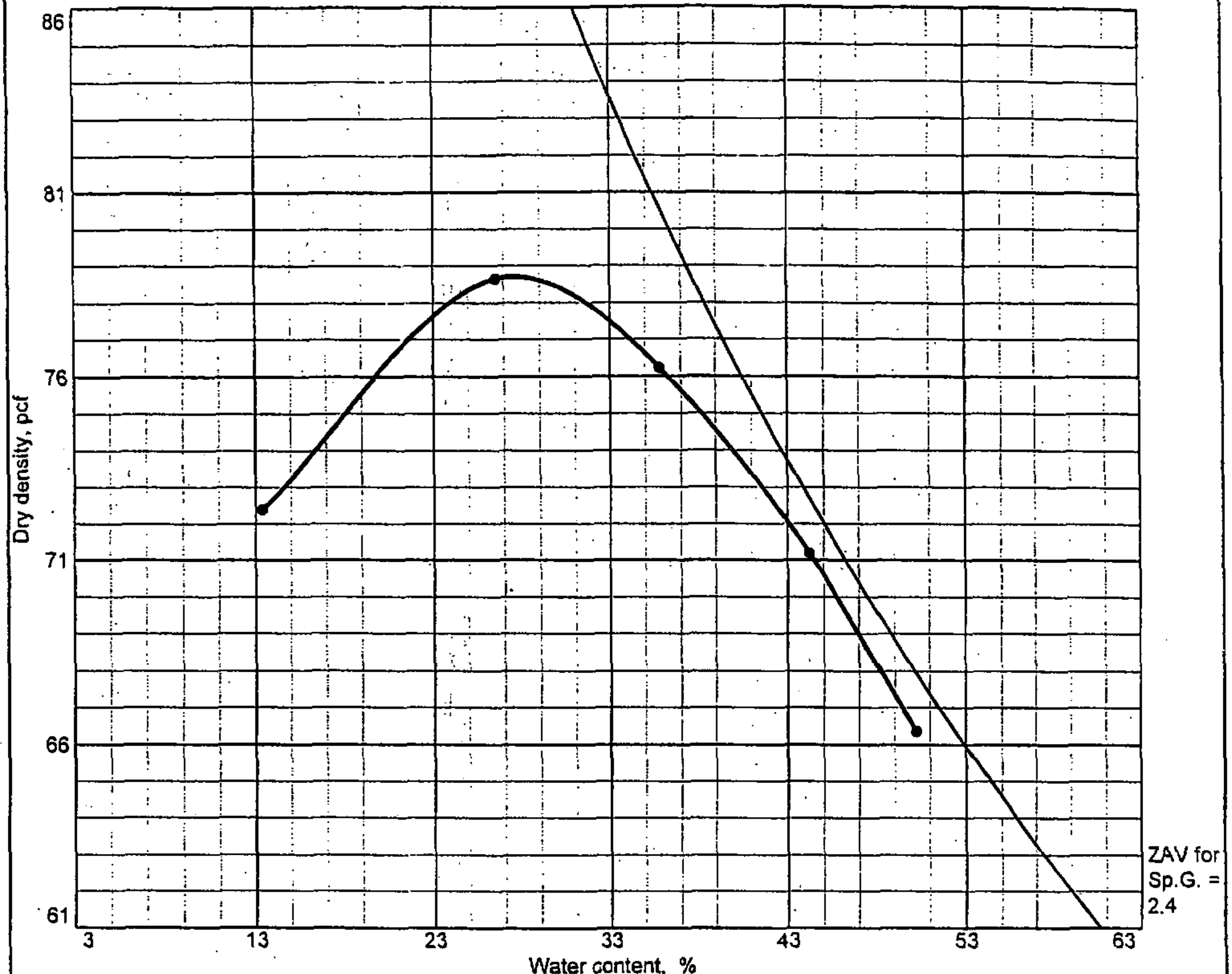
Remarks:

COMPACTION TEST REPORT

VALLEY FORGE LABORATORIES, INC.

Plate

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Procedure B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
			50.2	2.4				

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 78.7 pcf Optimum moisture = 27.6 %	Mixed 5/3/00, Collected 5/4/00 Tested 5/8/00, 5/9/00

Project No. 00135 **Client:** Hart Crowser
Project: Hart Crowser

• **Source:** **Sample No.:** 4 Day Test, Mix 30-20-20

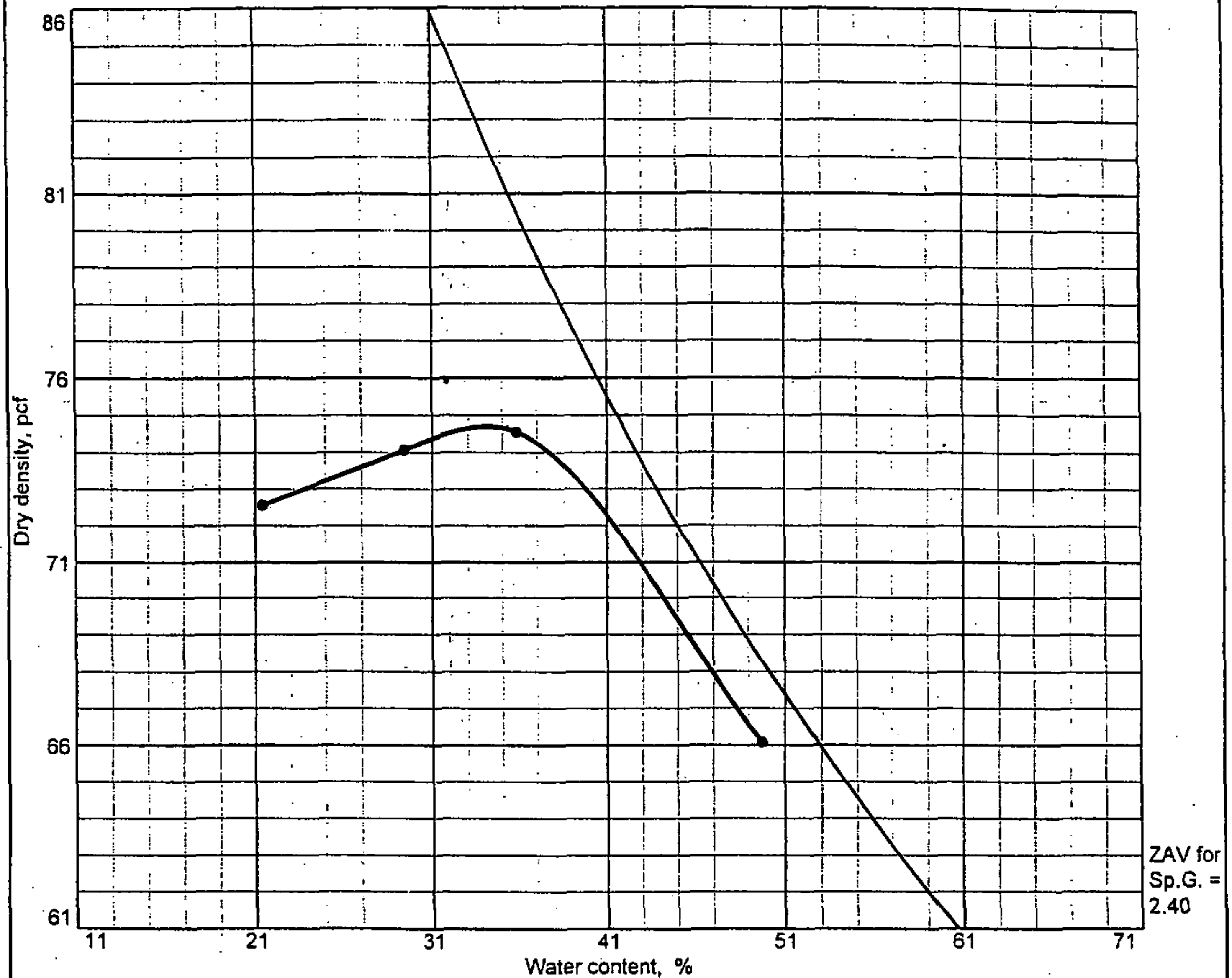
COMPACTION TEST REPORT

VALLEY FORGE LABORATORIES, INC.

Remarks:
Dry point performed on 5/9/00.

Plate

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Procedure B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
			65.9	2.40				

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 74.7 pcf Optimum moisture = 34.1 %	Mixed 5/3/00, Collected 5/4/00 Tested 5/11/00, 5/12/00

Project No. 00135 **Client:** Hart Crowser

Project: Hart Crowser

• **Source:** **Sample No.:** 7 Day Test, Mix 30-20-20

COMPACTION TEST REPORT

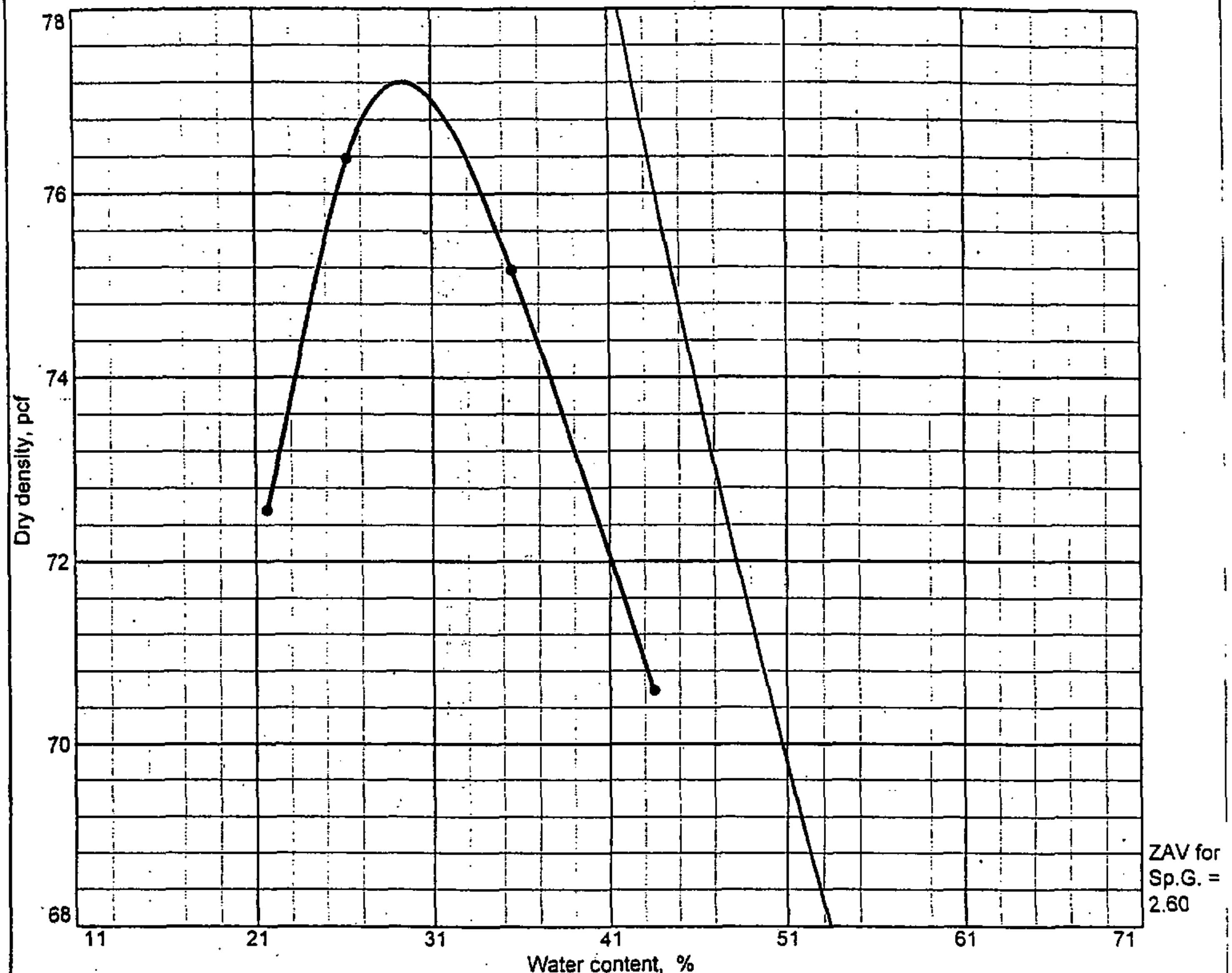
VALLEY FORGE LABORATORIES, INC.

Remarks:

Dry point performed on 5/12/00

Plate

COMPACTION TEST REPORT



Test specification: ASTM D 698-91 Procedure B Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
			43.6	2.60				

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 77.2 pcf Optimum moisture = 29.4 %	Mixed 5/3/00, Collected 5/4/00 Tested 5/26/00

Project No. 00135 **Client:** Hart Crowser

Project: Hart Crowser

Source: **Sample No.:** 22 Day Test, Mix 30-20-20

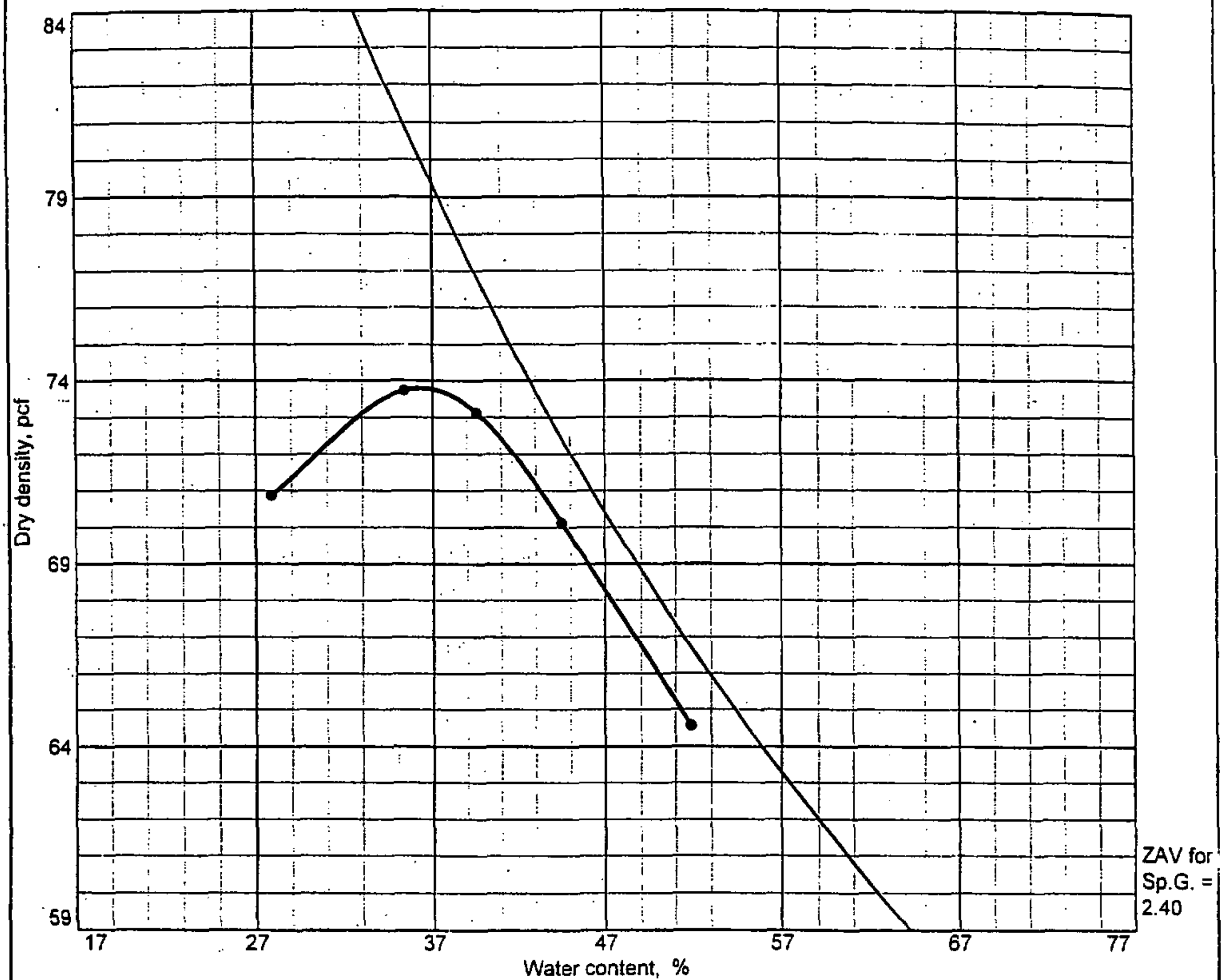
Remarks:

COMPACTION TEST REPORT

VALLEY FORGE LABORATORIES, INC.

Plate

COMPACTION TEST REPORT



Test specification: ASTM D 1557-91 Procedure B Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in.	% < No.200
	USCS	AASHTO						
			51.9	2.40				

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 73.8 pcf Optimum moisture = 36.3 %	Mixed 5/3/00, Collected 5/4/00 Tested 6/1/00, 6/2/00

Project No. 00135 **Client:** Hart Crowser

Project: Hart Crowser

• **Source:** **Sample No.:** 28 Day Test, Mix 30-20-20

Remarks:

Dry point performed on 6/2/00.

COMPACTION TEST REPORT

VALLEY FORGE LABORATORIES, INC.

Plate

VALLEY
FORGE
LABORATORIES, INC.

Engineering Consultants Since 1967

SOIL LABORATORY TEST REPORT 5-3

VFL Project No. 00135
June 2, 2000

Attention: Ms. Iliana Alvarado
Hart Crowser, Inc.
75 Montgomery Street, Floor 5
Jersey City, NJ 07302

Re: Resilient Modulus Testing
PROPAT Pilot Program

Sample Descriptions:

Composite samples for resilient modulus testing were proportioned and mixed in the field and delivered to VFL. The samples were designated as mix 30-16-16 or 30-20-20. All samples were broken down over 3/4" sieve. Modified Proctors were then performed on each mix at 1 day, 4 days, 7 days and 21 days

Testing:

Specimens were prepared as received using a split mold of 2.8-in. diameter, 5.6 in. height. After 3-4 hours of drying under the sun, the specimens were placed in 6 lifts and compacted to get maximum moist density. After remolding, specimens were extracted from the mold and placed in an oven for curing at 120°F.

At 7 days of curing, specimens were removed from the oven and subjected to resilient modulus testing in accordance with AASHTO TP-46-94, which includes a preconditioning sequence (500 cycles) and 15 loading sequence (100 cycles per sequence) with a combination of 3 levels of confining pressures and 15 levels of deviator stresses.

Results:

The testing results are summarized in Table 1. Detailed summary reports for each specimen are included in Attachment A with plots of resilient modulus vs. deviator stresses and selected load and deformation vs. time/cycles.

Fax (610) 688-8143 • 6 Berkeley Road, Devon, PA 19333-1397 • (610) 688-8517

www.valleyforgelabs.com • engineers@valleyforgelabs.com

As the results show, resilient modulus (M_R) values of the tested specimens are not sensitive to confining pressures and deviator stresses, and thus are well represented by the mean. However, the lowest deviator stress (1.8 psi) is an exception. At this very low stress level, small deformation responses approach the precision of the sensing instruments. Therefore, M_R values at 1.8 psi deviator stress are ignored in calculating the mean values and standard deviations.

It should be pointed out that PROPAT components often caused cracking on specimens when remolded due to lack of adhesion. Conditions of specimens at test are noted in Table 1. Most cracks are in the cross-sectional direction, which seem to result in lower M_R values.

If you have any questions regarding this report, please call me.

Sincerely,

Bashar S. Qubain, Ph.D., P.E.
Director of Geotechnical Engineering

BSQ:lcw

C-3
RESILIENT MODULUS TEST RESULTS

Table 1. Laboratory Testing Results of Resilient Modulus (M_R) at 7 Days

Sample No.	Moisture and Density as Compacted			Moisture and Density At Test			Mean M_R Value (psi)	Standard Deviation (psi)	Remarks
	Moisture (%)	Moist Density (pcf)	Dry Density (pcf)	Moisture (%)	Moist Density (pcf)	Dry Density (pcf)			
30-16-16 A	50.8	99.8	66.2	45.1	96.3	66.4	6,400	400	Specimen had (2) hairline cracks.
30-16-16 B	27.8	98.2	76.9	26.5	96.2	76.0	2,400	200	Specimen had (3) minor (cross-sectional) cracks.
30-16-16 C	28.3	100.0	78.0	26.1	97.9	77.7	6,200	480	Specimen had (1) minor crack.
30-20-20 A	28.1	87.1	68.0	19.3	84.8	71.1	1,600	150	Specimen had (2) major (cross-sectional) cracks (separated).
30-20-20 B	31.5	94.6	71.9	18.2	90.4	76.5	5,900	380	No cracks.
30-20-20 C	31.6	94.2	71.6	15.8	91.3	78.8	3,800	390	Specimen had (1) minor crack.

