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FINAL
TREATABILITY STUDY REPORT
OPERABLE UNIT #2
ASBESTOS DUMP SITES
MORRIS COUNTY, NEW JERSEY
Work Assignment: C02110
(Ref. No. 1-635-297)

Prepared for:
U.S. Environmental Protection Agency

Contract: 68-W9-0003

TRC
TRC Environmental Corporation

DRS 002 0954

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ASBESTOS DUMP SITES
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Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Emergency and Remedial Response Division
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New York, New York 10278

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1.0 INTRODUCTION/REPORT ORGANIZATION

1.1 Project Description

The treatability study has been initiated by the Environmental Protection Agency (EPA), under EPA Contract No. 68-W9-0003 (TES 6), Work Assignment No. C02110, in order to assess the viability of the solidification/stabilization technology for the New Jersey Asbestos Dump Superfund Site - Operable Unit 2 (OU-2). The objective of the study is to determine design specifications and to identify limitations and potential problems that could arise from solidification of Asbestos Contaminated Material (ACM) present at the OU-2 Site.

TRC Environmental Corporation (TRC), under contract to EPA has conducted the treatability study in general accordance with the Treatability Study Work Plan, and the Field Sampling and Analysis Methodology Plan Operable Unit #2, Asbestos Dump Sites, Morris County, New Jersey, dated November 19, 1991 and February 20, 1992 respectively.

The subcontractor selected to perform the laboratory portion of the treatability study was

Kiber Associates Inc. (Kiber)
4000 Dekalb Technical Parkway, Suite 200
Atlanta, GA 30340
Contact: Steve Zarlinski

The activities associated with this treatability study, and described within this report, include the following:

- collect and ship raw waste samples;
- conduct physical analyses of ACM;
- conduct chemical analyses of ACM;
- prescreen/select mixtures;
- solidify raw waste material;
- perform testing of solidified cores;
- analyze results;
- prepare and submit draft treatability report; and
- prepare and submit final treatability report

1.2 Report Organization

This report presents the study procedures, test methods, analytical results, and assessments made under the solidification treatability study. The study was divided into four tasks, with the objectives of minimizing costs and streamlining the testing process.

This report is presented in seven sections. Section 2.0 presents site background information and details of previous investigations. Section 3.0 presents a brief description of the stabilization/solidification remediation technology. Section 4.0 presents the objectives of the treatability study and is sub-sectioned to present the objectives for each of the four tasks outlined above. Section 5.0 presents a comprehensive description of the methodology used for each of the tasks, the preparation of the sample cores, the parameters analyzed for, the methods utilized, the quality requirements and number of samples tested. Section 6.0 presents the main conclusions derived from an assessment of the results of the treatability study. Recommendations for further actions are noted where applicable. This section also summarizes the results obtained from the tests conducted on each of the waste types using different solidification reagents. Section 7.0 presents the deviations between the work conducted in the treatability study and that required by the Work Plan.

Due to the large number of tables, it was considered more effective and comprehensive to keep all tables together, rather than interspersing them within the text. The appendices follow the tables. Thus, the tables are presented at the end of the written section of the report.

2.0 SITE BACKGROUND AND PREVIOUS INVESTIGATIONS

2.1 Site Background

The Asbestos Dump Site (the "site") is a National Priority List site which includes four properties in southeastern Morris County, New Jersey. These four properties include the Millington Site, the Dietzman Tract, the New Vernon Road Site, and the White Bridge Road Site. The Asbestos Dump Site is divided into three operable units. A Record of Decision (ROD) for the first operable unit, the Millington Site, was signed on September 30, 1988.

The second operable unit (OU-2) consist of the New Vernon Road and White Bridge Road properties. A ROD was signed for OU-2 on September 27, 1991. The remedial alternative selected in the ROD included *in situ* solidification/stabilization of asbestos contaminated material (ACM). This treatability study supports the remedial design for existing contaminant conditions at OU-2. All untreated ACM discussed in this report has been collected from OU-2.

2.2 Previous Investigations

The following paragraphs summarize previous investigations undertaken at OU-2.

- During 1987, Fred C. Hart Associates, Inc. (F.C. Hart), completed a Remedial Investigation (RI) for National Gypsum of the Asbestos Disposal Sites, Morris County, New Jersey.

- During March and June, 1990, representatives from U.S. EPA's Removal Action Branch (RAB) and Emergency Response Team (ERT), and the U.S. Fish and Wildlife Service conducted site visits to collect information for removal assessment at the OU-2 property.

- On August 2, 1990, based on recommendations from ERT representatives, sampling was conducted at the New Vernon Road property. RAB collected surface soil samples from the surface of the driveway, the floor of the shed, the current owner's vacuum cleaner and from inside the house. All samples were analyzed for the presence of asbestos fibers and percent asbestos. ERT's dust sample was analyzed by both Polarized Light Microscopy (PLM) and Transmission Electron Microscopy (TEM) methods. Sampling results indicated that two to five percent chrysotile asbestos was present throughout the surfaces of the driveway and the shed located on the property. The samples from the vacuum cleaner and inside the house showed no presence of asbestos.

- During August and September, 1990, EPA conducted a site walkover, soil sampling, and subsequent analyses to assess asbestos contamination at the New Vernon Road and White Bridge Road properties. At the New Vernon Road property, additional work conducted by the EPA at the site included disassembly and off-site removal of the shed, covering various areas with geotextile fabric and paving of driveways. Based on this investigation, EPA concluded that additional information should be collected at both properties pertaining to asbestos contamination in soils.

- On October 12, 1990, EPA and TRC completed an inspection of the interior of the dwelling at 237 New Vernon Road located on the New Vernon Road property. The inspection was completed by a state-certified Safety Inspector and an EPA Asbestos Inspection and Management Planner. This inspection, which was limited to one-half of the house rented by a tenant, included the collection of three samples that were analyzed for percent asbestos. Sampling results indicated that no ACM was present in that portion of the house located on the property.

- During October and November, 1990, TRC conducted a field investigation at the New Vernon Road and White Bridge Road properties. The results of soil borings at the properties indicated three general types of ACM were present: asbestos contaminated soils, asbestos containing tiles and what appeared to be wall-board slurry. Concentrations of volatile organics, base neutrals, phenols, pesticides and metals at the two properties were discussed and evaluated in the RI data compilation report, prepared by TRC. These constituents were not determined to be a problem at either site location.

- A Feasibility Study was performed by TRC for OU-2; the results are presented in the Feasibility Study report, dated June 7, 1991. Asbestos was the only

contaminant of concern considered as part of the evaluation. The study evaluated five remedial alternatives, including:

- no action,
- native soil/vegetative cap,
- excavation and off-site landfill disposal,
- in-situ stabilization/solidification, and
- excavation followed with treatment by vitrification.

The EPA selected solidification/stabilization as the preferred remedial alternative. This project is intended to develop pre-design information required to implement this technology and complete the design at OU-2.

3.0 REMEDIAL TECHNOLOGY DESCRIPTION

Because of its ability to reduce mobility of contaminants and provide long term permanence to the remedy, *in situ* solidification has been selected by the EPA as part of the remedy at OU-2 of the Asbestos Dump site. TRC has been unable to find comprehensive assessment reports on *in situ* solidification of land-disposed asbestos containing material. However, solidification has been selected as an element in 58 RODs signed by EPA between 1982 and 1989 (EPA, 1990). It has been specified in at least six Region II RODs during this period. The goal of the solidification process is the long term immobilization of asbestos at OU-2. This will be achieved by converting the waste into a solid monolith that will reduce asbestos mobility and the likelihood of airborne emissions or leaching of asbestos that may be present at the site.

Solidification facilitates a physical reduction of the mobility of hazardous constituents. This process may occur *in situ*, in tanks or in containers and will improve the physical characteristics of the material and decrease the surface area across which transfer of contaminants can occur. Solidification of waste materials can occur by use of several solidification agents. These include cement-based, pozzolanic- or silicate-based, thermoplastic-based or organic polymer-based agents.

One example of a system to solidify materials *in situ* is as follows: chemical additives from a storage silo are fed to a tank and mixed with water. A pump then feeds the slurry to a soil mixing auger drill rig. Cement and supplementary water are also pumped to the drill rig. The soil mixing system consists of one set of cutting blades and two sets of mixing blades attached to a vertical drive auger, which rotate at approximately 15 revolutions per minute (rpm). Two conduits in the auger allow for injection of the slurry/water feed. Additive injection occurs on the auger down stroke, with further mixing occurring upon withdrawal of the auger. The treated soil columns, typically with a diameter of 36 inches, are positioned to provide an overlapping pattern. For large-scale applications, a four-auger machine is used. The overlapping column arrangement is still retained with the four-auger system. The deep soil mixing system can be used for several soil types in most climates with treatment capabilities

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to a depth in excess of 100 feet. The minimum depth of mixing for a shallow soil mixing system is approximately 10 feet. Other variations of this technology exist using excavation backhoes, bulldozers and harrows for shallow applications.

No major liquid or solid side stream wastes are produced as part of the solidification process. In some cases, airborne emissions can exceed applicable, relevant and appropriate requirements (ARARs) due to the process of physically mixing contaminated material with solidification agents. In addition, exothermic reactions occurring as part of the solidification process may result in volatile organic compounds (VOC) stripping/emissions. However, VOCs are not believed to be a problem at the site and controls can be implemented to minimize airborne emissions.

4.0 OBJECTIVES OF SOLIDIFICATION TREATABILITY STUDY

The overall objective of the treatability study was to determine the design parameters for the implementation of full-scale solidification/stabilization treatment at OU-2. The following objectives were developed:

1. determine the design parameters (e.g., volume change, unconfined compressive strength etc.) for the implementation of solidification/stabilization as a remedial technology for ACM found at OU-2;

2. determine the most effective and economical solidification/stabilization agent and the optimum additives and mixtures for ACM at OU-2;

3. recommend the preferred agent/mixtures using the results of the physical and chemical testing performed as part of the treatability study; and

4. verify the waste characteristics of both sites for comparison.

The quality of the data produced as part of the study was designed to be quantitative in nature. Geotechnical samples were analyzed in such a way as to produce data quality that is consistent with what is specified in the American Society of Testing Materials (ASTM) methods used in the analyses.

In order to provide a systematic and cost-effective approach for evaluation of the solidification/stabilization process, a four-tasked treatability study was developed. The four tasks were developed in order to achieve a logical, objective procedure, whereby the results of the previous task could be assessed before proceeding to the next task. This was to ensure that the most appropriate tests were performed at all times, based on the knowledge of what the previous results had determined. The four tasks are described in the following sections.

4.1 Task 1 - Characterization of Untreated Materials

Task 1 was designed to verify that the asbestos is the only contaminant of concern at both sites. Task 1 involved analytical characterization of the untreated materials in order to determine the types and concentrations of contaminants presented in the material and to prepare each waste sample for treatment in Tasks 2 through 4. The Task 1 testing was conducted in order to

1. determine the baseline level of organic and inorganic contamination for elevation of the solidification/stabilization treatment; and

2. determine if any organic or inorganic compounds might be present in significant concentrations that could have adverse effects on the solidification/ stabilization treatment.

4.2 Task 2 - Development and Pre-Screening of Solidified Mixtures

The purpose of Task 2 was to evaluate several solidification mixtures for strength characteristics. Task 2 involved the development and pre-screening of various solidification mixtures for evaluation during the solidification treatment process. The testing was intended to optimize reagent and water concentrations for effective solidification treatment. As a result of the Task 2 testing, selected candidate mixtures were further evaluated under Task 3.

Specific objectives included the following:

1. determine the type and quantity of reagent required to achieve solidification;

2. estimate the volumetric expansion of waste materials due to reagent addition;

3. estimate the strength properties of the treated materials; and

4. evaluate the physical integrity of each of the developed mixtures.

4.3 Task 3 - Physical Property Analysis of Candidate Solidified Mixtures

The objective of Task 3 was to perform comprehensive strength testing on the solidified mixtures. Task 3 involved the evaluation of candidate mixtures identified in Task 2 using physical property analyses. The Task 3 testing was conducted in order to

1. estimate the volumetric expansion of candidate mixtures due to reagent additions;

2. estimate the strength properties of the candidate mixtures; and

3. evaluate the structural integrity of each of the candidate mixtures.

4.4 Task 4 - Comprehensive Analyses of Final Selected Solidified Mixtures

The purpose of Task 4 was to perform a variety of comprehensive tests on the final selected solidification mixtures. Task 4 involved comprehensive analyses designed to evaluate the final selected mixtures for physical strength, durability, leaching, and permeability. On the basis of the results obtained from Task 4, recommendations for the *in situ* immobilization of asbestos contaminated material have been made.

5.0 METHODOLOGY AND RESULTS

5.1 Task 1 - Characterization of Untreated Materials

5.1.1 Methodology

5.1.1.1 Sample Selection - Soil, Slurry, Tile (White Bridge Road)

Nine 55-gallon drums of untreated material were collected by TRC from the White Bridge Road Site and shipped to KIBER via land transportation. The materials were received by Kiber from VOCAN, Inc., a transportation company, on February 5, 1992.

As outlined in TRC's subcontract, three drums containing each of three types of materials were received; - a soil material, a slurry material, and a tile-waste material. All drums were received in excellent physical condition. Upon receipt of the untreated materials, a number was assigned to each of the drums. Table 1 summarizes these numbers and presents the waste material in each drum. The volatile emissions generated during shipping were estimated by monitoring each drum using a Photoionization Detector. These results are also summarized on Table 1.

Drum numbers 1, 4, and 7 were selected for the untreated waste characterization. These selections were made based on visual observations of the materials and review of the photoionization readings. The top portion of material from each drum was removed in order to obtain a sample from the center of the drum. For each sample, the following quantities were taken for analytical testing:

- two 4-ounce jars for volatile and semivolatile analyses;
- one 8-ounce jar for inorganic analyses; and
- one 2-quart container for asbestos analyses.

Each material was sampled in duplicate, in accordance with the original statement of work. Five aliquots of the tile waste were sampled for asbestos content analyses. Table 2 presents the details of the number of samples prepared, the sample identifications, the drum from which they originated, and the analyses conducted.

5.1.1.2 Sample Analyses (White Bridge Road)

All organic and inorganic analyses were conducted by Kiber Analytical Services, Inc. (KAS). All asbestos testing was conducted by Hygeian Environmental Laboratories, Inc. located in Marietta, Georgia. The particle-size analyses were conducted by GeoSyntec Consultants at their Geomechanics and Environmental Laboratory located in Norcross, Georgia. The moisture content analyses were performed by Kiber Associates, Inc.

The following methods sanctioned by the EPA or the ASTM were used:

• Total TCL Volatiles	EPA Method CLP Statement of Work 1988/89
• Total TCL Semivolatiles	EPA Method CLP Statement of Work 1988/89
• Total TAL Inorganics	EPA Method CLP Statement of Work 1990
• Asbestos Content	TEM (Level III)
• Moisture Content	ASTM D 2216
• Unit Weight	ASTM D 698
• Particle-Size	ASTM D 422

5.1.1.3 Sample Selection and Analyses (New Vernon Road)

A total of six soil samples were collected from the New Vernon Road property and analyzed for TCL and TAL parameters through the EPA Contract Laboratory Program. This sampling and analysis was conducted to verify that the characteristics of the material collected from the White Bridge Roadsite and subsequently used for treatability study testing were comparable to the materials present at the New Vernon Road site. The six samples were taken at locations of known contamination scattered throughout the Site.

5.1.2 Results

White Bridge Road

Concentrations of toluene and methylene chloride were detected up to a maximum value of 22 micrograms/kilogram (µg/kg) and 71 µg/kg, respectively. In all cases, the slurry samples contained the highest concentrations. Bis(2-ethylhexyl) phthalate was the only semivolatile consistently detected in the samples. The results of the volatile and semivolatile analyses are summarized in Table 3.

Levels of aluminum, calcium, iron and magnesium were detected at maximum values of 17,700 mg/kg, 168,000 mg/kg, 32,100 mg/kg and 54,600 mg/kg, respectively. These levels were not expected to adversely affect the solidification process to be implemented in Tasks 2 through 4 (and in fact, did not adversely affect solidification).

Table 4 presents a summary of the inorganic analyses. Constitutents that were consistently detected in the samples are presented in Tables 3 and 4.

Several other chemicals were detected at levels above the maximum acceptable limits and these also did not adversely affect solidification. Therefore, based on the TCL and TAL concentrations, proprietary solidification reagents will not be required for solidification treatment. The full results of the analytical tests for the White Bridge Roadsite are presented in Appendix A.

The tile waste was consistently found to contain the highest concentration of asbestos. The maximum value was 5.7 x 10^{12} structures/liter. Table 5 presents the results of the asbestos analyses. Appendix B presents the analytical reports for the asbestos content of each material that contains individual data sheets.

The water content data indicated that the slurry material has a water content which would require high quantities of reagent for effective solidification. Too much moisture appears to hamper the solidification and reduce the specimen's strength. The moisture content for each sample is presented on Table 6.

The unit weight determinations are presented on Table 7.

New Vernon Road

Six soil samples were taken from the New Vernon Road Site and analyzed for organic and inorganic characteristics. The analytical results for the testing of the soil on New Vernon Road can be found in Appendix C. The results of the soil testing from New Vernon Road indicate that the waste materials located on Site do not contain amounts of organic or inorganic materials other than asbestos that would require remediation. All analyses were performed by a CLP laboratory. The data was then validated by Dynamac, a subcontractor to TRC.

5.2 Task 2 - Development and Pre-Screening of Solidified Mixtures

5.2.1 Methodology

To evaluate the effects mixing would have on the waste, this task required that a composite material be used in addition to the soil, tile and slurry wastes. Equal total-weight proportions of each waste were homogenized to create this composite. The materials were mixed until the composite was visually homogeneous. In accordance with the requirements of the Work Plan, the tile waste was reduced to three sub-specimens with maximum particle-sizes of 3 mm, 12 mm, and 25 mm. All of the Task 2 testing and the material compositing were conducted using the reduced material having a maximum particle size of 12 mm.

Based on the TCL and TAL concentrations, proprietary solidification reagents were determined not to be required for treatment - only non-proprietary reagents would be used to conduct solidification treatment on each of the waste materials. These included Type I Portland cement, cement kiln dust, blast furnace slag and mixtures of each. The Type I Portland cement and cement kiln dust were provided by Lone Star Industries, Inc. of Nazareth, Pennsylvania.

"Firmex" (blast furnace slag), mixed with cement kiln dust was provided by Trident Engineering. The material is referred to as blast furnace slag throughout the treatability study report. The blast furnace slag was supplied on behalf of Trident Engineering by Blue Circle Cement, Inc., of Sparrows Point, Maryland.

5.2.1.1 Sample Matrix

A total of 384 mixtures (96 mixtures for each of the waste streams, i.e., soil, tile, slurry, and the composite material) were developed. The 384 mixtures were developed by utilizing three waste to reagent ratios, two water content ratios, five different reagents, and all specimens tested in triplicate. Five basic compositions of non-proprietary reagents were used for solidification treatment:

- Type I Portland cement;
- Cement kiln dust;
- 50/50 mixture of cement and kiln dust;
- 25/75 mixture of cement and kiln dust, respectively; and
- blast furnace slag and cement kiln dust combination.

The reagent mixtures of cement and cement kiln dust were formed by developing a bulk mixture. The bulk mixture was then used as the solidification reagent, which was slurried with water. The blast furnace slag reagent was used in conjunction with cement kiln dust. The concentrations developed were recommended by Trident Engineering. All mixtures evaluated were developed in triplicate. In order to assist in identifying the nature of each waste material, the pH of each untreated material was determined.

The pH of the untreated materials and a summary of their physical properties are presented in Table 8.

5.2.1.2 Sample Preparation

The mixtures were formed by placing aliquots of each untreated material into a blending chamber. A selected reagent and water were then slurried, added to the untreated materials and blended at a rate of approximately 30 to 40 rotations per minute (rpm) until visually homogeneous. The reagent/water slurry was initially formed by adding the specified percentage of potable tap water to the appropriate percentage of reagent. Because *in situ* treatment is intended to be used at the site, the reagent/water slurry was then mixed to the specification typically used by full-scale

remediation contractors. Water-addition rates in the range of approximately 75 to 100 percent of the reagent concentration were maintained. This blending process was necessary to activate the binding mechanism of the solidification reagents, and also to facilitate on-site blending processes typically used by full-scale solidification contractors. For clarity the following is noted:

- The "percent reagent addition" and the "percent water addition" were based on the total weight of the material relative to the total weight of the untreated aliquot. For example, in a mixture with 10 percent addition of reagent and 5 percent addition of water, 20 grams of reagent were slurried with 10 grams of water and then added to 200 grams of untreated material.

- The "percent water addition" was the quantity of water added to each mixture to achieve effective solidification. The "moisture content" was the percentage of moisture contained in the treated material as determined by the same ASTM test method used to determine moisture content under Task 1 (ASTM D 2216).

Upon reagent addition and homogenization, each mixture was compacted into cylinders measuring approximately two inches in diameter by four inches in height. The mixtures were allowed to cure for a period of two days in a controlled environment maintained at room temperature.

At the completion of the two-day curing time, the volumetric increases, and the unconfined compressive strength resulting from the solidification treatment were determined. The volumetric increase was determined by calculating the percent difference based on the height of the untreated material before solidification, and the height of the treated material after the two-day cure. The penetrometer analyses were conducted using a pocket penetrometer, to estimate the unconfined compressive strength of materials. Although estimations, intended for screening purposes only, experience shows that the trends of the penetrometer analyses often correlate with more expensive compression testing. All penetrometer analyses were conducted in triplicate.

The 16 basic mixtures (four waste types x four reagents) developed for each of the waste streams are presented in Table 9. This table includes the reagent or reagent mixture used for solidification and the reagent concentrations. These mixtures were used as the basis of the treatability study evaluation. The concentrations were selected as an optimum range of concentrations based on KIBER's experience and recommendations from TRC or Trident Engineering. The mixtures were developed using two different "percent water addition" concentrations. The "percent water addition" was selected based on the best volume addition for the blending process. A second mixture using a lower volume of water was also then evaluated. This concentration was selected as the minimum water concentration practical for full-scale implementation. This minimum concentration for "percent water addition" was a visual assessment based on KIBER's experience. These concentrations were generally

in the range of 75 to 100 percent of the reagent concentration. All mixtures outlined above were produced in triplicate in accordance with the project Work Plan.

5.2.2 Results

All mixtures developed and their respective results are presented in Tables 10 through 13. These tables are a comprehensive presentation of the data generated and the analyses conducted in Task 2 of the treatability study. The results are summarized in the following subsections for each waste material.

5.2.2.1 Soil

The blended mixtures developed with the cement, the cement kiln dust, and the blast furnace slag reagents each achieved penetrometer strengths greater than 4.5 tons per square foot (tsf). The pocket penetrometer used shows readings in tons per foot. One ton per square foot (tsf) is equal to 13.9 pounds per square inch (psi). It is generally considered that 50 psi is a minimum required strength for effective solidification treatment. The mixtures with the cement kiln dust alone, had lower strengths than the other mixtures. Based on the evaluation of the cured samples, all reagents produced homogeneous mixtures. All samples were monolithic or formed a solid mass of treated material. The volumetric change for all the mixtures was in the range of 9 percent shrinkage for mixtures with low reagent concentrations to 69 percent expansion for the high concentrations of cement kiln dust. Table 10 presents the mixtures for the soil material.

5.2.2.2 Tile

In order to treat the tile waste in Tasks 2 through 4, the tile waste was reduced to three sub-specimens having maximum particle sizes of 3 millimeters (mm), 12 mm, and 25 mm, respectively. The tile waste is actually mixed with soil at the site. However, in order to evaluate solidification of the tile material alone, the tile was separated from the soil. In general, low reagent concentrations did not sufficiently coat the tile pieces. When compacted, most mixtures with the exception of when cement kiln dust was used, were non-monolithic and had a honey-combed structure. The mixtures did however have penetrometer strengths greater than 4.5 tsf psi.

Because of the high concentrations added, the cement kiln dust did produce monolithic mixtures; however, these materials appeared soft, and flexed and deformed under pressure. The cement kiln dust mixtures with percent water additions near the reagent addition concentrations were too wet after the two-day cure. The penetrometer strengths varied from 0 to 4.5 tsf.

The mixtures developed using the cement and cement kiln dust blend produced adequate strengths. The concentrations were sufficient to coat the tile waste particles. The blast furnace slag mixtures appeared dry and flaky but did have penetrometer strengths greater than 4.5 tsf. The volumetric change varied from 19 percent

shrinkage to 18 percent expansion. A greenish color was observed in all of the blast furnace slag samples after several days of curing; this may have resulted from the presence of other metals (e.g., copper). Table 11 presents the mixtures for the tile material.

5.2.2.3 Slurry

Due to the high water content of the untreated slurry material, these mixtures did not have results as favorable as those developed for the other mixtures. All mixtures except for those solidified with blast furnace slag had low penetrometer strengths. All mixtures were wet and soft after the two days of curing. The blast furnace slag samples had free water form in the voids created by the penetrometer analyses. The volumetric expansions were in the range of 3 to 41 percent increase. Table 12 presents the mixtures for the slurry material.

5.2.2.4 Composite

The Work Plan specified a composite waste material be evaluated to determine the effects of mixing the various waste types. The cement and blast furnace slag mixtures produced strong, solid monoliths as measured by the penetrometer. The cement kiln dust alone was non-effective at solidifying the material; however, when enhanced with Portland cement, it produced sufficient physical properties. The high water content of the slurry material appear to lessen the effectiveness of the solidification treatment. Without the slurry material, the composite material would have properties similar to the soil material. The tile mixed with some soil, produced better monolithic structures than the tile waste alone. Since the tile is mixed with soil at the site, this mixture is anticipated to be more realistic to the actual on-site conditions. The volumetric expansions ranged from 5 to 54 percent. Table 13 presents the mixtures for the composite material.