ATTACHMENT A

Detailed Laboratory Testing Reports

Resilient Modulus Test for material type 2

Data File 301616A7.DAT

Date: 05/12/00

Soil Sample 30-16-16 A @ 7
Location
Sample No.
Specific Gravity 0.00

SOIL SPECIMEN MEASUREMENTS:

Diameter	Top	0.00
	Middle	2.82
	Bottom	0.00
	Average	2.82

Membrane Thickness 0.0000
Net Diameter (inch) 2.82
Ht Specimen+Cap+Base 5.56
Seating Load: 10% σd
Ht Cap+Base 0.00
Initial Length,Lo(inch) 5.56
Inside Diameter of Mold 0.00

SOIL SPECIMEN WEIGHT:
Initial Wt. of Container
+Wet Soil-gms 907.7
Final Wt of Container
+Wet Siol-gms 0.0
Weight Wet Soil Used 907.7

SOIL SPECIMEN VOLUME:
Initial Area Ao
(inch²) 6.23
Volume Ao·Lo
(inch3) 34.65
Wet Density (pcf) 99.80

Compaction Water Content % 50.80
% Stauration 0.00
Dry Density (pcf) 66.18

Compaction Method Remolded

Water Content After
Mr Testing % 45.1

Vertical Spacing Between
LVDT Clamps(inch) 0.00

LOAD ID:
TP46-94 Subgrade soil
Number of cycles for precond. 500
Number of cycles per sequence 100
Load time 0.10 Cycle time 1.00 sec
Seating Load (lbs) 10.0

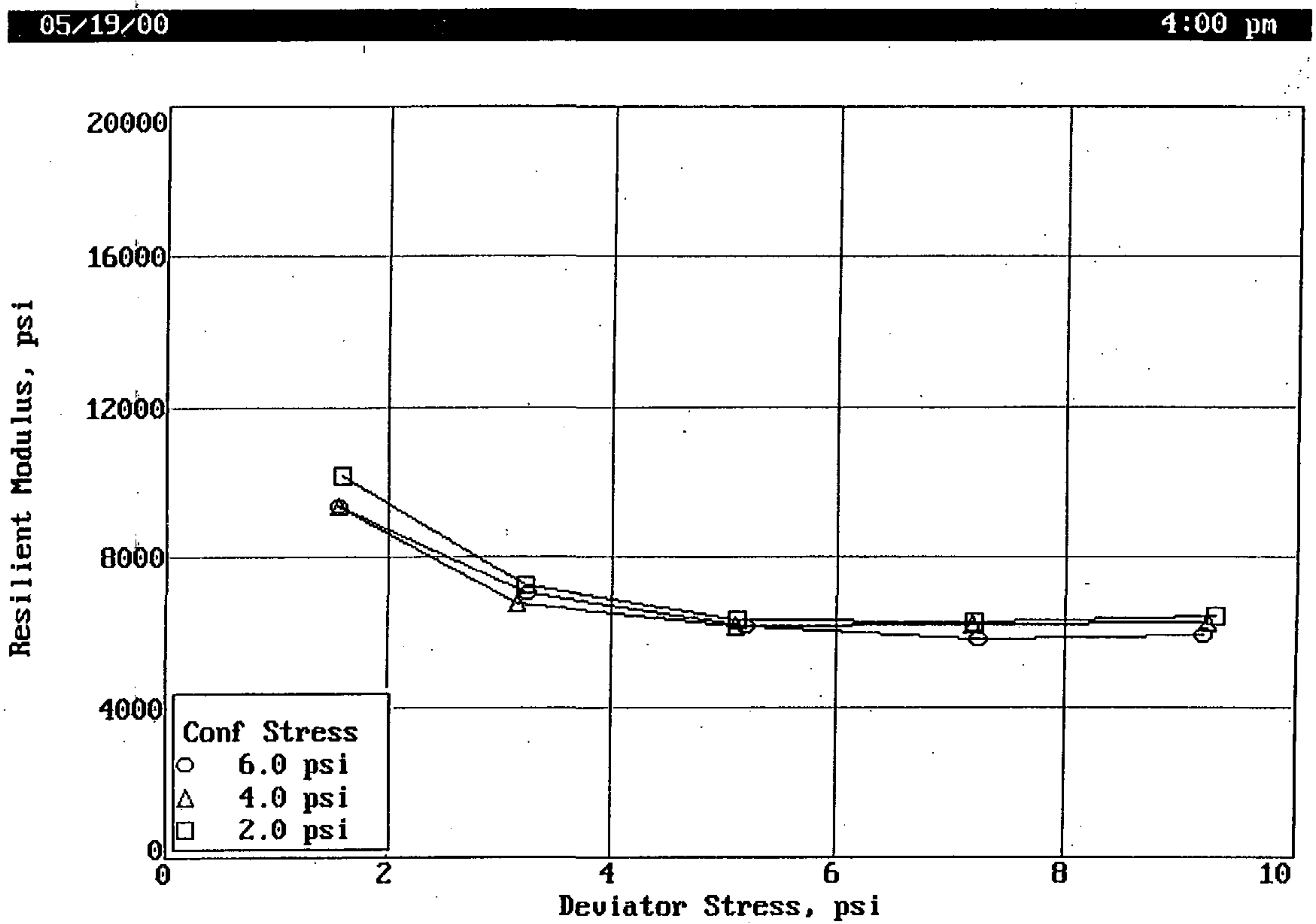
Waveform Type
Comments:
Cured for 7 days

A Chamber Press. σ3 psi	B Nominal σd psi	C Mean Deviator Load lbs	D Standard Deviation of Load lbs	E Applied Deviator Stress psi	F Mean Recov Df LVDT #1 inch	G Mean Recov Df LVDT #2 inch	H Mean Recov. Def. inch	I Std. Dev. of Recov. Def. inch	J Mean of Resilient Strain in/in	K Mean of Mr psi	L Std Dev of Mr psi	M θ (σd+3σ3) psi
6.0	1.8	9.67	0.04	1.552	0.000918	0.000927	0.000922	0.000004	0.000166	9358	47	19.552
6.0	3.6	20.27	0.08	3.252	0.002614	0.002532	0.002573	0.000013	0.000463	7028	17	21.252
6.0	5.4	32.32	0.11	5.185	0.004728	0.004597	0.004662	0.000020	0.000839	6183	8	23.185
6.0	7.2	45.12	0.21	7.239	0.007030	0.006727	0.006879	0.000019	0.001237	5851	10	25.239
6.0	9.0	57.29	0.04	9.191	0.008575	0.008528	0.008552	0.000005	0.001538	5976	4	27.191
4.0	1.8	9.73	0.05	1.560	0.000937	0.000918	0.000926	0.000005	0.000167	9370	27	13.560
4.0	3.6	19.70	0.02	3.161	0.002603	0.002580	0.002591	0.000005	0.000466	6782	13	15.161
4.0	5.4	31.77	0.07	5.098	0.004533	0.004632	0.004583	0.000009	0.000824	6185	3	17.098
4.0	7.2	44.76	0.10	7.182	0.006424	0.006443	0.006434	0.000006	0.001157	6207	8	19.182
4.0	9.0	57.58	0.08	9.239	0.008275	0.008141	0.008208	0.000009	0.001476	6258	5	21.239
2.0	1.8	9.94	0.02	1.595	0.000845	0.000900	0.000872	0.000004	0.000157	10165	26	7.595
2.0	3.6	20.08	0.03	3.222	0.002442	0.002510	0.002476	0.000006	0.000445	7236	15	9.222
2.0	5.4	31.88	0.06	5.116	0.004545	0.004475	0.004510	0.000009	0.000811	6307	9	11.116
2.0	7.2	44.86	0.03	7.198	0.006448	0.006333	0.006390	0.000003	0.001149	6263	6	13.198
2.0	9.0	57.96	0.12	9.300	0.008115	0.007936	0.008025	0.000004	0.001443	6443	10	15.300

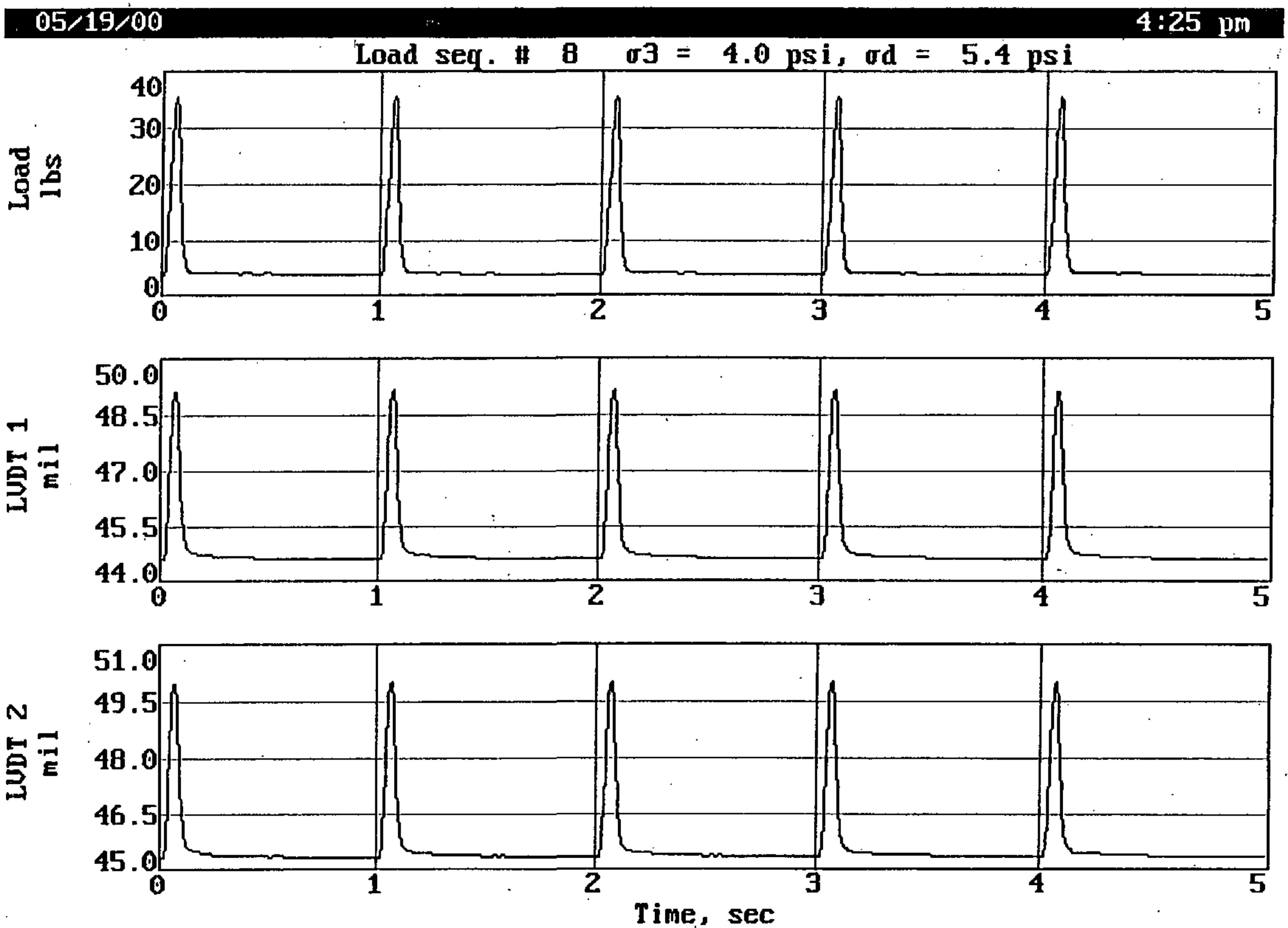
Data File 301616A7.DAT

Permanent Deformation Data:

Seq. #	Chamber Press. σ3 psi	Nominal σd psi	Actual Contact Stress psi	Permanent Def. inch
1	6.0	1.8	0.2	0.000021
2	6.0	3.6	0.4	0.000022
3	6.0	5.4	0.6	0.000028
4	6.0	7.2	0.8	0.000036
5	6.0	9.0	1.0	0.000046
6	4.0	1.8	0.2	0.000044
7	4.0	3.6	0.4	0.000044
8	4.0	5.4	0.6	0.000045
9	4.0	7.2	0.8	0.000046
10	4.0	9.0	1.0	0.000049
11	2.0	1.8	0.2	0.000047
12	2.0	3.6	0.4	0.000048
13	2.0	5.4	0.6	0.000048
14	2.0	7.2	0.8	0.000049
15	2.0	9.0	1.0	0.000051



Sample No: 30-16-16 A @ 7 Location:



Sample No: 30-16-16 A @ 7 Location:

Resilient Modulus Test for material type 2

Data File 30161687.DAT

Date: 05/17/00

Soil Sample 30-16-16 B @ 7
Location
Sample No.
Specific Gravity 0.00

SOIL SPECIMEN MEASUREMENTS:

Diameter	Top	0.00
	Middle	2.81
	Bottom	0.00
	Average	2.81

Membrane Thickness 0.0000
Net Diameter (inch) 2.81
Ht Specimen+Cap+Base 5.69
Seating Load: 10% σd
Ht Cap+Base 0.00
Initial Length,Lo(inch) 5.69
Inside Diameter of Mold 0.00

SOIL SPECIMEN WEIGHT:
Initial Wt. of Container +Wet Soil-gms 909.7
Final Wt of Container +Wet Siol-gms 0.0
Weight Wet Soil Used 909.7

SOIL SPECIMEN VOLUME:
Initial Area Ao (inch²) 6.20
Volume Ao·Lo (inch3) 35.29
Wet Density (pcf) 98.22

Compaction Water Content % 27.80
% Stauration 0.00
Dry Density (pcf) 76.86

Compaction Method Remolded

Water Content After Mr Testing % 26.5

Vertical Spacing Between LVDT Clamps(inch) 0.00

LOAD ID:
TP46-94 Subgrade soil
Number of cycles for precond. 500
Number of cycles per sequence 100
Load time 0.10 Cycle time 1.00 sec
Seating Load (lbs) 10.0

Waveform Type
Comments:
Cured for 7 days

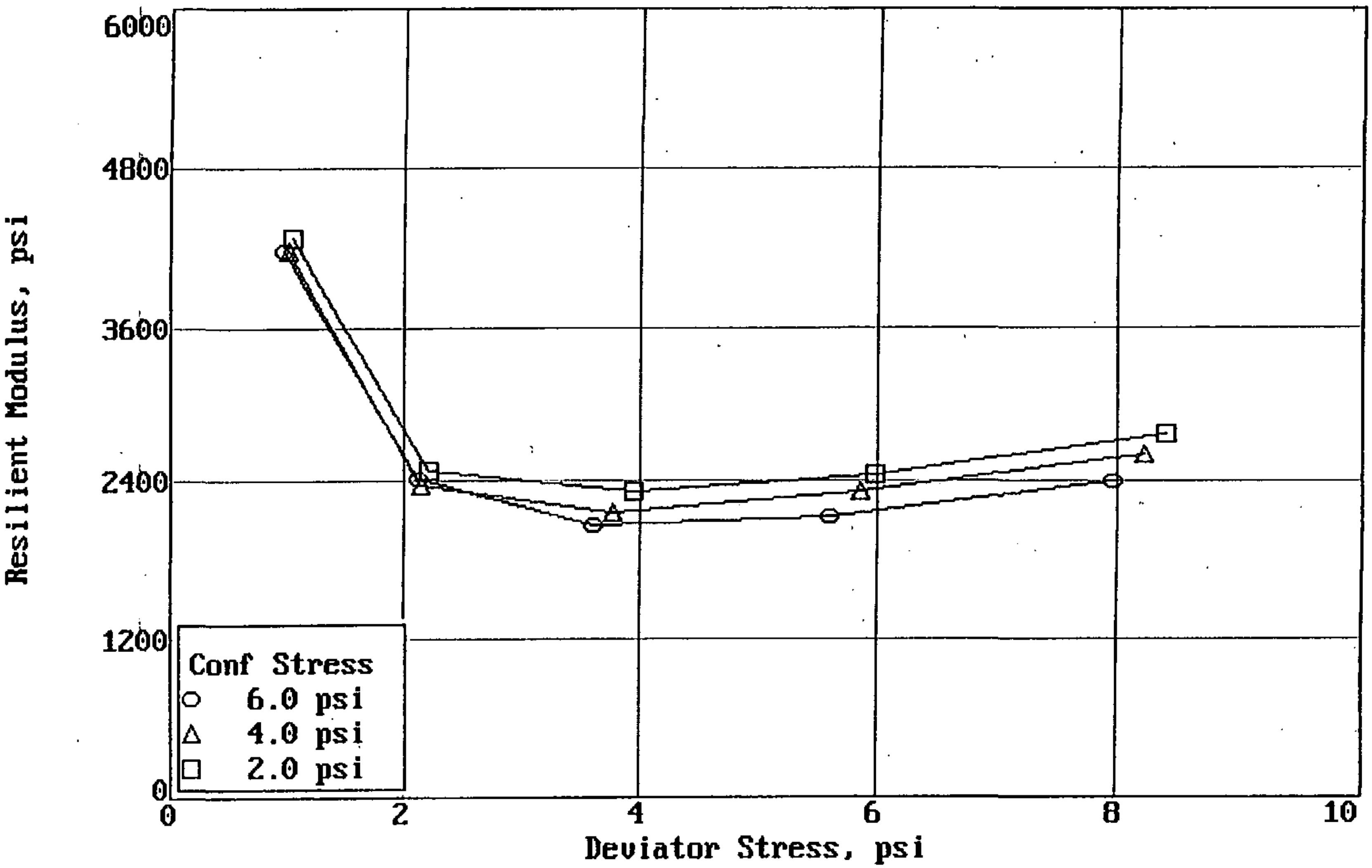
A Chamber Press. $\sigma 3$ psi	B Nominal σd psi	C Mean Deviator Load lbs	D Standard Deviation of Load lbs	E Applied Deviator Stress psi	F Mean Recov Df LVDT #1 inch	G Mean Recov Df LVDT #2 inch	H Mean Recov. Def. inch	I Std. Dev. of Recov. Def. inch	J Mean of Resilient Strain in/in	K Mean of Mr psi	L Std Dev of Mr psi	M θ $(\sigma d+3\sigma 3)$ psi
6.0	1.8	6.12	0.03	0.988	0.001358	0.001329	0.001343	0.000009	0.000236	4183	14	18.988
6.0	3.6	13.19	0.03	2.127	0.005036	0.004987	0.005012	0.000010	0.000881	2414	2	20.127
6.0	5.4	22.36	0.03	3.605	0.010049	0.009770	0.009909	0.000012	0.001742	2070	2	21.605
6.0	7.2	34.71	0.10	5.596	0.015221	0.014806	0.015014	0.000020	0.002639	2121	4	23.596
6.0	9.0	49.35	0.08	7.957	0.018549	0.018984	0.018767	0.000013	0.003298	2413	3	25.957
4.0	1.8	6.36	0.04	1.025	0.001417	0.001375	0.001396	0.000005	0.000245	4178	18	13.025
4.0	3.6	13.35	0.03	2.153	0.005200	0.005135	0.005168	0.000012	0.000908	2370	6	14.153
4.0	5.4	23.41	0.04	3.775	0.009941	0.009990	0.009966	0.000007	0.001751	2156	4	15.775
4.0	7.2	36.26	0.01	5.847	0.014068	0.014606	0.014337	0.000013	0.002520	2320	2	17.847
4.0	9.0	50.91	0.11	8.209	0.017580	0.018131	0.017856	0.000027	0.003138	2616	3	20.209
2.0	1.8	6.56	0.03	1.058	0.001414	0.001405	0.001409	0.000006	0.000248	4273	15	7.058
2.0	3.6	13.75	0.04	2.217	0.005119	0.005031	0.005075	0.000008	0.000892	2486	4	8.217
2.0	5.4	24.44	0.09	3.941	0.009565	0.009759	0.009662	0.000028	0.001698	2321	4	9.941
2.0	7.2	37.04	0.06	5.973	0.013631	0.014143	0.013886	0.000011	0.002440	2447	2	11.973
2.0	9.0	52.08	0.07	8.398	0.016848	0.017520	0.017181	0.000012	0.003020	2781	2	14.398

Data File 301616B7.DAT

Permanent Deformation Data:

Seq. #	Chamber Press. σ3 psi	Nominal σd psi	Actual Contact Stress psi	Permanent Def. inch
1	6.0	1.8	0.2	0.000013
2	6.0	3.6	0.4	0.000015
3	6.0	5.4	0.6	0.000022
4	6.0	7.2	0.8	0.000030
5	6.0	9.0	1.0	0.000037
6	4.0	1.8	0.2	0.000031
7	4.0	3.6	0.4	0.000033
8	4.0	5.4	0.6	0.000035
9	4.0	7.2	0.8	0.000037
10	4.0	9.0	1.0	0.000039
11	2.0	1.8	0.2	0.000034
12	2.0	3.6	0.4	0.000035
13	2.0	5.4	0.6	0.000037
14	2.0	7.2	0.8	0.000039
15	2.0	9.0	1.0	0.000041

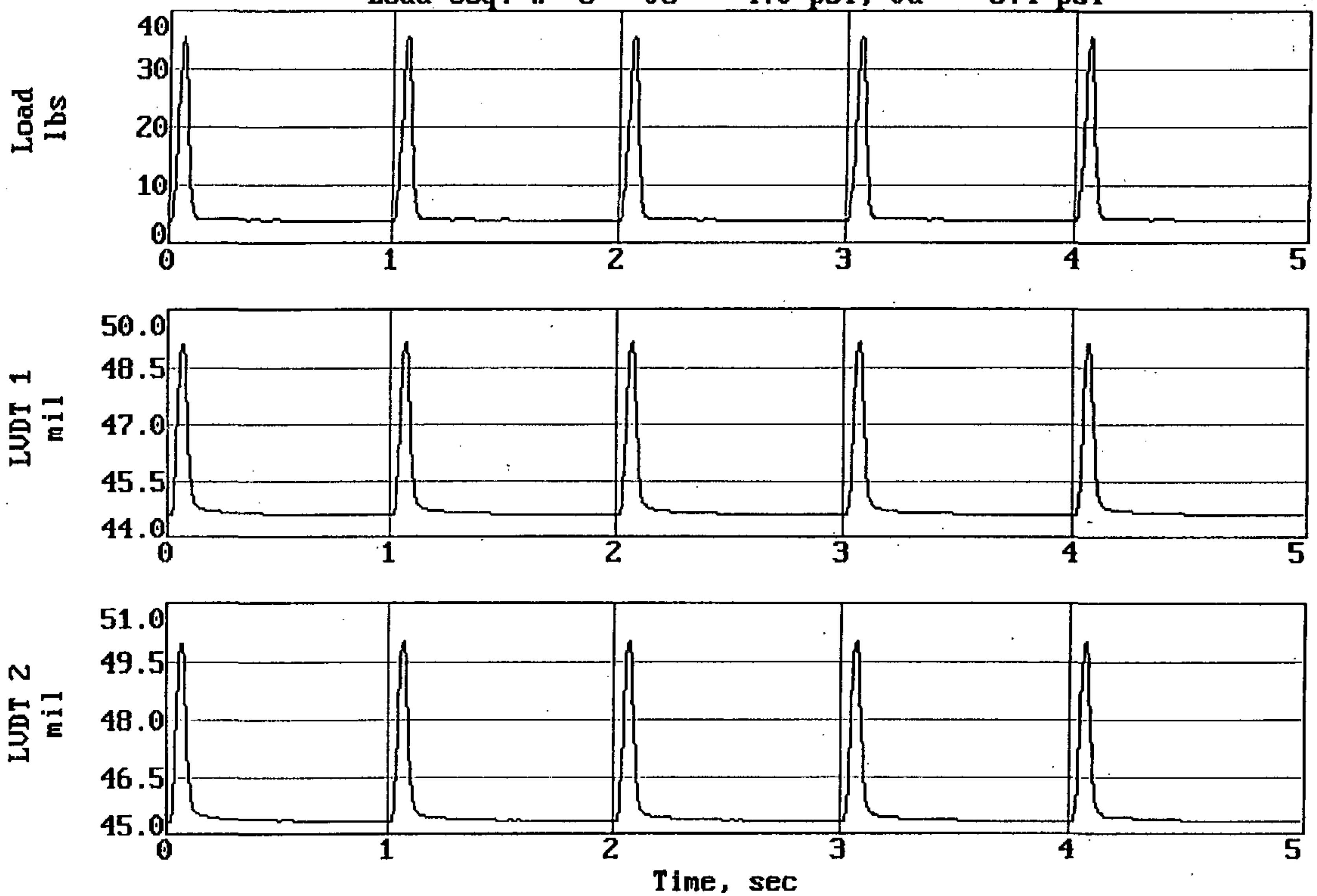
05/19/00 4:22 pm



Sample No: 30-16-16 B @ 7 Location:

05/19/00 4:23 pm

Load seq. # 8 σ3 = 4.0 psi, σd = 5.4 psi



Sample No: 30-16-16 A @ 7 Location:

Resilient Modulus Test for material type 2

Data File 301616C7.DAT

Date: 05/17/00

Soil Sample 30-16-16 C @ 7
Location
Sample No.
Specific Gravity 0.00

SOIL SPECIMEN MEASUREMENTS:

Diameter Top 0.00
Middle 2.81
Bottom 0.00
Average 2.81
Membrane Thickness 0.0000
Net Diameter (inch) 2.81
Ht Specimen+Cap+Base 5.65
Seating Load: 10% σd
Ht Cap+Base 0.00
Initial Length,Lo(inch) 5.65
Inside Diameter of Mold 0.00

SOIL SPECIMEN WEIGHT:
Initial Wt. of Container +Wet Soil-gms 922.2
Final Wt of Container +Wet Siol-gms 0.0
Weight Wet Soil Used 922.2

SOIL SPECIMEN VOLUME:
Initial Area Ao (inch²) 6.21
Volume Ao·Lo (inch3) 35.13
Wet Density (pcf) 100.02

Compaction Water Content % 28.30
% Stauration 0.00
Dry Density (pcf) 77.96

Compaction Method Remolded

Water Content After Mr Testing % 26.1

Vertical Spacing Between LVDT Clamps(inch) 0.00

LOAD ID:
TP46-94 Subgrade soil
Number of cycles for precond. 500
Number of cycles per sequence 100
Load time 0.10 Cycle time 1.00 sec
Seating Load (lbs) 10.0

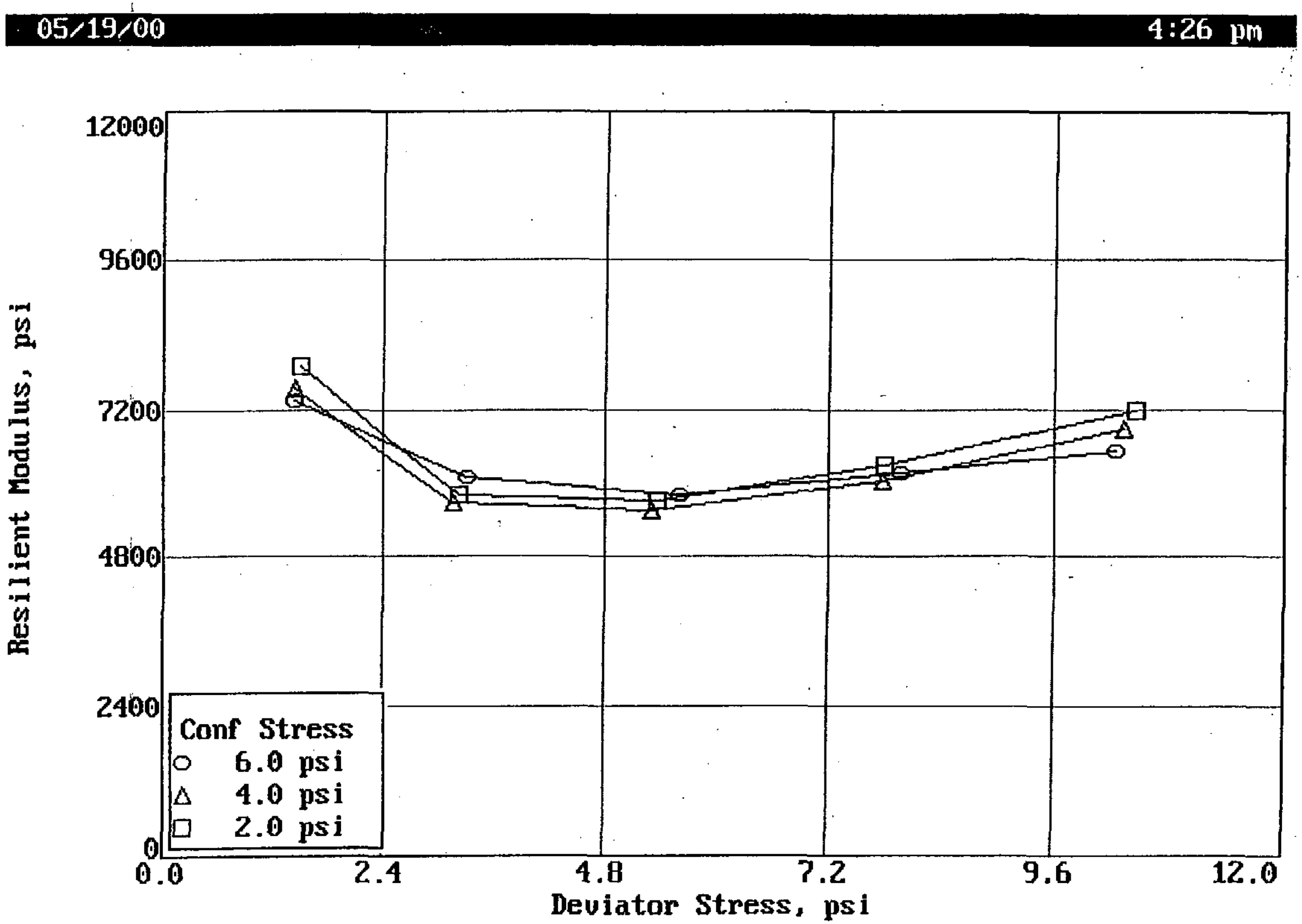
Waveform Type
Comments:
Cured for 7 days

A Chamber Press. σ3 psi	B Nominal σd psi	C Mean Deviator Load lbs	D Standard Deviation of Load lbs	E Applied Deviator Stress psi	F Mean Recov Of LVDT #1 inch	G Mean Recov Of LVDT #2 inch	H Mean Recov. Def. inch	I Std. Dev. of Recov. Def. inch	J Mean of Resilient Strain in/in	K Mean of Mr psi	L Std Dev of Mr psi	M θ (σd+3σ3) psi
6.0	1.8	8.85	0.03	1.425	0.001139	0.001053	0.001096	0.000006	0.000194	7349	22	19.425
6.0	3.6	20.61	0.06	3.317	0.003212	0.002927	0.003069	0.000007	0.000543	6109	11	21.317
6.0	5.4	34.87	0.03	5.611	0.005526	0.005352	0.005439	0.000006	0.000962	5832	2	23.611
6.0	7.2	49.58	0.10	7.978	0.007336	0.007267	0.007301	0.000002	0.001292	6177	11	25.978
6.0	9.0	63.63	0.06	10.239	0.009005	0.008702	0.008853	0.000004	0.001566	6538	6	28.239
4.0	1.8	8.91	0.03	1.434	0.001094	0.001053	0.001073	0.000003	0.000190	7554	37	13.434
4.0	3.6	19.61	0.02	3.155	0.003162	0.003110	0.003136	0.000003	0.000555	5687	7	15.155
4.0	5.4	32.94	0.05	5.299	0.005469	0.005338	0.005403	0.000004	0.000956	5544	6	17.299
4.0	7.2	48.29	0.12	7.770	0.007372	0.007115	0.007243	0.000011	0.001281	6064	6	19.770
4.0	9.0	64.25	0.05	10.338	0.008635	0.008351	0.008493	0.000004	0.001502	6881	5	22.338
2.0	1.8	9.35	0.04	1.505	0.001100	0.001053	0.001077	0.000006	0.000190	7901	35	7.505
2.0	3.6	20.04	0.04	3.225	0.003231	0.003026	0.003128	0.000009	0.000553	5828	9	9.225
2.0	5.4	33.35	0.03	5.366	0.005410	0.005178	0.005294	0.000006	0.000936	5730	5	11.366
2.0	7.2	48.55	0.02	7.812	0.007126	0.006887	0.007007	0.000006	0.001239	6303	3	13.812
2.0	9.0	65.01	0.11	10.460	0.008335	0.008118	0.008227	0.000012	0.001455	7188	2	16.460

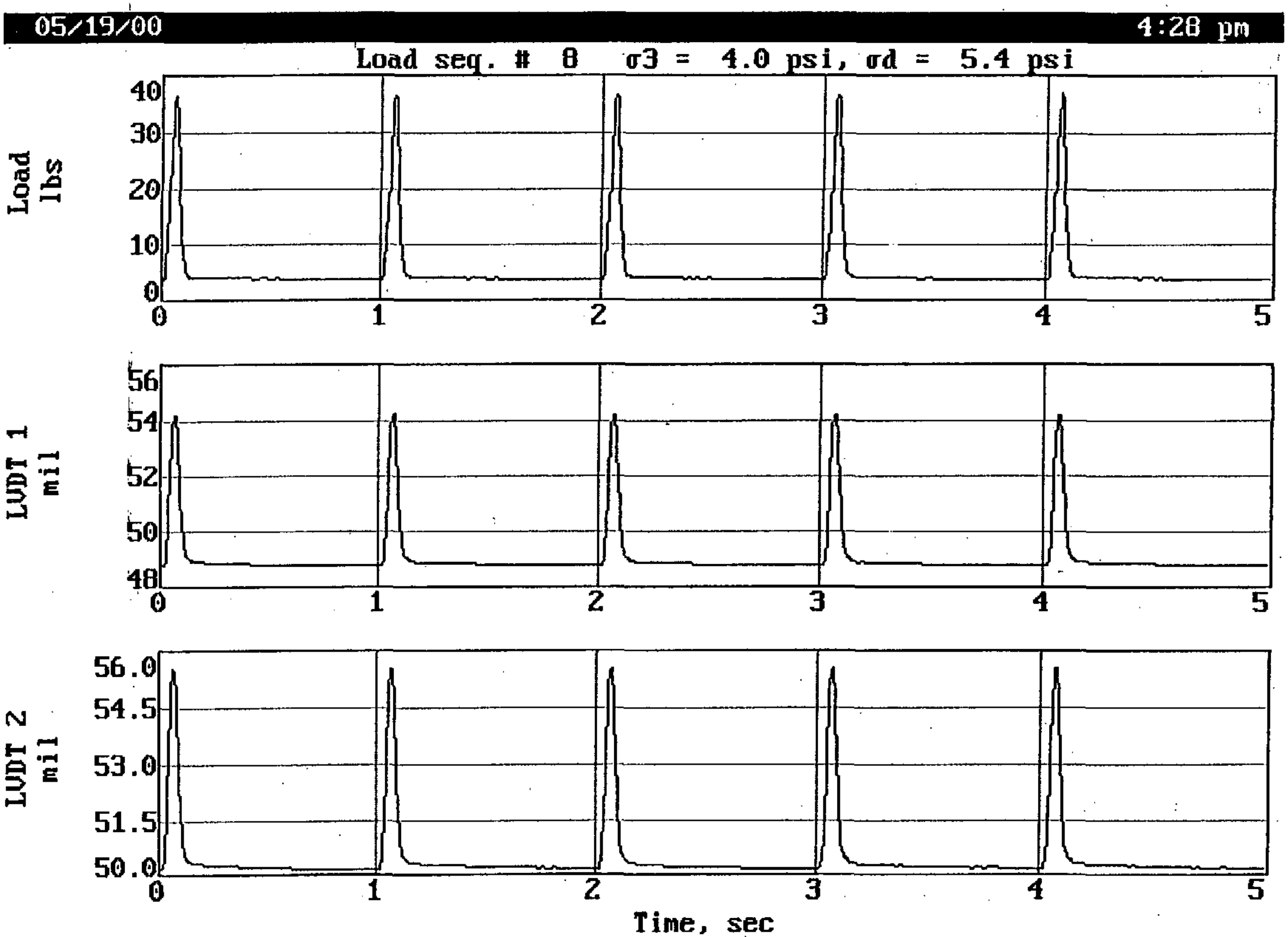
Data File 301616C7.DAT

Permanent Deformation Data:

Seq. #	Chamber Press. $\sigma 3$ psi	Nominal σd psi	Actual Contact Stress psi	Permanent Def. inch
1	6.0	1.8	0.2	0.000036
2	6.0	3.6	0.4	0.000037
3	6.0	5.4	0.6	0.000042
4	6.0	7.2	0.8	0.000047
5	6.0	9.0	1.0	0.000050
6	4.0	1.8	0.2	0.000048
7	4.0	3.6	0.4	0.000049
8	4.0	5.4	0.6	0.000050
9	4.0	7.2	0.8	0.000050
10	4.0	9.0	1.0	0.000052
11	2.0	1.8	0.2	0.000050
12	2.0	3.6	0.4	0.000050
13	2.0	5.4	0.6	0.000051
14	2.0	7.2	0.8	0.000052
15	2.0	9.0	1.0	0.000053



Sample No: 30-16-16 C @ 7 Location:



Sample No: 30-16-16 C @ 7 Location:

Resilient Modulus Test for material type 2

Data File 302020A7.DAT

Date: 05/16/00

Soil Sample 30-20-20 A @ 7
Location
Sample No.
Specific Gravity 0.00

SOIL SPECIMEN MEASUREMENTS:

Diameter	Top	0.00
	Middle	2.81
	Bottom	0.00
	Average	2.81

Membrane Thickness 0.0000
Net Diameter (inch) 2.81
Ht Specimen+Cap+Base 5.83
Seating Load: 10% σd
Ht Cap+Base 0.00
Initial Length,Lo(inch) 5.83
Inside Diameter of Mold 0.00

SOIL SPECIMEN WEIGHT:
Initial Wt. of Container +Wet Soil-gms 828.6
Final Wt of Container +Wet Siol-gms 0.0
Weight Wet Soil Used 828.6

SOIL SPECIMEN VOLUME:
Initial Area Ao (inch²) 6.21
Volume Ao·Lo (inch3) 36.23
Wet Density (pcf) 87.14

Compaction Water Content % 28.10
% Stauration 0.00
Dry Density (pcf) 68.02

Compaction Method Remolded

Water Content After Mr Testing % 19.3

Vertical Spacing Between LVDT Clamps(inch) 0.00

LOAD ID:
TP46-94 Subgrade soil
Number of cycles for precond. 500
Number of cycles per sequence 100
Load time 0.10 Cycle time 1.00 sec
Seating Load (lbs) 10.0

Waveform Type
Comments:
Cured for 7 days

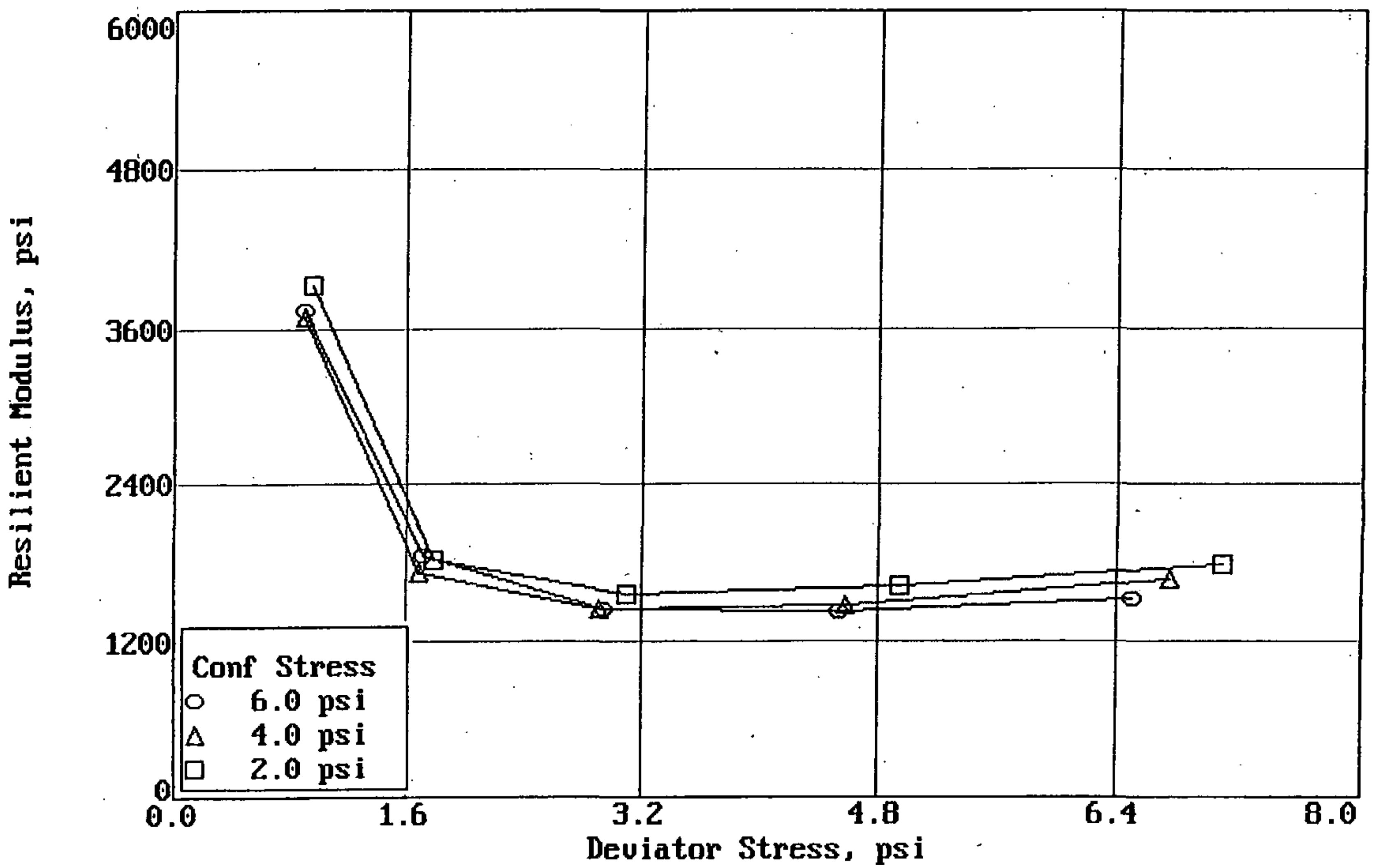
A Chamber Press. σ3 psi	B Nominal σd psi	C Mean Deviator Load lbs	D Standard Deviation of Load lbs	E Applied Deviator Stress psi	F Mean Recov Df LVDT #1 inch	G Mean Recov Df LVDT #2 inch	H Mean Recov. Def. inch	I Std. Dev. of Recov. Def. inch	J Mean of Resilient Strain in/in	K Mean of Mr psi	L Std Dev of Mr psi	M θ (σd+3σ3) psi
6.0	1.8	5.57	0.02	0.896	0.001385	0.001415	0.001398	0.000002	0.000240	3737	10	18.896
6.0	3.6	10.71	0.03	1.724	0.005330	0.005508	0.005419	0.000011	0.000929	1855	5	19.724
6.0	5.4	18.26	0.06	2.939	0.011692	0.012088	0.011890	0.000029	0.002039	1441	1	20.939
6.0	7.2	28.20	0.09	4.537	0.018295	0.018998	0.018646	0.000021	0.003198	1419	3	22.537
6.0	9.0	40.41	0.17	6.502	0.024281	0.025413	0.024846	0.000020	0.004262	1526	6	24.502
4.0	1.8	5.62	0.05	0.905	0.001412	0.001441	0.001426	0.000022	0.000245	3700	65	12.905
4.0	3.6	10.52	0.05	1.692	0.005680	0.005817	0.005749	0.000055	0.000986	1716	11	13.692
4.0	5.4	18.09	0.04	2.911	0.011671	0.011977	0.011824	0.000027	0.002028	1435	3	14.911
4.0	7.2	28.50	0.10	4.586	0.017867	0.018484	0.018176	0.000066	0.003118	1471	1	16.586
4.0	9.0	41.88	0.08	6.738	0.023178	0.024051	0.023615	0.000022	0.004051	1664	3	18.738
2.0	1.8	5.98	0.05	0.962	0.001427	0.001418	0.001422	0.000006	0.000244	3944	26	6.962
2.0	3.6	11.15	0.02	1.794	0.005722	0.005826	0.005774	0.000009	0.000990	1811	5	7.794
2.0	5.4	19.24	0.07	3.095	0.011468	0.011716	0.011592	0.000030	0.001988	1557	3	9.095
2.0	7.2	30.70	0.12	4.940	0.017520	0.017926	0.017723	0.000028	0.003040	1625	4	10.940
2.0	9.0	44.07	0.07	7.091	0.022896	0.023305	0.023101	0.000025	0.003962	1790	2	13.091

Data File 302020A7.DAT

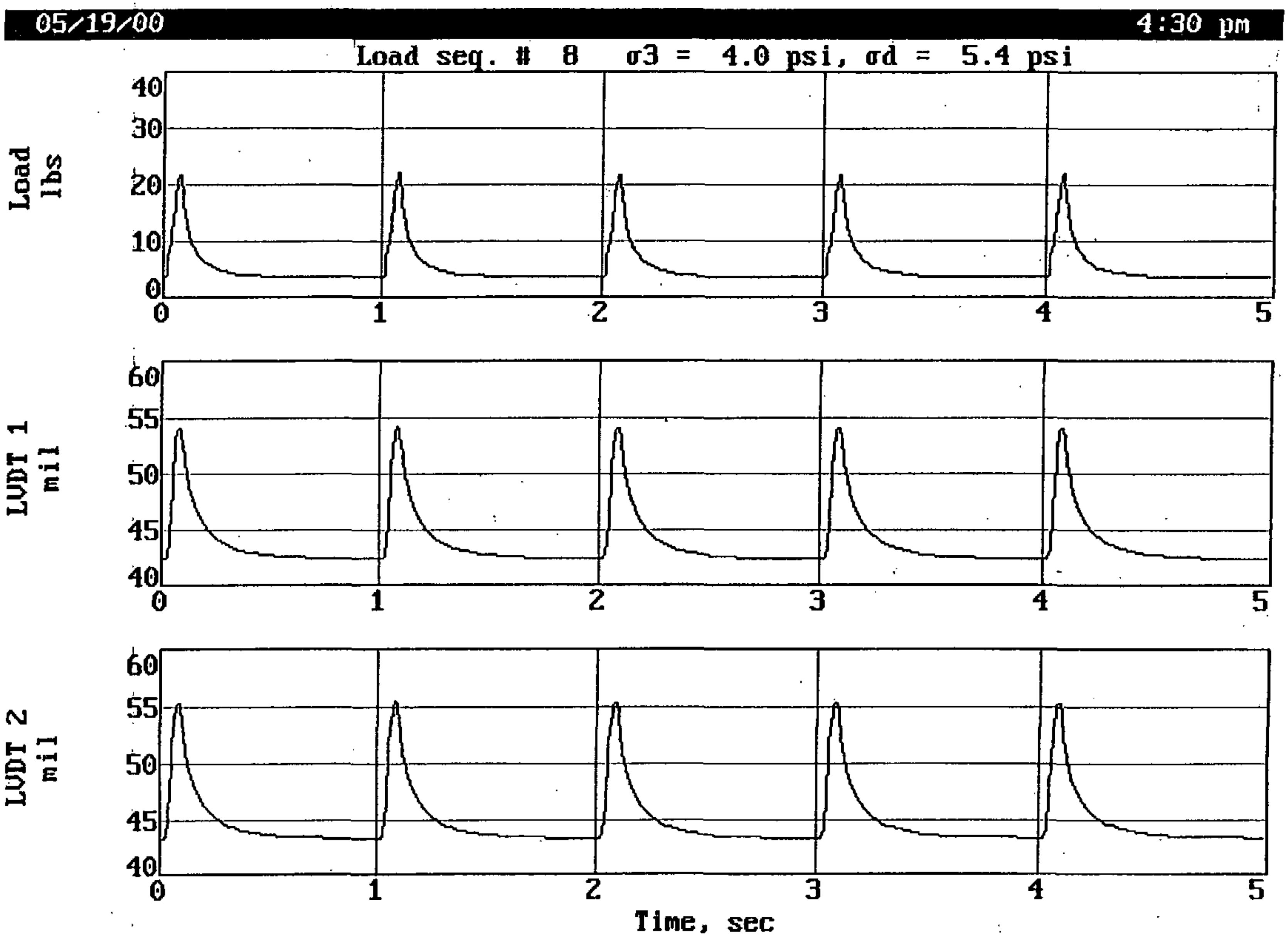
Permanent Deformation Data:

Seq. #	Chamber Press. $\sigma 3$ psi	Nominal σd psi	Actual Contact Stress psi	Permanent Def. inch
1	6.0	1.8	0.2	0.000005
2	6.0	3.6	0.4	0.000007
3	6.0	5.4	0.6	0.000015
4	6.0	7.2	0.8	0.000027
5	6.0	9.0	1.0	0.000047
6	4.0	1.8	0.2	0.000038
7	4.0	3.6	0.4	0.000040
8	4.0	5.4	0.6	0.000043
9	4.0	7.2	0.8	0.000047
10	4.0	9.0	1.0	0.000055
11	2.0	1.8	0.2	0.000047
12	2.0	3.6	0.4	0.000048
13	2.0	5.4	0.6	0.000060
14	2.0	7.2	0.8	0.000066
15	2.0	9.0	1.0	0.000072

05/19/00 4:28 pm



Sample No: 30-20-20 A @ 7 Location:



Sample No: 30-20-20 A @ 7 Location:

Resilient Modulus Test for material type 2

Data File 30202087.DAT

Date: 05/16/00

Soil Sample 30-20-20 8 a 7
Location ______
Sample No. ______
Specific Gravity 0.00

SOIL SPECIMEN MEASUREMENTS:

Diameter Top 0.00
Diameter Middle 2.81
Diameter Bottom 0.00
Average 2.81
Membrane Thickness 0.0000
Net Diameter (inch) 2.81
Ht Specimen+Cap+Base 5.66
Seating Load: 10% σd
Ht Cap+Base 0.00
Initial Length, Lo(inch) 5.66
Inside Diameter of Mold 0.00

SOIL SPECIMEN WEIGHT:

Initial Wt. of Container +Wet Soil-gms 872.5
Final Wt of Container +Wet Siol-gms 0.0
Weight Wet Soil Used 872.5

SOIL SPECIMEN VOLUME:

Initial Area Ao ($inch^2$) 6.21
Volume Ao·Lo (inch3) 35.14
Wet Density (pcf) 94.59

Compaction Water Content % 31.50
% Stauration 0.00
Dry Density (pcf) 71.93

Compaction Method Remolded

Water Content After Mr Testing % 18.2

Vertical Spacing Between LVDT Clamps(inch) 0.00

LOAD ID:

TP46-94 Subgrade soil
Number of cycles for precond. 500
Number of cycles per sequence 100
Load time 0.10 Cycle time 1.00 sec
Seating Load (lbs) 10.0

Waveform Type ______
Comments:
Cured for 7 days

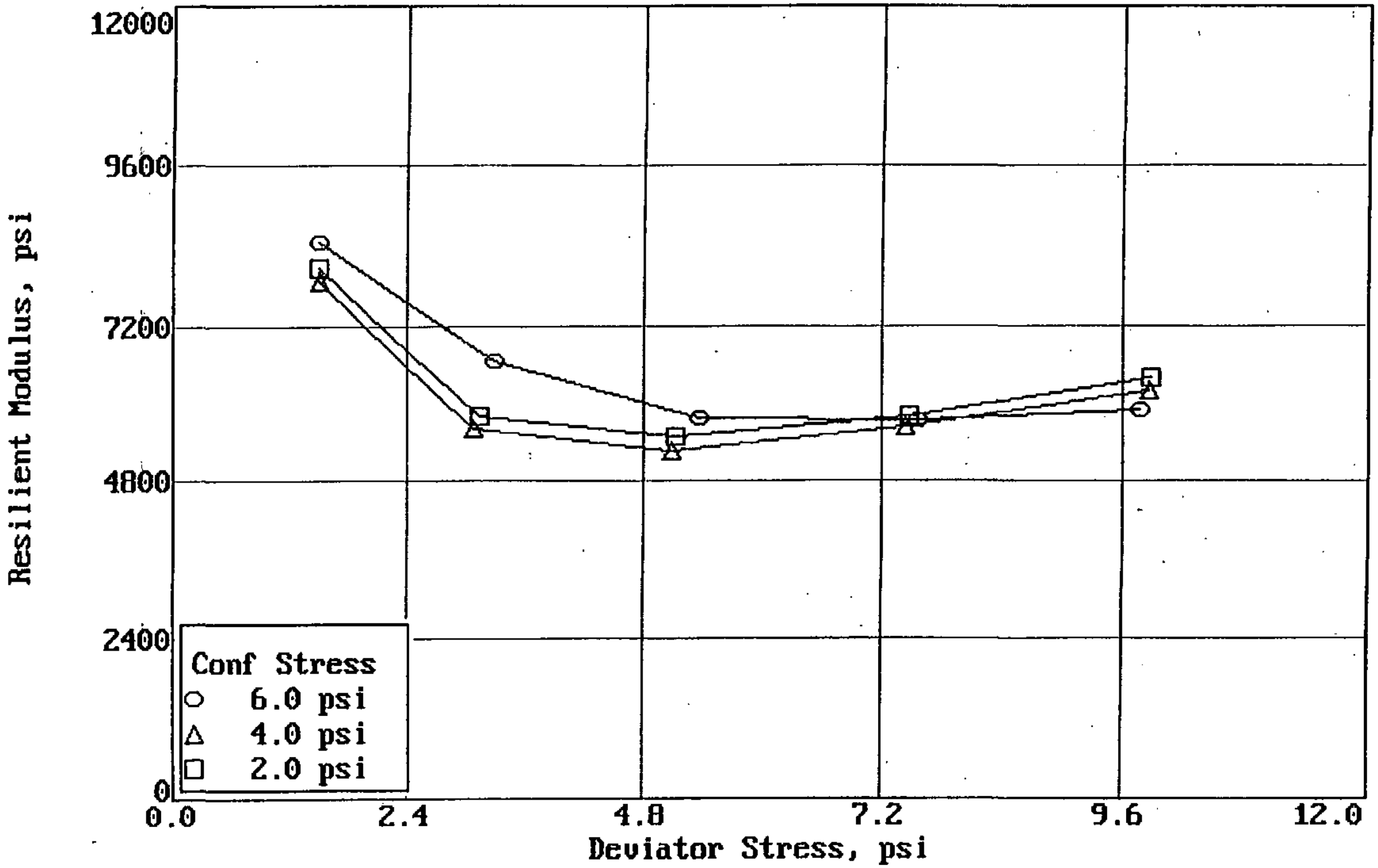
A Chamber Press. $\sigma 3$ psi	B Nominal σd psi	C Mean Deviator Load lbs	D Standard Deviation of Load lbs	E Applied Deviator Stress psi	F Mean Recov Df LVDT #1 inch	G Mean Recov Df LVDT #2 inch	H Mean Recov. Def. inch	I Std. Dev. of Recov. Def. inch	J Mean of Resilient Strain in/in	K Mean of Mr psi	L Std Dev of Mr psi	M θ ($\sigma d+3\sigma 3$) psi
6.0	1.8	9.35	0.01	1.507	0.000974	0.001040	0.001007	0.000005	0.000178	8477	42	19.507
6.0	3.6	20.43	0.04	3.292	0.002767	0.002819	0.002793	0.000004	0.000493	6675	9	21.292
6.0	5.4	33.22	0.05	5.354	0.005175	0.005295	0.005235	0.000011	0.000924	5791	5	23.354
6.0	7.2	46.92	0.03	7.561	0.007327	0.007525	0.007426	0.000007	0.001311	5766	5	25.561
6.0	9.0	60.56	0.09	9.758	0.009206	0.009488	0.009347	0.000008	0.001650	5912	5	27.758
4.0	1.8	9.28	0.03	1.496	0.001029	0.001124	0.001077	0.000005	0.000190	7869	27	13.496
4.0	3.6	19.12	0.04	3.080	0.003050	0.003153	0.003101	0.000002	0.000548	5625	11	15.080
4.0	5.4	31.54	0.05	5.083	0.005369	0.005550	0.005460	0.000011	0.000964	5272	2	17.083
4.0	7.2	46.14	0.06	7.434	0.007339	0.007564	0.007452	0.000013	0.001316	5650	5	19.434
4.0	9.0	61.11	0.05	9.846	0.008839	0.009138	0.008989	0.000003	0.001587	6203	7	21.846
2.0	1.8	9.32	0.03	1.502	0.001003	0.001108	0.001055	0.000010	0.000186	8061	54	7.502
2.0	3.6	19.49	0.04	3.140	0.002971	0.003129	0.003050	0.000005	0.000539	5829	11	9.140
2.0	5.4	31.88	0.04	5.136	0.005210	0.005406	0.005308	0.000004	0.000937	5479	4	11.136
2.0	7.2	46.35	0.05	7.468	0.007150	0.007406	0.007278	0.000007	0.001285	5811	7	13.468
2.0	9.0	61.31	0.06	9.880	0.008585	0.008869	0.008725	0.000003	0.001541	6412	8	15.880

Data File 302020B7.DAT

Permanent Deformation Data:

Seq. #	Chamber Press. $\sigma 3$ psi	Nominal σd psi	Actual Contact Stress psi	Permanent Def. inch
1	6.0	1.8	0.2	0.000014
2	6.0	3.6	0.4	0.000015
3	6.0	5.4	0.6	0.000020
4	6.0	7.2	0.8	0.000026
5	6.0	9.0	1.0	0.000031
6	4.0	1.8	0.2	0.000029
7	4.0	3.6	0.4	0.000029
8	4.0	5.4	0.6	0.000030
9	4.0	7.2	0.8	0.000031
10	4.0	9.0	1.0	0.000033
11	2.0	1.8	0.2	0.000031
12	2.0	3.6	0.4	0.000031
13	2.0	5.4	0.6	0.000032
14	2.0	7.2	0.8	0.000032
15	2.0	9.0	1.0	0.000034

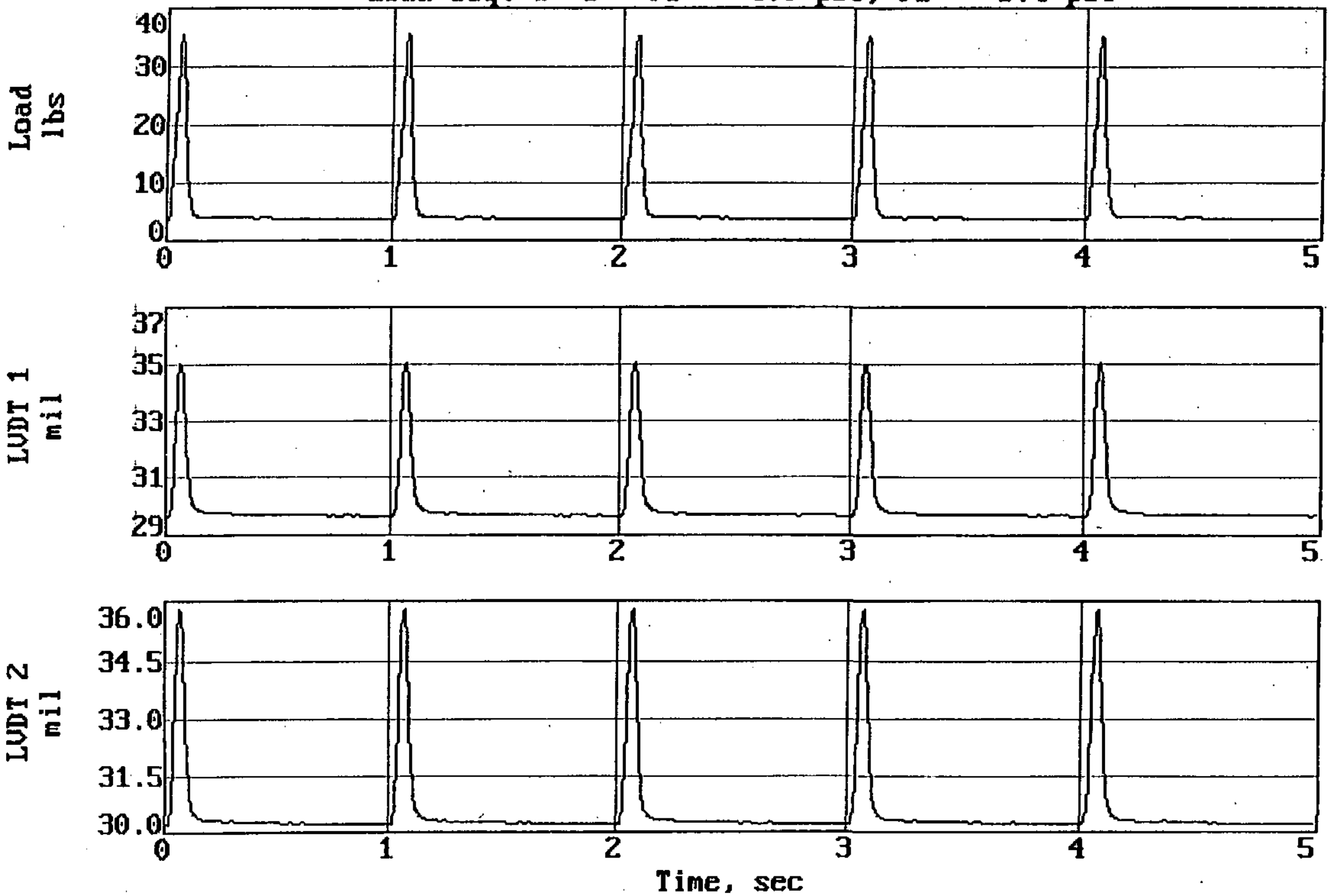
05/19/00 4:31 pm



Sample No: 30-20-20 B @ 7 Location:

05/19/00 4:32 pm

Load seq. # 8 σ3 = 4.0 psi, σd = 5.4 psi



Sample No: 30-20-20 B @ 7 Location:

Resilient Modulus Test for material type 2

Data File 302020C7.DAT

Date: 05/16/00

Soil Sample 30-20-20 C @ 7
Location
Sample No.
Specific Gravity 0.00

SOIL SPECIMEN MEASUREMENTS:

Diameter Top 0.00
Middle 2.81
Bottom 0.00
Average 2.81
Membrane Thickness 0.0000
Net Diameter (inch) 2.81
Ht Specimen+Cap+Base 5.70
Seating Load: 10% σd
Ht Cap+Base 0.00
Initial Length,Lo(inch) 5.70
Inside Diameter of Mold 0.00

SOIL SPECIMEN WEIGHT:
Initial Wt. of Container
+Wet Soil-gms 874.3
Final Wt of Container
+Wet Siol-gms 0.0
Weight Wet Soil Used 874.3

SOIL SPECIMEN VOLUME:
Initial Area Ao
(inch²) 6.21
Volume Ao·Lo
(inch3) 35.37
Wet Density (pcf) 94.19

Compaction Water Content % 31.60
% Stauration 0.00
Dry Density (pcf) 71.57

Compaction Method Remolded

Water Content After
Mr Testing % 15.8

Vertical Spacing Between
LVDT Clamps(inch) 0.00

LOAD ID:
TP46-94 Subgrade soil
Number of cycles for precond. 500
Number of cycles per sequence 100
Load time 0.10 Cycle time 1.00 sec
Seating Load (lbs) 10.0

Waveform Type
Comments:
Cured for 7 days

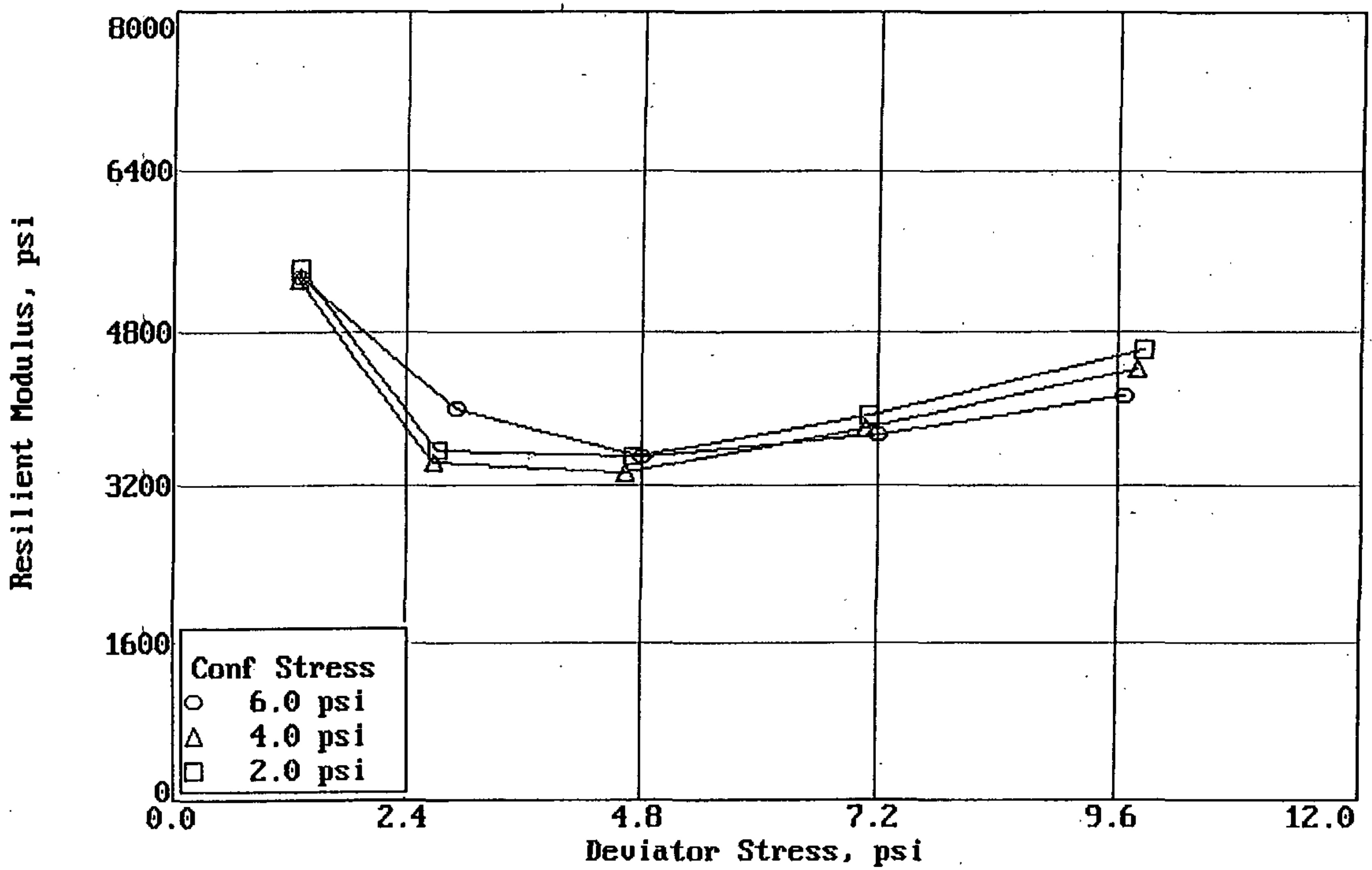
A Chamber Press. σ3 psi	B Nominal σd psi	C Mean Deviator Load lbs	D Standard Deviation of Load lbs	E Applied Deviator Stress psi	F Mean Recov Df LVDT #1 inch	G Mean Recov Df LVDT #2 inch	H Mean Recov. Def. inch	I Std. Dev. of Recov. Def. inch	J Mean of Resilient Strain in/in	K Mean of Mr psi	L Std Dev of Mr psi	M θ (σd+3σ3) psi
6.0	1.8	8.11	0.01	1.307	0.001282	0.001508	0.001395	0.000007	0.000245	5342	32	19.307
6.0	3.6	18.20	0.04	2.932	0.003815	0.004506	0.004161	0.000005	0.000730	4016	7	20.932
6.0	5.4	29.74	0.02	4.792	0.007002	0.008573	0.007787	0.000002	0.001366	3507	2	22.792
6.0	7.2	44.73	0.06	7.208	0.010258	0.011736	0.010983	0.000007	0.001927	3740	5	25.208
6.0	9.0	59.92	0.04	9.654	0.012772	0.013750	0.013255	0.000001	0.002326	4151	3	27.654
4.0	1.8	7.99	0.03	1.288	0.001270	0.001490	0.001380	0.000004	0.000242	5318	9	13.288
4.0	3.6	16.65	0.04	2.683	0.004071	0.004813	0.004441	0.000006	0.000779	3443	10	14.683
4.0	5.4	28.79	0.05	4.639	0.007383	0.008422	0.007902	0.000009	0.001387	3346	3	16.639
4.0	7.2	43.83	0.05	7.063	0.010145	0.011014	0.010573	0.000005	0.001855	3807	3	19.063
4.0	9.0	60.75	0.07	9.788	0.012254	0.012958	0.012606	0.000004	0.002212	4425	4	21.788
2.0	1.8	8.09	0.05	1.304	0.001231	0.001514	0.001372	0.000008	0.000241	5414	21	7.304
2.0	3.6	16.97	0.03	2.735	0.003955	0.004759	0.004356	0.000008	0.000764	3578	6	8.735
2.0	5.4	29.31	0.04	4.723	0.007217	0.008079	0.007648	0.000005	0.001342	3519	3	10.723
2.0	7.2	44.20	0.08	7.122	0.009934	0.010647	0.010286	0.000007	0.001805	3946	5	13.122
2.0	9.0	61.20	0.03	9.861	0.011830	0.012481	0.012156	0.000004	0.002133	4623	3	15.861

Data File 302020C7.DAT

Permanent Deformation Data:

Seq. #	Chamber Press. $\sigma 3$ psi	Nominal σd psi	Actual Contact Stress psi	Permanent Def. inch
1	6.0	1.8	0.2	0.000012
2	6.0	3.6	0.4	0.000014
3	6.0	5.4	0.6	0.000028
4	6.0	7.2	0.8	0.000053
5	6.0	9.0	1.0	0.000060
6	4.0	1.8	0.2	0.000057
7	4.0	3.6	0.4	0.000058
8	4.0	5.4	0.6	0.000059
9	4.0	7.2	0.8	0.000060
10	4.0	9.0	1.0	0.000062
11	2.0	1.8	0.2	0.000059
12	2.0	3.6	0.4	0.000060
13	2.0	5.4	0.6	0.000061
14	2.0	7.2	0.8	0.000062
15	2.0	9.0	1.0	0.000064

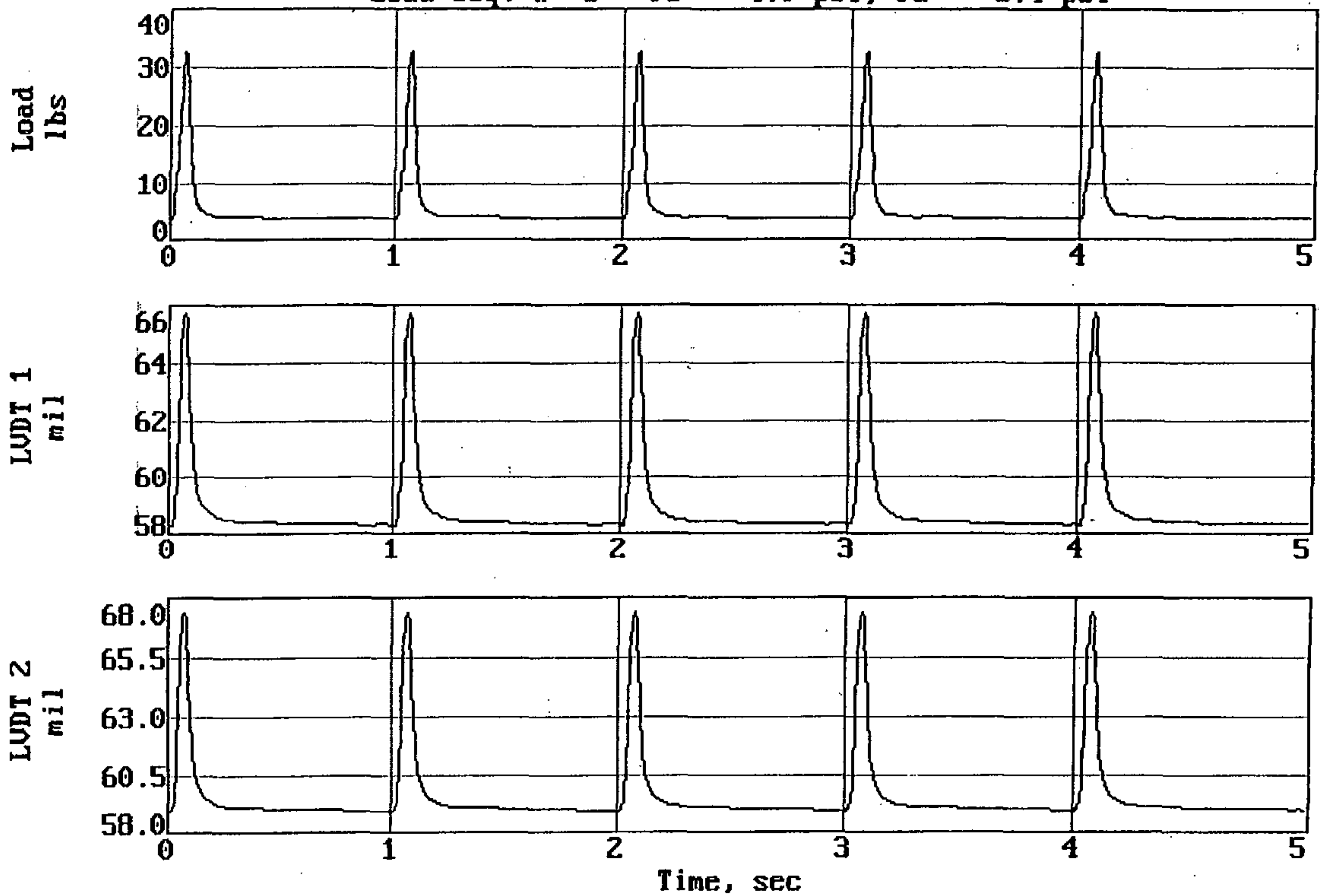
05/19/00 4:33 pm



Sample No: 30-20-20 C @ 7 Location:

05/19/00 4:35 pm

Load seq. # 8 σ3 = 4.0 psi, σd = 5.4 psi



Sample No: 30-20-20 C @ 7 Location:

VALLEY
FORGE
LABORATORIES, INC.