5.2.2.5 All Materials

An experiment was conducted to evaluate the disintegration properties of one mixture. A cement kiln dust mixture of the tile waste was selected because of the unfavorable results the cement kiln dust produced for all mixtures after two days of curing. The tile waste was selected as it was found to be the most porous mixture. The experiment included submerging the sample in water to evaluate any physical degradation or disintegration of the monolith. After three weeks of soaking in water, the treated mixture still had a penetrometer strength greater than 4.5 tsf and no surface degradation was evident. It is believed that all mixtures would produce adequate physical integrity given longer curing times.

The results for Task 2 can be summarized as follows:

- The mixtures developed using only cement kiln dust did not produce favorable test results for any of the mixtures.

- The cement kiln dust must be enhanced with addition of Portland cement to become a viable reagent.

- Increased reagent concentrations will be required for the solidification of the slurry material.

- Based on visual observations and informal experiments conducted several weeks after solidification, all mixtures will produce increased integrity with increased curing time.

Appendix D contains sample calculations for the following Task 2 parameters - quantity of reagent and water, volumetric expansion, moisture content, bulk unit weight, and dry unit weight.

5.3 Task 3 - Physical Property Analysis of Candidate Solidified Mixtures

5.3.1 Methodology

5.3.1.1 Sample Selection

The Task 3 testing was conducted as a comparative study to evaluate the solidification effects of each of the four waste streams. A total of 16 different mixture types were developed for the Task 3 evaluations. These mixtures included four reagent additions for each of the waste streams, i.e., soil, tile, slurry, and the composite material. The four reagent types were chosen after an evaluation of Task 2 testing. The evaluation was performed based on the pocket penetrometer readings and the visual observations noted during testing. Visual observations noted if the mixtures appeared well coated, too dry, or if free water was in the mixtures. The pocket pentrometer tests show readings in tons per square foot (tsf) and had a maximum reading of 4.5 tsf. Test results thought to be adequate had readings between 3 tsf and 4 tsf, any reading below 3.0 was considered inadequate for further testing. Shown below are the reagents used for Task 2 testing with the Task 3 chosen reagents and percentages after evaluation of the Task 2 testing results. Also noted are some observations and during the evaluation of reagents for the Task 3 testing.

	Reagent Percentages	
Agent	**Task 2 Percent Additions**	**Task 3 Percent Additions**
Portland Cement	15, 20, 25	20
Cement Kiln Dust (CKD)	20, 25, 30	--
Blast Furnace Slag/CKD	10/5, 10/8, 20/5, 20/8	20/8
50% Portland Cement/50% CKD	15, 20, 25, 30	30
25% Portland Cement/75% CKD	30	35

- Portland cement performed well at the 20 percent level except when mixed with slurry. At 15 percent addition the samples were sometimes not well coated and were too dry.

- The cement kiln dust (CKD) used alone did not show any acceptable strength and was discontinued from further testing.

- The blast furnace slag/CKD mixture showed adequate strength with a 20 percent blast furnace slag/8 percent CKD ratio. Other combinations using less agent material did not show adequate strength.

- The 50/50 combination of Portland cement and CKD performed well with the exception of when it is used with slurry. Strengths were consistently high only at the 30 percent addition level.

- The 25/75 combination of Portland cement and CKD performed adequately when mixed with soil or tile but was inadequate when mixed with slurry or the composite material.

The mixtures developed for the soil material are presented in Table 14; for the tile material in Table 15; for the slurry material in Table 16; and for the composite material in Table 17.

5.3.1.2 Analytical Tests

After the untreated materials had been blended with the different reagents, formed into molds and allowed to cure for two weeks, a series of physical property tests were conducted to evaluate the physical characteristics and integrity of each treated monolith. The following testing was conducted in general accordance with the test methods detailed below:

• Unconfined Compressive Strength of cohesive soils	ASTM D 2166
• Bulk Density of thin sections of glass-fiber reinforced concrete	ASTM D 948
• Porosity of thin sections of glass-fiber reinforced concrete	ASTM D 948

The volumetric expansion of each of the solidified materials was also evaluated. The tests are described in more detail below.

5.3.1.2.1 Unconfined Compressive Strength and Moisture Content

The unconfined compressive strength (UCS) was determined by ASTM method D2166 using specimens measuring approximately 3.0 inches in diameter by 6.0 inches in height. Each specimen was tested at a strain rate of 0.06 inches per minute, an approximate equivalent of 1.0 percent per minute. Testing was terminated either when the load decreased with increasing strain or 15 percent axial strain was achieved. All specimens were tested in duplicate. Moisture content determinations of each specimen were obtained using trimmings remaining at the completion of the testing.

5.3.1.2.2 Porosity and Bulk Density

The bulk density and porosity testing were conducted using specimens measuring approximately 2.0 inches in diameter by 4.0 inches in height. As specified in the Work Plan, three mixtures were selected and tested in triplicate. All other specimens were tested in duplicate. The triplicate testing was conducted for quality assurance (QA) purposes.

Three testing parameters were determined - the porosity, the "as-cured" bulk density, and the saturated bulk density. The "as-cured" bulk density is the relationship of the mass to the volume of the test specimen determined after curing, but prior to porosity testing.

Each specimen was then submerged in water for a period of not less than 24 hours. After the 24 hour submergence, each specimen was weighed in accordance with the parameters specified in ASTM D 948. The submerged weight of each specimen was determined using a hydromassimeter developed by KIBER for treatability testing.

Each specimen was resubmerged in the water for 2 additional hours, after which each specimen was reweighed. The 2-hour soaking cycles were repeated until the mass increase for each specimen was less than 0.5 percent of the heavier mass as outlined by ASTM method D948.

The specimens were then dried in an oven at a temperature of 105°C for a period of not less than 24 hours. The dried mass of each specimen was determined at intervals of 2 hours until a decrease of mass was less than 0.5 percent of the lowest mass obtained as outlined by ASTM method D948. Using the information obtained from the testing, the saturated bulk density and the apparent porosity of each specimen were then determined.

5.3.1.2.3 Volumetric Expansion

The volumetric expansion due to the addition of the solidification reagents was determined for each mixture type. Duplicate analyses were conducted for each mixture. The volumetric expansion was simply calculated as the percent change in volume before and after treatment.

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5.3.2 *Results*

The results for the parameters tested are described in detail in the following subsections:

5.3.2.1 *Unconfined Compressive Strength*

The results of the UCS and moisture content analyses are summarized on Table 18.

Soil

The unconfined compressive strength is typically used to evaluate the strength properties of solidified materials with 50 pounds per square inch (psi) generally being considered a minimum for effective solidification treatment. The UCS for the soil mixtures were in the range of 165.0 to 486.6 psi with the higher strengths being obtained with the 50/50 cement and kiln dust mixture and the blast furnace slag and kiln dust combination.

Tile

The UCS for the tile mixtures were in the range of 351.7 to greater than 925.5 psi. All reagents used for solidification produced favorable strengths. The blast furnace slag mixtures had strengths greater than the capacity of KIBER's load frame. Thus, the value presented is reported as greater than the largest strength obtained. The higher strengths were obtained with the 50/50 cement and kiln dust mixture and the blast furnace slag and kiln dust combination.

Slurry

The UCS for the slurry mixtures were in the range of 34.4 to 165.7 psi. All combinations of reagents, except for the Type 1 Portland cement, produced adequate strengths as compared to the typical 50 psi standard.

Composite

The UCS for the composite mixtures were in the range of 115.5 to 194.4 psi for the cement, the 50/50 cement and kiln dust mixture, and the 25/75 cement and kiln dust mixture. The strengths for the blast furnace slag mixtures were 517.2 and 542.8 psi.

With the exception of a few slurry mixtures, all reagents produced adequate strengths as typically used for evaluation of effective solidification. For all mixtures, low axial strain rates were observed, i.e., in the approximate range of 1 to 3 percent.

Appendix D contains a sample calculation for unconfined compressive strength.

5.3.2.2 *Porosity and Bulk Density*

The following are the ranges of apparent porosities for each of the mixture types as determined by the porosity testing summarized on Table 19:

- Soil 41.8 to 48.2 percent
- Tile 47.4 to 53.9 percent
- Slurry 72.8 to 76.9 percent
- Composite 58.8 to 62.6 percent

Table 19 also includes the results of the bulk density analyses.

Appendix E contains a sample calculation for porosity and bulk density.

5.3.2.3 *Durability Testing*

An informal experiment was conducted following the porosity testing, in order to visually assess the ability of each treated mixture to withstand the durability testing to be conducted later under Task 4. The dried monoliths were immersed in water. This process of immersing, drying and immersing the monolith simulates the cycles the materials are subjected to in the wet/dry durability testing. The observations noted below are qualitative interpretations based on KIBER's experience in conducting treatability studies and observations noted by TRC and EPA personnel.

Soil

The soil mixtures maintained a good physical integrity and were resistant to the stresses induced in each specimen. Slight surface cracking was observed during drying; however no heaving of these fissures was observed during the wetting process.

Tile

The tile mixtures had a honey-combed structure in appearance. The mixtures were solid, intact monoliths. When submerged in water, the water appeared cloudy indicating potential particulate migration.

Slurry

The slurry mixtures were light-weight when oven dried. This was apparent from the dry unit weights for the UCS testing summarized on Table 18, i.e., 29.8 to 36.9 pcf. Surface cracking was observed after oven-drying, and heaving along these fissures was noted after immersion in water. The slurry mixtures were not resistant to durability stresses.

Composite

The composite materials maintained good physical integrity during the experiment. The characteristics of each mixture were similar to those for the soil mixtures.

A review of the mixtures and reagents indicates that (1) the 25/75 mixture of cement and cement kiln dust would not produce adequate resistance to long-term durability stresses, and (2) the resistance to the durability testing by the remaining reagents were comparable. However, the addition of kiln dust to the solidifying reagent appeared to be beneficial in that the additional material provided some bulking effects which filled the voids. Since the durability of the materials appeared to be comparable, a more monolithic material would minimize the potential leaching and/or migration of particulates and asbestos materials.

Volumetric Expansion

The following are the ranges of the volumetric change for each of the developed mixtures as summarized on Table 20:

- Soil — 10 to 34% Expansion
- Tile — -7 to 12% Expansion*
- Slurry — 14 to 40% Expansion
- Composite — 17 to 33% Expansion

*Shrinkage (-7) occurred

In general, the mixtures solidified using cement had the lowest volumetric expansions and the mixtures solidified with the 25/75 cement and kiln dust combination had the highest volumetric expansions. All reagents for the tile mixtures except the 25/75 cement and kiln dust mixture produced volumetric reduction or shrinkage. This was simply due to the reagents filling in the voids, or honey-combed structure formed by the tile monoliths.

5.4 Task 4 - Comprehensive Analyses of Final Selected Mixtures

5.4.1 Methodology

Based on the results of the Task 3 analyses, it was decided to conduct comprehensive tests on three waste streams - soil, slurry and the composite material. The tile waste was eliminated from the comprehensive tests as this will likely be mixed with the other waste materials in the field. (The only test the tile mixtures were subjected to, under Task 4, was the UCS test.) Two reagent additions for each of the waste materials, i.e., soil, tile, slurry, and the composite material were selected. The selected compositions of the reagents were

- 50/50 mixture of cement and cement kiln dust; and
- 20/8% blast furnace slag and cement kiln dust combination.

The selection of the reagents was based on the unconfined compressive strength results from Task 3. These results show that the mixture utilizing Portland cement alone and slurry did not produce favorable results; also the 25/75 mixture of Portland cement and cement kiln dust did not produce favorable results during Task 3 testing. The mixtures developed for the soil material are presented in Table 21; for the slurry material in Table 22; the composite material in Table 23; and the tile mixtures in Table 24.

After the mixtures had been prepared and allowed to cure for two weeks, a series of physical property tests to evaluate the physical condition and structural integrity of each treated monolith was initiated. The structural integrity was evaluated based on (1) the permeability; (2) the durability to resist cycles of freeze/thaw and wet/dry; (3) strength, both confined and unconfined; and (4) leachability. The following testing was conducted in general accordance with the test methods specified below:

• Permeability	EPA Method 9100/ASTM D 5084
• Wet/Dry Durability	ASTM D 559
• Freeze/Thaw Durability	ASTM D 4842
• Bulk Density	ASTM D 948
• Porosity	ASTM D 948
• Moisture Content	ASTM D 2216
• Triaxial Strength	ASTM D 2850
• Unconfined Compressive Strength	ASTM D 2166 (tile mixtures only)
• Leachability	ANS 16.1

The volumetric expansion of each of the materials (including the tile mixtures) was also assessed. The methodology for each of these tests is described in more detail below.

5.4.1.1 Permeability

The permeability testing was conducted in accordance with ASTM D 5084 using the guidelines established in EPA Method 9100. The permeability testing was determined using specimens measuring approximately 3.0 inches in diameter by 2.5 inches in height. Duplicate specimens were tested for each mixture type developed in Task 4. Each specimen was back-pressure saturated at an effective confining stress of 0.7 psi, and consolidation was performed at an effective confining stress of 5.0 psi. The specimens were permeated using falling-head hydraulic gradients ranging from 9 to 1.

5.4.1.2 Wet/Dry Durability

The wet/dry durability testing was conducted in accordance with ASTM D 559. The testing was conducted to determine the durability of the material to resist moisture changes, material loss, and structural integrity when subjected to repeated cycles of wetting and drying. Duplicate testing was conducted for each mixture. The wet/dry testing was conducted using specimens measuring approximately 3.0 inches in

diameter and 6.0 inches in height. As specified in the ASTM test method, two specimens are required for each test in order to determine the durability of the material.

The testing was conducted for a period of 12 cycles of wetting and drying as specified in the ASTM test method. In order to represent the drying cycles, the specimens were placed in an oven at a temperature of 70°C for a minimum time period of approximately 42 hours. Each specimen was then submerged in water for a period of 5 hours. The action of drying and wetting constituted one cycle of wet/dry. After each specimen is dried a wire scratch brush is applied with two firm strokes on all areas of the specimen. The specimen is then weighed to determine the total material loss.

5.4.1.3 Freeze/Thaw Durability

The freeze/thaw durability testing was conducted in general accordance with ASTM D 4842. The testing was conducted to determine the durability of the material to resist moisture changes, material loss, and structural integrity when subjected to repeated cycles of freezing and thawing. The freeze/thaw testing was conducted using specimens measuring approximately 2.0 inches in diameter and 4.0 inches in height. Since the ASTM test method specifies that the testing be conducted in triplicate, a total of six replicate analyses were conducted for each mixture. Each analysis requires two specimens, a test specimen and a control specimen.

The freeze/thaw testing was conducted by placing each test specimen in the freezer at a temperature of less than -15°C for a minimum time period of 24 hours. The corresponding control specimens were placed in a humid environment maintained at room temperature, i.e., approximately 23°C. After the freezing cycles, the test and control specimens were thawed in water for a period of 24 hours. The 48 hour period of freezing and thawing constituted one cycle of freeze/thaw. At the completion of the thawing cycles, each specimen was removed from the water and rinsed with water in order to remove any particulates. The water was then filtered through Whatman 934-AH glass microfiber filters having a pore opening of 1.5 microns. The filter papers were then dried in an oven at 105°C in order to determine the amount of material loss due to the freezing and thawing process. A total of 12 freeze/thaw cycles were utilized for each test.

The potential leaching of asbestos due to degradation of the monolith as measured by freeze/thaw durability was also assessed. The filtration for cycles 11 and 12 was conducted using 1.5 micron filters composed of cellulose esters. The filters were placed in the oven for determination of mass loss. Upon measurement of the material loss, the filter papers were dissolved using sulfuric acid. The leachate from cycles 11 and 12 for each of the three test specimens, and the corresponding particulates from the dissolved filter paper were composited. This method generated approximately 1200 ml of leachate for the asbestos testing. Each leachate composite was analyzed in

accordance with EPA 600/4-80-005. All analyses were validated by Dynamac, a subcontractor to TRC.

5.4.1.4 Porosity and Bulk Density

The bulk density and porosity testing were conducted using specimens measuring approximately 2.0 inches in diameter by 4.0 inches in height. Duplicate specimens were tested for each mixture type. As specified in the work plan, two mixtures were selected and tested in triplicate. The triplicate testing was conducted for quality assurance (QA) purposes. The porosity, the "as-cured" bulk density, and the saturated bulk density were tested. The methodology employed (ASTM D948) is described under Section 6.3.1.

5.4.1.5 Volumetric Expansion

The volumetric expansion due to the addition of the solidification reagents was determined for each mixture type. Duplicate analyses were conducted for each mixture. The volumetric expansion was simply calculated as the percent change before and after treatment of the solidified specimen.

5.4.1.6 Triaxial Strength

The triaxial strength testing was conducted in accordance with ASTM D 2850. The testing was performed on specimens measuring approximately 3.0 inches in diameter and 6.0 inches in height. Duplicate specimens were tested for each mixture type. The triaxial test specimens were prepared by saturating each specimen in water in accordance with the testing protocol established for the bulk density and porosity testing described above. Upon saturation, each specimen was placed in a plastic bag with a wet paper towel to maintain the moisture. The specimens were shipped to KIBER's subcontract laboratory for triaxial testing (Physical Laboratory of Law Environmental, Inc. [Law]). Each specimen was tested at a strain rate of approximately 0.3 percent per minute.

5.4.1.7 ANS 16.1 Leachability

The leachability of each selected mixture was determined in accordance with the American Nuclear Society (ANS) Test Method 16.1 for radioactive leachability. Although developed for evaluation of radioactivity, the ANS leachability procedure is often used to evaluate the leachability of inorganic constituents that have undergone solidification. The ANS leachability was conducted in duplicate for each mixture. A blank test was also performed in accordance with CLP protocols. The blank was conducted in order to detect any contamination due to (1) laboratory equipment, (2) deficiencies in decontamination procedures, (3) leachate sampling, or (4) shipping to the specified CLP laboratory.

The testing was conducted using specimens measuring approximately 2.0 inches in diameter and 4.0 inches in height. Each specimen was placed in a 3000 mL glass beaker. Prior to testing, each glass beaker was washed using Alconox laboratory soap and rinsed using deionized water. Each beaker was then soaked in a solution of nitric and hydrochloric acid. Before initiation of the leachability tests, each of the acid-soaked beakers was thoroughly rinsed with deionized water. The leachability evaluations were also conducted using deionized water. Each specimen was immersed in 2100 mL of water. The water used had a pH between 6.0 and 6.5. This is the pH range of the site ground water. The water, hereafter referred to as the leachate, was replaced after the intervals of 2 hours, 7 hours, 24 hours, 48 hours, 72 hours, 4 days, 5 days, 19 days, 47 days, and 90 days. All leachates were analyzed by separate laboratories, participating in the CLP program. All leachates were also validated by TRC's subcontractor (Dynamac).

5.4.1.8 Unconfined Compressive Strength

A separate study was conducted to evaluate the solidification of the tile waste. The primary objective of the tile study was to evaluate the effect of the maximum particle size on the unconfined compressive strength (UCS) of the solidified mixtures. The UCS testing conducted in Task 4 was only performed on the tile mixtures. Testing of the selected mixtures for the soil, slurry and composite untreated materials was performed in Task 3.

The tile waste materials used for the UCS study were prepared in Task 1 as part of the particle-size reduction. The tile waste was reduced to three sub-specimens having maximum particle sizes of 0.15 inches (3 mm), 0.50 inches (12 mm), and 1.0 inches (25 mm). The UCS was determined using specimens measuring approximately 3.0 inches in diameter and 6.0 inches in height. Triplicate analyses for each of the selected mixtures and particle sizes were conducted. Each specimen was tested at a strain rate of 0.06 inches per minute, an approximate equivalent of 1.0 percent per minute. Testing was terminated either when the load decreased with increasing strain or 15 percent axial strain was achieved. Moisture content of each specimen was determined using trimmings obtained at the completion of the testing.

5.4.2 Results

5.4.2.1 Permeability

The results of the permeability and moisture content testing are presented in Table 25. Permeability testing was conducted in order to evaluate the ability of water to flow through the treated mixtures. Solidified materials are typically in the range of 10^{-4} to 10^{-8} centimeters/second (cm/sec). Hydraulic conductivities of less than 10^{-5} cm/sec are generally acceptable for solidified materials (EPA, 1989). The hydraulic conductivities for the mixtures tested ranged from a high of 2.1×10^{-6} cm/sec to a low of 6.6×10^{-9} cm/sec. Values were typically in the range of 10^{-7} cm/sec. Both the selected mixture

reagents produced favorable permeability results. No conclusions can be made as to the more effective reagents since the results are generally comparable.

5.4.2.2 Wet/Dry Durability

The wet/dry durability results are presented on Table 26. Durability testing was conducted to determine the durability of the material to resist moisture changes, material loss, and structural integrity when subjected to repeated (12) cycles of wetting and drying. The specimens were placed in an oven at a temperature of 70°C for a minimum time period of 42 hours. Each specimen was then submerged in water for a period of five hours. The action of drying/wetting constituted one cycle.

The average total material loss reported from analyses performed on the solidified core samples and duplicates are as follows: (EPA, 1989) "No standards are currently established for determining whether stabilized material has passed durability testing; however, Vick et al. (1987) suggest that up to 15 percent weight loss is an acceptable amount."

Waste Type	**Reagent Type**	**Total Material Loss**
Soil	Cement/CKD	5.0%
Soil	Blast Furnace Slag	5.0%
Slurry	Cement/CKD	16.8%
Slurry	Blast Furnace Slag	21.5%
Composite	Cement/CKD	6.2%
Composite	Blast Furnace Slag	13.0%

It should be noted that the ASTM method used for the wet/dry testing involved the scraping of the specimens with a wire scratch brush. This procedure is far more rigorous than any expected physical forces the solidified mass would be subjected to. Therefore, although the total material loss found for the slurry mixtures were above the 15 percent recommended criteria for material loss, this information should be used accordingly for the remedial design purposes. The fact that a number is above or below 15 percent should not be the only criteria used for design but be used as a guide on how the solidified mass would react if subjected to similar circumstances as in the test methods.

5.4.2.3 Freeze/Thaw Durability

The freeze/thaw durability results are presented in Table 27. Durability testing was conducted to determine the durability of the material to resist moisture changes, material loss, and structural integrity when subjected to repeated (12) cycles of freezing and thawing. The freeze/thaw testing was conducted by placing each test specimen in the freezer at a temperature of less than minus 15°C for a minimum

period of 24 hours. The test specimens were then thawed in water for a period of 24 hours. This total 48 hour period constituted one freeze/thaw cycle. The results of the specimen degradation are presented as follows:

Waste Type	Reagent Type	Total Material Loss
Soil	Cement/CKD	1.0%
Soil	Firmex/CKD	1.7%
Slurry	Cement/CKD	3.7%
Slurry	Firmex/CKD	1.2%
Composite	Cement/CKD	0.6%
Composite	Firmex/CKD	0.7%

Comparison of the two reagent types with respect to durability testing shows that the Cement/CKD mixture has better durability characteristics when mixed with the waste than the Blast Furnace Slag/CKD mixture. The exception to this statement is for the slurry solidified with Blast Furnace Slag/CKD combination during the Freeze/Thaw testing which showed a lower material loss value than the Cement/CKD mixture, although both mixtures behaved satisfactorily. With respect to the durability tests performed during this study, Cement/CKD is the preferred mixture.

Overall performance with respect to the durability tests has shown favorable results with the exception of the slurry waste. The high moisture content of the slurry waste and the effect this has on Freeze/Thaw and Wet/Dry testing has shown that if the slurry was solidified *in situ* without any pretreatment it may crumble, flake off, etc. and thus reduce its' structural stability. The analytical results from this testing is shown in Table 28. The results show that asbestos fibers were released from the solidified mixtures in amounts from approximately 8 to 490 million structures per liter. The results also show that there was no large differences in how the two reagent mixtures reacted when compared with each other.

A more thorough discussion of how the leaching analytical results may affect the remedial design are discussed in this section under the ANS 16.1 leachability heading.

5.4.2.4 Porosity and Bulk Density

The porosity and bulk density test results are presented in Table 29. The ranges of apparent porosities for each of the mixture types are summarized below:

- Soil 42.6 to 48.1%
- Slurry 74.3 to 78.4%
- Composite 58.8 to 59.6%

The results from the Task 4 testing are comparative to those for the Task 3 testing. The conclusion made between the two mixtures is that they are comparable.

5.4.2.5 Volumetric Expansion

The following are the ranges of the volumetric changes for each of the developed mixtures as summarized in Table 30:

- Soil — 16 to 32% Expansion
- Slurry — 32 to 49% Expansion
- Composite — 20 to 44% Expansion
- Tile — -12 to 13% Expansion

These results are comparable to the results presented in Task 3. In general, the blast furnace slag with kiln dust reagents produced mixtures with lower volumetric expansions than the mixtures developed using cement and kiln dust. This was also true for the tile mixtures, where no discernable difference was noted based on a comparison of the volumetric expansions for the different particles sizes.

5.4.2.6 Triaxial Strength

The triaxial strength results are presented in Tables 31 and 32. Table 31 presents the condition of each specimen prior to and after the sample saturation procedure and Table 32 presents the specimen condition at the time of triaxial testing. Triaxial strength testing is usually not conducted on solidified materials, thus no standard specification has been established for this testing. The triaxial strength at failure, at an effective confining stress of 10 psi, for the soil was in the range of 281 to 1300 psi, for the slurry in the range of 102 to 126 psi, and for the composite in the range of 178 to 634 psi. The results indicate that the blast furnace slag and kiln dust reagents produced triaxial strengths greater than the cement and kiln dust mixtures.

5.4.2.7 ANS 16.1 Leachability

The ANS16.1 leachability analytical results are presented in Table 33. The results show that asbestos fibers are leaching from the solidified materials in amounts from 144 million to over 11 billion structures per liter. Although this is a substantial reduction from the trillions of structures per liter contained within the on site asbestos tile, the leaching of fibers from the solidified materials are in excess of the Safe Drinking Water Act (40 CFR 141.50-.51) maximum contaminant level of 7,200,000 fibers per liter asbestos contamination in ground water. The results did not show any significant difference in how the cement/cement kiln dust mixture compared to the blast furnace slag/kiln dust mixture performed.

Table 33 shows that the majority of asbestos fibers were released within the first five days of the test. This initial release of fibers from the outer surface of the solidified mass would also be expected in the field. The subsequent release of fibers after the

initial release would also be expected to yield high numbers of asbestos leaching from the on site solidified mass. It is expected that the mass would release fibers through a surface washing effect for many years. The pH of ground water at both sites is approximately 6.0, this acidic pH level might be expected to slowly degrade the surface of the mass thus continuously releasing asbestos fibers.

Although there is considerable evidence that the mass will leach asbestos fibers, it is not expected that these fibers will travel rapidly through the soils. An EPA report "Movement of Selected Metals, Asbestos, and Cyanide in Soil," (EPA 600/2-77-020) compares the physical transport of asbestos with that of clay sized particles because of their comparable small size. The report states that "clay particles 0.1 to 2.0 µm in diameter are estimated to move at a rate of 1 to 10 cm per 3,000 to 40,000 years, depending on the soil texture." This report also states that migration of asbestos through soil is not a problem of any significance and that asbestos does not offer a serious contamination prospect to the soil or undergrnound water supplies and cannot be classed as a soil pollutant.

5.4.2.8 Unconfined Compressive Strength

The unconfined compressive strength results (for tile waste materials only) are presented in Table 34. Although the effective strength required will vary for each project, a UCS of 50 psi is generally used as the basis for effective solidification. The UCS for the tile mixtures were in the range of 237.9 psi to greater than 898.4 psi. No conclusions based on the effect of the particle sizes are included. The mixtures containing 1.0 inch particles do appear to have lower strengths than the 0.5 inch particle mixtures, however, this effect is likely due to the limitations of the testing. ASTM test methods recommends that the maximum particle size for strength testing should not exceed one-sixth of the diameter of the specimen container. Thus, only qualitative comparisons of the data can be conducted. The results reported as greater than, indicate that KIBER was unable to rupture these specimens and that the strengths were beyond the limits of the equipment.

Appendix E contains sample calculations for the following Task 4 parameters - permeability, wet/dry durability, freeze/thaw durability, and triaxial shear testing.

6.0 CONCLUSIONS AND RECOMMENDATIONS

This treatability study was conducted to evaluate the effectiveness of solidification as a treatment technology for the remediation/immobilization asbestos contaminated material. The chemical characteristics of the two study areas which comprise the site, including waste depth and volume, surface water run-off, and seasonal fluctuations of the water table, have all been considered when evaluating the treatability study the application of data to determine the application of this technology.

The untreated waste was tested in the forms of soil, slurry, tile and a composite or homogenized blend of material consisting of equal-weight proportions of each waste type. Non-proprietary reagents - Type I Portland cement, cement kiln dust, and blast furnace slag were tested using the four different forms of untreated waste (including a variety of slurry concentrations), to determine the effectiveness of the solidification process.

Following the first three tasks of developing more detailed analytical and durability tests while reducing the number of reagent options tested, two reagent mixtures were identified for the final task (Task 4) in which soil, tile and composite materials were analyzed. These mixtures were

- a 30 percent reagent addition that consisted of a 50/50 mixture of Type 1 Portland cement and cement kiln dust; and

- a 28 percent reagent addition that consisted of 20 percent blast furnace slag with 8 percent cement kiln dust.

Because slurry material had significantly different physical characteristics, different reagent concentrations were selected. The concentrations finally selected and evaluated for the slurry material in the final task were

- a 50 percent reagent addition that consisted of a 50/50 mixture of Type 1 Portland cement and cement kiln dust; and

- a 28 percent reagent addition that consisted of 20 percent blast furnace slag and 8 percent cement kiln dust.

The following are conclusions and recommendations developed from the treatability study:

- There were no target compound list (TCL) organic or target analyte list (TAL) inorganic contaminants in the wastes tested at both sites that will adversely affect the solidification treatment process. For this reason, proprietary solidification reagents were not used for treatment during the treatability study. In addition, exothermic reactions, occurring as part of the solidification process are not expected to produce significant organic vapor emissions during remediation because of the low levels of volatile organic compounds (VOCs) found to be present in the untreated waste material tested.

- The slurry materials tested have a high moisture content of approximately 200 percent. The high moisture content of the slurry appears to lessen the effectiveness of the solidification treatment. The permeability is increased, the unconfined compressive strength is decreased, and the results of the durability testing show a greater amount of the total material loss than with the other wastes tested.

- Visual observations of the freeze/thaw specimens noted that the slurry mixtures may heave and degrade if exposed to freeze/thaw cycles.

  The slurry material will need to be treated as an individual component of the waste stream. This could involve utilizing techniques such as dewatering, or modifying the process by using higher reagent addition rates, adding dry reagent, etc. to increase the effectiveness of solidifying this material.

- The ANS 16.1 leachability and the freeze/thaw analytical results indicate that asbestos fibers will leach from a solidified mass that is constructed with the components similar to those used during the treatability study. The results of the leachability testing have shown the release of asbestos fibers from solidified mixtures in amounts in excess of billions of asbestos structures per liter. Although this is considerable evidence that the mass will leach asbestos fibers, it is not expected that asbestos fibers will travel rapidly through the onsite soils.

- All mixtures demonstrate hydraulic conductivities adequate for effective solidification (2.1×10^{-6} - 6.6×10^{-9}cm/sec). The values reported meet the specifications typically accepted for land disposal of solidified materials, although this parameter is often project specific.

- The strength properties of the solidified materials tested meet the minimum guidelines (50 psi) established by the EPA. The minimum guidelines have been suggested in order to provide a stable base for overlying materials, such as construction equipment or an impermeable cover.

- The treatability study evaluated five different reagent mixtures with varying water content ratios. The objective of the study was to identify a mixture that would be best suited for *in situ* solidification at the two Asbestos Dump sites previously mentioned. By process of elimination through Tasks 2, and 3, two mixtures were chosen for comprehensive physical and analytical testing during Task 4. These two mixtures were a combination of Type 1 Portland cement/cement kiln dust, and a combination of blast furnace slag/cement kiln dust.

  It is concluded by this treatability study that the Type 1 Portland cement/cement kiln dust combination would be best suited for the *in situ* solidification at the New Vernon Road and White Bridge Road properties. Type 1 portland cement and cement kiln dust are widely used products, are in great supply, and have been used for other solidification projects, throughout the country. The mixture has produced specimens with adequate strength, permeability, and durability characteristics. The actual percentages of the reagents used may need to be altered for low moisture and high moisture areas as well as the amount of water addition to produce the slurry feed mixture. A water addition of 75-100 percent that of the solidification agent is

recommended, this allow for a pumpable slurry and was successfully used throughout the treatability study.

Although the blast furnace slag performed comparable with the Type 1 Portland cement, it has not been recommended because of the possible inconsistency of its chemical characteristics. Blast furnace slag is a by-product of burning ore and coke, this by-product is the impurities removed from the burning operations. Preparation of effective design specifications using this material would be difficult. Use of this material would necessitate a rigorous analytical testing program during the remedial action efforts that would add additional cost and time to the project.

7.0 DEVIATIONS FROM THE WORK PLAN

The treatability study was performed in general accordance with the "Treatability Study Work Plan, Operable Unit #2, Asbestos Dump Sites, Morris County, New Jersey," dated November 19, 1991. Minor deviations in procedure and technical analysis were agreed upon among EPA, TRC and Kiber, prior to the commencement of a particular activity. The format of this Treatability Study Report also deviates somewhat from that proposed in the Work Plan. All deviations are discussed below:

- The Work Plan states that "Phase one testing includes preparation of 128 cores for physical testing." Kiber prepared 384 mixtures - 96 for each of the waste streams, i.e., soil, tile, slurry and the composite material. This was performed to evaluate more options of solidification agent to waste ratios.

- The Work Plan states that during the initial screening process, the "small solidified masses of ACM...will be allowed to cure for seven days." Based on Kiber's experience and because the samples were prepared for comparative purposes only, two days curing time was considered sufficient.

- Two analytical methods were amended from those required in the Work Plan. The method for testing for asbestos (soil) was changed from EPA Level II (TEM) to Level III at the request of EPA. The freeze/thaw (durability) test method was changed from ASTM D 560 to ASTM D 4842 to facilitate leaching tests as requested by EPA.

- The Work Plan states that in the second phase of testing, tests will be conducted on three matrices of untreated ACM. These are "slurry, soil and waste." The "waste" referred to was the composite material, prepared from equal-weight proportions of soil, tile and slurry. All tests in Table 3 of the Work Plan were performed on this composite waste, with the exception of the unconfined compressive strength tests which were performed on the tile waste. This testing was conducted under Task 4 of the treatability study. The reason for testing the tile waste rather than the composite was to evaluate the effect of the maximum particle size on the UCS of the solidified mixtures. UCS testing

for the soil, slurry and composite material had already been performed under Task 3 of the treatability study.

- The Work Plan presents an outline format for the Treatability Study Report to follow. Although the subject matter of the outline proposed in the Work Plan has been mostly included in this report, the exact format has changed. With the benefit of the treatability study near completion, it can be seen that the format adopted in this report, more closely follows the chronological progress and development of the study. It is intended that this should produce a more comprehensive report and improve the clarity of the document for a reader not familiar with all the activities conducted. The one area which has not been included within this draft report is a cost evaluation of the remedial action. This has been performed as part of the remedial design and would be an unnecessary task to duplicate this effort.

- The Work Plan also states that the vendor's (i.e., Kiber's) final Treatability Study Report would be included in the TRC report as an appendix. TRC has determined that it will be more effective to combine KIBER's results and TRC's results into one comprehensive report.

REFERENCES

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American Society for Testing and Materials. January 1991. *Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock.* Designation: D 2216-90.

American Society for Testing and Materials. November 1963. *Standard Test Method for Particle-size Analysis of Soils.* Designation: D 422-90.

TABLE 1. TASK 1, DRUM LOG NEW JERSEY ASBESTOS DUMP SITES - OU2 TREATABILITY STUDY RESULTS

Drum Number	Waste Type	Photoionization Reading (units)
1	Soil	12
2	Soil	0
3	Soil	0
4	Tile	40
5	Tile	40
6	Tile	0
7	Slurry	12
8	Slurry	8
9	Slurry	2

TABLE 2
Task 1
Sample Log

SAMPLE NUMBER	DRUM NUMBER	WASTE TYPE	ANALYSES CONDUCTED
T11U1	1	SOIL	TCL, TAL, ASBESTOS
T11U2	1	SOIL	TCL, TAL, ASBESTOS
T14U3	4	TILE	TCL, TAL, ASBESTOS
T14U4	4	TILE	TCL, TAL, ASBESTOS
T17U5	7	SLURRY	TCL, TAL, ASBESTOS
T17U6	7	SLURRY	TCL, TAL, ASBESTOS
T14U7	4	TILE	ASBESTOS
T14U8	4	TILE	ASBESTOS
T14U9	4	TILE	ASBESTOS
T11MC1	1	SOIL	MOISTURE CONTENT
T11MC2	1	SOIL	MOISTURE CONTENT
T11MC3	1	SOIL	MOISTURE CONTENT
T11MC4	1	SOIL	MOISTURE CONTENT
T11MC5	1	SOIL	MOISTURE CONTENT
T14MC1	4	TILE	MOISTURE CONTENT
T14MC2	4	TILE	MOISTURE CONTENT
T14MC3	4	TILE	MOISTURE CONTENT
T14MC4	4	TILE	MOISTURE CONTENT
T14MC5	4	TILE	MOISTURE CONTENT
T14MC6	4	TILE	MOISTURE CONTENT
T14MC7	4	TILE	MOISTURE CONTENT
T14MC8	4	TILE	MOISTURE CONTENT
T14MC9	4	TILE	MOISTURE CONTENT
T14MC10	4	TILE	MOISTURE CONTENT
T17MC1	7	SLURRY	MOISTURE CONTENT
T17MC2	7	SLURRY	MOISTURE CONTENT
T17MC3	7	SLURRY	MOISTURE CONTENT
T17MC4	7	SLURRY	MOISTURE CONTENT
T17MC5	7	SLURRY	MOISTURE CONTENT
*T14A	4	TILE	PARTICLE SIZE
*T14B	4	TILE	PARTICLE SIZE
*T14C	4	TILE	PARTICLE SIZE

* T14A: MAXIMUM PARTICLE SIZE = 3 mm
* T14B: MAXIMUM PARTICLE SIZE = 12 mm
* T14C: MAXIMUM PARTICLE SIZE = 25 mm

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TREATABILITY STUDY RESULTS

TABLE 3
Task 1
Summary of TCL Organic Analyses

ANALYTICAL PARAMETER	CONCENTRATIONS (ug/kg)					
	SOIL		TILE		SLURRY	
	T11U1	T11U2	T14U3	T14U4	T17U5	T17U6
I. VOLATILES						
Toluene	1.7	ND	15	12	22	19
Acetone	ND	ND	<MDL	ND	410	180
Xylenes	0.7	0.8	1.3	1.6	27	20
MEK	ND	ND	ND	ND	100	<MDL
Benzene	ND	ND	ND	ND	16	13
Ethylbenzene	0.2	0.3	0.7	0.6	4.6	3.2
Chlorobenzene	ND	ND	ND	ND	7.3	5.2
Methylene Chloride	16	14	25	22	71	71
Trichloroethene	ND	ND	ND	ND	2.4	2.4
II. SEMIVOLATILES						
bis(2-Ethylhexyl)phthalate	39	40	94	2900	230	200
butylbenzylphthalate	ND	ND	25	<MDL	ND	ND
Di-n-butylphthalate	<MDL	<MDL	75	17	<MDL	<MDL

ND: Not Detectable
MDL: Method Detection Limit

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TREATABILITY STUDY RESULTS

TABLE 4
Task 1
Summary of TAL Inorganic Analyses

ANALYTICAL PARAMETER	CONCENTRATIONS (mg/kg)					
	SOIL		TILE		SLURRY	
	T11U1	T11U2	T14U3	T14U4	T17U5	T17U6
III. Inorganics						
Aluminum	17,100	17,700	12,500	13,800	13,700	11,900
Arsenic	3.7	6.6	<3.4	<3.3	<11.2	<12.1
Barium	57.3	80.7	69.3	66.2	29.5	27.9
Calcium	2300	3010	105,000	37,500	168,000	147,000
Chromium	28.9	32.3	77.8	75.2	105	109
Cobalt	9.0	12.1	9.6	12.0	11.8	14.0
Copper	11.7	14.5	14.1	9.0	15.3	14.2
Iron	31,400	32,100	10,500	10,800	11,700	10,800
Lead	12.7	13.5	23.8	16.4	43.6	45.4
Magnesium	2880	4030	31,800	54,600	40,400	44,900
Mercury	0.08	0.14	5.2	5.0	2.1	2.5
Nickel	16	20.5	201	271	281	303
Potassium	491	615	824	423	277	<262
Sodium	179	129	112	157	134	238
Vanadium	52.9	54.5	19.3	16.5	25.4	17.6
Zinc	28.1	38.1	68.1	35.9	784	380

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TABLE 5
Task 1
Asbestos Content Results

SAMPLE NUMBER	DRUM NUMBER	WASTE TYPE	ASBESTOS CONTENT (Structures / Liter)
T11U1	1	SOIL	6.1×10^{6}
T11U2	1	SOIL	1.8×10^{7}
T14U3	4	TILE	3.4×10^{12}
T14U4	4	TILE	6.9×10^{11}
T17U5	7	SLURRY	1.5×10^{12}
T17U6	7	SLURRY	1.5×10^{12}
T14U7	4	TILE	5.7×10^{12}
T14U8	4	TILE	5.7×10^{12}
T14U9	4	TILE	3.7×10^{12}

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TREATABILITY STUDY RESULTS

TABLE 6
Task 1
Moisture Content Results

SAMPLE NUMBER	DRUM NUMBER	WASTE TYPE	MOISTURE CONTENT (%)
T11MC1	1	SOIL	24.52
T11MC2	1	SOIL	24.68
T11MC3	1	SOIL	25.35
T11MC4	1	SOIL	25.12
T11MC5	1	SOIL	23.05
T14MC1	4	TILE	31.47
T14MC2	4	TILE	30.43
T14MC3	4	TILE	32.64
T14MC4	4	TILE	31.41
T14MC5	4	TILE	31.37
T14MC6	4	TILE	28.44
T14MC7	4	TILE	29.84
T14MC8	4	TILE	29.16
T14MC9	4	TILE	32.86
T14MC10	4	TILE	26.99
T17MC1	7	SLURRY	366.57
T17MC2	7	SLURRY	240.07
T17MC3	7	SLURRY	303.21
T17MC4	7	SLURRY	307.04
T17MC5	7	SLURRY	324.69

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TREATABILITY STUDY RESULTS

TABLE 7
Task 1
Unit Weight Determination

WASTE TYPE	UNIT WEIGHT (Pounds per cubic foot)	
	BULK	DRY
SOIL	122.2	98.7
TILE	82.8	62.5
SLURRY	70.8	17.0

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TREATABILITY STUDY RESULTS

TABLE 8
Task 2
Summary of Physical Characteristics

TESTING PARAMETER	WASTE TYPE		
	SOIL	TILE	SLURRY
1. UNIT WEIGHT			
Bulk Unit Weight	122.2 pcf	82.8 pcf	70.8 pcf
Dry Unit Weight	98.7 pcf	62.5 pcf	17.0 pcf
2. MOISTURE CONTENT			
Minimum	23.05 %	26.99 %	240.07 %
Maximum	25.35 %	32.86 %	366.57 %
Average	24.54 %	30.46 %	308.32 %
3. pH	8.34	10.52	12.25

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TREATABILITY STUDY RESULTS

TABLE 9
Task 2
[1] Summary of Optimum Mixture Range

REAGENT TYPE	REAGENT ADDITION (%)
TYPE I PORTLAND CEMENT	15
TYPE I PORTLAND CEMENT	20
TYPE I PORTLAND CEMENT	25
CEMENT KILN DUST	20
CEMENT KILN DUST	25
CEMENT KILN DUST	30
CEMENT KILN DUST	40
50% CEMENT / 50% KILN DUST	15
50% CEMENT / 50% KILN DUST	20
50% CEMENT / 50% KILN DUST	25
50% CEMENT / 50% KILN DUST	30
FIRMEX / CEMENT KILN DUST	10 / 5
FIRMEX / CEMENT KILN DUST	10 / 8
FIRMEX / CEMENT KILN DUST	20 / 5
FIRMEX / CEMENT KILN DUST	20 / 8
25% CEMENT / 75% KILN DUST	30

[1] For each of the four waste types (i.e., soil, tile, slurry and a composite), the mixtures were developed at two water contents and each in triplicate.

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TREATABILITY STUDY RESULTS

TABLE 10
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** NO. 1

TASK NUMBER: NO 2 **CURE TIME:** 2 DAYS

WASTE TYPE: SOIL **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T21001	RKS	3-3-92	TYPE I PORTLAND CEMENT	15	20	150 0	22 5	30 0	1.55	1 58	2	>4 5	>4 5	>4 5	
T21002	RKS	3-3-92	TYPE I PORTLAND CEMENT	15	20	150 0	22 5	30 0	1 69	1 63	-4	>4 5	>4 5	>4 5	
T21003	RKS	3-3-92	TYPE I PORTLAND CEMENT	15	20	150 0	22 5	30 0	1 63	1 49	-9	>4 5	>4 5	>4 5	solid mass
T21004	RKS	3-3-92	TYPE I PORTLAND CEMENT	15	10	150 0	22 5	15 0	1 60	1 54	-4	>4 5	>4 5	>4 5	very hard
T21005	RKS	3-3-92	TYPE I PORTLAND CEMENT	15	10	150 0	22 5	15 0	1 62	1 55	-4	>4 5	>4 5	>4 5	
T21006	RKS	3-3-92	TYPE I PORTLAND CEMENT	15	10	150 0	22 5	15 0	1 45	1 51	4	>4 5	>4 5	>4 5	
T21007	RKS	3-3-92	TYPE I PORTLAND CEMENT	20	22	150 0	30 0	33 0	1 48	1 59	7	>4 5	>4 5	>4 5	
T21008	RKS	3-3-92	TYPE I PORTLAND CEMENT	20	22	150 0	30 0	33 0	1 42	1.59	12	>4 5	>4 5	>4 5	
T21009	RKS	3-3-92	TYPE I PORTLAND CEMENT	20	22	150 0	30 0	33 0	1.40	1 72	23	>4 5	>4 5	>4 5	solid mass
T21010	RKS	3-3-92	TYPE I PORTLAND CEMENT	20	12	150 0	30 0	18 0	1 43	1 64	15	>4 5	>4 5	>4 5	very hard
T21011	RKS	3-3-92	TYPE I PORTLAND CEMENT	20	12	150 0	30 0	18 0	1 42	1 61	13	>4 5	>4 5	>4 5	
T21012	RKS	3-3-92	TYPE I PORTLAND CEMENT	20	12	150 0	30 0	18 0	1 34	1.59	19	>4 5	>4 5	>4 5	
T21013	RKS	3-3-92	TYPE I PORTLAND CEMENT	25	24	150 0	37.5	36 0	1 49	1 67	12	>4 5	>4.5	>4 5	
T21014	RKS	3-3-92	TYPE I PORTLAND CEMENT	25	24	150 0	37 5	36 0	1 56	1.74	12	>4.5	>4 5	>4 5	
T21015	RKS	3-3-92	TYPE I PORTLAND CEMENT	25	24	150 0	37.5	36 0	1.44	1 80	25	>4 5	>4 5	>4 5	solid mass
T21016	RKS	3-3-92	TYPE I PORTLAND CEMENT	26	13	150 0	37.5	19 5	1 51	1 69	12	>4 5	>4 5	>4 5	very hard
T21017	RKS	3-3-92	TYPE I PORTLAND CEMENT	26	13	150 0	37 5	19 5	1 48	1 66	12	>4 5	>4 5	>4 5	
T21018	RKS	3-3-92	TYPE I PORTLAND CEMENT	25	13	150 0	37.5	19 5	1.49	1 69	13	>4 5	>4 5	>4 5	
T21019	RKS	3-3-92	CEMENT KILN DUST	20	26	150 0	30 0	39 0	1.42	1 67	18	0 5	1 0	0 5	
T21020	RKS	3-3-92	CEMENT KILN DUST	20	26	150 0	30 0	39 0	1.35	1 81	34	0 0	0 5	0 5	
T21021	RKS	3-3-92	CEMENT KILN DUST	20	26	150 0	30 0	39 0	1 31	1 77	35	0 5	0 0	0 5	
T21022	RKS	3-3-92	CEMENT KILN DUST	20	21	150 0	30 0	31 5	1 41	1 68	19	0 5	1 0	0 5	
T21023	RKS	3-3-92	CEMENT KILN DUST	20	21	150 0	30 0	31 5	1 36	1 71	26	1 0	0 5	1 0	
T21024	RKS	3-3-92	CEMENT KILN DUST	20	21	150 0	30 0	31 5	1 44	1 74	21	0 5	1.0	0 5	
T21025	RKS	3-3-92	CEMENT KILN DUST	25	26	150 0	37 5	39 0	1 40	1 80	29	0 5	0 5	0 0	
T21026	RKS	3-3-92	CEMENT KILN DUST	25	26	150 0	37.5	39.0	1.46	1 84	26	0 5	0 5	1.0	

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion.

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TREATABILITY STUDY RESULTS

TABLE 10 (continued)
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** NO. 1

TASK NUMBER: NO. 2 **CURE TIME:** 2 DAYS

WASTE TYPE: SOIL **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T21027	JWF	3-3-92	CEMENT KILN DUST	25	26	150.0	37.5	39.0	1.39	1.79	29	2.0	1.5	1.0	
T21028	JWF	3-3-92	CEMENT KILN DUST	25	24	150.0	37.5	36.0	1.46	1.60	10	1.5	2.0	1.5	
T21029	JWF	3-3-92	CEMENT KILN DUST	25	24	150.0	37.5	36.0	1.41	1.74	23	2.0	2.0	2.0	
T21030	JWF	3-3-92	CEMENT KILN DUST	25	24	150.0	37.5	36.0	1.34	1.68	25	2.0	1.5	2.0	
T21031	JWF	3-3-92	CEMENT KILN DUST	30	34	150.0	45.0	51.0	1.37	1.76	28	0.5	0.0	0.5	
T21032	JWF	3-3-92	CEMENT KILN DUST	30	34	150.0	45.0	51.0	1.25	1.70	36	0.5	0.5	0.5	
T21033	JWF	3-3-92	CEMENT KILN DUST	30	34	150.0	45.0	51.0	1.27	1.83	44	0.5	0.5	0.0	
T21034	JWF	3-3-92	CEMENT KILN DUST	30	28	150.0	45.0	42.0	1.45	1.71	18	1.0	1.0	1.0	
T21035	JWF	3-3-92	CEMENT KILN DUST	30	28	150.0	45.0	42.0	1.31	1.67	27	1.0	1.0	1.0	
T21036	JWF	3-3-92	CEMENT KILN DUST	30	28	150.0	45.0	42.0	1.48	1.91	29	1.0	0.5	2.5	
T21037	RKS	3-4-92	CEMENT KILN DUST	40	43	150.0	60.0	64.5	1.47	2.11	44	0.0	0.0	0.0	
T21038	RKS	3-4-92	CEMENT KILN DUST	40	43	150.0	60.0	64.5	1.46	2.15	47	0.0	0.0	0.0	
T21039	RKS	3-4-92	CEMENT KILN DUST	40	43	150.0	60.0	64.5	1.27	2.14	69	0.0	0.5	0.0	
T21040	RKS	3-4-92	CEMENT KILN DUST	40	35	150.0	60.0	52.5	1.45	1.94	34	0.0	0.5	0.5	
T21041	RKS	3-4-92	CEMENT KILN DUST	40	35	150.0	60.0	52.5	1.44	1.96	36	0.5	0.5	0.5	
T21042	RKS	3-4-92	CEMENT KILN DUST	40	35	150.0	60.0	52.5	1.49	2.05	38	0.5	0.5	0.5	
T21043	RKS	3-4-92	50% CEMENT / 50% KILN DUST	15	20	150.0	22.5	30.0	1.49	1.62	9	>4.5	>4.5	>4.5	
T21044	RKS	3-4-92	50% CEMENT / 50% KILN DUST	15	20	150.0	22.5	30.0	1.46	1.55	6	>4.5	>4.5	>4.5	
T21045	RKS	3-4-92	50% CEMENT / 50% KILN DUST	15	20	150.0	22.5	30.0	1.33	1.59	20	>4.5	>4.5	>4.5	
T21046	RKS	3-4-92	50% CEMENT / 50% KILN DUST	15	10	150.0	22.5	15.0	1.27	1.51	19	>4.5	>4.5	>4.5	
T21047	RKS	3-4-92	50% CEMENT / 50% KILN DUST	15	10	150.0	22.5	15.0	1.38	1.63	18	>4.5	>4.5	>4.5	
T21048	RKS	3-4-92	50% CEMENT / 50% KILN DUST	15	10	150.0	22.5	15.0	1.32	1.50	14	>4.5	>4.5	>4.5	
T21049	RKS	3-4-92	50% CEMENT / 50% KILN DUST	20	22	150.0	30.0	33.0	1.39	1.67	20	>4.5	>4.5	>4.5	
T21050	RKS	3-4-92	50% CEMENT / 50% KILN DUST	20	22	150.0	30.0	33.0	1.36	1.62	19	>4.5	>4.5	>4.5	
T21051	RKS	3-4-92	50% CEMENT / 50% KILN DUST	20	22	150.0	30.0	33.0	1.37	1.55	13	>4.5	>4.5	>4.5	
T21052	RKS	3-4-92	50% CEMENT / 50% KILN DUST	20	14	150.0	30.0	21.0	1.40	1.67	19	>4.5	>4.5	>4.5	very solid

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion.