Engineering Consultants Since 1967

SOIL LABORATORY TEST REPORT 5-3 ADDENDUM

VFL Project No. 00135
June 23, 2000

Geotechnical Engineering

Attention: Ms. Iliana Alvarado
Hart Crowser, Inc.
75 Montgomery Street, Floor 5
Jersey City, NJ 07302

Construction Quality Control

Re: Resilient Modulus Testing at 28 Days
PROPAT Pilot Program

Sample Descriptions:

Laboratory Testing

Specimens are designated as Mix 30-16-16 and 30-20-20 which were cured for 28 days at 120°F. Preparation and remolding of the specimens are described in the Soil Laboratory Test Report 5-3 dated June 2, 2000.

Testing:

NDT and Related Services

Specimens cured for 28 days were subjected to resilient modulus testing in accordance with AASHTO TP-46-94, which includes a preconditioning sequence (500 cycles) and 15 loading sequence (100 cycles per sequence) with a combination of 3 levels of confining pressures and 5 levels of deviator stresses.

Research and Special Studies

Results:

The testing results are summarized in Table 2. The 7-day M_R values are also shown in the table for comparison purposes. Detailed summary reports for each specimen are included in Attachment A with plots of resilient modulus vs. deviator stresses and selected load and deformation vs. time/cycles.

Environmental Engineering

Similar to the results for 7 day specimens, resilient modulus (M_R) values of the tested specimens do not significantly vary for different confining pressures and deviator stresses, and thus are well represented by the mean. However, the lowest deviator stress (1.8 psi) is an exception. At this very low stress level, permanent plastic strains are not completely removed and the associated small deformation response approaches the precision of the sensing instruments. Therefore, M_R values at 1.8 psi deviator stress are ignored in calculating the mean values and standard deviations.

Transportation and Traffic Engineering

Cracking conditions of specimens at test are noted in Table 2. Different from the 7-day specimens, certain adhesion appeared to have developed at the cracks for 28-day specimens.

If you have any questions regarding this report, please call me.

Sincerely,

Bashar S. Qubain, Ph.D., P.E.
Director of Geotechnical Engineering

BSQ:lcw

Table 2. Laboratory Testing Results of Resilient Modulus (M_R) at 28 Days

Sample No.	Moisture and Density as Compacted			Moisture and Density At Test			Mean M_R Value (28 Days) (psi)	Standard Deviation (28 Days) (psi)	Mean M_R Value (7 Days) (psi)	Remarks
	Moisture (%)	Moist Density (pcf)	Dry Density (pcf)	Moisture (%)	Moist Density (pcf)	Dry Density (pcf)				
30-16-16 A	51.4	96.8	63.9	19.6	84.7	70.8	5,088	205	6,400	One (short, cross-sectional) and a few hairline cracks.
30-16-16 B	28.8	94.4	73.3	12.0	88.1	78.7	3,838	406	2,400	2 (short, cross-sectional) cracks.
30-16-16 C	29.1	94.0	72.8	8.8	85.7	78.8	3,384	354	6,200	2 (short, cross-sectional) cracks.
30-20-20 A	34.9	95.6	70.9	18.3	90.0	76.1	5,865	416	1,600	Minor hairline cracks.
30-20-20 B	35.0	92.9	68.8	22.6	88.3	72.0	4,720	706	5,900	One major (cross-sectional) crack, separated and minor (short) hairline cracks.
30-20-20 C	37.6	99.6	72.4	17.9	91.9	77.9	3,717	401	3,800	One major short crack, 2 cross-sectional cracks, and minor hairline cracks.

ATTACHMENT A

Detailed Laboratory Testing Reports

Resilient Modulus Test for material type 2

Data File 301616A8.DAT

Date: 06/13/00

Soil Sample 30-16-16 A @ 28
Location
Sample No.
Specific Gravity 0.00

SOIL SPECIMEN MEASUREMENTS:

Diameter Top 0.00
Middle 2.81
Bottom 0.00
Average 2.81
Membrane Thickness 0.0000
Net Diameter (inch) 2.81
Ht Specimen+Cap+Base 5.68
Seating Load: 10% σd
Ht Cap+Base 0.00
Initial Length,Lo(inch) 5.68
Inside Diameter of Mold 0.00

SOIL SPECIMEN WEIGHT:
Initial Wt. of Container
+Wet Soil-gms 894.3
Final Wt of Container
+Wet Siol-gms 0.0
Weight Wet Soil Used 894.3

SOIL SPECIMEN VOLUME:
Initial Area Ao
(inch²) 6.19
Volume Ao·Lo
(inch3) 35.21
Wet Density (pcf) 96.79

Compaction Water Content % 51.40
% Stauration 0.00
Dry Density (pcf) 63.93

Compaction Method Remolded

Water Content After
Mr Testing % 19.6

Vertical Spacing Between
LVDT Clamps(inch) 0.00

LOAD ID:
TP46-94 Subgrade soil
Number of cycles for precond. 500
Number of cycles per sequence 100
Load time 0.10 Cycle time 1.00 sec
Seating Load (lbs) 10.0

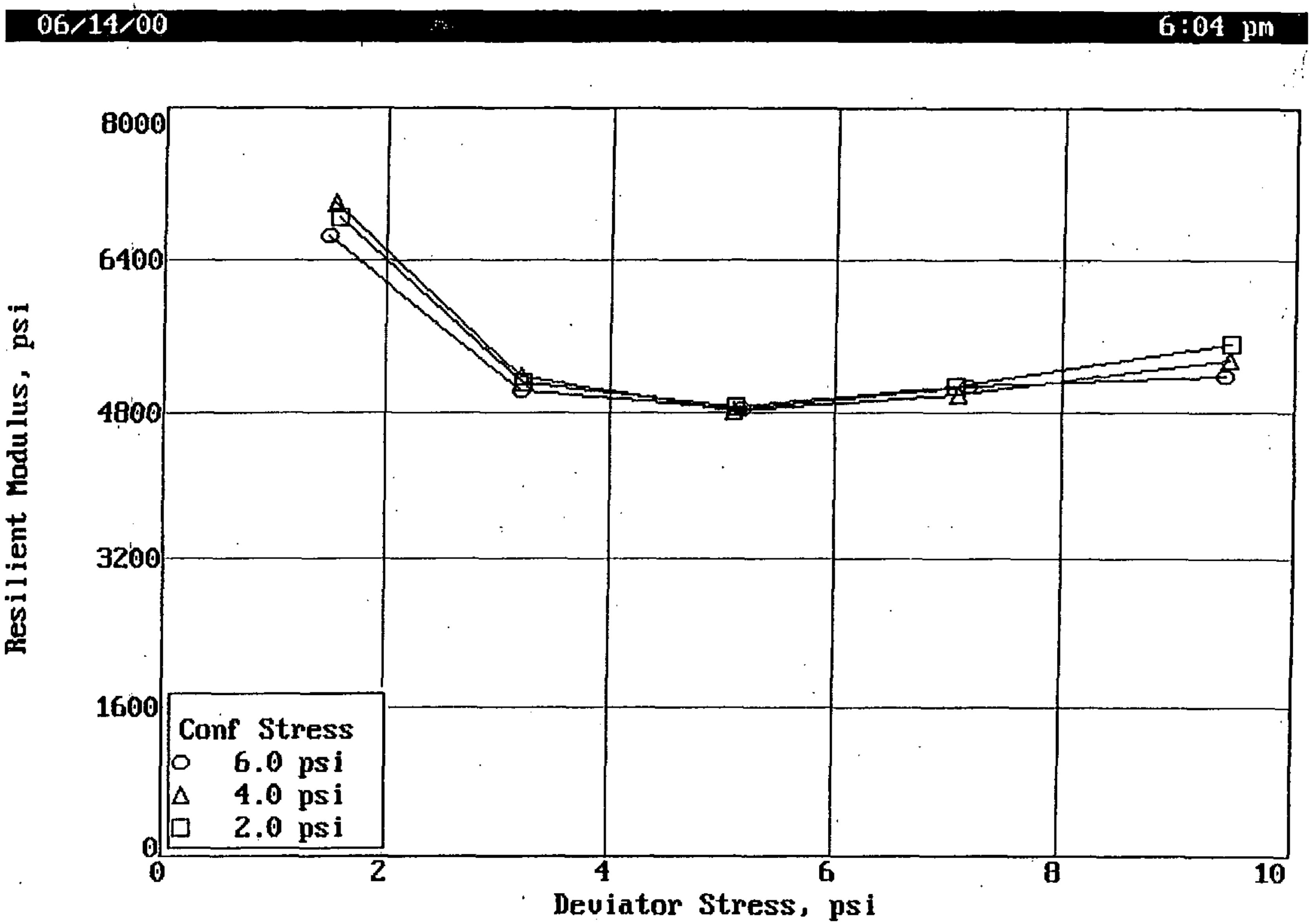
Waveform Type
Comments:
Cured for 28 days

A Chamber Press. σ3 psi	B Nominal σd psi	C Mean Deviator Load lbs	D Standard Deviation of Load lbs	E Applied Deviator Stress psi	F Mean Recov Df LVDT #1 inch	G Mean Recov Df LVDT #2 inch	H Mean Recov. Def. inch	I Std. Dev. of Recov. Def. inch	J Mean of Resilient Strain in/in	K Mean of Mr psi	L Std Dev of Mr psi	M θ (σd+3σ3) psi
6.0	1.8	9.20	0.02	1.485	0.001292	0.001245	0.001268	0.000007	0.000223	6658	39	19.485
6.0	3.6	19.86	0.06	3.207	0.003644	0.003609	0.003626	0.000007	0.000638	5029	6	21.207
6.0	5.4	32.05	0.04	5.176	0.006046	0.006126	0.006086	0.000006	0.001071	4835	4	23.176
6.0	7.2	44.38	0.07	7.166	0.007932	0.008123	0.008027	0.000007	0.001412	5075	5	25.166
6.0	9.0	58.25	0.09	9.406	0.010291	0.010320	0.010305	0.000011	0.001813	5189	4	27.406
4.0	1.8	9.55	0.03	1.542	0.001242	0.001257	0.001249	0.000004	0.000220	7020	23	13.542
4.0	3.6	19.89	0.04	3.211	0.003500	0.003550	0.003525	0.000007	0.000620	5179	9	15.211
4.0	5.4	31.62	0.01	5.107	0.006042	0.006041	0.006042	0.000008	0.001063	4805	6	17.107
4.0	7.2	43.78	0.09	7.070	0.008041	0.008097	0.008069	0.000005	0.001419	4981	9	19.070
4.0	9.0	58.38	0.08	9.427	0.009946	0.010051	0.009999	0.000004	0.001759	5360	5	21.427
2.0	1.8	9.70	0.06	1.567	0.001324	0.001275	0.001299	0.000007	0.000229	6854	49	7.567
2.0	3.6	20.01	0.03	3.231	0.003645	0.003528	0.003587	0.000007	0.000631	5121	12	9.231
2.0	5.4	31.70	0.02	5.119	0.006027	0.005942	0.005984	0.000004	0.001053	4863	2	11.119
2.0	7.2	43.77	0.01	7.068	0.007859	0.007943	0.007901	0.000004	0.001390	5086	4	13.068
2.0	9.0	58.56	0.08	9.456	0.009588	0.009827	0.009708	0.000007	0.001708	5537	5	15.456

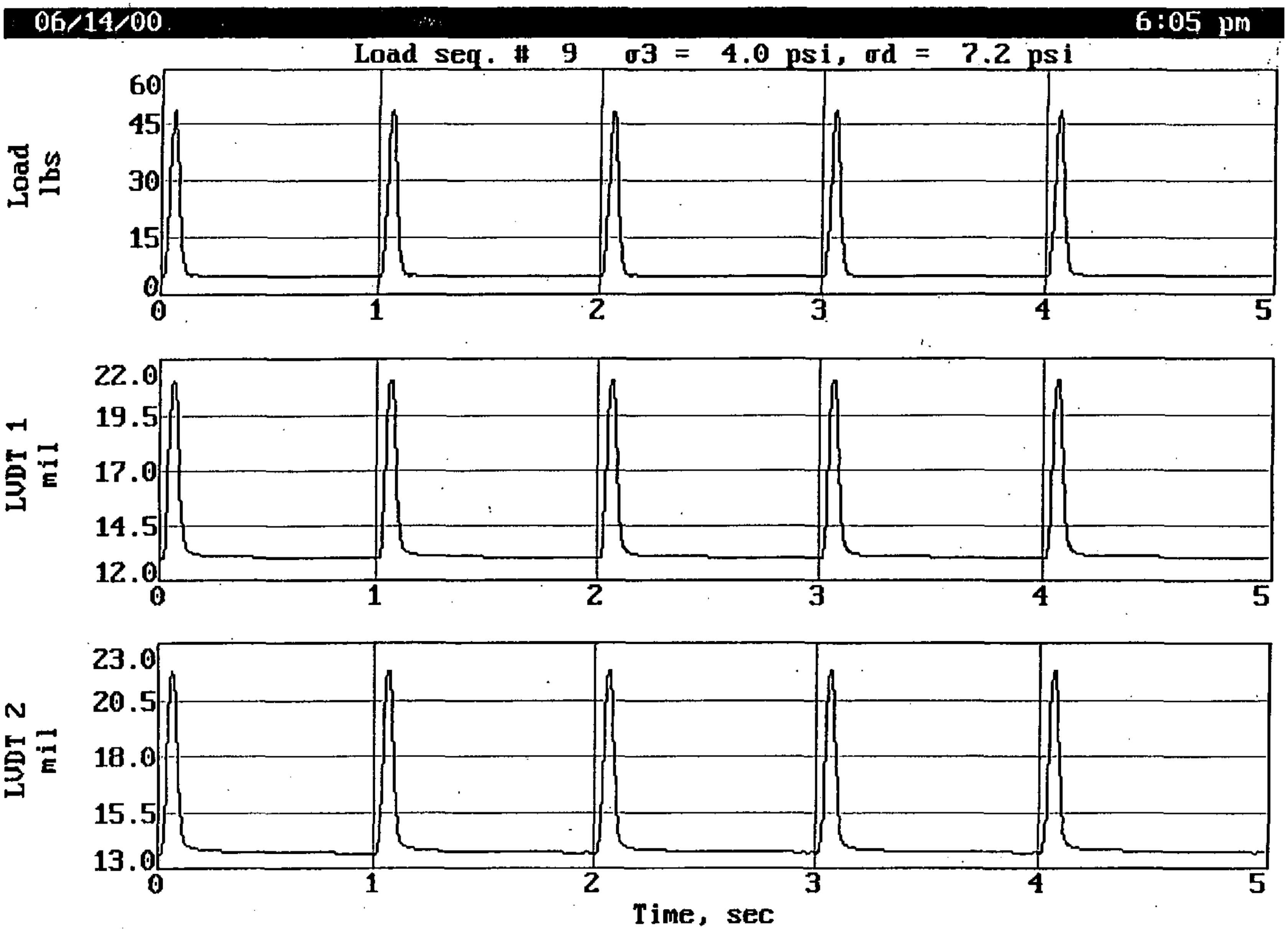
Data File 301616A8.DAT Da

Permanent Deformation Data:

Seq. #	Chamber Press. σ3 psi	Nominal σd psi	Actual Contact Stress psi	Permanent Def. inch
1	6.0	1.8	0.2	0.000006
2	6.0	3.6	0.4	0.000006
3	6.0	5.4	0.6	0.000008
4	6.0	7.2	0.8	0.000010
5	6.0	9.0	1.0	0.000013
6	4.0	1.8	0.2	0.000011
7	4.0	3.6	0.4	0.000012
8	4.0	5.4	0.6	0.000012
9	4.0	7.2	0.8	0.000013
10	4.0	9.0	1.0	0.000015
11	2.0	1.8	0.2	0.000013
12	2.0	3.6	0.4	0.000014
13	2.0	5.4	0.6	0.000014
14	2.0	7.2	0.8	0.000015
15	2.0	9.0	1.0	0.000017



Sample No: 30-16-16 A @ 28 Location:



Sample No: 30-16-16 A @ 28 Location:

Resilient Modulus Test for material type 2

Data File 301616B2.DAT

Date: 06/13/00

Soil Sample 30-16-16 B @ 28
Location
Sample No.
Specific Gravity 0.00

SOIL SPECIMEN MEASUREMENTS:

Diameter Top 0.00
Middle 2.81
Bottom 0.00
Average 2.81
Membrane Thickness 0.0000
Net Diameter (inch) 2.81
Ht Specimen+Cap+Base 5.70
Seating Load: 10% σd
Ht Cap+Base 0.00
Initial Length,Lo(inch) 5.70
Inside Diameter of Mold 0.00

SOIL SPECIMEN WEIGHT:
Initial Wt. of Container
+Wet Soil-gms 875.1
Final Wt of Container
+Wet Siol-gms 0.0
Weight Wet Soil Used 875.1

SOIL SPECIMEN VOLUME:
Initial Area Ao
(inch²) 6.20
Volume Ao·Lo
(inch3) 35.33
Wet Density (pcf) 94.38

Compaction Water Content % 28.80
% Stauration 0.00
Dry Density (pcf) 73.28

Compaction Method Remolded

Water Content After
Mr Testing % 12.0

Vertical Spacing Between
LVDT Clamps(inch) 0.00

LOAD ID:
TP46-94 Subgrade soil
Number of cycles for precond. 500
Number of cycles per sequence 100
Load time 0.10 Cycle time 1.00 sec
Seating Load (lbs) 10.0

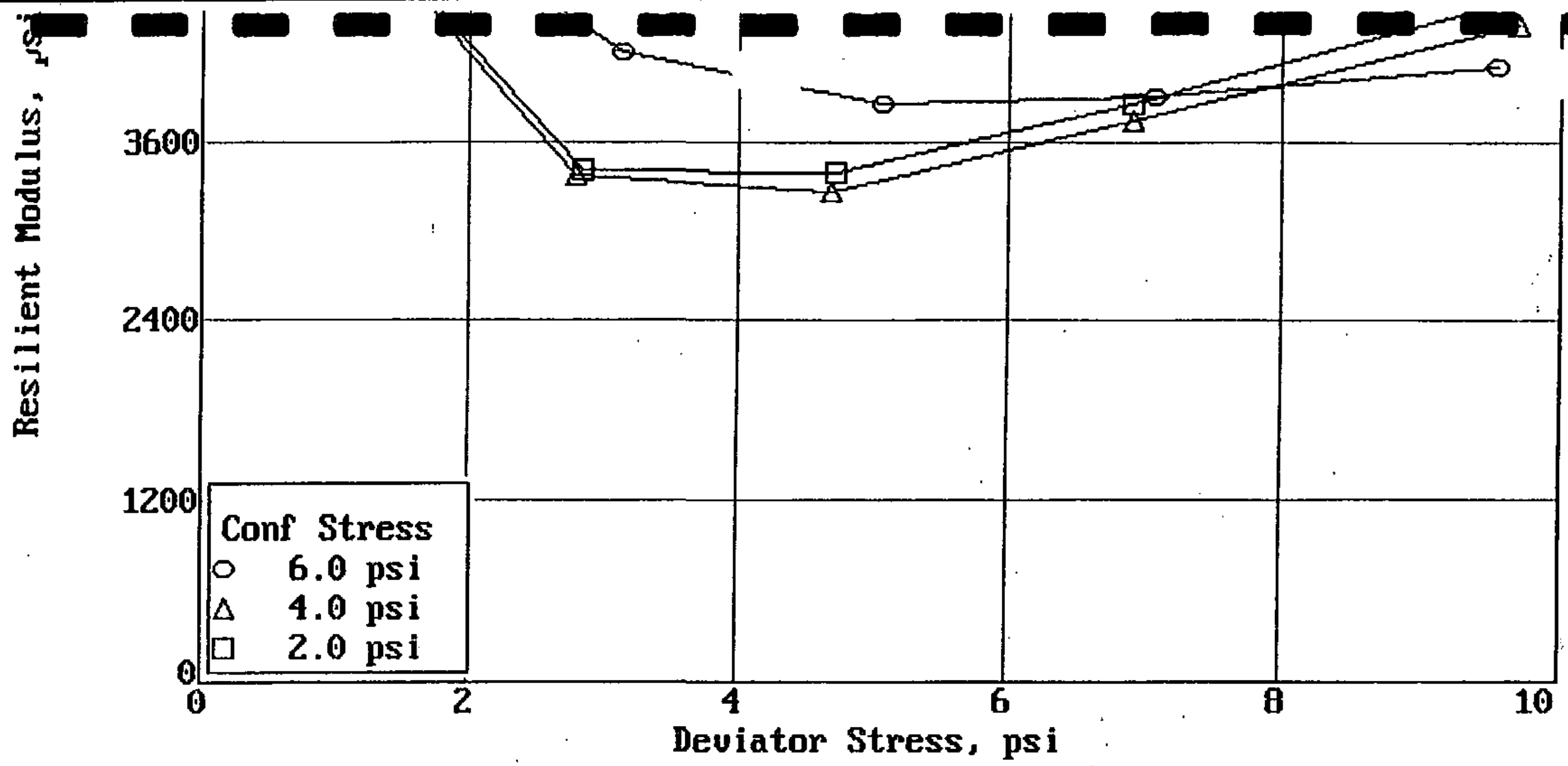
Waveform Type
Comments:
Cured for 28 days

A Chamber Press. σ3 psi	B Nominal σd psi	C Mean Deviator Load lbs	D Standard Deviation of Load lbs	E Applied Deviator Stress psi	F Mean Recov Of LVDT #1 inch	G Mean Recov Of LVDT #2 inch	H Mean Recov. Def. inch	I Std. Dev. of Recov. Def. inch	J Mean of Resilient Strain in/in	K Mean of Mr psi	L Std Dev of Mr psi	M θ (σd+3σ3) psi
6.0	1.8	8.66	0.03	1.398	0.001472	0.001572	0.001518	0.000006	0.000266	5252	16	19.398
6.0	3.6	19.42	0.07	3.134	0.004267	0.004234	0.004251	0.000005	0.000746	4203	11	21.134
6.0	5.4	31.42	0.03	5.069	0.007489	0.007478	0.007484	0.000006	0.001313	3862	2	23.069
6.0	7.2	43.83	0.04	7.073	0.010396	0.010263	0.010329	0.000008	0.001812	3904	3	25.073
6.0	9.0	59.19	0.11	9.551	0.013458	0.013119	0.013288	0.000006	0.002331	4098	8	27.551
4.0	1.8	8.52	0.02	1.375	0.001551	0.001707	0.001629	0.000004	0.000286	4812	8	13.375
4.0	3.6	17.39	0.05	2.806	0.004776	0.004688	0.004732	0.000008	0.000830	3380	11	14.806
4.0	5.4	28.99	0.07	4.678	0.008271	0.008084	0.008177	0.000010	0.001434	3261	7	16.678
4.0	7.2	42.81	0.07	6.908	0.010630	0.010462	0.010546	0.000006	0.001850	3734	5	18.908
4.0	9.0	60.19	0.12	9.712	0.012789	0.012501	0.012645	0.000006	0.002218	4379	7	21.712
2.0	1.8	8.51	0.02	1.373	0.001640	0.001579	0.001609	0.000004	0.000282	4865	18	7.373
2.0	3.6	17.64	0.03	2.846	0.004757	0.004765	0.004761	0.000004	0.000835	3409	4	8.846
2.0	5.4	29.22	0.04	4.714	0.007945	0.007889	0.007917	0.000005	0.001389	3395	5	10.714
2.0	7.2	42.81	0.05	6.909	0.010275	0.010153	0.010212	0.000006	0.001791	3857	5	12.909
2.0	9.0	60.70	0.09	9.796	0.012386	0.012016	0.012201	0.000009	0.002140	4577	4	15.796