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TREATABILITY STUDY RESULTS

TABLE 10 (continued)
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** NO. 1

TASK NUMBER: NO. 2 **CURE TIME:** 2 DAYS

WASTE TYPE: SOIL **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T21053	RKS	3-4-92	50% CEMENT / 50% KILN DUST	20	14	150.0	30.0	21.0	1.44	1.77	23	>4.5	>4.5	>4.5	
T21054	RKS	3-4-92	50% CEMENT / 50% KILN DUST	20	14	150.0	30.0	21.0	1.46	1.72	18	>4.5	>4.5	>4.5	
T21055	RKS	3-4-92	50% CEMENT / 50% KILN DUST	25	24	150.0	37.5	36.0	1.34	1.83	37	>4.5	>4.5	>4.5	
T21056	RKS	3-4-92	50% CEMENT / 50% KILN DUST	25	24	150.0	37.5	36.0	1.38	1.61	17	>4.5	>4.5	>4.5	
T21057	RKS	3-4-92	50% CEMENT / 50% KILN DUST	25	24	150.0	37.5	36.0	1.34	1.63	22	>4.5	>4.5	>4.5	
T21058	RKS	3-4-92	50% CEMENT / 50% KILN DUST	25	16	150.0	37.5	24.0	1.29	1.76	36	>4.5	>4.5	>4.5	
T21059	RKS	3-4-92	50% CEMENT / 50% KILN DUST	25	16	150.0	37.5	24.0	1.31	1.65	26	>4.5	>4.5	>4.5	
T21060	RKS	3-4-92	50% CEMENT / 50% KILN DUST	25	16	150.0	37.5	24.0	1.41	1.72	22	>4.5	>4.5	>4.5	
T21061	RKS	3-4-92	50% CEMENT / 50% KILN DUST	30	26	150.0	45.0	39.0	1.26	1.81	44	>4.5	>4.5	>4.5	
T21062	RKS	3-4-92	50% CEMENT / 50% KILN DUST	30	26	150.0	45.0	39.0	1.30	1.70	31	>4.5	>4.5	>4.5	
T21063	RKS	3-4-92	50% CEMENT / 50% KILN DUST	30	26	150.0	45.0	39.0	1.27	1.59	25	>4.5	>4.5	>4.5	
T21064	RKS	3-4-92	50% CEMENT / 50% KILN DUST	30	19	150.0	45.0	28.5	1.33	1.90	43	>4.5	>4.5	>4.5	
T21065	RKS	3-4-92	50% CEMENT / 50% KILN DUST	30	19	150.0	45.0	28.5	1.25	1.85	48	>4.5	>4.5	>4.5	
T21066	RKS	3-4-92	50% CEMENT / 50% KILN DUST	30	19	150.0	45.0	28.5	1.34	1.70	27	>4.5	>4.5	>4.5	
T21067	RKS	3-4-92	FIRMEX / CEMENT KILN DUST	10 / 5	18	150.0	15/7.5	27.0	1.39	1.60	15	0.5	0.5	2	
T21068	RKS	3-4-92	FIRMEX / CEMENT KILN DUST	10 / 5	18	150.0	15/7.5	27.0	1.49	1.59	7	1	1	2	
T21069	RKS	3-4-92	FIRMEX / CEMENT KILN DUST	10 / 5	18	150.0	15/7.5	27.0	1.38	1.52	10	0.5	1	3.5	
T21070	RKS	3-4-92	FIRMEX / CEMENT KILN DUST	10 / 5	12	150.0	15/7.5	18.0	1.29	1.51	17	2	3.5	>4.5	
T21071	RKS	3-4-92	FIRMEX / CEMENT KILN DUST	10 / 5	12	150.0	15/7.5	18.0	1.40	1.71	22	1	1	1.5	
T21072	RKS	3-4-92	FIRMEX / CEMENT KILN DUST	10 / 5	12	150.0	15/7.5	18.0	1.33	1.52	14	1.5	1.5	1	
T21073	RKS	3-4-92	FIRMEX / CEMENT KILN DUST	10 / 8	20	150.0	15/12	30.0	1.31	1.56	19	4	3.5	>4.5	
T21074	RKS	3-4-92	FIRMEX / CEMENT KILN DUST	10 / 8	20	150.0	15/12	30.0	1.34	1.64	22	>4.5	4.5	4.5	
T21075	RKS	3-4-92	FIRMEX / CEMENT KILN DUST	10 / 8	20	150.0	15/12	30.0	1.31	1.57	20	3.5	>4.5	>4.5	
T21076	RKS	3-4-92	FIRMEX / CEMENT KILN DUST	10 / 8	12	150.0	15/12	18.0	1.32	1.56	18	3	>4.5	>4.5	
T21077	RKS	3-4-92	FIRMEX / CEMENT KILN DUST	10 / 8	12	150.0	15/12	18.0	1.37	1.65	20	>4.5	>4.5	>4.5	
T21078	RKS	3-4-92	FIRMEX / CEMENT KILN DUST	10 / 8	12	150.0	15/12	18.0	1.31	1.81	38	>4.5	>4.5	>4.5	

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion.

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TREATABILITY STUDY RESULTS

TABLE 10 (continued)
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** NO. 1

TASK NUMBER: NO. 2 **CURE TIME:** 2 DAYS

WASTE TYPE: SOIL **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T21079	JWF	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 5	22	150 0	30/7 5	33 0	1 34	1 56	16	>4 5	>4 5	>4 5	
T21080	JWF	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 5	22	150 0	30/7.5	33 0	1.29	1.71	33	2 5	2 5	4	
T21081	JWF	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 5	22	150 0	30/7.5	33 0	1 39	1 53	10	1 5	0 5	1	
T21082	JWF	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 5	15	150 0	30/7 5	22 5	1 49	1 62	9	>4 5	>4 5	2 5	
T21083	JWF	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 5	15	150 0	30/7 5	22 5	1.42	1 56	10	2	3 5	3	
T21084	JWF	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 5	15	150 0	30/7 5	22.5	1.36	1 52	12	3	2 5	3 5	
T21085	JWF	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 8	22	150 0	30/12	33 0	1.32	1.61	22	3	4.5	3 5	
T21086	JWF	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 8	22	150 0	30/12	33 0	1.31	1.48	13	>4 5	>4 5	>4 5	
T21087	JWF	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 8	22	150.0	30/12	33.0	1.26	1.62	29	>4.5	>4.5	>4.5	
T21088	JWF	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 8	15	150.0	30/12	22 5	1.35	1.63	21	>4 5	>4.5	>4.5	
T21089	JWF	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 8	15	150.0	30/12	22.5	1.36	1.60	18	>4 5	>4.5	>4.5	
T21090	JWF	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 8	15	150 0	30/12	22 5	1.34	1 65	23	>4 5	>4 5	>4 5	
T21091	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	29	150 0	46	43 5	1.36	1 81	33	>4 5	>4 5	>4 5	
T21092	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	29	150 0	46	43 5	1.41	1 88	33	>4 5	>4 6	>4 5	
T21093	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	29	150 0	45	43 5	1 28	1 86	45	>4 5	>4 5	>4 5	
T21094	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	22	150 0	45	33	1 33	1 80	35	>4 5	>4 5	>4 5	
T21095	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	22	150 0	45	33	1.27	1.73	36	>4 5	4 5	>4 5	
T21096	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	22	150 0	45	33	1.37	1 92	40	>4 5	>4 5	>4 5	

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion.

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TREATABILITY STUDY RESULTS

TABLE 11
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** NO 4

TASK NUMBER: NO 2 **CURE TIME:** 2 DAYS

WASTE TYPE: TILE **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T24001	RKS	2-28-92	TYPE I PORTLAND CEMENT	15	20	150 0	22 5	30 0	1 98	1 98	0	>4 5	>4 5	>4 5	
T24002	RKS	2-28-92	TYPE I PORTLAND CEMENT	15	20	150 0	22 5	30 0	2 02	1 93	-4	>4 5	>4 5	>4 5	not sufficiently coated
T24003	RKS	2-28-92	TYPE I PORTLAND CEMENT	15	20	150 0	22 5	30 0	2 09	1 91	-9	>4 5	>4 5	>4 5	
T24004	RKS	2-28-92	TYPE I PORTLAND CEMENT	15	10	150 0	22 5	15 0	2 05	2 05	0	>4 5	>4 5	>4 5	
T24005	RKS	2-28-92	TYPE I PORTLAND CEMENT	15	10	150 0	22 5	15 0	2 03	2 03	0	>4 5	>4 5	>4 5	too dry, barely coated
T24006	RKS	2-28-92	TYPE I PORTLAND CEMENT	15	10	150 0	22 5	15 0	1 97	2 02	3	>4 5	>4 5	>4 5	
T24007	RKS	2-28-92	TYPE I PORTLAND CEMENT	20	23	150 0	30 0	34 5	2 15	2 15	0	>4 5	>4 5	>4 5	
T24008	RKS	2-28-92	TYPE I PORTLAND CEMENT	20	23	150 0	30 0	34 5	2 22	2 09	-6	>4 5	>4 5	>4 5	fairly well coated
T24009	RKS	2-28-92	TYPE I PORTLAND CEMENT	20	23	150 0	30 0	34 5	2 16	2 11	-2	>4 5	>4 5	>4 5	
T24010	RKS	2-28-92	TYPE I PORTLAND CEMENT	20	13	150 0	30 0	19 5	2 21	2 19	-1	>4 5	>4 5	>4 5	
T24011	RKS	2-28-92	TYPE I PORTLAND CEMENT	20	13	150 0	30 0	19 5	2 26	2 21	-2	>4 5	>4 5	>4 5	too dry, barely coated
T24012	RKS	2-28-92	TYPE I PORTLAND CEMENT	20	13	150 0	30 0	19 5	2 23	2 23	0	>4 5	>4 5	>4 5	
T24013	RKS	2-28-92	TYPE I PORTLAND CEMENT	25	20	150 0	37 5	30 0	2 15	2 10	-2	>4 5	>4 5	>4 5	
T24014	RKS	2-28-92	TYPE I PORTLAND CEMENT	25	20	150 0	37 5	30 0	2 04	1 98	-3	>4 5	>4 5	>4 5	well coated
T24015	RKS	2-28-92	TYPE I PORTLAND CEMENT	25	20	150 0	37 5	30 0	2 07	2 03	-2	>4 5	>4 5	>4 5	
T24016	RKS	2-28-92	TYPE I PORTLAND CEMENT	25	12	150 0	37 5	18 0	2 17	2 02	-7	>4 5	>4 5	>4 5	
T24017	RKS	2-28-92	TYPE I PORTLAND CEMENT	25	12	150 0	37 5	18 0	1 99	1 97	-1	>4 5	>4 5	>4 5	lightly coated, very dry
T24018	RKS	2-28-92	TYPE I PORTLAND CEMENT	25	12	150 0	37 5	18 0	2 13	2 06	-3	>4 5	>4 5	>4 5	
T24019	BJ	3-1-92	CEMENT KILN DUST	20	23	150 0	30 0	34 5	1 81	1 78	-2	>4 5	>4 5	>4 5	
T24020	BJ	3-1-92	CEMENT KILN DUST	20	23	150 0	30 0	34 5	1 92	1 85	-4	>4 5	>4 5	4 5	formed solid masses,
T24021	BJ	3-1-92	CEMENT KILN DUST	20	23	150 0	30 0	34 5	2 06	1 87	-9	3	>4 5	3 5	yet still flex under
T24022	BJ	3-1-92	CEMENT KILN DUST	20	20	150 0	30 0	30 0	1 96	1 77	-10	>4 5	>4 5	>4 5	pressure
T24023	BJ	3-1-92	CEMENT KILN DUST	20	20	150 0	30 0	30 0	1 94	1 74	-10	>4 5	>4 5	>4 5	
T24024	BJ	3-1-92	CEMENT KILN DUST	20	20	150 0	30 0	30 0	1 89	1 79	-5	>4 5	4 5	>4 5	
T24025	BJ	3-1-92	CEMENT KILN DUST	25	26	150 0	37 5	39 0	1 84	1 79	-3	4 5	>4 5	3 5	
T24026	BJ	3-1-92	CEMENT KILN DUST	25	26	150 0	37 5	39 0	2 06	1 87	-9	3	4	3	

[1] *Negative value denotes volumetric decrease and positive value denotes volumetric expansion*

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TREATABILITY STUDY RESULTS

TABLE 11 (continued)
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** NO 4

TASK NUMBER: NO 2 **CURE TIME:** 2 DAYS

WASTE TYPE: TILE **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T24027	BJ	3-1-92	CEMENT KILN DUST	25	26	150.0	37.5	39.0	1.99	2.02	2	3	3.5	4.5	solid masses
T24028	BJ	3-1-92	CEMENT KILN DUST	25	21	150.0	37.5	31.5	1.97	1.95	-1	4	4.5	3.5	yet still flex -
T24029	BJ	3-1-92	CEMENT KILN DUST	25	21	150.0	37.5	31.5	2.18	1.91	-12	4.5	4.5	4.5	well coated material
T24030	BJ	3-1-92	CEMENT KILN DUST	25	21	150.0	37.5	31.5	2.04	1.96	-4	4.5	4.5	4.5	
T24031	BJ	3-1-92	CEMENT KILN DUST	30	31	150.0	45.0	46.5	2.12	2.05	-3	2.5	3.5	3	
T24032	BJ	3-1-92	CEMENT KILN DUST	30	31	150.0	45.0	46.5	2.02	2.00	-1	2.5	3	2	too wet, too weak
T24033	BJ	3-1-92	CEMENT KILN DUST	30	31	150.0	45.0	46.5	2.21	1.93	-13	2.5	2	1.5	
T24034	BJ	3-1-92	CEMENT KILN DUST	30	26	150.0	45.0	39.0	1.99	2.01	1	4.5	3	4.5	
T24035	BJ	3-1-92	CEMENT KILN DUST	30	26	150.0	45.0	39.0	2.26	2.02	-11	3.5	4.5	4.5	
T24036	BJ	3-1-92	CEMENT KILN DUST	30	26	150.0	45.0	39.0	2.13	2.18	2	4.5	4.5	4	
T24037	BJ	3-1-92	CEMENT KILN DUST	40	41	150.0	60.0	61.5	2.10	2.27	8	1	0	0	
T24038	BJ	3-1-92	CEMENT KILN DUST	40	41	150.0	60.0	61.5	2.19	2.30	5	0.5	2	2	
T24039	BJ	3-1-92	CEMENT KILN DUST	40	41	150.0	60.0	61.5	2.03	2.17	7	0.5	0.5	0.5	far too wet
T24040	BJ	3-1-92	CEMENT KILN DUST	40	36	150.0	60.0	54.0	2.12	2.23	5	1	1	0.5	
T24041	BJ	3-1-92	CEMENT KILN DUST	40	36	150.0	60.0	54.0	2.15	2.21	3	1	2	2	
T24042	BJ	3-1-92	CEMENT KILN DUST	40	36	150.0	60.0	54.0	1.90	2.24	18	1.5	1.5	1.5	
T24043	RKS	3-2-92	50% CEMENT / 50% KILN DUST	15	20	150.0	22.5	30.0	2.07	2.01	-3	>4.5	>4.5	>4.5	
T24044	RKS	3-2-92	50% CEMENT / 50% KILN DUST	15	20	150.0	22.5	30.0	1.94	1.91	-2	>4.5	>4.5	>4.5	
T24045	RKS	3-2-92	50% CEMENT / 50% KILN DUST	15	20	150.0	22.5	30.0	2.04	1.86	-9	>4.5	>4.5	>4.5	material not
T24046	RKS	3-2-92	50% CEMENT / 50% KILN DUST	15	15	150.0	22.5	22.5	2.17	1.94	-11	>4.5	>4.5	>4.5	sufficiently coated
T24047	RKS	3-2-92	50% CEMENT / 50% KILN DUST	15	15	150.0	22.5	22.5	2.21	2.00	-10	>4.5	>4.5	>4.5	
T24048	RKS	3-2-92	50% CEMENT / 50% KILN DUST	15	15	150.0	22.5	22.5	1.97	1.79	-9	>4.5	>4.5	>4.5	
T24049	RKS	3-2-92	50% CEMENT / 50% KILN DUST	20	22	150.0	30.0	33.0	2.01	1.84	-8	>4.5	>4.5	>4.5	
T24050	RKS	3-2-92	50% CEMENT / 50% KILN DUST	20	22	150.0	30.0	33.0	2.12	1.79	-16	>4.5	>4.5	>4.5	
T24051	RKS	3-2-92	50% CEMENT / 50% KILN DUST	20	22	150.0	30.0	33.0	2.13	1.85	-13	>4.5	>4.5	>4.5	
T24052	RKS	3-2-92	50% CEMENT / 50% KILN DUST	20	19	150.0	30.0	28.5	2.03	1.81	-11	>4.5	>4.5	>4.5	

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion

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TREATABILITY STUDY RESULTS

TABLE 11 (continued)
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** NO. 4

TASK NUMBER: NO 2 **CURE TIME:** 2 DAYS

WASTE TYPE: TILE **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T24053	RKS	3-2-92	50% CEMENT / 50% KILN DUST	20	19	150 0	30 0	28 5	2 03	1 75	-14	>4 5	>4 5	>4 5	
T24054	RKS	3-2-92	50% CEMENT / 50% KILN DUST	20	19	150 0	30 0	28 5	2 05	1 82	-11	>4 5	>4 5	>4 5	
T24055	RKS	3-2-92	50% CEMENT / 50% KILN DUST	25	24	150 0	37 5	36 0	2 17	1 88	-13	>4 5	>4 5	>4 5	
T24056	RKS	3-2-92	50% CEMENT / 50% KILN DUST	25	24	150 0	37 5	36 0	2 03	1 90	-6	>4 5	>4 5	>4 5	
T24057	RKS	3-2-92	50% CEMENT / 50% KILN DUST	25	24	150 0	37 5	36 0	2 08	1 96	-6	>4 5	>4 5	>4 5	material well coated
T24058	RKS	3-2-92	50% CEMENT / 50% KILN DUST	25	21	150 0	37 5	31 5	2 02	1 98	-2	>4 5	>4 5	>4 5	
T24059	RKS	3-2-92	50% CEMENT / 50% KILN DUST	25	21	150 0	37 5	31 5	2 10	1 82	-13	>4 5	>4 5	>4 5	
T24060	RKS	3-2-92	50% CEMENT / 50% KILN DUST	25	21	150 0	37 5	31 5	2 17	1 89	-13	>4 5	>4 5	>4 5	
T24061	RKS	3-2-92	50% CEMENT / 50% KILN DUST	30	27	150 0	45 0	40 5	2 13	1 94	-9	>4 5	>4 5	>4 5	
T24062	RKS	3-2-92	50% CEMENT / 50% KILN DUST	30	27	150 0	45 0	40 5	2 08	1 95	-6	>4 5	>4 5	>4 5	
T24063	RKS	3-2-92	50% CEMENT / 50% KILN DUST	30	27	150 0	45 0	40 5	2 11	1 91	-9	>4 5	>4 5	>4 5	material very well
T24064	RKS	3-2-92	50% CEMENT / 50% KILN DUST	30	22	150 0	45 0	33 0	2 10	2 03	-3	>4 5	>4 5	>4 5	coated and solid
T24065	RKS	3-2-92	50% CEMENT / 50% KILN DUST	30	22	150 0	45 0	33 0	2.08	1 93	-7	>4 5	>4 5	>4 5	
T24066	RKS	3-2-92	50% CEMENT / 50% KILN DUST	30	22	150 0	45 0	33 0	2.02	1 94	-4	>4 5	>4 5	>4 5	
T24067	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	10 / 5	20	150 0	15/7 5	30 0	2 02	1 82	-10	>4 5	>4 5	>4 5	
T24068	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	10 / 5	20	150 0	15/7 5	30 0	2 13	1.79	-16	>4 5	>4 5	>4 5	
T24069	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	10 / 5	20	150 0	15/7 5	30 0	2 18	1.74	-19	>4 5	>4 5	>4 5	
T24070	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	10 / 5	12	150 0	15/7 5	18 0	2 15	1 83	-15	>4 5	>4 5	>4 5	
T24071	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	10 / 5	12	150 0	15/7.5	18 0	2 20	1 85	-16	>4 5	>4 5	>4 5	material barely coated
T24072	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	10 / 5	12	150 0	15/7 5	18 0	2 21	1 87	-15	>4 5	>4 5	>4 5	
T24073	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	10 / 8	21	150 0	15/12	31 5	2 09	1 86	-11	>4 5	>4 5	>4 5	
T24074	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	10 / 8	21	150 0	15/12	31 5	2 02	1 82	-10	>4 5	>4 5	>4 5	
T24075	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	10 / 8	21	150 0	15/12	31 5	2 15	1 92	-11	>4 5	>4 5	>4 5	
T24076	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	10 / 8	13	150 0	15/12	19 5	2 11	2 00	-5	>4 5	>4 5	>4 5	
T24077	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	10 / 8	13	150 0	15/12	19 5	2 04	1 99	-2	>4 5	>4 5	>4 5	material not sufficiently coated
T24078	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	10 / 8	13	150 0	15/12	19 5	2 06	2 01	-2	>4 5	>4 5	>4 5	

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion

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TREATABILITY STUDY RESULTS

TABLE 11 (continued)
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** NO 4

TASK NUMBER: NO 2 **CURE TIME:** 2 DAYS

WASTE TYPE: TILE **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T24079	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	20 / 5	23	150 0	30/7 5	34 5	2 03	1 94	-4	>4 5	>4 5	>4 5	
T24080	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	20 / 5	23	150 0	30/7 5	34 5	2 01	2 02	0	>4 5	>4 5	>4 5	
T24081	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	20 / 5	23	150 0	30/7 5	34 5	1 97	1 89	-4	>4 5	>4 5	>4 5	
T24082	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	20 / 5	15	150 0	30/7 5	22 5	1 94	1 89	-3	>4 5	>4 5	>4 5	
T24083	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	20 / 5	15	150 0	30/7.5	22 5	1 96	1 92	-2	>4 5	>4 5	>4 5	dry and flakey
T24084	RKS	3-2-92	FIRMEX / CEMENT KILN DUST	20 / 5	15	150.0	30/7.5	22.5	2 02	1 86	-8	>4 5	>4 5	>4 5	
T24085	RKS	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 8	24	150.0	30/12	36 0	1 86	1 90	2	>4 5	>4.5	>4.5	
T24086	RKS	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 8	24	150 0	30/12	36 0	1.98	2 01	2	>4 5	>4.5	>4.5	
T24087	RKS	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 8	24	150.0	30/12	36 0	1.94	1.97	2	>4 5	>4.5	>4.5	
T24088	RKS	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 8	16	150.0	30/12	24.0	2.08	1.98	-5	>4 5	>4.5	>4.5	
T24089	RKS	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 8	16	150.0	30/12	24.0	1.93	1.91	-1	>4.5	>4.5	>4.5	
T24090	RKS	3-3-92	FIRMEX / CEMENT KILN DUST	20 / 8	16	150 0	30/12	24 0	1 94	2 04	5	>4 5	>4 5	>4 5	
T24091	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	30	150 0	45 0	45 0	1 99	1 96	-2	>4 5	>4 5	>4 5	
T24092	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	30	150 0	45 0	45 0	1 90	2 05	8	>4 5	>4 5	>4 5	
T24093	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	30	150 0	45 0	45 0	1 81	2 16	19	>4 5	>4 5	>4 5	
T24094	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	22	150 0	45 0	33 0	1 97	2 03	3	>4 5	>4 5	>4 5	
T24095	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	22	150 0	45 0	33 0	1.82	1 96	8	>4 5	>4 5	>4 5	
T24096	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	22	150 0	45 0	33 0	1 91	2 16	13	>4 5	>4 5	>4 5	

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion.