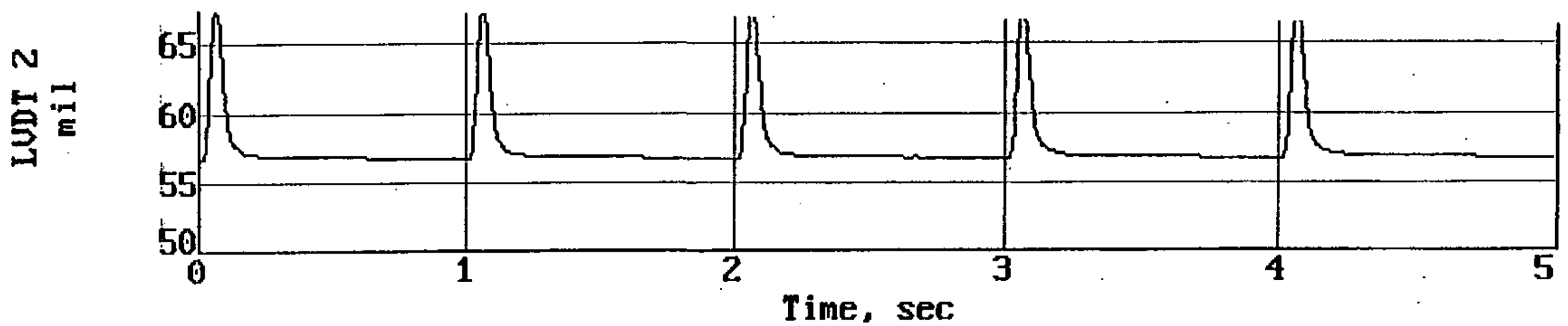
Data File 301616B2.DAT

Permanent Deformation Data:

Seq. #	Chamber Press. σ3 psi	Nominal σd psi	Actual Contact Stress psi	Permanent Def. inch
1	6.0	1.8	0.2	0.000026
2	6.0	3.6	0.4	0.000027
3	6.0	5.4	0.6	0.000036
4	6.0	7.2	0.8	0.000046
5	6.0	9.0	1.0	0.000057
6	4.0	1.8	0.2	0.000053
7	4.0	3.6	0.4	0.000054
8	4.0	5.4	0.6	0.000055
9	4.0	7.2	0.8	0.000057
10	4.0	9.0	1.0	0.000060
11	2.0	1.8	0.2	0.000057
12	2.0	3.6	0.4	0.000058
13	2.0	5.4	0.6	0.000059
14	2.0	7.2	0.8	0.000060
15	2.0	9.0	1.0	0.000062

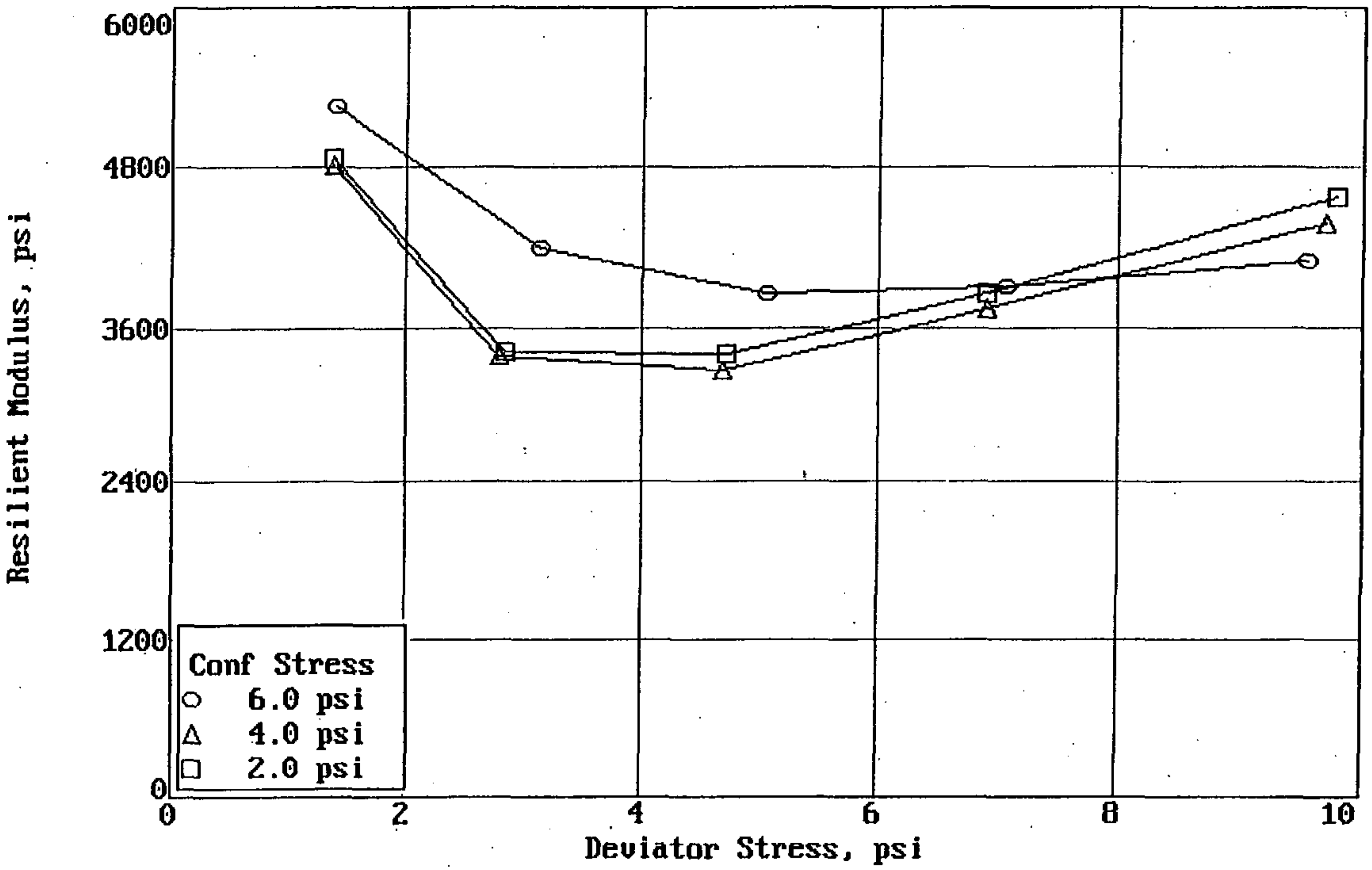


Sample No: 30-16-16 B @ 28 Location:



Sample No: 30-16-16 B @ 28 Location:

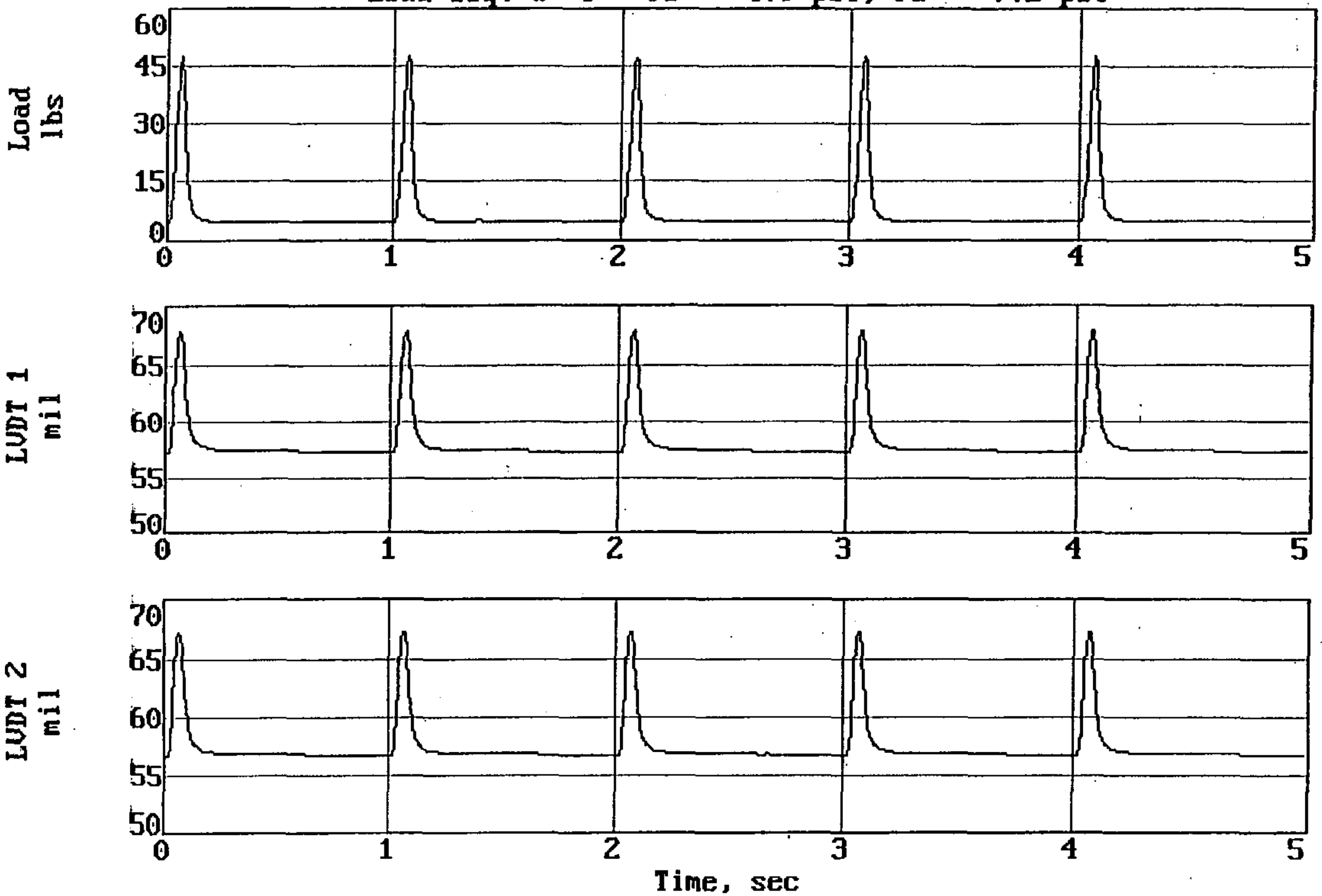
06/14/00 6:05 pm



Sample No: 30-16-16 B @ 28 Location:

06/14/00 6:06 pm

Load seq. # 9 σ3 = 4.0 psi, σd = 7.2 psi



Sample No: 30-16-16 B @ 28 Location:

Resilient Modulus Test for material type 2

Data File 301616C2.DAT

Date: 06/13/00

Soil Sample 30-16-16 C @ 28
Location
Sample No.
Specific Gravity 0.00

SOIL SPECIMEN MEASUREMENTS:

Diameter	Top	0.00
	Middle	2.82
	Bottom	0.00
	Average	2.82

Membrane Thickness 0.0000
Net Diameter (inch) 2.82
Ht Specimen+Cap+Base 5.78
Seating Load: 10% σd
Ht Cap+Base 0.00
Initial Length,Lo(inch) 5.78
Inside Diameter of Mold 0.00

SOIL SPECIMEN WEIGHT:
Initial Wt. of Container +Wet Soil-gms 886.5
Final Wt of Container +Wet Siol-gms 0.0
Weight Wet Soil Used 886.5

SOIL SPECIMEN VOLUME:
Initial Area Ao (inch²) 6.22
Volume Ao·Lo (inch3) 35.94
Wet Density (pcf) 93.98

Compaction Water Content % 29.10
% Stauration 0.00
Dry Density (pcf) 72.80

Compaction Method Remolded

Water Content After Mr Testing % 8.8

Vertical Spacing Between LVDT Clamps(inch) 0.00

LOAD ID:
TP46-94 Subgrade soil
Number of cycles for precond. 500
Number of cycles per sequence 100
Load time 0.10 Cycle time 1.00 sec
Seating Load (lbs) 10.0

Waveform Type
Comments:
Cured for 28 days

A Chamber Press. σ3 psi	B Nominal σd psi	C Mean Deviator Load lbs	D Standard Deviation of Load lbs	E Applied Deviator Stress psi	F Mean Recov Df LVDT #1 inch	G Mean Recov Df LVDT #2 inch	H Mean Recov. Def. inch	I Std. Dev. of Recov. Def. inch	J Mean of Resilient Strain in/in	K Mean of Mr psi	L Std Dev of Mr psi	M θ (σd+3σ3) psi
6.0	1.8	8.29	0.03	1.332	0.001747	0.001680	0.001713	0.000010	0.000297	4491	27	19.332
6.0	3.6	18.77	0.04	3.016	0.005187	0.004731	0.004959	0.000006	0.000859	3512	3	21.016
6.0	5.4	30.24	0.05	4.858	0.009148	0.008474	0.008811	0.000001	0.001526	3184	5	22.858
6.0	7.2	44.15	0.05	7.094	0.012162	0.011761	0.011961	0.000007	0.002071	3425	2	25.094
6.0	9.0	59.60	0.08	9.576	0.015102	0.014829	0.014963	0.000008	0.002591	3696	5	27.576
4.0	1.8	8.21	0.02	1.319	0.001732	0.001759	0.001745	0.000002	0.000302	4364	11	13.319
4.0	3.6	16.94	0.04	2.723	0.005312	0.005248	0.005280	0.000010	0.000914	2978	7	14.723
4.0	5.4	28.44	0.06	4.570	0.009048	0.009064	0.009056	0.000014	0.001568	2914	5	16.570
4.0	7.2	42.42	0.01	6.815	0.011974	0.011853	0.011914	0.000007	0.002063	3304	2	18.815
4.0	9.0	60.05	0.10	9.649	0.014319	0.014038	0.014178	0.000008	0.002455	3930	4	21.649
2.0	1.8	8.28	0.01	1.331	0.001756	0.001734	0.001745	0.000006	0.000302	4404	18	7.331
2.0	3.6	17.23	0.04	2.769	0.005144	0.005174	0.005159	0.000008	0.000893	3099	6	8.769
2.0	5.4	28.84	0.05	4.633	0.008816	0.008634	0.008725	0.000014	0.001511	3067	1	10.633
2.0	7.2	42.42	0.12	6.816	0.011573	0.011384	0.011479	0.000012	0.001988	3429	8	12.816
2.0	9.0	60.38	0.07	9.701	0.013891	0.013634	0.013762	0.000007	0.002383	4071	3	15.701

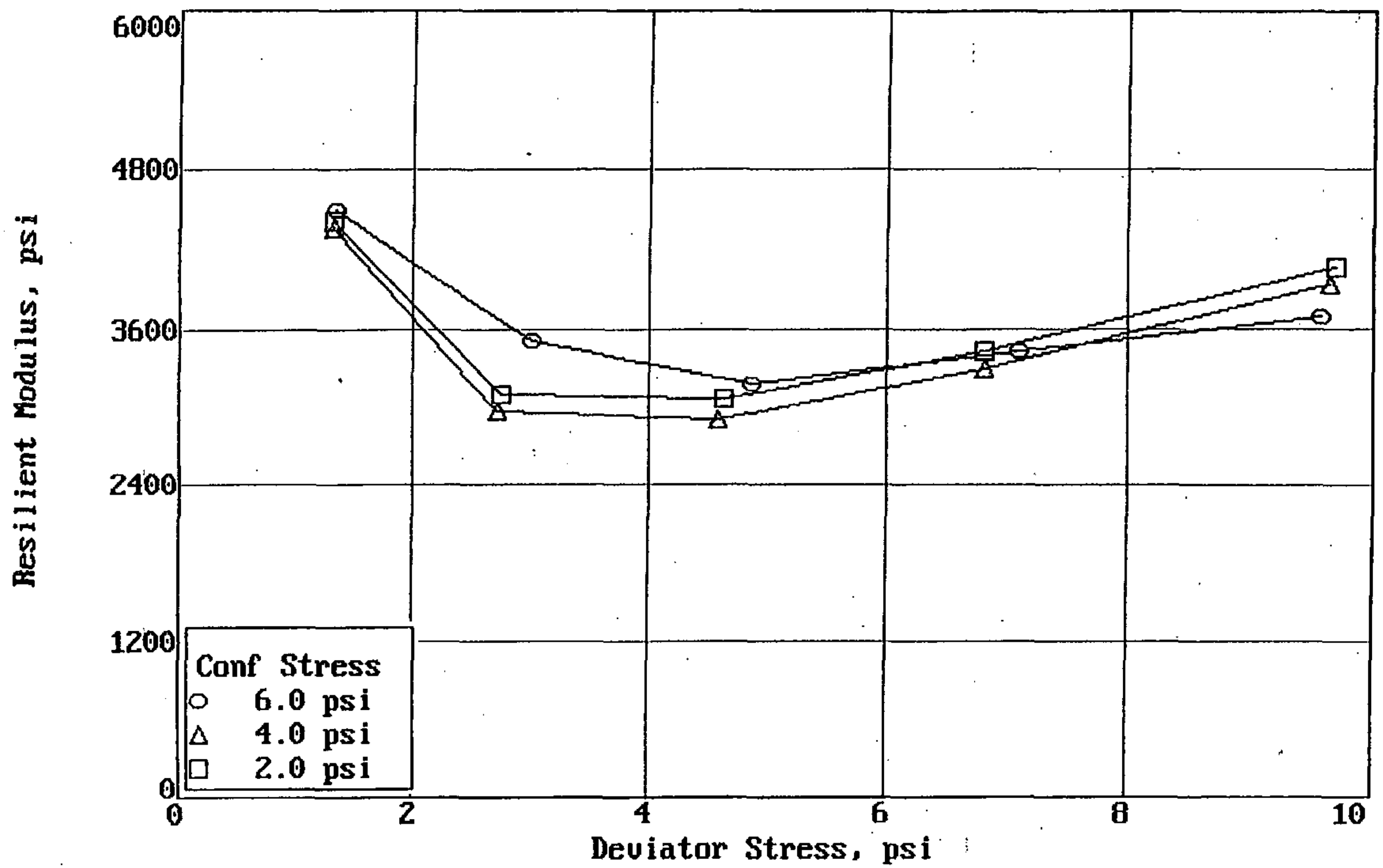
Data File 301616C2.DAT

Da

Permanent Deformation Data:

Seq. #	Chamber Press. $\sigma 3$ psi	Nominal σd psi	Actual Contact Stress psi	Permanent Def. inch
1	6.0	1.8	0.2	0.000018
2	6.0	3.6	0.4	0.000020
3	6.0	5.4	0.6	0.000032
4	6.0	7.2	0.8	0.000060
5	6.0	9.0	1.0	0.000067
6	4.0	1.8	0.2	0.000063
7	4.0	3.6	0.4	0.000064
8	4.0	5.4	0.6	0.000066
9	4.0	7.2	0.8	0.000067
10	4.0	9.0	1.0	0.000070
11	2.0	1.8	0.2	0.000067
12	2.0	3.6	0.4	0.000067
13	2.0	5.4	0.6	0.000069
14	2.0	7.2	0.8	0.000070
15	2.0	9.0	1.0	0.000072

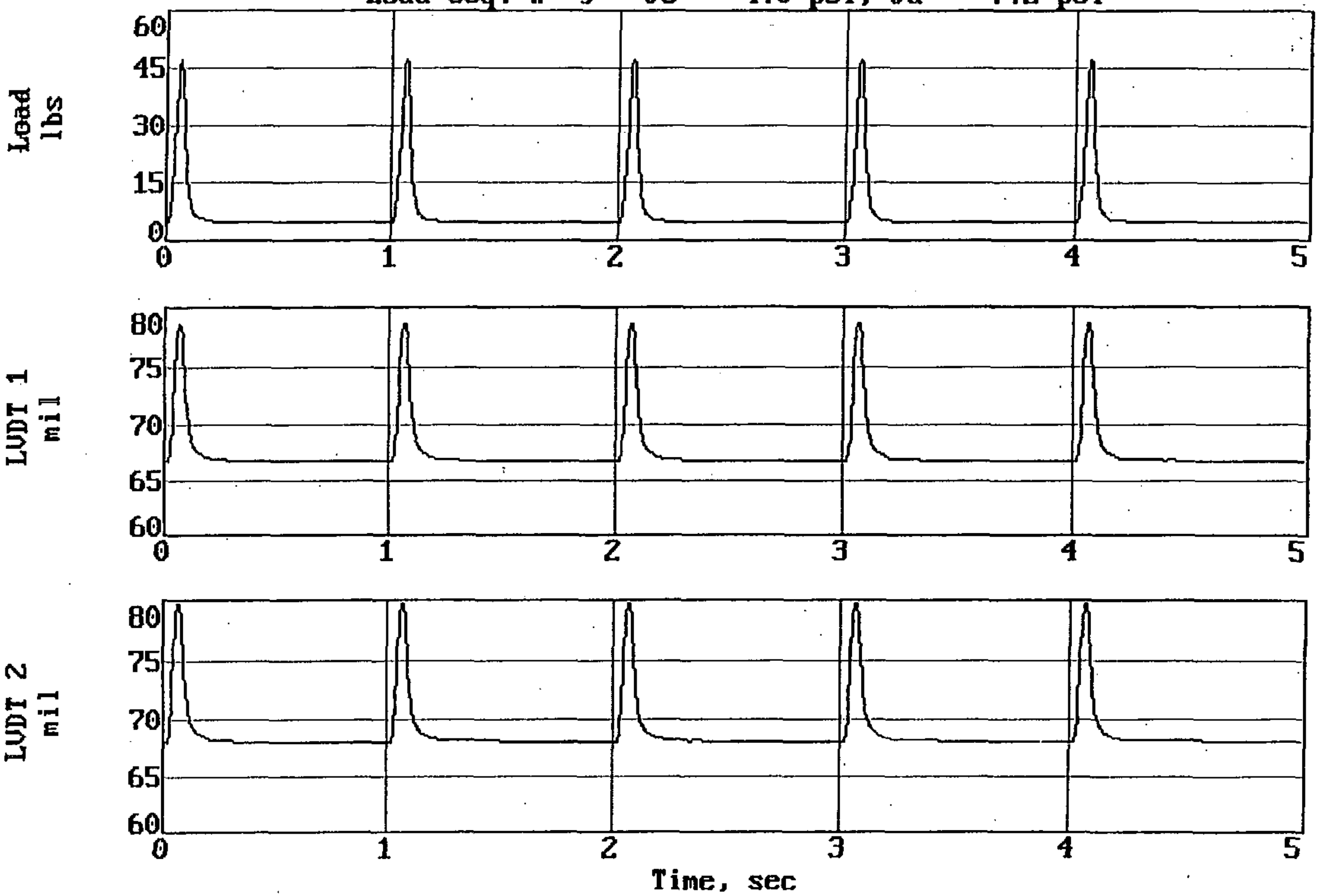
06/14/00 6:07 pm



Sample No: 30-16-16 C @ 28 Location:

06/14/00 6:07 pm

Load seq. # 9 σ3 = 4.0 psi, σd = 7.2 psi



Sample No: 30-16-16 C @ 28 Location:

*r3

Resilient Modulus Test for material type 2

Data File 302020A2.DAT

Date: 06/13/00

Soil Sample 30-20-20 A @ 28
Location
Sample No.
Specific Gravity 0.00

SOIL SPECIMEN MEASUREMENTS:

Diameter	Top	0.00
	Middle	2.82
	Bottom	0.00
	Average	2.82

Membrane Thickness 0.0000
Net Diameter (inch) 2.82
Ht Specimen+Cap+Base 5.69
Seating Load: 10% σd
Ht Cap+Base 0.00
Initial Length,Lo(inch) 5.69
Inside Diameter of Mold 0.00

SOIL SPECIMEN WEIGHT:
Initial Wt. of Container
+Wet Soil-gms 889.4
Final Wt of Container
+Wet Siol-gms 0.0
Weight Wet Soil Used 889.4

SOIL SPECIMEN VOLUME:
Initial Area Ao
(inch²) 6.23
Volume Ao·Lo
(inch3) 35.44
Wet Density (pcf) 95.62

Compaction Water Content % 34.90
% Stauration 0.00
Dry Density (pcf) 70.89

Compaction Method Remolded

Water Content After
Mr Testing % 18.3

Vertical Spacing Between
LVDT Clamps(inch) 0.00

LOAD ID:
TP46-94 Subgrade soil
Number of cycles for precond. 500
Number of cycles per sequence 100
Load time 0.10 Cycle time 1.00 sec
Seating Load (lbs) 10.0

Waveform Type
Comments:
Cured for 28 days

A Chamber Press. $\sigma 3$ psi	B Nominal σd psi	C Mean Deviator Load lbs	D Standard Deviation of Load lbs	E Applied Deviator Stress psi	F Mean Recov Of LVDT #1 inch	G Mean Recov Of LVDT #2 inch	H Mean Recov. Def. inch	I Std. Dev. of Recov. Def. inch	J Mean of Resilient Strain in/in	K Mean of Mr psi	L Std Dev of Mr psi	M Θ $(\sigma d+3\sigma 3)$ psi
6.0	1.8	8.57	0.06	1.375	0.000925	0.001070	0.000996	0.000008	0.000175	7850	50	19.375
6.0	3.6	19.56	0.03	3.139	0.002639	0.003005	0.002821	0.000002	0.000496	6326	10	21.139
6.0	5.4	32.28	0.06	5.180	0.004853	0.005480	0.005167	0.000007	0.000909	5700	13	23.180
6.0	7.2	45.95	0.06	7.373	0.006664	0.007738	0.007201	0.000005	0.001266	5822	5	25.373
6.0	9.0	60.29	0.04	9.673	0.008778	0.009654	0.009216	0.000011	0.001621	5968	7	27.673
4.0	1.8	8.48	0.01	1.360	0.000921	0.001090	0.001005	0.000003	0.000177	7699	31	13.360
4.0	3.6	18.28	0.04	2.933	0.002890	0.003248	0.003069	0.000008	0.000540	5434	23	14.933
4.0	5.4	30.96	0.05	4.968	0.005202	0.005659	0.005431	0.000005	0.000955	5202	9	16.968
4.0	7.2	46.12	0.02	7.401	0.006954	0.007545	0.007249	0.000004	0.001275	5805	2	19.401
4.0	9.0	61.10	0.04	9.803	0.008316	0.009064	0.008690	0.000004	0.001528	6414	5	21.803
2.0	1.8	8.62	0.02	1.384	0.000964	0.001082	0.001023	0.000003	0.000180	7690	19	7.384
2.0	3.6	18.64	0.01	2.991	0.002881	0.003198	0.003040	0.000008	0.000535	5595	13	8.991
2.0	5.4	31.55	0.06	5.062	0.005025	0.005528	0.005276	0.000008	0.000928	5455	9	11.062
2.0	7.2	46.45	0.05	7.452	0.006740	0.007378	0.007059	0.000005	0.001241	6003	3	13.452
2.0	9.0	61.71	0.08	9.902	0.008079	0.008831	0.008455	0.000005	0.001487	6659	5	15.902

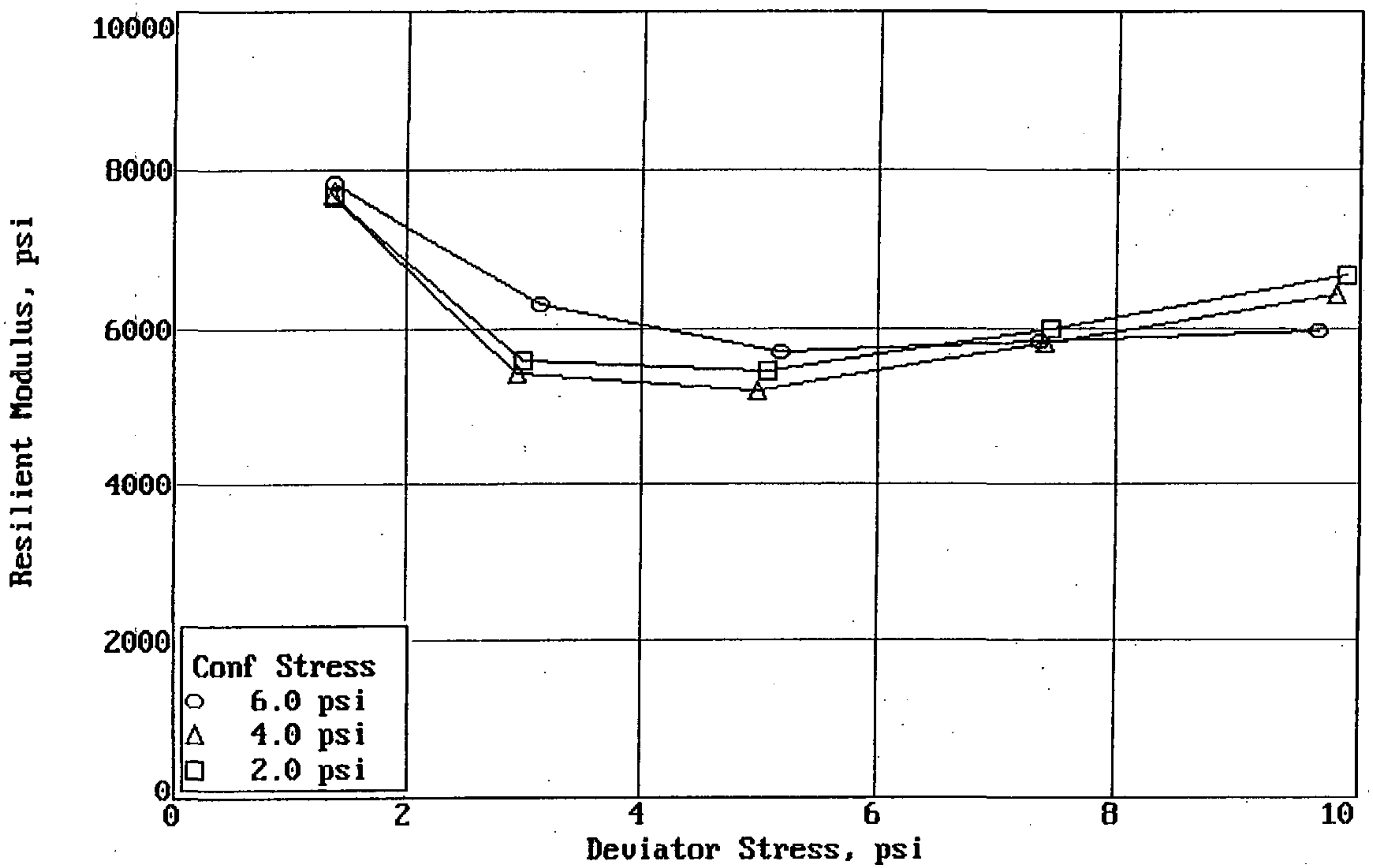
Data File 302020A2.DAT

Da

Permanent Deformation Data:

Seq. #	Chamber Press. $\sigma 3$ psi	Nominal σd psi	Actual Contact Stress psi	Permanent Def. inch
1	6.0	1.8	0.2	0.000015
2	6.0	3.6	0.4	0.000017
3	6.0	5.4	0.6	0.000023
4	6.0	7.2	0.8	0.000030
5	6.0	9.0	1.0	0.000037
6	4.0	1.8	0.2	0.000035
7	4.0	3.6	0.4	0.000035
8	4.0	5.4	0.6	0.000036
9	4.0	7.2	0.8	0.000037
10	4.0	9.0	1.0	0.000040
11	2.0	1.8	0.2	0.000038
12	2.0	3.6	0.4	0.000038
13	2.0	5.4	0.6	0.000039
14	2.0	7.2	0.8	0.000040
15	2.0	9.0	1.0	0.000041

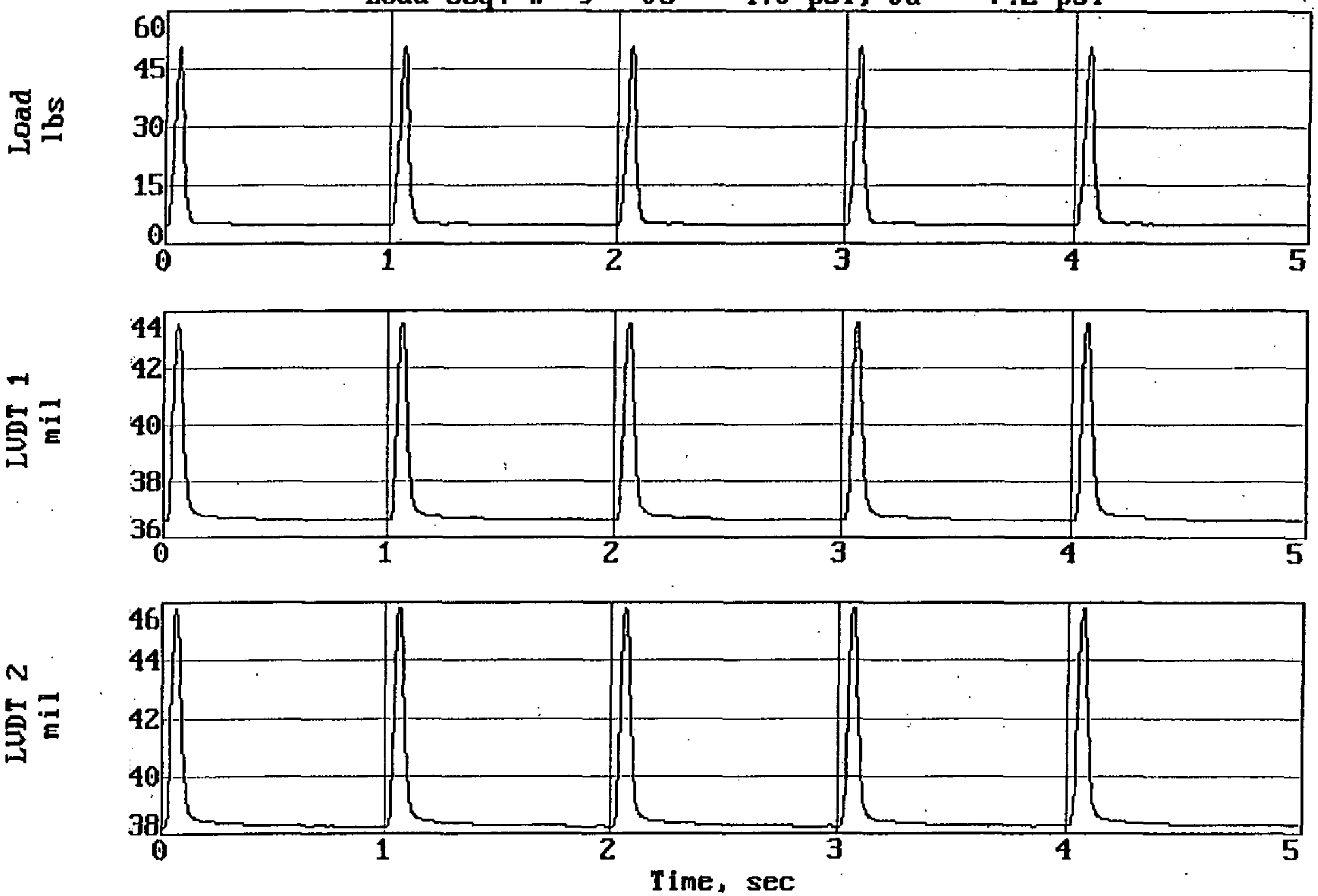
06/14/00 6:08 pm



Sample No: 30-20-20 A @ 28 Location:

06/14/00 6:10 pm

Load seq. # 9 σ3 = 4.0 psi, σd = 7.2 psi



Sample No: 30-20-20 A @ 28 Location:

Resilient Modulus Test for material type 2

Data File 302020B2.DAT

Date: 06/13/00

Soil Sample 30-20-20 B @ 28
Location
Sample No.
Specific Gravity 0.00

SOIL SPECIMEN MEASUREMENTS:

Diameter	Top	0.00
	Middle	2.81
	Bottom	0.00
	Average	2.81

Membrane Thickness 0.0000
Net Diameter (inch) 2.81
Ht Specimen+Cap+Base 5.76
Seating Load: 10% σd
Ht Cap+Base 0.00
Initial Length,Lo(inch) 5.76
Inside Diameter of Mold 0.00

SOIL SPECIMEN WEIGHT:
Initial Wt. of Container
+Wet Soil-gms 873.0
Final Wt of Container
+Wet Siol-gms 0.0
Weight Wet Soil Used 873.0

SOIL SPECIMEN VOLUME:
Initial Area Ao
(inch²) 6.20
Volume Ao·Lo
(inch3) 35.72
Wet Density (pcf) 92.91

Compaction Water Content % 35.00
% Stauration 0.00
Dry Density (pcf) 68.82

Compaction Method Remolded

Water Content After
Mr Testing % 22.6

Vertical Spacing Between
LVDT Clamps(inch) 0.00

LOAD ID:
TP46-94 Subgrade soil
Number of cycles for precond. 500
Number of cycles per sequence 100
Load time 0.10 Cycle time 1.00 sec
Seating Load (lbs) 10.0

Waveform Type
Comments:
Cured for 28 days

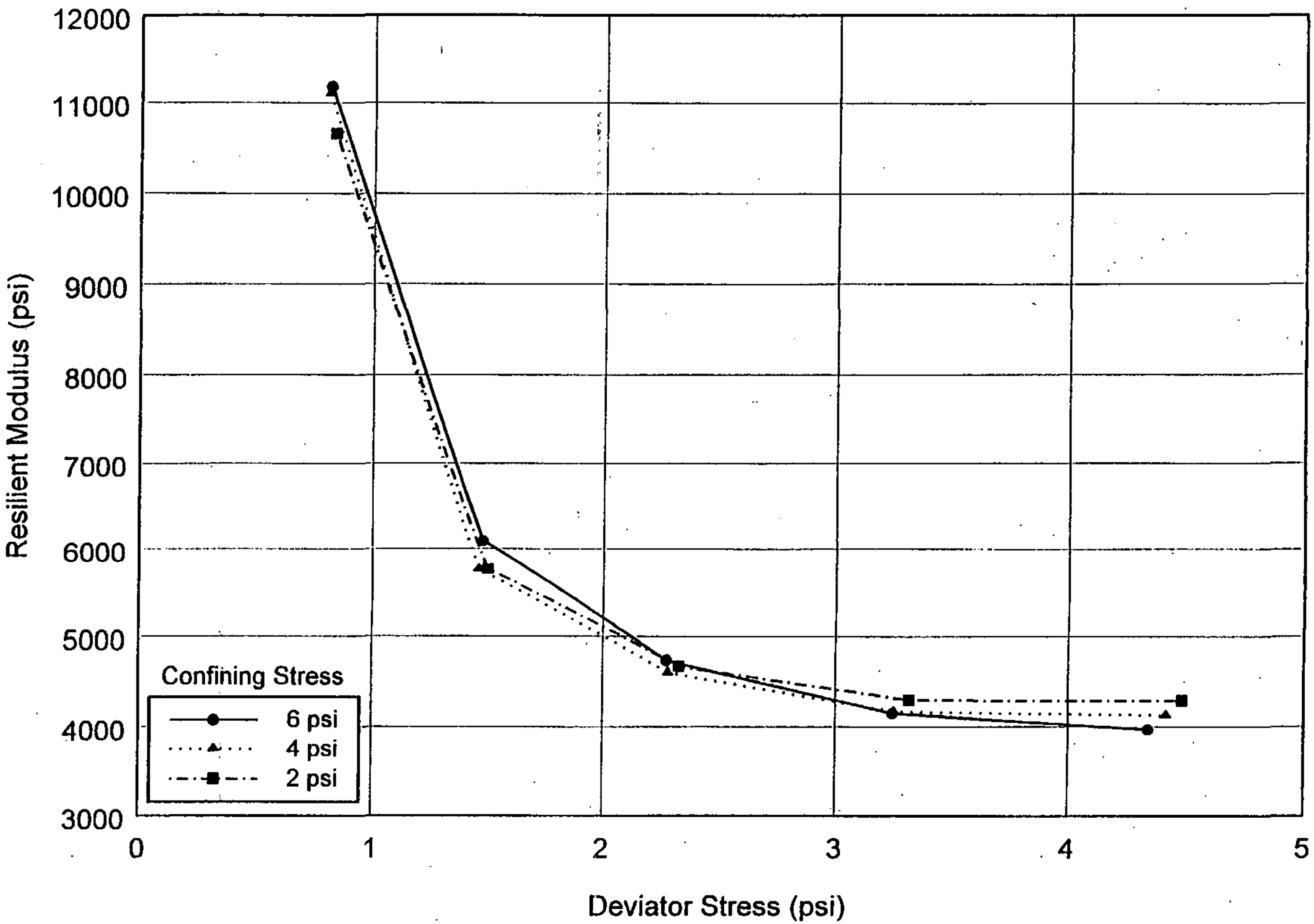
A Chamber Press. σ3 psi	B Nomina σd psi	C Mean Deviator Load lbs	D Standard Deviation of Load lbs	E Applied Deviator Stress psi	F Mean Recov Df LVDT #1 inch	G Mean Recov Df LVDT #1 inch	H Mean Recov Def. inch	I Std. Dev. of Recov. Def. inch	J Mean of Resilient Strain in/in	K Mean of Mr psi	L Std Dev of Mr psi	M Θ (σd+3σ3) psi
6.0	1.8	5.01	0.03	0.810	0.000373	0.000461	0.000417	0.000004	0.000072	11181	159	18.810
6.0	3.6	9.18	0.03	1.484	0.001284	0.001518	0.001401	0.000007	0.000243	6098	21	19.484
6.0	5.4	14.07	0.04	2.275	0.002543	0.002986	0.002765	0.000004	0.000480	4737	16	20.275
6.0	7.2	20.07	0.01	3.246	0.004117	0.004880	0.004499	0.000002	0.000782	4152	4	21.246
6.0	9.0	26.86	0.03	4.344	0.005799	0.006797	0.006298	0.000004	0.001094	3969	7	22.344
4.0	1.8	4.97	0.03	0.804	0.000370	0.000463	0.000417	0.000002	0.000072	11105	188	12.804
4.0	3.6	9.06	0.02	1.465	0.001327	0.001600	0.001464	0.000005	0.000254	5761	41	13.465
4.0	5.4	14.11	0.04	2.282	0.002614	0.003091	0.002853	0.000011	0.000496	4603	24	14.282
4.0	7.2	20.10	0.02	3.250	0.004137	0.004831	0.004484	0.000011	0.000779	4172	21	15.250
4.0	9.0	27.32	0.03	4.418	0.005654	0.006661	0.006158	0.000010	0.001070	4129	12	16.418
2.0	1.8	5.14	0.03	0.831	0.000405	0.000493	0.000449	0.000004	0.000078	10654	215	6.831
2.0	3.6	9.30	0.03	1.504	0.001371	0.001634	0.001503	0.000006	0.000261	5760	64	7.504
2.0	5.4	14.40	0.03	2.329	0.002631	0.003107	0.002869	0.000005	0.000499	4671	11	8.329
2.0	7.2	20.51	0.03	3.317	0.004082	0.004796	0.004439	0.000009	0.000771	4300	13	9.317
2.0	9.0	27.74	0.06	4.486	0.005507	0.006530	0.006019	0.000016	0.001046	4289	15	10.486

Data File 302020B2.DAT

Da

Permanent Deformation Data:

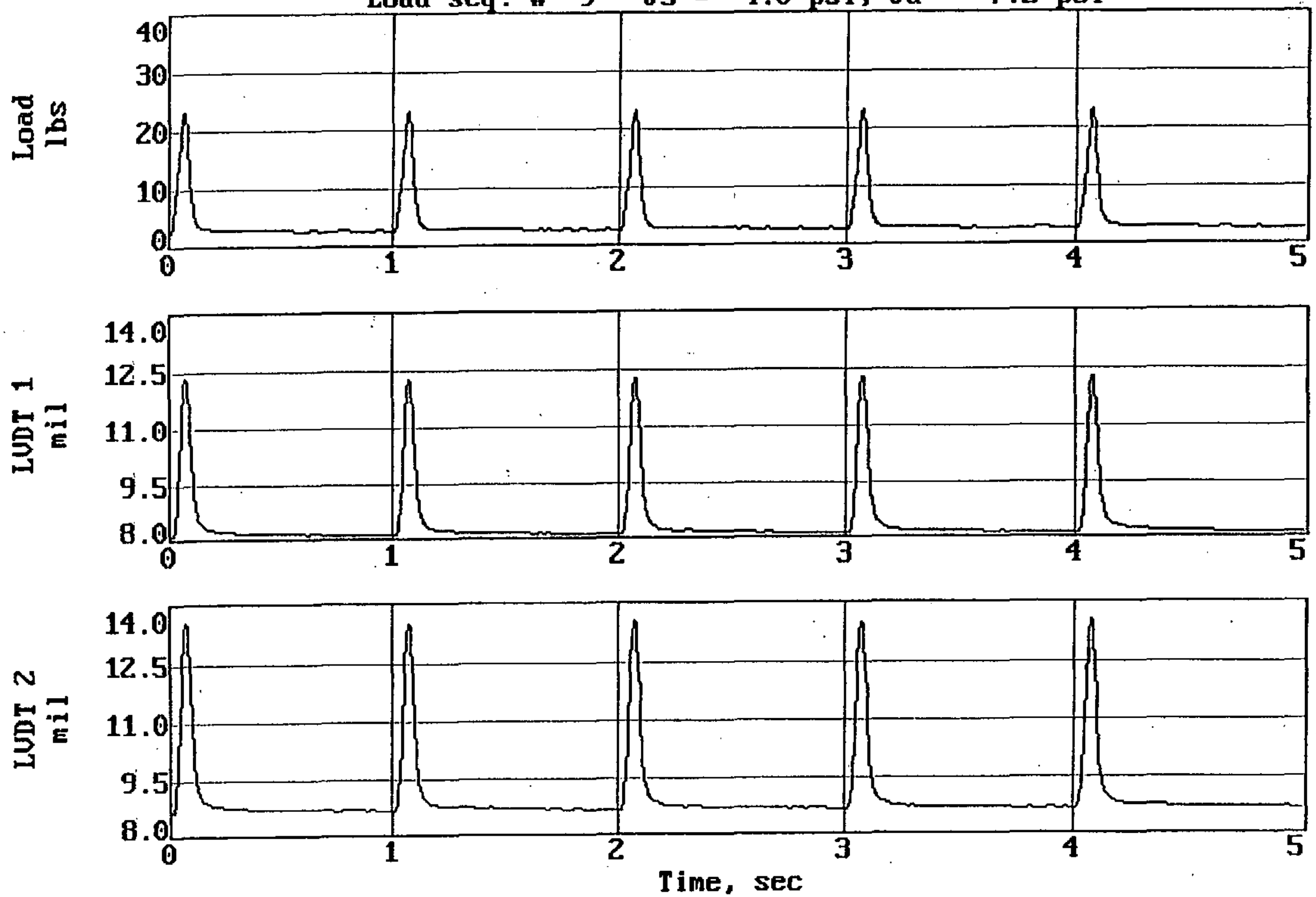
Seq. #	Chamber Press. σ3 psi	Nominal σd psi	Actual Contact Stress psi	Permanent Def. inch
1	6.0	1.8	0.2	0.000003
2	6.0	3.6	0.4	0.000003
3	6.0	5.4	0.6	0.000005
4	6.0	7.2	0.8	0.000006
5	6.0	9.0	1.0	0.000008
6	4.0	1.8	0.2	0.000007
7	4.0	3.6	0.4	0.000008
8	4.0	5.4	0.6	0.000008
9	4.0	7.2	0.8	0.000008
10	4.0	9.0	1.0	0.000009
11	2.0	1.8	0.2	0.000008
12	2.0	3.6	0.4	0.000009
13	2.0	5.4	0.6	0.000009
14	2.0	7.2	0.8	0.000009
15	2.0	9.0	1.0	0.000010