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TREATABILITY STUDY RESULTS

TABLE 12
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** NO 7

TASK NUMBER: NO 2 **CURE TIME:** 2 DAYS

WASTE TYPE: SLURRY **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T27001	RKS	3-4-92	TYPE I PORTLAND CEMENT	15	20	150 0	22 5	30 0	1 84	2 14	16	0	0	0	
T27002	RKS	3-4-92	TYPE I PORTLAND CEMENT	15	20	150 0	22 5	30 0	1 76	2 19	24	0	0 5	0	
T27003	RKS	3-4-92	TYPE I PORTLAND CEMENT	15	20	150 0	22 5	30 0	1 83	2 17	19	0	0	0	
T27004	RKS	3-4-92	TYPE I PORTLAND CEMENT	15	10	150 0	22 5	15 0	2 01	2 09	4	1	1 5	0 5	
T27005	RKS	3-4-92	TYPE I PORTLAND CEMENT	15	10	150 0	22 5	15 0	1 79	1 92	7	0 5	0 5	1	
T27006	RKS	3-4-92	TYPE I PORTLAND CEMENT	15	10	150 0	22 5	15 0	1 88	2 12	13	1	1	0 5	
T27007	RKS	3-5-92	TYPE I PORTLAND CEMENT	20	21	150 0	30 0	31 5	1 89	2 28	21	1 5	1 5	1 5	
T27008	RKS	3-5-92	TYPE I PORTLAND CEMENT	20	21	150 0	30 0	31 5	1 91	2 27	19	1 5	0 5	1	
T27009	RKS	3-5-92	TYPE I PORTLAND CEMENT	20	21	150 0	30 0	31 5	1 92	2 31	20	1	1	0 5	
T27010	RKS	3-5-92	TYPE I PORTLAND CEMENT	20	11	150 0	30 0	16 5	1 97	2 15	9	2	3	1 5	
T27011	RKS	3-5-92	TYPE I PORTLAND CEMENT	20	11	150 0	30 0	16 5	1 87	2 24	20	2 5	2 5	2 5	
T27012	RKS	3-5-92	TYPE I PORTLAND CEMENT	20	11	150 0	30 0	16 5	1 89	2 01	6	2	2 5	2 5	
T27013	RKS	3-5-92	TYPE I PORTLAND CEMENT	25	23	150 0	37 5	34 5	1 99	2 32	17	2	1 5	2	
T27014	RKS	3-5-92	TYPE I PORTLAND CEMENT	25	23	150 0	37 5	34 5	1 98	2 31	17	1 5	2	1 5	
T27015	RKS	3-5-92	TYPE I PORTLAND CEMENT	25	23	150 0	37 5	34 5	1 96	2 30	17	2	1 5	1 5	
T27016	RKS	3-5-92	TYPE I PORTLAND CEMENT	25	12	150 0	37 5	18 0	1 97	2 14	9	1 5	2 5	2 5	
T27017	RKS	3-5-92	TYPE I PORTLAND CEMENT	25	12	150 0	37 5	18 0	1 80	2 04	13	3 5	2 5	2 5	
T27018	RKS	3-5-92	TYPE I PORTLAND CEMENT	25	12	150 0	37 5	18 0	1 92	2 13	11	4	3 5	3 5	
T27019	RKS	3-5-92	CEMENT KILN DUST	20	20	150 0	30 0	30 0	1 92	2 24	17	0	0	0	
T27020	RKS	3-5-92	CEMENT KILN DUST	20	20	150 0	30 0	30 0	1 89	2 19	16	0	0	0	
T27021	RKS	3-5-92	CEMENT KILN DUST	20	20	150 0	30 0	30 0	1 87	2 14	14	0	0	0	
T27022	RKS	3-5-92	CEMENT KILN DUST	20	15	150 0	30 0	22 5	1 91	2 15	13	0	0	0	
T27023	RKS	3-5-92	CEMENT KILN DUST	20	15	150 0	30 0	22 5	1 92	2 04	6	0	0	0	
T27024	RKS	3-5-92	CEMENT KILN DUST	20	15	150 0	30 0	22 5	1.76	2 06	17	0	0	0	
T27025	RKS	3-5-92	CEMENT KILN DUST	25	23	150 0	37.5	34 5	1 74	2 30	32	0	0	0	
T27026	RKS	3-5-92	CEMENT KILN DUST	25	23	150 0	37.5	34 5	1 76	2 35	34	0	0	0	

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion.

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TREATABILITY STUDY RESULTS

TABLE 12 (continued)
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** NO 7

TASK NUMBER: NO. 2 **CURE TIME:** 2 DAYS

WASTE TYPE: SLURRY **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T27027	RKS	3-5-92	CEMENT KILN DUST	25	23	150 0	37 5	34 5	1 68	2.36	40	0	0	0	
T27028	RKS	3-5-92	CEMENT KILN DUST	25	17	150 0	37 5	25 5	1 71	2 12	24	0	0	0	
T27029	RKS	3-5-92	CEMENT KILN DUST	25	17	150 0	37 5	25 5	1 69	2 27	34	0	0	0	
T27030	RKS	3-5-92	CEMENT KILN DUST	25	17	150 0	37 5	25 5	1 72	2 17	26	0	0	0	
T27031	RKS	3-5-92	CEMENT KILN DUST	30	28	150 0	45 0	42 0	2.04	2 31	13	0	0	0	
T27032	RKS	3-5-92	CEMENT KILN DUST	30	28	150 0	45 0	42 0	1.97	2 28	16	0	0	0	
T27033	RKS	3-5-92	CEMENT KILN DUST	30	28	150 0	45 0	42.0	1.93	2.43	26	0	0	0	
T27034	RKS	3-5-92	CEMENT KILN DUST	30	22	150 0	45 0	33 0	1.92	2 31	20	0	0	0	
T27035	RKS	3-5-92	CEMENT KILN DUST	30	22	150 0	45 0	33 0	1 89	2 22	17	0	0	0	
T27036	RKS	3-5-92	CEMENT KILN DUST	30	22	150 0	45 0	33 0	1.95	2 34	20	0	0	0	
T27037	RKS	3-5-92	CEMENT KILN DUST	40	35	150 0	60 0	52 5	1.83	2.53	38	0	0	0	
T27038	RKS	3-5-92	CEMENT KILN DUST	40	35	150 0	60 0	52 5	1 86	2 52	35	0	0	0	
T27039	RKS	3-5-92	CEMENT KILN DUST	40	35	150 0	60 0	52 5	1 88	2 65	41	0	0	0	
T27040	RKS	3-5-92	CEMENT KILN DUST	40	30	150 0	60 0	45 0	1 99	2 42	22	0	0	0	
T27041	RKS	3-5-92	CEMENT KILN DUST	40	30	150 0	60 0	45 0	1 87	2 49	33	0	0	0	
T27042	RKS	3-5-92	CEMENT KILN DUST	40	30	150 0	60 0	45 0	1 94	2 38	23	0	0	0	
T27043	BJ	3-5-92	50% CEMENT / 50% KILN DUST	15	15	150 0	22 5	22 5	2 03	2 09	3	0 5	0	0	
T27044	BJ	3-5-92	50% CEMENT / 50% KILN DUST	15	15	150 0	22 5	22 5	1 86	2 15	16	0 5	0 5	0	
T27045	BJ	3-5-92	50% CEMENT / 50% KILN DUST	15	15	150 0	22 5	22 5	1.75	2 08	19	0	0	0	
T27046	BJ	3-5-92	50% CEMENT / 50% KILN DUST	15	10	150 0	22 5	15 0	1 71	1 99	16	0 5	0	0	
T27047	BJ	3-5-92	50% CEMENT / 50% KILN DUST	15	10	150 0	22 5	15 0	1 62	1.99	23	0	0	0 5	
T27048	BJ	3-5-92	50% CEMENT / 50% KILN DUST	15	10	150 0	22 5	15 0	1 65	2 07	25	0	0 5	0	
T27049	BJ	3-5-92	50% CEMENT / 50% KILN DUST	20	17	150 0	30 0	25 5	2 02	2 17	7	0 5	0 5	0	
T27050	BJ	3-5-92	50% CEMENT / 50% KILN DUST	20	17	150 0	30 0	25 5	1 86	1 97	6	0 5	0 5	0 5	
T27051	BJ	3-5-92	50% CEMENT / 50% KILN DUST	20	17	150 0	30 0	25 5	1 88	2 11	12	0 5	0 5	0 5	
T27052	BJ	3-5-92	50% CEMENT / 50% KILN DUST	20	12	150 0	30 0	18 0	1 92	2 04	6	0	0	0 5	

[1] *Negative value denotes volumetric decrease and positive value denotes volumetric expansion.*

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TREATABILITY STUDY RESULTS

TABLE 12 (continued)
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** NO 7

TASK NUMBER: NO 2 **CURE TIME:** 2 DAYS

WASTE TYPE: SLURRY **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T27053	BJ	3-5-92	50% CEMENT / 50% KILN DUST	20	12	150 0	30 0	18 0	1 82	2 02	11	0 5	0 5	0 5	
T27054	BJ	3-5-92	50% CEMENT / 50% KILN DUST	20	12	150 0	30 0	18 0	1 76	2 03	15	0	0 5	0	
T27055	BJ	3-5-92	50% CEMENT / 50% KILN DUST	25	20	150 0	37 5	30 0	1 78	2 12	19	0 5	1	0 5	
T27056	BJ	3-5-92	50% CEMENT / 50% KILN DUST	25	20	150 0	37 5	30 0	1 85	2 17	17	0 5	0 5	0	
T27057	BJ	3-5-92	50% CEMENT / 50% KILN DUST	25	20	150 0	37 5	30 0	2 01	2 32	15	1	1	1	
T27058	BJ	3-5-92	50% CEMENT / 50% KILN DUST	25	15	150 0	37 5	22 5	1 73	2 18	26	1	1	0 5	
T27059	BJ	3-5-92	50% CEMENT / 50% KILN DUST	25	15	150 0	37 5	22 5	1 89	2 17	15	1	1 5	1	
T27060	BJ	3-5-92	50% CEMENT / 50% KILN DUST	25	15	150 0	37 5	22 5	1 78	2 20	24	1	1	1	
T27061	BJ	3-5-92	50% CEMENT / 50% KILN DUST	30	25	150 0	45 0	37 5	1 71	2 25	32	0 5	0 5	0 5	
T27062	BJ	3-5-92	50% CEMENT / 50% KILN DUST	30	25	150 0	45 0	37 5	1 78	2 32	30	0 5	1 5	0 5	
T27063	BJ	3-5-92	50% CEMENT / 50% KILN DUST	30	25	150 0	45 0	37 5	1 90	2 26	19	0 5	0 5	0 5	
T27064	BJ	3-5-92	50% CEMENT / 50% KILN DUST	30	20	150 0	45 0	30 0	1 88	2 22	18	1	0 5	0 5	
T27065	BJ	3-5-92	50% CEMENT / 50% KILN DUST	30	20	150 0	45 0	30 0	1 78	2 29	29	1	1	1	
T27066	BJ	3-5-92	50% CEMENT / 50% KILN DUST	30	20	150 0	45 0	30 0	1 85	2 24	21	1	1	1	
T27067	BJ	3-5-92	FIRMEX / CEMENT KILN DUST	10 / 5	10	150 0	15/7 5	15 0	1 76	2 07	18	3	2 5	2 5	
T27068	BJ	3-5-92	FIRMEX / CEMENT KILN DUST	10 / 5	10	150 0	15/7 5	15 0	1 79	1 98	11	3	3	3	
T27069	BJ	3-5-92	FIRMEX / CEMENT KILN DUST	10 / 5	10	150 0	15/7 5	15 0	1 76	2 05	16	3	3 5	3 5	
T27070	BJ	3-5-92	FIRMEX / CEMENT KILN DUST	10 / 5	7	150 0	15/7 5	10 5	1 82	2 04	12	2 5	2	2 5	
T27071	BJ	3-5-92	FIRMEX / CEMENT KILN DUST	10 / 5	7	150 0	15/7.5	10 5	1 96	2 03	4	3	2 5	2	
T27072	BJ	3-5-92	FIRMEX / CEMENT KILN DUST	10 / 5	7	150 0	15/7 5	10 5	1.83	2 01	10	2 5	2 5	2 5	
T27073	BJ	3-5-92	FIRMEX / CEMENT KILN DUST	10 / 8	11	150 0	15/12	16 5	1 76	1 95	11	1 5	1 5	1 5	
T27074	BJ	3-5-92	FIRMEX / CEMENT KILN DUST	10 / 8	11	150 0	15/12	16 5	1 86	2 14	15	1 5	2 5	2	
T27075	BJ	3-5-92	FIRMEX / CEMENT KILN DUST	10 / 8	11	150 0	15/12	16 5	1 84	1 99	8	2	1 5	2	
T27076	BJ	3-5-92	FIRMEX / CEMENT KILN DUST	10 / 8	9	150 0	15/12	13 5	1 82	2 19	20	2	2	1 5	
T27077	BJ	3-5-92	FIRMEX / CEMENT KILN DUST	10 / 8	9	150 0	15/12	13 5	1 96	2 02	3	2	2 5	2	
T27078	BJ	3-5-92	FIRMEX / CEMENT KILN DUST	10 / 8	9	150 0	15/12	13 5	1 79	2 03	13	2	2	2 5	

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion.

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TREATABILITY STUDY RESULTS

TABLE 12 (continued)
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** NO 7

TASK NUMBER: NO 2 **CURE TIME:** 2 DAYS

WASTE TYPE: SLURRY **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T27079	RKS	3-5-92	FIRMEX / CEMENT KILN DUST	20 / 5	14	150 0	30/7 5	21 0	1 92	2 26	18	>4 5	>4 5	>4 5	
T27080	RKS	3-5-92	FIRMEX / CEMENT KILN DUST	20 / 5	14	150 0	30/7 5	21 0	1 95	2 24	15	>4 5	4	>4 5	
T27081	RKS	3-5-92	FIRMEX / CEMENT KILN DUST	20 / 5	14	150 0	30/7 5	21 0	1 96	2 21	13	>4 5	>4 5	4	strong but very wet-
T27082	RKS	3-5-92	FIRMEX / CEMENT KILN DUST	20 / 5	12	150 0	30/7 5	18 0	1.85	2 19	18	>4 5	>4 5	4 5	free water formed in indentations
T27083	RKS	3-5-92	FIRMEX / CEMENT KILN DUST	20 / 5	12	150 0	30/7 5	18 0	1 87	2 15	15	>4 5	>4 5	4	
T27084	RKS	3-5-92	FIRMEX / CEMENT KILN DUST	20 / 5	12	150 0	30/7 5	18 0	1.84	2 12	15	>4 5	>4 5	>4 5	
T27085	RKS	3-5-92	FIRMEX / CEMENT KILN DUST	20 / 8	15	150 0	30/12	22 5	1 90	2 13	12	3 5	>4 5	>4 5	
T27086	RKS	3-5-92	FIRMEX / CEMENT KILN DUST	20 / 8	15	150 0	30/12	22.5	1.89	2.25	19	>4 5	>4 5	>4 5	
T27087	RKS	3-5-92	FIRMEX / CEMENT KILN DUST	20 / 8	15	150 0	30/12	22.5	1.88	2 22	18	>4.5	>4.5	>4.5	strong but very wet-
T27088	RKS	3-5-92	FIRMEX / CEMENT KILN DUST	20 / 8	13	150.0	30/12	19.5	2.08	2.29	10	>4 5	>4.5	>4.5	free water formed in indentations
T27089	RKS	3-5-92	FIRMEX / CEMENT KILN DUST	20 / 8	13	150 0	30/12	19.5	1.90	2.11	11	>4.5	>4.5	>4.5	
T27090	RKS	3-5-92	FIRMEX / CEMENT KILN DUST	20 / 8	13	150 0	30/12	19 5	1 92	2 15	12	>4 5	4 5	>4.5	
T27091	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	24	150 0	45 0	36 0	1 75	2 30	31	0	0	0	7-DAY PENETROMETER 0 tsf
T27092	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	24	150 0	45 0	36 0	1 94	2 40	24	0	0	0	7-DAY PENETROMETER 0 25 tsf
T27093	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	24	150 0	45 0	36 0	1 87	2 46	32	0	0	0	7-DAY PENETROMETER 0 5 tsf
T27094	RKS	3-18 92	25% CEMENT / 75% KILN DUST	30	21	150 0	45 0	31.5	1 86	2 37	27	0	0	0	7-DAY PENETROMETER 0 tsf
T27095	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	21	150 0	45 0	31 5	1 77	2 40	36	0	0	0	7-DAY PENETROMETER 0 5 tsf
T27096	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	21	150 0	45.0	31 5	1 85	2 26	22	0	0	0	7-DAY PENETROMETER 1 0 tsf

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion

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TREATABILITY STUDY RESULTS

TABLE 13
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** COMPOSITE SAMPLE OF SLURRY, SOIL, AND TILE

TASK NUMBER: NO 2 **CURE TIME:** 2 DAYS

WASTE TYPE: COMPOSITE **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T2C001	RKS	3-9-92	TYPE I PORTLAND CEMENT	15	20	150 0	22 5	30 0	1 60	1 83	14	2 0	4 0	2 5	
T2C002	RKS	3-9-92	TYPE I PORTLAND CEMENT	15	20	150 0	22 5	30 0	1 52	1 80	18	4 0	4 0	4 0	
T2C003	RKS	3-9-92	TYPE I PORTLAND CEMENT	15	20	150 0	22 5	30 0	1 45	1 89	30	2 0	3 0	2 5	
T2C004	RKS	3-9-92	TYPE I PORTLAND CEMENT	15	10	150 0	22 5	15 0	1 57	1 79	14	4 0	4 0	4 0	
T2C005	RKS	3-9-92	TYPE I PORTLAND CEMENT	15	10	150 0	22 5	15 0	1 52	1 65	9	4 5	4 0	4 5	
T2C006	RKS	3-9-92	TYPE I PORTLAND CEMENT	15	10	150 0	22 5	15 0	1 54	1 66	8	>4 5	>4 5	>4 5	
T2C007	RKS	3-9-92	TYPE I PORTLAND CEMENT	20	22	150 0	30 0	33 0	1 50	1 97	31	4 5	4 5	>4 5	
T2C008	RKS	3-9-92	TYPE I PORTLAND CEMENT	20	22	150 0	30 0	33 0	1 46	1 89	29	>4 5	>4 5	>4 5	
T2C009	RKS	3-9-92	TYPE I PORTLAND CEMENT	20	22	150 0	30 0	33 0	1 45	1 96	35	4 0	4 0	4 5	
T2C010	RKS	3-9-92	TYPE I PORTLAND CEMENT	20	13	150 0	30 0	19 5	1 48	1 79	21	>4 5	>4 5	>4 5	
T2C011	RKS	3-9-92	TYPE I PORTLAND CEMENT	20	13	150 0	30 0	19 5	1 59	1 88	18	>4 5	>4 5	>4 5	
T2C012	RKS	3-9-92	TYPE I PORTLAND CEMENT	20	13	150 0	30 0	19 5	1 58	1 82	15	>4 5	>4.5	>4 5	
T2C013	RKS	3-9-92	TYPE I PORTLAND CEMENT	25	24	150 0	37 5	36 0	1 75	2 09	19	>4 5	>4.5	>4 5	
T2C014	RKS	3-9-92	TYPE I PORTLAND CEMENT	25	24	150 0	37 5	36 0	1 65	2 00	21	>4 5	>4 5	>4 5	
T2C015	RKS	3-9-92	TYPE I PORTLAND CEMENT	25	24	150 0	37 5	36 0	1 61	1 97	22	>4 5	4 5	>4 5	
T2C016	RKS	3-9-92	TYPE I PORTLAND CEMENT	25	15	150 0	37 5	22 5	1.41	1 86	32	>4 5	>4 5	>4 5	
T2C017	RKS	3-9-92	TYPE I PORTLAND CEMENT	25	15	150 0	37 5	22 5	1 65	1 87	13	>4 5	>4 5	>4 5	
T2C018	RKS	3-9-92	TYPE I PORTLAND CEMENT	25	15	150 0	37 5	22 5	1 59	1 77	11	>4 5	>4 5	>4 5	
T2C019	RKS	3-9-92	CEMENT KILN DUST	20	20	150 0	30 0	30 0	1 62	2 01	24	0 0	0 0	0 0	
T2C020	RKS	3-9-92	CEMENT KILN DUST	20	20	150 0	30 0	30 0	1.63	1 94	27	0 0	0 0	0 0	
T2C021	RKS	3-9-92	CEMENT KILN DUST	20	20	150 0	30 0	30 0	1 56	1 97	26	0 0	0 0	0 0	
T2C022	RKS	3-9-92	CEMENT KILN DUST	20	16	150 0	30 0	24 0	1 46	1 94	33	0 0	0 5	0 0	
T2C023	RKS	3-9-92	CEMENT KILN DUST	20	16	150 0	30 0	24 0	1 62	1 87	15	0 0	0 0	1 0	
T2C024	RKS	3-9-92	CEMENT KILN DUST	20	16	150 0	30 0	24 0	1 56	1 86	19	0 0	0 0	0 0	
T2C025	RKS	3-9-92	CEMENT KILN DUST	25	23	150 0	37 5	34 5	1 57	1 94	24	0 0	0 0	0 5	
T2C026	RKS	3-9-92	CEMENT KILN DUST	25	23	150 0	37 5	34 5	1 57	1 96	25	0 0	0 0	0 0	

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion.

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TREATABILITY STUDY RESULTS

TABLE 13 (continued)
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** COMPOSITE SAMPLE OF SLURRY, SOIL, AND TILE

TASK NUMBER: NO 2 **CURE TIME:** 2 DAYS

WASTE TYPE: COMPOSITE **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T2C027	RKS	3-9-92	CEMENT KILN DUST	25	23	150 0	37 5	34 5	1.51	1 89	25	0 0	0 0	0 0	
T2C028	RKS	3-9-92	CEMENT KILN DUST	25	19	150 0	37 5	28 5	1.47	1 88	28	0 0	0 0	0 0	
T2C029	RKS	3-9-92	CEMENT KILN DUST	25	19	150 0	37 5	28 5	1.41	1 70	21	0 0	0 0	0 5	
T2C030	RKS	3-9-92	CEMENT KILN DUST	25	19	150 0	37 5	28 5	1 62	1 94	20	0 0	0 0	0 0	
T2C031	RKS	3-9-92	CEMENT KILN DUST	30	26	150 0	45 0	39 0	1.61	2 07	29	0 0	0 0	0 0	
T2C032	RKS	3-9-92	CEMENT KILN DUST	30	26	150 0	45 0	39 0	1 59	2 00	26	0 0	0.0	0 0	
T2C033	RKS	3-9-92	CEMENT KILN DUST	30	26	150 0	45.0	39.0	1 60	2 11	32	0.0	0 0	0.0	
T2C034	RKS	3-9-92	CEMENT KILN DUST	30	23	150.0	45.0	34 5	1 52	1 94	28	0 0	0.0	0.0	
T2C035	RKS	3-9-92	CEMENT KILN DUST	30	23	150.0	45.0	34 5	1.51	2.01	33	0.0	0.5	0 0	
T2C036	RKS	3-9-92	CEMENT KILN DUST	30	23	150.0	45 0	34.5	1.53	1 96	28	0.0	0.0	0 0	
T2C037	RKS	3-9-92	CEMENT KILN DUST	40	34	150 0	60 0	51.0	1.59	2 08	31	0.0	0 0	0 0	
T2C038	RKS	3-9-92	CEMENT KILN DUST	40	34	150 0	60 0	51 0	1 48	2 11	43	0 0	0 0	0 0	
T2C039	RKS	3-9-92	CEMENT KILN DUST	40	34	150 0	60 0	51 0	1 46	2 25	54	0 0	0 0	0 0	
T2C040	RKS	3-9-92	CEMENT KILN DUST	40	30	150 0	60 0	45 0	1 54	2 04	32	0 0	0 5	0 5	
T2C041	RKS	3-9-92	CEMENT KILN DUST	40	30	150 0	60 0	45 0	1 43	2 07	45	0 0	0 0	0 0	
T2C042	RKS	3-9-92	CEMENT KILN DUST	40	30	150 0	60 0	45 0	1 52	1 94	28	0 0	0 5	0 0	
T2C043	RKS	3-9-92	50% CEMENT / 50% KILN DUST	15	18	150 0	22 5	27 0	1 51	1 88	25	2 0	3 0	1 5	
T2C044	RKS	3-9-92	50% CEMENT / 50% KILN DUST	15	18	150 0	22 5	27 0	1 53	1 81	18	2 5	2 5	2 0	
T2C045	RKS	3-9-92	50% CEMENT / 50% KILN DUST	15	18	150 0	22 5	27 0	1.59	1 73	9	4 0	>4 5	3 0	
T2C046	RKS	3-9-92	50% CEMENT / 50% KILN DUST	15	13	150 0	22 5	19 5	1 52	1 88	24	2 5	3 5	2 5	
T2C047	RKS	3-9-92	50% CEMENT / 50% KILN DUST	15	13	150 0	22 5	19 5	1 60	1 78	11	3 5	3 5	4 0	
T2C048	RKS	3-9-92	50% CEMENT / 50% KILN DUST	15	13	150 0	22 5	19 5	1 57	1 75	11	>4 5	4 0	>4 5	
T2C049	RKS	3-9-92	50% CEMENT / 50% KILN DUST	20	20	150 0	30 0	30 0	1 68	1 90	13	2 5	3 5	3 5	
T2C050	RKS	3-9-92	50% CEMENT / 50% KILN DUST	20	20	150 0	30 0	30 0	1 56	1 92	23	>4 5	3 5	>4 5	
T2C051	RKS	3-9-92	50% CEMENT / 50% KILN DUST	20	20	150 0	30.0	30 0	1 51	1 90	26	2 5	4 0	3 5	
T2C052	RKS	3-9-92	50% CEMENT / 50% KILN DUST	20	16	150 0	30 0	22 5	1 66	1 92	16	4 0	2 5	3 5	

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion.

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TREATABILITY STUDY RESULTS

TABLE 13 (continued)
Task 2
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PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** COMPOSITE SAMPLE OF SLURRY, SOIL, AND TILE

TASK NUMBER: NO 2 **CURE TIME:** 2 DAYS

WASTE TYPE: COMPOSITE **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T2C053	RKS	3-9-92	50% CEMENT / 50% KILN DUST	20	15	150 0	30 0	22 5	1 62	1 84	14	3 5	4	3 5	
T2C054	RKS	3-9-92	50% CEMENT / 50% KILN DUST	20	15	150 0	30 0	22 5	1 45	1 77	22	>4 5	>4 5	4	
T2C055	RKS	3-10-92	50% CEMENT / 50% KILN DUST	25	22	150 0	37 5	33 0	1 59	1 84	16	3 5	3 5	4 5	
T2C056	RKS	3-10-92	50% CEMENT / 50% KILN DUST	25	22	150 0	37 5	33 0	1 46	1 86	27	3 5	2	4	
T2C057	RKS	3-10-92	50% CEMENT / 50% KILN DUST	25	22	150 0	37 5	33 0	1 47	1 93	31	4 5	4	4	
T2C058	RKS	3-10-92	50% CEMENT / 50% KILN DUST	25	17	150 0	37 5	25 5	1 52	1 76	16	4 5	4 5	3	
T2C059	RKS	3-10-92	50% CEMENT / 50% KILN DUST	25	17	150 0	37 5	25 5	1 61	1 77	10	>4 5	4 5	2 5	
T2C060	RKS	3-10-92	50% CEMENT / 50% KILN DUST	25	17	150 0	37 5	25 5	1 51	1 79	19	4	4 5	>4 5	
T2C061	RKS	3-10-92	50% CEMENT / 50% KILN DUST	30	24	150 0	45 0	36 0	1 55	2 02	30	3 5	4 5	3	
T2C062	RKS	3-10-92	50% CEMENT / 50% KILN DUST	30	24	150 0	45 0	36 0	1 57	2 04	30	4	4	>4 5	
T2C063	RKS	3-10-92	50% CEMENT / 50% KILN DUST	30	24	150 0	45 0	36 0	1 48	2 11	43	4 5	>4 5	3 5	
T2C064	RKS	3-10-92	50% CEMENT / 50% KILN DUST	30	19	150 0	45 0	28 5	1 44	1 92	33	>4 5	>4 5	>4 5	
T2C065	RKS	3-10-92	50% CEMENT / 50% KILN DUST	30	19	150 0	45 0	28 5	1 65	1 90	15	4 5	4	4 5	
T2C066	RKS	3-10-92	50% CEMENT / 50% KILN DUST	30	19	150 0	45 0	28 5	1 66	1 98	19	4 5	>4 5	>4 5	
T2C067	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	10 / 5	17	150 0	15/7 5	25.5	1 68	1 81	8	>4 5	>4 5	>4 5	
T2C068	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	10 / 5	17	150 0	15/7 5	25 5	1 59	1 76	11	>4 5	>4 5	>4 5	
T2C069	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	10 / 5	17	150 0	15/7 5	25 5	1 57	1 78	13	>4 5	>4 5	>4 5	
T2C070	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	10 / 5	10	150.0	15/7 5	15 0	1 53	1 60	5	>4 5	>4 5	>4 5	
T2C071	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	10 / 5	10	150 0	15/7.5	15 0	1 59	1 74	9	>4 5	>4 5	>4 5	
T2C072	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	10 / 5	10	150 0	15/7 5	15 0	1 55	1 66	7	>4 5	>4 5	>4 5	
T2C073	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	10 / 8	18	150 0	15/12	27 0	1 54	1 88	22	>4 5	>4.5	>4 5	
T2C074	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	10 / 8	18	150 0	15/12	27 0	1 51	1 92	27	>4 5	>4 5	>4 5	
T2C075	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	10 / 8	18	150 0	15/12	27 0	1 56	1 94	24	>4 5	>4 5	>4 5	
T2C076	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	10 / 8	11	150 0	15/12	16 5	1 65	1 73	5	>4 5	>4 5	>4 5	
T2C077	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	10 / 8	11	150 0	15/12	16 5	1.49	1 71	15	>4 5	>4.5	>4 5	
T2C078	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	10 / 8	11	150 0	15/12	16 5	1 51	1 76	17	>4.5	>4 5	>4 5	

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion.

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TREATABILITY STUDY RESULTS

TABLE 13 (continued)
Task 2
Developed Mixtures and Penetrometer Analyses

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) **DRUM NUMBER:** COMPOSITE SAMPLE OF SLURRY, SOIL, AND TILE

TASK NUMBER: NO 2 **CURE TIME:** 2 DAYS

WASTE TYPE: COMPOSITE **REVIEWED BY:** SJZ

KIBER SAMPLE NO	MIXED BY	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)	PENETROMETER ANALYSES (tons per square foot) READING 1	READING 2	READING 3	TREATMENT OBSERVATIONS (if any)
T2C079	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	20 / 5	20	150 0	30/7 5	30 0	1 58	1 99	26	>4 5	>4 5	>4 5	
T2C080	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	20 / 5	20	150 0	30/7 5	30 0	1 43	1 83	28	>4 5	>4 5	>4 5	
T2C081	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	20 / 5	20	150 0	30/7 5	30.0	1 59	1 89	19	>4 5	>4 5	>4 5	
T2C082	RKS	3-10 92	FIRMEX / CEMENT KILN DUST	20 / 5	13	150 0	30/7 5	19 5	1 58	1 88	19	>4 5	>4 5	>4 5	
T2C083	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	20 / 5	13	150 0	30/7 5	19 5	1 52	1 79	18	>4 5	>4 5	>4 5	
T2C084	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	20 / 5	13	150 0	30/7 5	19 5	1.57	1 83	17	>4 5	>4 5	>4 5	
T2C085	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	20 / 8	21	150 0	30/12	31.5	1 53	1.87	22	>4 5	>4 5	>4 5	
T2C086	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	20 / 8	21	150.0	30/12	31 5	1 50	1.98	32	>4.5	>4 5	>4 5	
T2C087	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	20 / 8	21	150 0	30/12	31.5	1.47	2.02	37	>4.5	>4.5	>4.5	
T2C088	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	20 / 8	14	150.0	30/12	21.0	1 62	1.87	15	>4 5	>4.5	>4.5	
T2C089	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	20 / 8	14	150.0	30/12	21 0	1.49	1.76	18	>4 5	>4.5	>4 5	
T2C090	RKS	3-10-92	FIRMEX / CEMENT KILN DUST	20 / 8	14	150 0	30/12	21 0	1 59	1 92	21	>4 5	>4 5	>4 5	
T2C091	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	24	150 0	45	36	1 58	1 93	22	3 0	2 0	2 5	7-DAY PENETROMETER 4 5 tsf
T2C092	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	24	150 0	45	36	1 62	1 97	22	1 0	2.5	1 5	7-DAY PENETROMETER >4 5 tsf
T2C093	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	24	150 0	45	36	1 61	2 04	35	1 5	2 0	2 5	7-DAY PENETROMETER >4 5 tsf
T2C094	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	22	150 0	45	33	1 61	2 03	26	2 5	3 5	4 0	7-DAY PENETROMETER >4 5 tsf
T2C095	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	22	150 0	45	33	1 55	2 02	30	2 5	2.5	2 5	7-DAY PENETROMETER >4 5 tsf
T2C096	RKS	3-18-92	25% CEMENT / 75% KILN DUST	30	22	150 0	45	33	1 53	1 88	23	2 5	2 5	2 5	7 DAY PENETROMETER >4 5 tsf

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion.

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TREATABILITY STUDY RESULTS

TABLE 14
Task 3
Developed Mixtures

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) DRUM NUMBER: 1

TASK NUMBER: NO. 3 CURE TIME: 14 DAYS

WASTE TYPE: SOIL REVIEWED BY: SJZ

KIBER SAMPLE NO.	MIXED BY:	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	TREATMENT OBSERVATIONS (if any)
T311A	RKS	3-19-92	CEMENT	20	19	1000	200	190	3(2x4)
T311B	RKS	3-19-92	CEMENT	20	19	1500	300	285	1(2x4) 1(3x6)
T311C	RKS	3-19-92	CEMENT	20	19	2000	400	380	2(3x6)
T311D	RKS	3-19-92	CEMENT	20	19	2000	400	380	2(3x6)
T311E	RKS	3-19-92	CEMENT	20	19	1000	200	290	1 (3x6)
T311F	BJ	3-27-92	CEMENT	20	19	200	40	38	1 volumetric increase mold
T311G	BJ	3-27-92	CEMENT	20	19	200	40	38	1 volumetric increase mold
T312A	RKS	3-19-92	50% CEMENT/50% CKD	30	30	2000	600	600	2(3x6)
T312B	RKS	3-19-92	50% CEMENT/50% CKD	30	30	2000	600	600	2(3x6) 2(2x4)
T312C	RKS	3-19-92	50% CEMENT/50% CKD	30	30	2000	600	600	2(3x6)
T312D	RKS	3-19-92	50% CEMENT/50% CKD	30	30	1000	300	300	2(2x4)
T312E	BJ	3-27-92	50% CEMENT/50% CKD	30	30	200	60	60	1 volumetric increase mold
T312F	BJ	3-27-92	50% CEMENT/50% CKD	30	30	200	60	60	1 volumetric increase mold
T313A	RKS	3-19-92	FIRMEX/CKD	20/8	21	2000	400/160	420	2(3x6)
T313B	RKS	3-19-92	FIRMEX/CKD	20/8	21	2000	400/160	420	2(3x6) 1(2x4)
T313C	RKS	3-19-92	FIRMEX/CKD	20/8	21	2000	400/160	420	2(3x6) 1(2x4)
T313D	RKS	3-19-92	FIRMEX/CKD	20/8	21	500	100/40	105	2(2x4)
T313E	BJ	3-27-92	FIRMEX/CKD	20/8	21	200	40/16	42	1 volumetric increase mold
T313F	BJ	3-27-92	FIRMEX/CKD	20/8	21	200	40/16	42	1 volumetric increase mold
T314A	RKS	3-19-92	25% CEMENT/75% CKD	35	30	2000	700	600	2(3x6) 1(2x4)

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TREATABILITY STUDY RESULTS

TABLE 14 (continued)
Task 3
Developed Mixtures

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) DRUM NUMBER: 1

TASK NUMBER: NO. 3 CURE TIME: 14 DAYS

WASTE TYPE: SOIL REVIEWED BY: SJZ

KIBER SAMPLE NO.	MIXED BY:	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	TREATMENT OBSERVATIONS (if any)
T314B	RKS	3-19-92	25% CEMENT/75% CKD	35	30	2000	700	600	2(3X6) 3(2x4)
T314C	RKS	3-19-92	25% CEMENT/75% CKD	35	30	2000	700	600	2(3x6)
T314D	BJ	3-27-92	25% CEMENT/75% CKD	35	30	200	70	60	1 volumetric increase mold
T314E	BJ	3-27-92	25% CEMENT/75% CKD	35	30	200	70	60	1 volumetric increase mold

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TREATABILITY STUDY RESULTS

TABLE 15
Task 3
Developed Mixtures

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) DRUM NUMBER: 4

TASK NUMBER: NO. 3 CURE TIME: 14 DAYS

WASTE TYPE: TILE REVIEWED BY: SJZ

KIBER SAMPLE NO.	MIXED BY:	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	TREATMENT OBSERVATIONS (if any)
T341A	RKS	3-20-92	CEMENT	20	18	2000	400	360	2(3X6) 1(2x4)
T341B	RKS	3-20-92	CEMENT	20	18	2000	400	360	2(3X6) 2(2x4)
T341C	RKS	3-20-92	CEMENT	20	18	2000	400	360	2(3X6) 1(2x4)
T341D	BJ	3-27-92	CEMENT	20	18	200	40	36	1 volumetric increase mold
T341E	BJ	3-27-92	CEMENT	20	18	200	40	36	1 volumetric increase mold
T342A	BJ	3-23-92	50% CEMENT/50% CKD	30	30	2000	600	600	2(3X6) 2(2x4)
T342B	BJ	3-23-92	50% CEMENT/50% CKD	30	30	2000	600	600	2(3X6) 2(2x4)
T342C	BJ	3-23-92	50% CEMENT/50% CKD	30	30	1600	480	480	2(3X6)
T342D	BJ	3-27-92	50% CEMENT/50% CKD	30	30	200	60	60	1 volumetric increase mold
T342E	BJ	3-27-92	50% CEMENT/50% CKD	30	30	200	60	60	1 volumetric increase mold
T343A	BJ	3-24-92	FIRMEX/CKD	20/8	28	2000	400/160	560	2(3X6) 2(2x4)
T343B	BJ	3-24-92	FIRMEX/CKD	20/8	28	2000	400/160	560	2(3X6) 2(2x4)
T343C	BJ	3-24-92	FIRMEX/CKD	20/8	28	1700	340/136	476	2(3X6)
T343D	BJ	3-27-92	FIRMEX/CKD	20/8	28	200	40/16	56	1 volumetric increase mold
T343E	BJ	3-27-92	FIRMEX/CKD	20/8	28	200	40/16	56	1 volumetric increase mold
T344A	BJ	3-24-92	25% CEMENT/75% CKD	35	35	2000	700	700	3(3X6)
T344B	BJ	3-24-92	25% CEMENT/75% CKD	35	35	2000	700	700	2(3X6) 2(2x4)
T344C	BJ	3-24-92	25% CEMENT/75% CKD	35	35	1500	525	525	1(3X6) 2(2x4)
T344D	BJ	3-27-92	25% CEMENT/75% CKD	35	35	200	70	70	1 volumetric increase mold
T344E	BJ	3-27-92	25% CEMENT/75% CKD	35	35	200	70	70	1 volumetric increase mold

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TREATABILITY STUDY RESULTS

TABLE 16
Task 3
Developed Mixtures

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) DRUM NUMBER: 7

TASK NUMBER: NO. 3 CURE TIME: 14 DAYS

WASTE TYPE: SLURRY REVIEWED BY: SJZ

KIBER SAMPLE NO.	MIXED BY:	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	TREATMENT OBSERVATIONS (if any)
T371A	BJ	3-20-92	CEMENT	35	26	2000	700	520	3(3X6) 1(2x4)
T371B	BJ	3-20-92	CEMENT	35	26	2000	700	520	3(3X6) 1(2x4)
T371C	BJ	3-20-92	CEMENT	35	26	600	210	156	2(2x4)
T371D	BJ	3-27-92	CEMENT	35	26	200	70	52	1 volumetric increase mold
T371E	BJ	3-27-92	CEMENT	35	26	200	70	52	1 volumetric increase mold
T372A	BJ	3-20-92	50% CEMENT/50% CKD	50	37	2000	1000	740	4(3X6)
T372B	BJ	3-20-92	50% CEMENT/50% CKD	50	37	2000	1000	740	2(3X6) 4(2x4)
T372C	BJ	3-27-92	50% CEMENT/50% CKD	50	37	200	100	74	1 volumetric increase mold
T372D	BJ	3-27-92	50% CEMENT/50% CKD	50	37	200	100	74	1 volumetric increase mold
T373A	BJ	3-20-92	FIRMEX/CKD	20/8	20	2000	400/160	400	3(3X6)
T373B	BJ	3-20-92	FIRMEX/CKD	20/8	20	2000	400/160	400	3(3X6) 1(2x4)
T373C	BJ	3-20-92	FIRMEX/CKD	20/8	20	800	160/64	160	3(2x4)
T373D	BJ	3-27-92	FIRMEX/CKD	20/8	20	200	40/16	40	1 volumetric increase mold
T373E	BJ	3-27-92	FIRMEX/CKD	20/8	20	200	40/16	40	1 volumetric increase mold
T374A	BJ	3-20-92	25% CEMENT/75% CKD	50	37	2000	1000	740	4(3X6)
T374B	BJ	3-20-92	25% CEMENT/75% CKD	50	37	2000	1000	740	2(3X6) 4(2x4)
T374C	BJ	3-27-92	25% CEMENT/75% CKD	50	37	200	100	74	1 volumetric increase mold
T374D	BJ	3-27-92	25% CEMENT/75% CKD	50	37	200	100	74	1 volumetric increase mold

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TREATABILITY STUDY RESULTS

TABLE 17
Task 3
Developed Mixtures

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) DRUM NUMBER:

TASK NUMBER: NO. 3 CURE TIME: 14 DAYS

WASTE TYPE: COMPOSITE REVIEWED BY: SJZ

KIBER SAMPLE NO.	MIXED BY:	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	TREATMENT OBSERVATIONS (if any)
T3C1A	BJ	3-25-92	CEMENT	20	20	2000	400	400	2(3X6) 1(2x4)
T3C1B	BJ	3-25-92	CEMENT	20	20	2000	400	400	2(3X6) 3(2x4)
T3C1C	BJ	3-25-92	CEMENT	20	20	1500	320	320	2(3X6)
T3C1D	BJ	3-25-92	CEMENT	20	20	200	40	40	1 volumetric increase mold
T3C1E	BJ	3-25-92	CEMENT	20	20	200	40	40	1 volumetric increase mold
T3C2A	BJ	3-25-92	50% CEMENT/50% CKD	30	30	2000	600	600	2(3X6) 3(2x4)
T3C2B	BJ	3-25-92	50% CEMENT/50% CKD	30	30	2000	600	600	2(3X6) 1(2x4)
T3C2C	BJ	3-25-92	50% CEMENT/50% CKD	30	30	1200	360	360	2(3X6)
T3C2D	BJ	3-25-92	50% CEMENT/50% CKD	30	30	200	60	60	1 volumetric increase mold
T3C2E	BJ	3-25-92	50% CEMENT/50% CKD	30	30	200	60	60	1 volumetric increase mold
T3C3A	BJ	3-25-92	FIRMEX/CKD	20/8	21	2000	400/160	420	2(3X6) 2(2x4)
T3C3B	BJ	3-25-92	FIRMEX/CKD	20/8	21	2000	400/160	420	2(3X6) 2(2x4)
T3C3C	BJ	3-25-92	FIRMEX/CKD	20/8	21	1500	300/120	315	2(3X6)
T3C3D	BJ	3-25-92	FIRMEX/CKD	20/8	21	200	40/16	42	1 volumetric increase mold
T3C3E	BJ	3-25-92	FIRMEX/CKD	20/8	21	200	40/16	42	1 volumetric increase mold
T3C4A	BJ	3-26-92	25% CEMENT/75% CKD	35	28	2000	700	560	2(3X6) 3(2x4)
T3C4B	BJ	3-26-92	25% CEMENT/75% CKD	35	28	2000	700	560	2(3X6) 1(2x4)
T3C4C	BJ	3-26-92	25% CEMENT/75% CKD	35	28	1200	420	336	2(3X6)
T3C4D	BJ	3-26-92	25% CEMENT/75% CKD	35	28	200	70	56	1 volumetric increase mold
T3C4E	BJ	3-26-92	25% CEMENT/75% CKD	35	28	200	70	56	1 volumetric increase mold

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TABLE 18
Task 3
Unconfined Compressive Strength Test Results

SAMPLE No.	WASTE TYPE	BULK UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	WATER CONTENT (%)	STRAIN AT FAILURE (%)	UNCONFINED COMPRESSIVE STRENGTH (psi)
T311-1	SOIL	110.7	86.1	28.5	1.5	232.3
T311-2	SOIL	111.4	86.0	29.4	1.3	325.1
T312-1	SOIL	107.6	79.3	35.8	1.5	338.1
T312-2	SOIL	107.4	79.2	35.6	1.2	233.1
T313-1	SOIL	112.8	85.3	32.3	0.6	279.8
T313-2	SOIL	111.4	85.0	31.2	1.3	486.6
T314-1	SOIL	103.4	78.7	31.3	1.1	165.0
T314-2	SOIL	105.9	78.2	35.5	1.2	234.6
T341-1	TILE	92.5	68.1	35.9	1.7	507.9
T341-2	TILE	100.5	73.9	36.0	2.0	743.7
T342-1	TILE	103.9	75.0	38.5	2.6	769.8
T342-2	TILE	103.6	73.0	41.9	2.5	686.4
T343-1	TILE	105.2	79.5	32.2	>1.9	>925.5
T343-2	TILE	104.7	80.1	30.7	>1.8	>894.2
T344-1	TILE	102.8	70.2	46.5	2.4	405.1
T344-2	TILE	100.5	69.2	45.1	2.1	351.7
T371-1	SLURRY	80.8	33.3	142.9	3.8	34.4
T371-2	SLURRY	81.2	33.7	141.1	3.7	38.6
T372-1	SLURRY	82.3	35.8	130.2	2.4	77.0
T372-2	SLURRY	83.8	36.4	130.3	3.2	79.6
T373-1	SLURRY	77.7	29.8	161.1	2.0	161.0
T373-2	SLURRY	78.4	30.8	154.3	2.2	165.7
T374-1	SLURRY	82.7	36.4	127.0	3.6	60.0
T374-2	SLURRY	83.0	36.9	124.6	3.9	55.0
T3C1-1	COMPOSITE	94.9	56.8	67.1	2.3	138.1
T3C1-2	COMPOSITE	96.8	58.0	67.0	2.2	128.7
T3C2-1	COMPOSITE	92.2	52.6	75.3	2.0	115.5
T3C2-2	COMPOSITE	96.3	57.4	67.8	2.0	194.4
T3C3-1	COMPOSITE	98.4	63.1	56.1	1.9	517.2
T3C3-2	COMPOSITE	96.2	58.2	65.4	2.4	542.8
T3C4-1	COMPOSITE	96.6	64.8	49.0	1.9	178.2
T3C4-2	COMPOSITE	96.5	59.7	61.8	2.0	170.4

NOTE: Alternate shading was added to separate the different samples. Every two samples are duplicate analyses.

A92-1050.T28

TABLE 19
Task 3
Porosity and Bulk Density Test Results

SAMPLE No.	WASTE TYPE	AS-CURED BULK DENSITY (pcf)	DRY BULK DENSITY (pcf)	SATURATED BULK DENSITY (pcf)	APPARENT POROSITY (%)
T311-1	SOIL	108	89	115	41.8
T311-2	SOIL	103	88	114	42.1
T311-3	SOIL	103	88	114	42.1
T312-1	SOIL	102	82	111	47.6
T312-2	SOIL	101	81	111	47.7
T313-1	SOIL	109	88	115	42.8
T313-2	SOIL	108	88	115	43.5
T314-1	SOIL	100	80	110	47.9
T314-2	SOIL	99	81	111	48.2
T341-1	TILE	85	77	107	47.4
T341-2	TILE	94	79	108	47.6
T342-1	TILE	98	75	107	50.6
T342-2	TILE	99	75	107	51.4
T342-3	TILE	98	74	107	51.8
T343-1	TILE	101	76	107	49.0
T343-2	TILE	99	72	106	53.2
T344-1	TILE	94	69	102	53.9
T344-2	TILE	95	70	103	53.5
T371-1	SLURRY	66	33	78	72.8
T371-2	SLURRY	55	35	80	72.8
T372-1	SLURRY	73	38	83	73.0
T372-2	SLURRY	73	37	83	73.5
T373-1	SLURRY	72	33	80	76.3
T373-2	SLURRY	70	31	79	76.9
T374-1	SLURRY	75	36	82	74.8
T374-2	SLURRY	74	36	82	75.2
T3C1-1	COMPOSITE	86	57	94	59.4
T3C1-2	COMPOSITE	85	57	94	59.6
T3C2-1	COMPOSITE	82	55	94	62.6
T3C2-2	COMPOSITE	83	56	94	61.9
T3C3-1	COMPOSITE	95	62	99	58.9
T3C3-2	COMPOSITE	93	61	98	58.8
T3C4-1	COMPOSITE	88	60	97	60.2
T3C4-2	COMPOSITE	89	57	95	61.9
T3C4-3	COMPOSITE	90	60	97	59.8

NOTE: Alternate shading was added to separate the different samples. Every two samples are duplicate analyses.