Sample No. 30-20-20 B

06/14/00 6:55 pm

Load seq. # 9 $\sigma 3$ = 4.0 psi, σd = 7.2 psi



Sample No: 30-20-20 B @ 28 Location:

Resilient Modulus Test for material type 2

Data File 302020C2.DAT

Date: 06/13/00

Soil Sample 30-20-20 C @ 28
Location
Sample No.
Specific Gravity 0.00

SOIL SPECIMEN MEASUREMENTS:

Diameter	Top	0.00
	Middle	2.81
	Bottom	0.00
	Average	2.81

Membrane Thickness 0.0000
Net Diameter (inch) 2.81
Ht Specimen+Cap+Base 5.71
Seating Load: 10% σd
Ht Cap+Base 0.00
Initial Length,Lo(inch) 5.71
Inside Diameter of Mold 0.00

SOIL SPECIMEN WEIGHT:
Initial Wt. of Container +Wet Soil-gms 927.4
Final Wt of Container +Wet Siol-gms 0.0
Weight Wet Soil Used 927.4

SOIL SPECIMEN VOLUME:
Initial Area Ao (inch²) 6.21
Volume Ao·Lo (inch3) 35.47
Wet Density (pcf) 99.61

Compaction Water Content % 37.60
% Stauration 0.00
Dry Density (pcf) 72.39

Compaction Method Remolded

Water Content After Mr Testing % 17.9

Vertical Spacing Between LVDT Clamps(inch) 0.00

LOAD ID:
TP46-94 Subgrade soil
Number of cycles for precond. 500
Number of cycles per sequence 100
Load time 0.10 Cycle time 1.00 sec
Seating Load (lbs) 10.0

Waveform Type
Comments:
Cured for 28 days

A Chamber Press. σ3 psi	B Nominal σd psi	C Mean Deviator Load lbs	D Standard Deviation of Load lbs	E Applied Deviator Stress psi	F Mean Recov Df LVDT #1 inch	G Mean Recov Df LVDT #2 inch	H Mean Recov. Def. inch	I Std. Dev. of Recov. Def. inch	J Mean of Resilient Strain in/in	K Mean of Mr psi	L Std Dev of Mr psi	M θ (σd+3σ3) psi
6.0	1.8	7.56	0.02	1.217	0.001596	0.001570	0.001582	0.000007	0.000277	4393	18	19.217
6.0	3.6	16.74	0.06	2.695	0.004839	0.004875	0.004854	0.000009	0.000850	3172	8	20.695
6.0	5.4	28.94	0.03	4.660	0.008107	0.008282	0.008195	0.000007	0.001435	3248	1	22.660
6.0	7.2	43.48	0.06	7.001	0.010863	0.011076	0.010969	0.000005	0.001920	3645	3	25.001
6.0	9.0	59.88	0.02	9.642	0.013033	0.013255	0.013144	0.000010	0.002301	4190	2	27.642
4.0	1.8	8.13	0.02	1.309	0.001499	0.001537	0.001518	0.000006	0.000266	4926	16	13.309
4.0	3.6	17.23	0.04	2.775	0.004575	0.004611	0.004593	0.000008	0.000804	3451	13	14.775
4.0	5.4	29.06	0.02	4.679	0.007765	0.007892	0.007828	0.000006	0.001370	3414	2	16.679
4.0	7.2	43.48	0.07	7.001	0.010617	0.010770	0.010693	0.000007	0.001872	3740	3	19.001
4.0	9.0	60.21	0.09	9.695	0.012661	0.012868	0.012765	0.000009	0.002235	4338	6	21.695
2.0	1.8	8.27	0.03	1.332	0.001508	0.001510	0.001508	0.000005	0.000264	5046	25	7.332
2.0	3.6	17.51	0.05	2.819	0.004445	0.004481	0.004463	0.000009	0.000781	3607	6	8.819
2.0	5.4	29.20	0.03	4.702	0.007608	0.007731	0.007670	0.000002	0.001343	3502	3	10.702
2.0	7.2	43.65	0.06	7.028	0.010406	0.010533	0.010469	0.000009	0.001833	3835	2	13.028
2.0	9.0	60.58	0.04	9.755	0.012382	0.012584	0.012483	0.000004	0.002185	4464	4	15.755

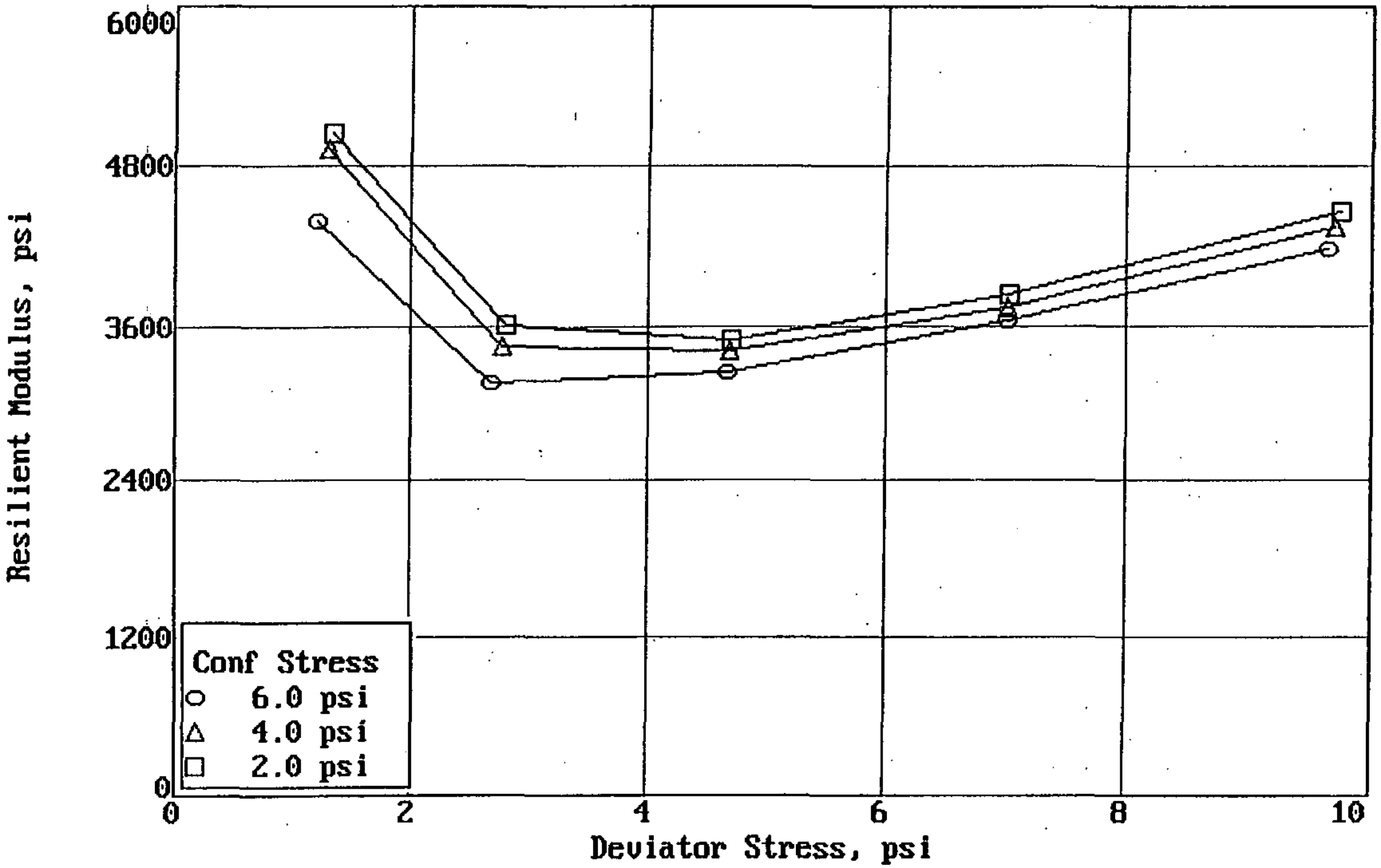
Data File 302020C2.DAT

Da

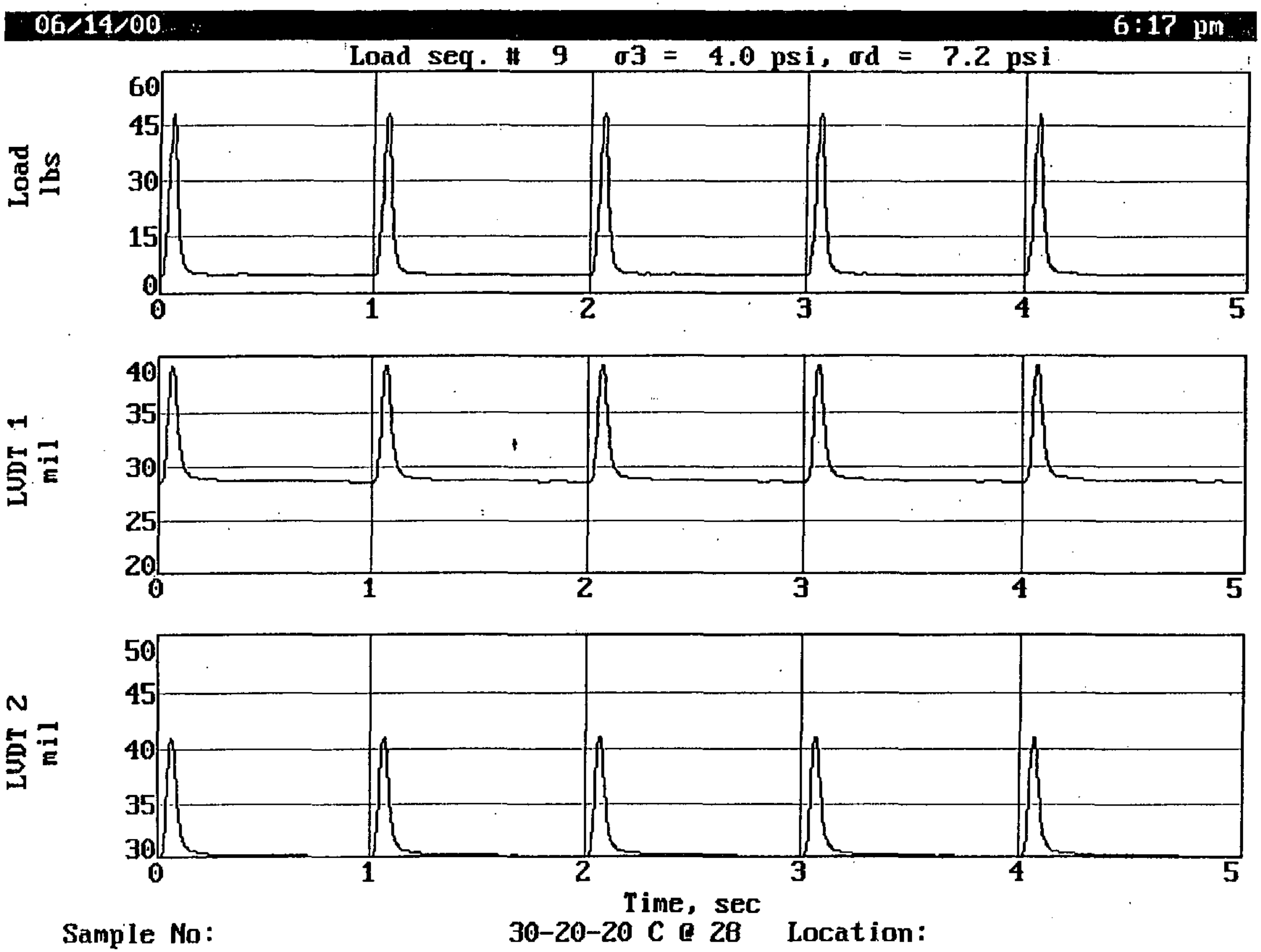
Permanent Deformation Data:

Seq. #	Chamber Press. $\sigma 3$ psi	Nominal σd psi	Actual Contact Stress psi	Permanent Def. inch
1	6.0	1.8	0.2	0.000022
2	6.0	3.6	0.4	0.000022
3	6.0	5.4	0.6	0.000025
4	6.0	7.2	0.8	0.000027
5	6.0	9.0	1.0	0.000030
6	4.0	1.8	0.2	0.000027
7	4.0	3.6	0.4	0.000027
8	4.0	5.4	0.6	0.000028
9	4.0	7.2	0.8	0.000029
10	4.0	9.0	1.0	0.000031
11	2.0	1.8	0.2	0.000028
12	2.0	3.6	0.4	0.000029
13	2.0	5.4	0.6	0.000030
14	2.0	7.2	0.8	0.000031
15	2.0	9.0	1.0	0.000032

06/14/00 6:17 pm



Sample No: 30-20-20 C @ 28 Location:



06/14/00
6:17 pm
Load seq. # 9 σ3 = 4.0 psi, σd = 7.2 psi
Load
lbs
60
45
30
15
0
0
1
2
3
4
5
LVDT 1
mil
40
35
30
25
20
LVDT 2
mil
50
45
40
35
30
Time, sec
Sample No:
30-20-20 C @ 28
Location:

APPENDIX D
DATA QUALITY REVIEW

APPENDIX D
CHEMICAL DATA QUALITY REVIEW

Six amended sediment samples were collected on May 5, 2000, (samples P-0503-G-1, P-0503-G-5, P-0503-G-8, P-0503-C2-1, P-0503-C2-6, and P-0503-C2-13). Three samples (P-0503-G-1, P-0503-G-5, and P-0503-G-8) were submitted to Severn Trent Laboratories of Pittsburgh, PA, for modified multiple extraction procedure (MEP) and analysis of the leachate. The American National Standard Institute (ANSI) 16.1 was performed on the remaining samples (P-0503-C2-1, P-0503-C2-6, and P-0503-C2-13) at the Hart Crowser laboratory in Seattle, WA. The resulting leachate (samples C1-L1 through L8, C2-L1 through L8, and C3-L1 through C3-L8) was submitted to Severn Trent Laboratories for analysis of the leachate.

The following criteria were evaluated in the standard data quality review process:

- Holding times;
- Method blanks;
- Procedure blanks;
- Surrogate recoveries;
- Matrix spike/matrix spike duplicate (MS/MSD) recoveries;
- Laboratory control sample/laboratory control sample duplicate (LCS/LCSD) recoveries;
- Laboratory duplicate relative percent difference (RPD); and
- Reporting limits.

Modified MEP

Three amended sediment samples were submitted for modified MEP (EPA Method 1320 as modified by NJDEP, 1998). The leachate was submitted for the analysis of the following:

- Total metals (EPA Method 200 series);
- Semivolatile organics (EPA Method 8270);
- Pesticides/PCBs (EPA Method 8081/8082);
- Polychlorinated dibenzo-p-dioxins and dibenzofurans (dioxins/furans) (days 1 and 7 only) (EPA Method 8290);
- Total organic carbon (TOC) (EPA Method 9060);
- Cyanide (EPA Method 9012A); and
- Total suspended solids (TSS) (EPA Method 160.2).

Minor Problems Encountered

Total Metals. All required holding times were met. Continuing calibration blank contamination of zinc and silver was detected. Associated sample results less than five times the blank contamination were qualified as non-detect (U). Method blank contamination of antimony, barium, magnesium, nickel, potassium, silver, sodium, and zinc was detected. Associated sample results less than five times the blank contamination were qualified as non-detect (U). MS/MSD and LCS recoveries and MS/MSD RPDs were within control limits. Reporting limits for cadmium were slightly above the screening criteria.

Semivolatile Organics. The extraction holding time for Day 1 was exceeded. Associated sample results were qualified as estimated (J/UJ). No method blank contamination was detected. Surrogate, MS/MSD, and LCS/LCSD recoveries were within control limits. MS/MSD RPDs and LCS/LCSD RPDs were within control limits. Reporting limits for some semivolatile organic compounds were exceeded slightly.

Pesticides. The extraction holding time for Day 1 was exceeded. Associated sample results were qualified as estimated (J/UJ). No method blank contamination was detected. Surrogate recoveries of tetrachloro-m-xylene and decechlorobiphenyl were below control limits for Day 2 in sample P-0503-G-8. Associated sample results were qualified as estimated (J/UJ). MS/MSD and LSC/LCSD recoveries were within control limits. MS/MSD RPDs and LCS/LCSD RPDs were within control limits. Reporting limits for some pesticides were above the screening criteria.

PCBs. The extraction holding time for Day 1 was exceeded. Associated sample results were qualified as estimated (UJ). No method blank contamination was detected. Surrogate recoveries of tetrachloro-m-xylene and decechlorobiphenyl were below control limits for Day 2 in sample P-0503-G-8. Associated sample results were qualified as estimated (UJ). MS/MSD and LCS/LCSD recoveries were within control limits. MS/MSD RPDs and LCS/LCSD RPDs were within control limits. Total PCB reporting limits were above the screening criteria.

Dioxins/Furans. All required holding times were met. No method blank contamination was detected. Surrogate and LCS recoveries were within control limits. Reporting limits were acceptable.

Total organic carbon. All required holding times were met. TOC was detected *in the method blank for Day 1 through 4. No qualifiers were applied as TOC* was detected in the associated samples at greater than five times the concentration in the method blank. MS/MSD and LCS/LCSD recoveries were within control limits. MS/MSD RPDs and LCS/LCSD RPDs were within control limits. Reporting limits were acceptable.

Cyanide. All required holding times were met. No method blank contamination was detected. MS/MSD recoveries were below control limits in Days 6 and 7. Associated sample results were qualified as estimated (UJ). LCS/LCSD recoveries and LCS/LCSD RPDs were within control limits. Reporting limits were acceptable.

TSS. All required holding times were met. No method blank contamination was detected. LCS/LCSD recoveries and LCS/LCSD RPDs were within control limits. Laboratory duplicate RPDs were within control limits. Reporting limits were acceptable.

ANSI 16.1

Twenty-five leachate samples were submitted for analysis of the following:

- Total metals (EPA Method 6000/7000);
- Semivolatile organics (EPA Method 8270);
- Pesticides/PCBs (EPA Method 8081/8082);
- Polychlorinated dibenzo-p-dioxins and dibenzofurans (dioxins/furans) (EPA Method 8290);
- Total organic carbon (TOC) (EPA Method 9060); and
- Total suspended solids (EPA Method 160.2).

Minor Problems Encountered

Total Metals. All required holding times were met. Continuing calibration blank contamination of beryllium, calcium, chromium, mercury, nickel, silver, and zinc was detected. Associated sample results less than five times the blank contamination were qualified as non-detect (U). Aluminum, antimony, beryllium, calcium, chromium, iron, mercury, sodium, and zinc were detected in the method blanks. The associated sample results less than five times the blank contamination were qualified as non-detect (U). Antimony, barium, chromium, manganese, sodium, and vanadium were detected in the procedure blank. Associated sample results less than five times the blank contamination were qualified (B). MS/MSD and LCS recoveries and MS/MSD RPDs were within control limits. Reporting limits for cadmium and arsenic were slightly below the screening criteria.

Semivolatile Organics. Extraction holding times for samples C1-L3 through C1-L5, C2-L3 through C2-L5, and C3-L3 through C3-L5 were exceeded.

Associated sample results were qualified as estimated (J/UJ). Two times the extraction holding times were exceeded for samples C1-L2, C2-L2, C3-L2. Associated non-detect results were qualified as rejected (UR) and detected results were qualified as estimated (J). No method blank contamination was detected. Diethylphthalate and phenol were detected in the procedure blank. Associated sample results less than five times the blank contamination were qualified (B). Surrogate recoveries were within control limits. MS/MSD and LCS/LCSD recoveries and MS/MSD RPDs were within control limits. LCS/LCSD RPDs for pentachlorophenol were above control limits in samples C1-L6, C2-L6, and C3-L6. No qualifiers were assigned as the remaining LCS/LCSD recoveries were acceptable. Reporting limits for some semivolatile organic compounds were above the screening criteria.

Pesticides. Extraction holding times for samples C1-L3 through C1-L5, C2-L3 through C2-L5, and C3-L3 through C3-L5 were exceeded. Associated sample results were qualified as estimated (J/UJ). Two times the extraction holding times were exceeded for samples C1-L2, C2-L2, and C3-L2. Associated non-detect results were qualified as rejected (UR) and detected results were qualified as estimated (J). No method blank contamination was detected. Alpha-chlordane was detected in the procedure blank. No qualifiers were assigned as alpha-chlordane was not detected in the associated samples. Surrogate recoveries were within control limits. MS/MSD and LCS/LCSD recoveries were within control limits. MS/MSD RPDs and LCS/LCSD RPDs were within control limits. Reporting limits for some pesticides were above the screening criteria.

PCBs. Extraction holding times for samples C1-L3 through C1-L5, C2-L3 through C2-L5, and C3-L3 through C3-L5 were exceeded. Associated sample results were qualified as estimated (J/UJ). Two times the extraction holding times were exceeded for samples C1-L2, C2-L2, and C3-L2. Associated non-detect results were qualified as rejected (UR) and detected results were qualified as estimated (J). No method blank or procedure blank contamination was detected. Surrogate recoveries were within control limits. LCS/LCSD recoveries and LCS/LCSD RPDs were within control limits. Reporting limits for total PCBs were above the screening criteria.

Dioxins/Furans. All required holding times were met. OCDD was detected in the method blank. No qualifiers were assigned as OCDD was not detected in the associated sample results. No procedure blank contamination was detected. Surrogate and LCS recoveries were within control limits. Laboratory duplicate RPDs were within control limits. Reporting limits were acceptable.

Total Organic Carbon. The holding times for samples C1-L1, C2-L1, and C3-L1 were exceeded. Associated sample results were qualified as estimated (J). No method blank contamination was detected. LCS recoveries were within control limits. Laboratory duplicate RPDs were within control limits. Reporting limits were acceptable.

Total Solids. All required holding times were met. No method blank contamination was detected. LCS/LCSD recoveries and LCS/LCSD RPDs were within control limits. Reporting limits were acceptable.

F:\docs\jobs\492418\PROPAT12-13-00.doc