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TABLE 20
Task 3
Developed Mixtures and Volumetric Expansion

KIBER SAMPLE NO.	WASTE TYPE	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	ORIGINAL WASTE HEIGHT (in)	TREATED MIXTURE HEIGHT (in)	[1] VOLUMETRIC EXPANSION (%)
T311F	SOIL	CEMENT	20	19	1.71	1.88	10
T311G	SOIL	CEMENT	20	19	1.64	1.98	21
T312E	SOIL	50% CEMENT/50% CKD	30	30	1.83	2.29	25
T312F	SOIL	50% CEMENT/50% CKD	30	30	1.78	2.30	29
T313E	SOIL	FIRMEX/CKD	20/8	21	1.75	2.12	21
T313F	SOIL	FIRMEX/CKD	20/8	21	1.71	2.18	27
T314D	SOIL	25% CEMENT/75% CKD	35	30	1.80	2.37	32
T314E	SOIL	25% CEMENT/75% CKD	35	30	1.82	2.44	34
T341D	TILE	CEMENT	20	18	2.45	2.27	-7
T341E	TILE	CEMENT	20	18	2.27	2.17	-4
T342D	TILE	50% CEMENT/50% CKD	30	30	2.52	2.37	-6
T342E	TILE	50% CEMENT/50% CKD	30	30	2.54	2.43	-4
T343C	TILE	FIRMEX/CKD	20/8	28	2.45	2.40	-2
T343D	TILE	FIRMEX/CKD	20/8	28	2.53	2.34	-8
T344D	TILE	25% CEMENT/75% CKD	35	35	2.65	2.66	0
T344E	TILE	25% CEMENT/75% CKD	35	35	2.33	2.62	12
T371D	SLURRY	CEMENT	35	26	2.29	2.92	28
T371E	SLURRY	CEMENT	35	26	2.55	2.91	14
T372C	SLURRY	50% CEMENT/50% CKD	50	37	2.52	3.37	34
T372D	SLURRY	50% CEMENT/50% CKD	50	37	2.37	3.32	40
T373D	SLURRY	FIRMEX/CKD	20/8	20	2.16	2.71	25
T373E	SLURRY	FIRMEX/CKD	20/8	20	2.32	2.75	19
T374C	SLURRY	25% CEMENT/75% CKD	50	37	2.41	3.23	34
T374D	SLURRY	25% CEMENT/75% CKD	50	37	2.39	3.26	36
T3C1	COMPOSITE	CEMENT	20	20	1.87	2.36	26
T3C1D	COMPOSITE	CEMENT	20	20	1.93	2.25	17
T3C2	COMPOSITE	50% CEMENT/50% CKD	30	30	2.00	2.54	27
T3C2D	COMPOSITE	50% CEMENT/50% CKD	30	30	1.98	2.56	29
T3C3	COMPOSITE	FIRMEX/CKD	20/8	21	1.91	2.50	31
T3C3D	COMPOSITE	FIRMEX/CKD	20/8	21	1.99	2.41	21
T3C4	COMPOSITE	25% CEMENT/75% CKD	35	28	2.04	2.44	20
T3C4D	COMPOSITE	25% CEMENT/75% CKD	35	28	1.98	2.63	33

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion

NOTE: Alternate shading was added to separate the different samples. Every two samples are duplicate analyses

TREATABILITY STUDY RESULTS

TABLE 21
Task 4
Selected Mixtures

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) DRUM NUMBER: 1

TASK NUMBER: NO. 4 CURE TIME: 14 DAYS

WASTE TYPE: SOIL REVIEWED BY: SJZ

KIBER SAMPLE NO.	MIXED BY:	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	SAMPLES FORMED
T411-1	RKS	4-28-92	50% CEMENT/50% CKD	30	30	2000	600	600	4(2x4) 1(3x6)
T411-2	RKS	4-28-92	50% CEMENT/50% CKD	30	30	2000	600	600	1(2x4) 2(3x6)
T411-3	RKS	4-28-92	50% CEMENT/50% CKD	30	30	2000	600	600	5(2x4) 1(3x6)
T411-4	RKS	4-28-92	50% CEMENT/50% CKD	30	30	2000	600	600	2(2x4) 2(3x6)
T411-5	RKS	4-28-92	50% CEMENT/50% CKD	30	30	2000	600	600	3(2x4) 2(3x6)
T411-6	RKS	4-28-92	50% CEMENT/50% CKD	30	30	2000	600	600	2(2x4) 2(3x6)
T411-7	RKS	4-28-92	50% CEMENT/50% CKD	30	30	2000	600	600	1(2x4) 2(3x6)
T411-8	RKS	4-28-92	50% CEMENT/50% CKD	30	30	2000	600	600	1(2x4) 1(3x6)
T411-9	BJ	5-11-92	50% CEMENT/50% CKD	30	30	200	60	60	1 volumetric increase mold
T411-10	BJ	5-11-92	50% CEMENT/50% CKD	30	30	200	60	60	1 volumetric increase mold
T412-1	RKS	4-28-92	FIRMEX/CKD	20/8	21	2000	400/160	420	2(3x6)
T412-2	RKS	4-28-92	FIRMEX/CKD	20/8	21	2000	400/160	420	4(2x4) 1(3x6)
T412-3	RKS	4-28-92	FIRMEX/CKD	20/8	21	2000	400/160	420	1(2x4) 2(3x6)
T412-4	RKS	4-28-92	FIRMEX/CKD	20/8	21	2000	400/160	420	4(2x4) 1(3x6)
T412-5	RKS	4-28-92	FIRMEX/CKD	20/8	21	2000	400/160	420	1(2x4) 2(3x6)
T412-6	RKS	4-28-92	FIRMEX/CKD	20/8	21	2000	400/160	420	1(2x4) 2(3x6)
T412-7	RKS	4-28-92	FIRMEX/CKD	20/8	21	2000	400/160	420	2(3x6)
T412-8	RKS	4-28-92	FIRMEX/CKD	20/8	21	2000	400/160	420	8(2x4)
T412-9	RKS	4-28-92	FIRMEX/CKD	20/8	21	1000	200/80	210	3(2x4)
T412-10	BJ	5-11-92	FIRMEX/CKD	20/8	21	200	40/16	42	1 volumetric increase mold
T412-11	BJ	5-11-92	FIRMEX/CKD	20/8	21	200	40/16	42	1 volumetric increase mold

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TREATABILITY STUDY RESULTS

TABLE 22
Task 4
Selected Mixtures

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) DRUM NUMBER: 7

TASK NUMBER: NO. 4 CURE TIME: 14 DAYS

WASTE TYPE: SLURRY REVIEWED BY: SJZ

KIBER SAMPLE NO.	MIXED BY:	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	SAMPLES FORMED
T471-1	RKS	4-28-92	50% CEMENT/50% CKD	50	37	2000	1000	740	3(2x4) 3(3x6)
T471-2	RKS	4-28-92	50% CEMENT/50% CKD	50	37	2000	1000	740	3(2x4) 3(3x6)
T471-3	RKS	4-28-92	50% CEMENT/50% CKD	50	37	2000	1000	740	3(2x4) 3(3x6)
T471-4	RKS	4-28-92	50% CEMENT/50% CKD	50	37	2000	1000	740	3(2x4) 3(3x6)
T471-5	RKS	4-28-92	50% CEMENT/50% CKD	50	37	2000	1000	740	10(2x4)
T471-6	BJ	5-11-92	50% CEMENT/50% CKD	50	37	200	100	74	1 volumetric increase mold
T471-7	BJ	5-11-92	50% CEMENT/50% CKD	50	37	200	100	74	1 volumetric increase mold
T472-1	RKS	4-28-92	FIRMEX/CKD	20/8	20	2000	400/160	400	1(2x4) 3(3x6)
T472-2	RKS	4-28-92	FIRMEX/CKD	20/8	20	2000	400/160	400	1(2x4) 3(3x6)
T472-3	RKS	4-28-92	FIRMEX/CKD	20/8	20	2000	400/160	400	1(2x4) 3(3x6)
T472-4	RKS	4-28-92	FIRMEX/CKD	20/8	20	2000	400/160	400	1(2x4) 3(3x6)
T472-5	RKS	4-28-92	FIRMEX/CKD	20/8	20	2000	400/160	400	12(2x4)
T472-6	RKS	4-28-92	FIRMEX/CKD	20/8	20	1000	200/80	200	6(2x4)
T472-7	BJ	5-11-92	FIRMEX/CKD	20/8	20	200	40/16	40	1 volumetric increase mold
T472-8	BJ	5-11-92	FIRMEX/CKD	20/8	20	200	40/16	40	1 volumetric increase mold

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TREATABILITY STUDY RESULTS

TABLE 23
Task 4
SELECTED MIXTURES

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) DRUM NUMBER: 1, 4, and 7

TASK NUMBER: NO. 4 CURE TIME: 14 DAYS

WASTE TYPE: COMPOSITE REVIEWED BY: SJZ

KIBER SAMPLE NO.	MIXED BY:	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	SAMPLES FORMED
T4C1-1	RKS	4-29-92	50% CEMENT/50% CKD	30	30	2000	600	600	3(2x4) 2(3x6)
T4C1-2	RKS	4-29-92	50% CEMENT/50% CKD	30	30	2000	600	600	3(2x4) 2(3x6)
T4C1-3	RKS	4-29-92	50% CEMENT/50% CKD	30	30	2000	600	600	3(2x4) 2(3x6)
T4C1-4	RKS	4-29-92	50% CEMENT/50% CKD	30	30	2000	600	600	4(2x4) 2(3x6)
T4C1-5	RKS	4-29-92	50% CEMENT/50% CKD	30	30	2000	600	600	3(2x4) 2(3x6)
T4C1-6	RKS	4-29-92	50% CEMENT/50% CKD	30	30	2000	600	600	3(2x4) 2(3x6)
T4C1-7	RKS	4-29-92	50% CEMENT/50% CKD	30	30	1000	300	300	4(2x4)
T4C1-8	BJ	5-11-92	50% CEMENT/50% CKD	30	30	200	60	60	1 volumetric increase mold
T4C1-9	BJ	5-11-92	50% CEMENT/50% CKD	30	30	200	60	60	1 volumetric increase mold
T4C2-1	RKS	4-29-92	FIRMEX/CKD	20/8	21	2000	400/160	420	2(2x4) 2(3x6)
T4C2-2	RKS	4-29-92	FIRMEX/CKD	20/8	21	2000	400/160	420	2(2x4) 2(3x6)
T4C2-3	RKS	4-29-92	FIRMEX/CKD	20/8	21	2000	400/160	420	3(2x4) 2(3x6)
T4C2-4	RKS	4-29-92	FIRMEX/CKD	20/8	21	2000	400/160	420	2(2x4) 2(3x6)
T4C2-5	RKS	4-29-92	FIRMEX/CKD	20/8	21	2000	400/160	420	2(2x4) 2(3x6)
T4C2-6	RKS	4-29-92	FIRMEX/CKD	20/8	21	2000	400/160	420	3(2x4) 2(3x6)
T4C2-7	RKS	4-29-92	FIRMEX/CKD	20/8	21	2000	400/160	420	8(2x4)
T4C2-8	BJ	5-11-92	FIRMEX/CKD	20/8	21	200	40/16	42	1 volumetric increase mold
T4C2-9	BJ	5-11-92	FIRMEX/CKD	20/8	21	200	40/16	42	1 volumetric increase mold

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TREATABILITY STUDY RESULTS

TABLE 24
Task 4
Selected Mixtures

PROJECT NAME: TRC TREATABILITY STUDY (ASBESTOS WASTE) DRUM NUMBER: 4

TASK NUMBER: NO. 4 CURE TIME: 14 DAYS

WASTE TYPE: TILE REVIEWED BY: SJZ

KIBER SAMPLE NO.	MIXED BY:	DATE TREATED	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	QUANTITY WASTE TREATED (grams)	QUANTITY REAGENT ADDED (grams)	QUANTITY WATER ADDED (grams)	SAMPLES FORMED
T44C1-1	RKS	4-30-92	50% CEMENT/ 50% CKD	30	30	2000	600	600	2(3x6)
T44C1-2	RKS	4-30-92	50% CEMENT/ 50% CKD	30	30	1000	300	300	2(3x6)
T44C1-3	BJ	5-11-92	50% CEMENT/ 50% CKD	30	30	200	60	60	1 volumetric increase mold
T44C1-4	BJ	5-11-92	50% CEMENT/ 50% CKD	30	30	200	60	60	1 volumetric increase mold
T44C2-1	RKS	4-30-92	FIRMEX/CKD	20/8	28	2500	500/200	700	3(3x6)
T44C2-2	BJ	5-11-92	FIRMEX/CKD	20/8	28	200	50/20	70	1 volumetric increase mold
T44C2-3	BJ	5-11-92	FIRMEX/CKD	20/8	28	200	50/20	70	1 volumetric increase mold
T44B1-1	RKS	4-30-92	50% CEMENT/ 50% CKD	30	30	2500	750	750	3(3x6)
T44B1-2	BJ	5-11-92	50% CEMENT/ 50% CKD	30	30	200	60	60	1 volumetric increase mold
T44B1-3	BJ	5-11-92	50% CEMENT/ 50% CKD	30	30	200	60	60	1 volumetric increase mold
T44B2-1	RKS	4-30-92	FIRMEX/CKD	20/8	28	2500	500/200	700	3(3x6)
T44B2-2	BJ	5-11-92	FIRMEX/CKD	20/8	28	200	50/20	70	1 volumetric increase mold
T44B2-3	BJ	5-11-92	FIRMEX/CKD	20/8	28	200	50/20	70	1 volumetric increase mold
T44A1-1	RKS	4-30-92	50% CEMENT/ 50% CKD	30	45	2000	600	900	3(3x6)
T44A1-2	BJ	5-11-92	50% CEMENT/ 50% CKD	30	45	200	60	90	1 volumetric increase mold
T44A1-3	BJ	5-11-92	50% CEMENT/ 50% CKD	30	45	200	60	90	1 volumetric increase mold
T44A2-1	RKS	4-30-92	FIRMEX/CKD	20/8	43	2000	400/160	860	3(3x6)
T44A2-2	BJ	5-11-92	FIRMEX/CKD	20/8	43	200	40/16	86	1 volumetric increase mold
T44A2-3	BJ	5-11-92	FIRMEX/CKD	20/8	43	200	40/16	86	1 volumetric increase mold

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TABLE 25
Task 4
Permeability Test Results

KIBER SAMPLE NO.	WASTE TYPE	REAGENT TYPE	BULK UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	HYDRAULIC CONDUCTIVITY (cm/sec)
T411	SOIL	CEMENT/CKD	110.3	79.6	38.6	5.0×10^{-7}
T411(DUP)	SOIL	CEMENT/CKD	105.8	77.1	37.2	2.0×10^{-7}
T411(QA)	SOIL	CEMENT/CKD	106.7	77.7	37.3	2.4×10^{-7}
T412	SOIL	FIRMEX/CKD	110.0	85.1	29.3	3.6×10^{-8}
T412(DUP)	SOIL	FIRMEX/CKD	114.8	86.7	32.4	6.6×10^{-9}
T412(DUP2)	SOIL	FIRMEX/CKD	110.4	83.4	32.4	1.1×10^{-7}
T471	SLURRY	CEMENT/CKD	77.7	36.7	111.8	1.8×10^{-7}
T471(DUP)	SLURRY	CEMENT/CKD	78.6	37.5	109.6	2.1×10^{-6}
T472	SLURRY	FIRMEX/CKD	79.2	30.0	163.9	3.5×10^{-7}
T472(DUP)	SLURRY	FIRMEX/CKD	77.4	29.2	165.0	2.5×10^{-7}
T4C1	COMPOSITE	CEMENT/CKD	95.0	58.4	62.7	7.8×10^{-7}
T4C1(DUP)	COMPOSITE	CEMENT/CKD	94.4	45.6	107.0	5.1×10^{-7}
T4C1(QA)	COMPOSITE	CEMENT/CKD	93.7	57.0	64.4	5.0×10^{-7}
T4C2	COMPOSITE	FIRMEX/CKD	95.8	62.5	53.3	2.9×10^{-7}
T4C2(DUP)	COMPOSITE	FIRMEX/CKD	96.5	59.8	61.4	1.6×10^{-7}

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TREATABILITY STUDY RESULTS

TABLE 26
Task 4
Wet / Dry Durability Test Results

KIBER SAMPLE NO.	WASTE TYPE	REAGENT TYPE	MAXIMUM SHRINKAGE (%)	MAXIMUM EXPANSION (%)	TOTAL MATERIAL LOSS (%)
T411	SOIL	CEMENT/CKD	3.0	0.0	5.2
T411(DUP)	SOIL	CEMENT/CKD	3.3	0.0	4.7
T412	SOIL	FIRMEX/CKD	2.4	1.2	2.4
T412(DUP)	SOIL	FIRMEX/CKD	2.8	0.6	7.5
T471	SLURRY	CEMENT/CKD	1.0	3.3	19.0
T471(DUP)	SLURRY	CEMENT/CKD	3.5	1.2	14.6
T472	SLURRY	FIRMEX/CKD	5.8	0.0	24.3
T472(DUP)	SLURRY	FIRMEX/CKD	5.8	0.4	18.7
T4C1	COMPOSITE	CEMENT/CKD	3.3	0.3	7.7
T4C1(DUP)	COMPOSITE	CEMENT/CKD	6.2	2.8	4.7
T4C2	COMPOSITE	FIRMEX/CKD	2.6	0.7	12.6
T4C2(DUP)	COMPOSITE	FIRMEX/CKD	2.7	0.8	13.4

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TREATABILITY STUDY RESULTS

TABLE 27
Task 4
Freeze/Thaw Testing Summary

KIBBR SAMPLE NO.	WASTE TYPE	REAGENT TYPE	AVERAGE CUMULATIVE MASS LOSS (%)		AVERAGE RELATIVE MASS LOSS (%)
			TEST	CONTROL	
T411	SOIL	CEMENT/CKD	1.07	0.10	0.97
T411-DUP	SOIL	CEMENT/CKD	1.21	0.14	1.07
T412	SOIL	FIRMEX/CKD	2.15	0.17	1.98
T412-DUP	SOIL	FIRMEX/CKD	1.67	0.20	1.47
T471	SLURRY	CEMENT/CKD	2.48	0.14	2.34
T471-DUP	SLURRY	CEMENT/CKD	5.30	0.17	5.13
T472	SLURRY	FIRMEX/CKD	1.15	0.10	1.05
T472-DUP	SLURRY	FIRMEX/CKD	1.45	0.19	1.26
T4C1	COMPOSITE	CEMENT/CKD	0.71	0.19	0.52
T4C1-DUP	COMPOSITE	CEMENT/CKD	0.75	0.11	0.64
T4C2	COMPOSITE	FIRMEX/CKD	0.50	0.27	0.23
T4C2-DUP	COMPOSITE	FIRMEX/CKD	1.17	0.09	1.08

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TREATABILITY STUDY RESULTS

TABLE 28
Task 4
Porosity and Bulk Density Test Results

KIBER SAMPLE NO.	WASTE TYPE	REAGENT TYPE	AS-CURED UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	SATURATED UNIT WEIGHT (pcf)	POROSITY (%)
T411	SOIL	CEMENT/CKD	97	82	112	47.9
T411(DUP)	SOIL	CEMENT/CKD	100	81	111	48.1
T412	SOIL	FIRMEX/CKD	111	90	116	42.6
T412(DUP)	SOIL	FIRMEX/CKD	109	87	115	43.4
T412(QA)	SOIL	FIRMEX/CKD	107	87	114	43.7
T471	SLURRY	CEMENT/CKD	60	36	82	74.6
T471(DUP)	SLURRY	CEMENT/CKD	62	36	83	74.3
T472	SLURRY	FIRMEX/CKD	65	30	79	78.4
T472(DUP)	SLURRY	FIRMEX/CKD	66	31	79	77.8
T4C1	COMPOSITE	CEMENT/CKD	82	60	98	59.6
T4C1(DUP)	COMPOSITE	CEMENT/CKD	82	60	98	59.6
T4C1(QA)	COMPOSITE	CEMENT/CKD	82	60	97	59.6
T4C2	COMPOSITE	FIRMEX/CKD	89	61	98	59.4
T4C2(DUP)	COMPOSITE	FIRMEX/CKD	93	62	99	58.8

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TABLE 29
Task 4
Developed Mixtures and Volumetric Expansion

KIBER SAMPLE NO.	REAGENT TYPE	PERCENT AGENT ADDITION	PERCENT WATER ADDITION	ORIGINAL WASTE HEIGHT (inches)	TREATED MIXTURE HEIGHT (inches)	[1] VOLUMETRIC EXPANSION (%)
T411-9	50% CEMENT/50% CKD	30	30	1.39	1.84	32
T411-10	50% CEMENT/50% CKD	30	30	1.43	1.71	20
T412-10	FIRMEX/CKD	20/8	21	1.46	1.70	16
T412-11	FIRMEX/CKD	20/8	21	1.37	1.63	19
T471-6	50% CEMENT/50% CKD	50	37	1.85	2.68	45
T471-7	50% CEMENT/50% CKD	50	37	1.79	2.67	49
T472-7	FIRMEX/CKD	20/8	20	1.62	2.32	43
T472-8	FIRMEX/CKD	20/8	20	1.84	2.43	32
T4C1-8	50% CEMENT/50% CKD	30	30	1.49	2.14	44
T4C1-9	50% CEMENT/50% CKD	30	30	1.65	2.11	28
T4C2-8	FIRMEX/CKD	20/8	21	1.60	1.92	20
T4C2-9	FIRMEX/CKD	20/8	21	1.63	1.96	20
T44A1-2	50% CEMENT/50% CKD	30	45	2.05	2.31	
T44A1-3	50% CEMENT/50% CKD	30	45	2.34	2.36	1
T44A2-2	FIRMEX/CKD	28	43	2.28	2.24	-2
T44A2-3	FIRMEX/CKD	28	43	2.17	2.30	6
T44B1-2	50% CEMENT/50% CKD	30	30	1.93	1.94	1
T44B1-3	50% CEMENT/50% CKD	30	30	2.07	2.00	-3
T44B2-2	FIRMEX/CKD	20/8	28	1.99	1.98	-1
T44B2-3	FIRMEX/CKD	20/8	28	2.05	1.99	-3
T44C1-3	50% CEMENT/50% CKD	30	30	1.82	1.84	1
T44C1-4	50% CEMENT/50% CKD	30	30	1.78	1.93	8
T44C2-2	FIRMEX/CKD	20/8	28	2.13	1.88	-12
T44C2-3	FIRMEX/CKD	20/8	28	1.95	1.85	-5

[1] Negative value denotes volumetric decrease and positive value denotes volumetric expansion.

A92-1050 T42

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TABLE 30
Task 4
Triaxial Strength Sample Preparation

KIBER SAMPLE NO.	WASTE TYPE	REAGENT TYPE	BULK UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	SATURATED UNIT WEIGHT (pcf)
T411-TS1	SOIL	CEMENT/CKD	106.682	84.4	26.4	110.3
T411-TS2	SOIL	CEMENT/CKD	108.500	86.8	25.0	111.1
T412-TS3	SOIL	FIRMEX/CKD	111.992	97.3	15.1	112.7
T412-TS4	SOIL	FIRMEX/CKD	112.613	100.1	12.5	113.5
T471-TS5	SLURRY	CEMENT/CKD	80.956	40.6	99.4	83.2
T471-TS6	SLURRY	CEMENT/CKD	80.517	40.4	99.3	82.7
T472-TS7	SLURRY	FIRMEX/CKD	76.832	39.1	96.5	77.8
T472-TS8	SLURRY	FIRMEX/CKD	76.409	39.9	91.5	78.1
T4C1-TS9	COMPOSITE	CEMENT/CKD	96.814	62.1	55.9	98.2
T4C1-TS10	COMPOSITE	CEMENT/CKD	95.460	59.7	59.9	96.5
T4C2-TS11	COMPOSITE	FIRMEX/CKD	95.598	67.8	41.0	96.3
T4C2-TS12	COMPOSITE	FIRMEX/CKD	97.650	69.8	39.9	98.3

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TREATABILITY STUDY RESULTS

TABLE 31
Task 4
Triaxial Strength Test Results

KIBER SAMPLE NO	WASTE TYPE	REAGENT TYPE	BULK UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	STRENGTH @ FAILURE (psi)
T411-TS1	SOIL	CEMENT/CKD	109.725	79.8	37.5	281
T411-TS2	SOIL	CEMENT/CKD	110.363	79.8	38.3	281
T412-TS3	SOIL	FIRMEX/CKD	112.247	85.1	31.9	523
T412-TS4	SOIL	FIRMEX/CKD	112.736	84.7	33.1	966 / 1300
T471-TS5	SLURRY	CEMENT/CKD	82.914	36.9	124.7	107
T471-TS6	SLURRY	CEMENT/CKD	82.621	37.2	122.1	102
T472-TS7	SLURRY	FIRMEX/CKD	78.332	30.9	153.5	112
T472-TS8	SLURRY	FIRMEX/CKD	78.315	28.1	178.7	126
T4C1-TS9	COMPOSITE	CEMENT/CKD	96.667	58.8	64.4	222
T4C1-TS10	COMPOSITE	CEMENT/CKD	96.446	58.1	66.0	178
T4C2-TS11	COMPOSITE	FIRMEX/CKD	96.030	58.2	65.0	[illegible]
T4C2-TS12	COMPOSITE	FIRMEX/CKD	96.918	59.9	61.8	634

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TABLE 32
Task 4
ANS 16.1 Leachability Specimen Conditions

KIBER SAMPLE NO.	WASTE TYPE	REAGENT TYPE	BULK UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)
T411-6-ANS1	SOIL	CEMENT/CKD	97.41	85.00	14.59
T411-7-ANS2	SOIL	CEMENT/CKD	99.33	90.59	9.64
T412-4-ANS3	SOIL	FIRMEX/CKD	109.74	104.30	5.21
T412-4-ANS4	SOIL	FIRMEX/CKD	107.31	99.08	8.31
T471-5-ANS5	SLURRY	CEMENT/CKD	68.05	46.46	46.47
T471-5-ANS6	SLURRY	CEMENT/CKD	68.39	49.23	38.91
T472-5-ANS7	SLURRY	FIRMEX/CKD	72.60	46.47	56.21
T472-5-ANS8	SLURRY	FIRMEX/CKD	68.87	41.25	66.95
T4C1-1-ANS9	COMPOSITE	CEMENT/CKD	84.08	69.83	20.40
T4C1-6-ANS10	COMPOSITE	CEMENT/CKD	85.29	74.64	14.27
T4C2-3-ANS11	COMPOSITE	FIRMEX/CKD	92.51	78.02	18.57
T4C2-4-ANS12	COMPOSITE	FIRMEX/CKD	90.81	76.73	18.35
T4B-ANS13	BLANK	BLANK	BLANK	BLANK	BLANK

A92-1050.T45

TABLE 33. ANS16.1 LEACHABILITY TEST RESULTS UNITS (MILLION STRUCTURES PER LITER)

	Soil/ Cement	Soil/ Cement	Soil/BFS	Soil/BFS	Slurry/ Cement	Slurry/ Cement	Slurry/ BFS	Slurry/ BFS	Comp./ Cement	Comp./ Cement	Comp./ BFS	Comp./ BFS
2 hour	89.73	122.36	8.16	130.52	16.32	3242.66	3691.33	3385.42	2039.41	2753.20	3528.17	3161.08
7 hour	9.79	16.32	8.16	BDL	1019.70	220.26	840.24	407.88	709.71	1359.60	562.88	138.68
1 day	27.74	31.00	3.26	4.89	1111.48	513.93	791.29	978.92	2222.95	130.52	652.61	146.84
2 days	78.31	106.05	24.47	32.63	358.94	840.24	1165.38		1903.45	734.19	987.98	1070.69
3 days	24.47	32.63	8.16	37.53	416.04	301.83	933.60	277.36	497.62	252.89	424.20	848.39
4 days	16.32	21.21	9.79	BDL	546.56	416.04	1664.16	1203.25	448.67	587.35	668.93	2528.86
5 days	57.10	8.16	57.10	17.95	293.67	296.39	1810.99	1359.60	350.78	424.20	530.25	693.40
19 days	65.26	BDL	24.47	1.63	203.94	158.26	644.45	301.83	334.46	269.20	57.10	1.63
47 days	24.47	0.00	BDL	BDL	244.73	326.31	34.26	220.26	203.94	179.47	16.32	114.24
90 days	9.78	1.63	0.48	BDL	61.94	65.20	40.96	143.44	44.16	19.56	9.12	52.16
Average	40.30	33.94	14.41	22.52	427.33	638.11	1161.67	827.80	875.52	671.02	743.76	875.60
Total Release of Fibers	402.97	339.36	144.05	225.15	4273.32	6381.12	11616.66	8277.96	8755.15	6710.18	7437.56	8755.97

*BFS (Blast Furnace Slag)
*Comp. (Composite of equal portions by weight of soil, tile, and slurry)

TABLE 34. TASK 4, UNCONFINED COMPRESSIVE STRENGTH TEST RESULTS

KIBER SAMPLE NO.	WASTE TYPE	REAGENT TYPE	BULK UNIT WEIGHT (pcf)	DRY UNIT WEIGHT (pcf)	MOISTURE CONTENT (%)	UNCONFINED COMPRESSIVE STRENGTH (psi)
Maximum Diameter = 0.15 inches						
T44A1-1	TILE	FIRMEX/CKD	90.563	62.5	44.9	237.9
T44A1-2	TILE	FIRMEX/CKD	92.664	61.9	49.7	307.5
T44A1-3	TILE	FIRMEX/CKD	93.886	62.8	49.5	311.3
T44A2-1	TILE	CEMENT/CKD	96.396	69.3	39.1	732.0
T44A2-2	TILE	CEMENT/CKD	95.123	67.8	40.3	732.7
T44A2-3	TILE	CEMENT/CKD	96.049	69.1	39.0	750.3
Maximum Diameter = 0.5 inches						
T44B1-1	TILE	FIRMEX/CKD	100.091	75.2	33.1	664.5
T44B1-2	TILE	FIRMEX/CKD	99.718	73.0	36.6	658.3
T44B1-3	TILE	FIRMEX/CKD	100.778	73.4	37.3	>829.4
T44B2-1	TILE	CEMENT/CKD	104.111	74.9	39.0	>885.5
T44B2-2	TILE	CEMENT/CKD	104.394	76.2	37.0	>898.4
T44B2-3	TILE	CEMENT/CKD	104.089	75.1	38.6	>880.8
Maximum Diameter = 1.0 inches						
T44C1-1	TILE	FIRMEX/CKD	100.961	75.4	33.9	796.5
T44C1-2	TILE	FIRMEX/CKD	95.553	73.9	29.3	607.5
T44C1-3	TILE	FIRMEX/CKD	96.359	70.8	36.1	585.2
T44C2-1	TILE	CEMENT/CKD	98.280	72.8	35.0	452.3
T44C2-2	TILE	CEMENT/CKD	99.045	71.0	39.5	521.3
T44C2-3	TILE	CEMENT/CKD	98.170	71.5	37.3	521.1

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APPENDIX A

TRC
Environmental Solutions through Technology

APPENDIX A

ANALYTICAL TEST RESULTS - UNTREATED MATERIAL - TASK 1

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KIBER ANALYTICAL SERVICES | GC/MS VOA RESULTS | LAB SAMPLE # 20212-1

KAI
TRC
Center: Drum No. 1
Sample #T11U1

SAMPLED (Date/Time/Init): 2/17/92, 15:15, SZ
ANALYSIS (Date/Time/Init): 2/22/92, 18:44, DLC
Dilution Factor: 1.208 Sample Matrix: SOLID
% Moisture: 20.1 Analysis Method: 8260

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis Concentration ug/Kg	Apparent Blank Conc. ug/Kg
Acetone	67-64-1	14.50	72.5	ND	<MDL
Benzene	71-43-2	0.15	0.8	ND	ND
Bromodichloromethane	75-27-4	0.16	0.8	ND	ND
Bromoform	75-25-2	0.14	0.7	ND	ND
Bromomethane	74-83-9	0.27	1.3	ND	ND
2-Butanone (Methyl ethyl ketone)	78-93-3	21.74	108.7	ND	ND
Carbon disulfide	75-15-0	0.17	0.8	ND	ND
Carbon tetrachloride	56-23-5	0.24	1.2	ND	ND
Chlorobenzene	108-90-7	0.23	1.1	ND	ND
Chloroethane	75-00-3	2.42	12.1	ND	ND
Chloroform	67-66-3	0.25	1.2	ND	ND
Chloromethane	74-87-3	2.42	12.1	ND	ND
Dibromochloromethane	124-48-1	0.09	0.4	ND	ND
1,1-Dichloroethane	75-34-3	0.18	0.9	ND	ND
1,2-Dichloroethane	107-06-2	0.12	0.6	ND	ND
1,1-Dichloroethene	75-35-4	0.21	1.1	ND	ND
1,2-Dichloroethene (total)	540-59-0	0.17	0.9	ND	ND
1,2-Dichloropropane	78-87-5	0.14	0.7	ND	ND
cis-1,3-Dichloropropene	10061-01-5	0.25	1.3	ND	ND
trans-1,3-Dichloropropene	10061-02-6	0.06	0.3	ND	ND
Ethylbenzene	100-41-4	0.13	0.7	0.2E	1.0E
2-Hexanone	591-78-6	2.42	12.1	ND	ND
Methylene chloride	75-09-2	1.09	5.4	16	7.5
4-Methyl-2-pentanone (MIBK)	108-10-1	2.42	12.1	ND	ND
Styrene	100-42-5	0.17	0.9	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.21	1.0	ND	ND
Tetrachloroethene	127-18-4	0.15	0.7	ND	ND
Toluene	108-88-3	0.24	1.2	1.7	1.6
1,1,1-Trichloroethane	71-55-6	0.83	4.1	ND	ND
1,1,2-Trichloroethane	79-00-5	0.15	0.7	ND	ND
Trichloroethene	79-01-6	0.25	1.2	ND	ND
Vinyl acetate	108-05-4	0.16	0.8	ND	ND
Vinyl chloride	75-01-4	2.42	12.1	ND	ND
Xylenes (total)	1330-20-7	0.26	1.3	0.7E	3.0
1,2-Dichloroethane-d4 (surrogate)	% Recovery	[OK=70-121]		77	80
Toluene-d8 (surrogate)	% Recovery	[OK=84-138]		99	92
Bromofluorobenzene (surrogate)	% Recovery	[OK=59-113]		86	93

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Schappelow

KIBER ANALYTICAL SERVICES | GC/MS VOA RESULTS | LAB SAMPLE # 20212-2

KAI
TRC
Center: Drum No. 1
Sample #T11U2

SAMPLED (Date/Time/Init): 2/17/92, 15:25, SZ
ANALYSIS (Date/Time/Init): 2/22/92, 19:10, DLC
Dilution Factor: 1.067 Sample Matrix: SOLID
% Moisture: 15.3 Analysis Method: 8260

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis Concentration ug/Kg	Apparent Blank Conc. ug/Kg
Acetone	67-64-1	12.80	64.0	ND	<MDL
Benzene	71-43-2	0.13	0.7	ND	ND
Bromodichloromethane	75-27-4	0.14	0.7	ND	ND
Bromoform	75-25-2	0.12	0.6	ND	ND
Bromomethane	74-83-9	0.23	1.2	ND	ND
2-Butanone (Methyl ethyl ketone)	78-93-3	19.21	96.0	ND	ND
Carbon disulfide	75-15-0	0.15	0.7	ND	ND
Carbon tetrachloride	56-23-5	0.21	1.1	ND	ND
Chlorobenzene	108-90-7	0.20	1.0	ND	ND
Chloroethane	75-00-3	2.13	10.7	ND	ND
Chloroform	67-66-3	0.22	1.1	ND	ND
Chloromethane	74-87-3	2.13	10.7	ND	ND
Dibromochloromethane	124-48-1	0.08	0.4	ND	ND
1,1-Dichloroethane	75-34-3	0.16	0.8	ND	ND
1,2-Dichloroethane	107-06-2	0.10	0.5	ND	ND
1,1-Dichloroethene	75-35-4	0.19	0.9	ND	ND
1,2-Dichloroethene (total)	540-59-0	0.15	0.8	ND	ND
1,2-Dichloropropane	78-87-5	0.13	0.6	ND	ND
cis-1,3-Dichloropropene	10061-01-5	0.22	1.1	ND	ND
trans-1,3-Dichloropropene	10061-02-6	0.06	0.3	ND	ND
Ethylbenzene	100-41-4	0.11	0.6	0.3E	0.9
2-Hexanone	591-78-6	2.13	10.7	ND	ND
Methylene chloride	75-09-2	0.96	4.8	14	6.6
4-Methyl-2-pentanone (MIBK)	108-10-1	2.13	10.7	ND	ND
Styrene	100-42-5	0.15	0.8	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.19	0.9	ND	ND
Tetrachloroethene	127-18-4	0.13	0.7	ND	ND
Toluene	108-88-3	0.21	1.0	1.5	1.4
1,1,1-Trichloroethane	71-55-6	0.73	3.7	ND	ND
1,1,2-Trichloroethane	79-00-5	0.13	0.7	ND	ND
Trichloroethene	79-01-6	0.22	1.1	ND	ND
Vinyl acetate	108-05-4	0.15	0.7	ND	ND
Vinyl chloride	75-01-4	2.13	10.7	ND	ND
Xylenes (total)	1330-20-7	0.23	1.2	0.8E	2.7
1,2-Dichloroethane-d4 (surrogate)	% Recovery	[OK=70-121]		74	80
Toluene-d8 (surrogate)	% Recovery	[OK=84-138]		98	92
Bromofluorobenzene (surrogate)	% Recovery	[OK=59-113]		85	93

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Schappelow

KIBER ANALYTICAL SERVICES | GC/MS VOA RESULTS | LAB SAMPLE # 20212-3

KAI
TRC
Center: Drum No. 4
Sample #T14U3

SAMPLED (Date/Time/Init): 2/17/92, 15:40, SZ
ANALYSIS (Date/Time/Init): 2/22/92, 19:36, DLC
Dilution Factor: 1.428 Sample Matrix: SOLID
% Moisture: 32.4 Analysis Method: 8260

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis Concentration ug/Kg	Apparent Blank Conc. ug/Kg
Acetone	67-64-1	17.14	85.7	<MDL	<MDL
Benzene	71-43-2	0.18	0.9	ND	ND
Bromodichloromethane	75-27-4	0.19	1.0	ND	ND
Bromoform	75-25-2	0.16	0.8	ND	ND
Bromomethane	74-83-9	0.31	1.6	ND	ND
2-Butanone (Methyl ethyl ketone)	78-93-3	25.70	128.5	ND	ND
Carbon disulfide	75-15-0	0.20	1.0	ND	ND
Carbon tetrachloride	56-23-5	0.28	1.4	ND	ND
Chlorobenzene	108-90-7	0.27	1.4	ND	ND
Chloroethane	75-00-3	2.86	14.3	ND	ND
Chloroform	67-66-3	0.29	1.5	ND	ND
Chloromethane	74-87-3	2.86	14.3	ND	ND
Dibromochloromethane	124-48-1	0.10	0.5	ND	ND
1,1-Dichloroethane	75-34-3	0.21	1.1	ND	ND
1,2-Dichloroethane	107-06-2	0.14	0.7	ND	ND
1,1-Dichloroethene	75-35-4	0.25	1.2	ND	ND
1,2-Dichloroethene (total)	540-59-0	0.20	1.0	ND	ND
1,2-Dichloropropane	78-87-5	0.17	0.8	ND	ND
cis-1,3-Dichloropropene	10061-01-5	0.30	1.5	ND	ND
trans-1,3-Dichloropropene	10061-02-6	0.07	0.4	ND	ND
Ethylbenzene	100-41-4	0.15	0.8	0.7E	1.2
2-Hexanone	591-78-6	2.86	14.3	ND	ND
Methylene chloride	75-09-2	1.29	6.4	25	8.9
4-Methyl-2-pentanone (MIBK)	108-10-1	2.86	14.3	ND	ND
Styrene	100-42-5	0.20	1.0	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.25	1.2	ND	ND
Tetrachloroethene	127-18-4	0.18	0.9	ND	ND
Toluene	108-88-3	0.28	1.4	15	1.9
1,1,1-Trichloroethane	71-55-6	0.98	4.9	ND	ND
1,1,2-Trichloroethane	79-00-5	0.18	0.9	ND	ND
Trichloroethene	79-01-6	0.29	1.5	ND	ND
Vinyl acetate	108-05-4	0.19	1.0	ND	ND
Vinyl chloride	75-01-4	2.86	14.3	ND	ND
Xylenes (total)	1330-20-7	0.31	1.6	1.3E	3.6
1,2-Dichloroethane-d4 (surrogate)	% Recovery	[OK=70-121]		74	80
Toluene-d8 (surrogate)	% Recovery	[OK=84-138]		107	92
Bromofluorobenzene (surrogate)	% Recovery	[OK=59-113]		77	93

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Schappelow

KIBER ANALYTICAL SERVICES | GC/MS VOA RESULTS | LAB SAMPLE # 20212-4

KAI
TRC
Center: Drum No. 4
Sample #T14U4

SAMPLED (Date/Time/Init): 2/17/92, 15:52, SZ
ANALYSIS (Date/Time/Init): 2/22/92, 20:02, DLC
Dilution Factor: 1.414
% Moisture: 32.4
Sample Matrix: SOLID
Analysis Method: 8260

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis Concentration ug/Kg	Apparent Blank Conc. ug/Kg
Acetone	67-64-1	16.97	84.8	ND	<MDL
Benzene	71-43-2	0.18	0.9	ND	ND
Bromodichloromethane	75-27-4	0.19	1.0	ND	ND
Bromoform	75-25-2	0.16	0.8	ND	ND
Bromomethane	74-83-9	0.31	1.6	ND	ND
2-Butanone (Methyl ethyl ketone)	78-93-3	25.45	127.3	ND	ND
Carbon disulfide	75-15-0	0.19	1.0	ND	ND
Carbon tetrachloride	56-23-5	0.28	1.4	ND	ND
Chlorobenzene	108-90-7	0.27	1.3	ND	ND
Chloroethane	75-00-3	2.83	14.1	ND	ND
Chloroform	67-66-3	0.29	1.5	ND	ND
Chloromethane	74-87-3	2.83	14.1	ND	ND
Dibromochloromethane	124-48-1	0.10	0.5	ND	ND
1,1-Dichloroethane	75-34-3	0.21	1.1	ND	ND
1,2-Dichloroethane	107-06-2	0.14	0.7	ND	ND
1,1-Dichloroethene	75-35-4	0.25	1.2	ND	ND
1,2-Dichloroethene (total)	540-59-0	0.20	1.0	ND	ND
1,2-Dichloropropane	78-87-5	0.17	0.8	ND	ND
cis-1,3-Dichloropropene	10061-01-5	0.30	1.5	ND	ND
trans-1,3-Dichloropropene	10061-02-6	0.07	0.4	ND	ND
Ethylbenzene	100-41-4	0.15	0.8	0.6E	1.2
2-Hexanone	591-78-6	2.83	14.1	ND	ND
Methylene chloride	75-09-2	1.27	6.4	22	8.8
4-Methyl-2-pentanone (MIBK)	108-10-1	2.83	14.1	ND	ND
Styrene	100-42-5	0.20	1.0	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.25	1.2	ND	ND
Tetrachloroethene	127-18-4	0.17	0.9	ND	ND
Toluene	108-88-3	0.28	1.4	12	1.9
1,1,1-Trichloroethane	71-55-6	0.97	4.8	ND	ND
1,1,2-Trichloroethane	79-00-5	0.17	0.9	ND	ND
Trichloroethene	79-01-6	0.29	1.5	ND	ND
Vinyl acetate	108-05-4	0.19	1.0	ND	ND
Vinyl chloride	75-01-4	2.83	14.1	ND	ND
Xylenes (total)	1330-20-7	0.31	1.5	1.6	3.5
1,2-Dichloroethane-d4 (surrogate)	% Recovery	[OK=70-121]		73	80
Toluene-d8 (surrogate)	% Recovery	[OK=84-138]		107	92
Bromofluorobenzene (surrogate)	% Recovery	[OK=59-113]		76	93

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Schappelow

KIBER ANALYTICAL SERVICES | GC/MS VOA RESULTS | LAB SAMPLE # 20212-5

KAI
TRC
Center: Drum No. 7
Sample #T17U5

SAMPLED (Date/Time/Init): 2/17/92, 16:00, SZ
ANALYSIS (Date/Time/Init): 2/22/92, 20:28, DLC
Dilution Factor: 5.867 Sample Matrix: SOLID
% Moisture: 84.7 Analysis Method: 8260

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis Concentration ug/Kg	Apparent Blank Conc. ug/Kg
Acetone	67-64-1	70.40	352.0	410	<MDL
Benzene	71-43-2	0.73	3.7	16	ND
Bromodichloromethane	75-27-4	0.79	4.0	ND	ND
Bromoform	75-25-2	0.66	3.3	ND	ND
Bromomethane	74-83-9	1.29	6.4	ND	ND
2-Butanone (Methyl ethyl ketone)	78-93-3	105.61	528.0	100E	ND
Carbon disulfide	75-15-0	0.81	4.0	ND	ND
Carbon tetrachloride	56-23-5	1.17	5.8	ND	ND
Chlorobenzene	108-90-7	1.11	5.6	7.3	ND
Chloroethane	75-00-3	11.73	58.7	ND	ND
Chloroform	67-66-3	1.21	6.0	ND	ND
Chloromethane	74-87-3	11.73	58.7	ND	ND
Dibromochloromethane	124-48-1	0.42	2.1	ND	ND
1,1-Dichloroethane	75-34-3	0.87	4.4	ND	ND
1,2-Dichloroethane	107-06-2	0.56	2.8	ND	ND
1,1-Dichloroethene	75-35-4	1.02	5.1	ND	ND
1,2-Dichloroethene (total)	540-59-0	0.84	4.2	ND	ND
1,2-Dichloropropane	78-87-5	0.70	3.5	ND	ND
cis-1,3-Dichloropropene	10061-01-5	1.24	6.2	ND	ND
trans-1,3-Dichloropropene	10061-02-6	0.31	1.5	ND	ND
Ethylbenzene	100-41-4	0.63	3.2	4.6	4.9
2-Hexanone	591-78-6	11.73	58.7	ND	ND
Methylene chloride	75-09-2	5.28	26.4	73	37
4-Methyl-2-pentanone (MIBK)	108-10-1	11.73	58.7	<MDL	ND
Styrene	100-42-5	0.84	4.2	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	1.02	5.1	ND	ND
Tetrachloroethene	127-18-4	0.72	3.6	ND	ND
Toluene	108-88-3	1.15	5.8	22	7.7
1,1,1-Trichloroethane	71-55-6	4.02	20.1	ND	ND
1,1,2-Trichloroethane	79-00-5	0.72	3.6	ND	ND
Trichloroethene	79-01-6	1.21	6.0	4.1E	ND
Vinyl acetate	108-05-4	0.80	4.0	ND	ND
Vinyl chloride	75-01-4	11.73	58.7	ND	ND
Xylenes (total)	1330-20-7	1.28	6.4	27	15
1,2-Dichloroethane-d4 (surrogate)	% Recovery	[OK=70-121]		71	80
Toluene-d8 (surrogate)	% Recovery	[OK=84-138]		95	92
Bromofluorobenzene (surrogate)	% Recovery	[OK=59-113]		87	93

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

KIBER ANALYTICAL SERVICES | GC/MS VOA RESULTS | LAB SAMPLE # 20212-6

KAI
TRC
Center: Drum No. 7
Sample #T17U6

SAMPLED (Date/Time/Init): 2/17/92, 16:00, SZ
ANALYSIS (Date/Time/Init): 2/22/92, 20:54, DLC
Dilution Factor: 5.758 Sample Matrix: SOLID
% Moisture: 83.8 Analysis Method: 8260

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis Concentration ug/Kg	Apparent Blank Conc. ug/Kg
Acetone	67-64-1	69.10	345.5	180E	<MDL
Benzene	71-43-2	0.72	3.6	13	ND
Bromodichloromethane	75-27-4	0.78	3.9	ND	ND
Bromoform	75-25-2	0.64	3.2	ND	ND
Bromomethane	74-83-9	1.27	6.3	ND	ND
2-Butanone (Methyl ethyl ketone)	78-93-3	103.64	518.2	<MDL	ND
Carbon disulfide	75-15-0	0.79	4.0	ND	ND
Carbon tetrachloride	56-23-5	1.15	5.7	ND	ND
Chlorobenzene	108-90-7	1.09	5.5	5.2	ND
Chloroethane	75-00-3	11.52	57.6	ND	ND
Chloroform	67-66-3	1.19	5.9	ND	ND
Chloromethane	74-87-3	11.52	57.6	ND	ND
Dibromochloromethane	124-48-1	0.42	2.1	ND	ND
1,1-Dichloroethane	75-34-3	0.86	4.3	ND	ND
1,2-Dichloroethane	107-06-2	0.55	2.7	ND	ND
1,1-Dichloroethene	75-35-4	1.00	5.0	ND	ND
1,2-Dichloroethene (total)	540-59-0	0.82	4.1	ND	ND
1,2-Dichloropropane	78-87-5	0.68	3.4	ND	ND
cis-1,3-Dichloropropene	10061-01-5	1.21	6.1	ND	ND
trans-1,3-Dichloropropene	10061-02-6	0.30	1.5	ND	ND
Ethylbenzene	100-41-4	0.62	3.1	3.2	4.8
2-Hexanone	591-78-6	11.52	57.6	ND	ND
Methylene chloride	75-09-2	5.18	25.9	71	36
4-Methyl-2-pentanone (MIBK)	108-10-1	11.52	57.6	<MDL	ND
Styrene	100-42-5	0.82	4.1	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	1.00	5.0	ND	ND
Tetrachloroethene	127-18-4	0.71	3.5	ND	ND
Toluene	108-88-3	1.13	5.6	19	7.6
1,1,1-Trichloroethane	71-55-6	3.94	19.7	ND	ND
1,1,2-Trichloroethane	79-00-5	0.71	3.5	ND	ND
Trichloroethene	79-01-6	1.19	5.9	2.4	ND
Vinyl acetate	108-05-4	0.78	3.9	ND	ND
Vinyl chloride	75-01-4	11.52	57.6	ND	ND
Xylenes (total)	1330-20-7	1.25	6.3	20	14
1,2-Dichloroethane-d4 (surrogate)	% Recovery	[OK=70-121]		71	80
Toluene-d8 (surrogate)	% Recovery	[OK=84-138]		97	92
Bromofluorobenzene (surrogate)	% Recovery	[OK=59-113]		86	93

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Chappelow

KIBER ANALYTICAL SERVICES | GC/MS VOA RESULTS | LAB SAMPLE # 20212-7

KAI
TRC
Water Rinse
Sample #R-BLANK

SAMPLED (Date/Time/Init): 2/17/92, 15:08, SZ
ANALYSIS (Date/Time/Init): 2/22/92, 21:20, DLC
Dilution Factor: 1.000
Sample Matrix: WATER
Analysis Method: 8260

TARGET COMPOUND LIST	CAS Number	MDL	PQL	ug/L Concentration	ug/L Blank Conc.
Acetone	67-64-1	12.00	60.0	ND	<MDL
Benzene	71-43-2	0.13	0.6	ND	ND
Bromodichloromethane	75-27-4	0.14	0.7	ND	ND
Bromoform	75-25-2	0.11	0.6	ND	ND
Bromomethane	74-83-9	0.22	1.1	ND	ND
2-Butanone (Methyl ethyl ketone)	78-93-3	18.00	90.0	ND	ND
Carbon disulfide	75-15-0	0.14	0.7	ND	ND
Carbon tetrachloride	56-23-5	0.20	1.0	ND	ND
Chlorobenzene	108-90-7	0.19	0.9	ND	ND
Chloroethane	75-00-3	2.00	10.0	ND	ND
Chloroform	67-66-3	0.21	1.0	ND	ND
Chloromethane	74-87-3	2.00	10.0	ND	ND
Dibromochloromethane	124-48-1	0.07	0.4	ND	ND
1,1-Dichloroethane	75-34-3	0.15	0.7	ND	ND
1,2-Dichloroethane	107-06-2	0.10	0.5	ND	ND
1,1-Dichloroethene	75-35-4	0.17	0.9	ND	ND
1,2-Dichloroethene (total)	540-59-0	0.14	0.7	ND	ND
1,2-Dichloropropane	78-87-5	0.12	0.6	ND	ND
cis-1,3-Dichloropropene	10061-01-5	0.21	1.1	ND	ND
trans-1,3-Dichloropropene	10061-02-6	0.05	0.3	ND	ND
Ethylbenzene	100-41-4	0.11	0.5	ND	0.8
2-Hexanone	591-78-6	2.00	10.0	ND	ND
Methylene chloride	75-09-2	0.90	4.5	1.9E	6.2
4-Methyl-2-pentanone (MIBK)	108-10-1	2.00	10.0	ND	ND
Styrene	100-42-5	0.14	0.7	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.17	0.9	ND	ND
Tetrachloroethene	127-18-4	0.12	0.6	ND	ND
Toluene	108-88-3	0.20	1.0	0.6E	1.3
1,1,1-Trichloroethane	71-55-6	0.68	3.4	ND	ND
1,1,2-Trichloroethane	79-00-5	0.12	0.6	ND	ND
Trichloroethene	79-01-6	0.21	1.0	ND	ND
Vinyl acetate	108-05-4	0.14	0.7	ND	ND
Vinyl chloride	75-01-4	2.00	10.0	ND	ND
Xylenes (total)	1330-20-7	0.22	1.1	0.3E	2.5
1,2-Dichloroethane-d4 (surrogate)	% Recovery	[OK=76-114]		78	80
Toluene-d8 (surrogate)	% Recovery	[OK=88-110]		93	92
Bromofluorobenzene (surrogate)	% Recovery	[OK=86-115]		89	93

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Shappelow

KIBER ANALYTICAL SERVICES | GC/MS VOA RESULTS | LAB SAMPLE # 20212-8

KAI
TRC
Water Blank
Sample #T-BLANK

SAMPLED (Date/Time/Init): 2/17/92, 16:09, SZ
ANALYSIS (Date/Time/Init): 2/22/92, 18:18, DLC
Dilution Factor: 1.000
Sample Matrix: WATER
Analysis Method: 8260

TARGET COMPOUND LIST	CAS Number	MDL	PQL	ug/L Concentration	ug/L Blank Conc.
Acetone	67-64-1	12.00	60.0	ND	<MDL
Benzene	71-43-2	0.13	0.6	ND	ND
Bromodichloromethane	75-27-4	0.14	0.7	ND	ND
Bromoform	75-25-2	0.11	0.6	ND	ND
Bromomethane	74-83-9	0.22	1.1	ND	ND
2-Butanone (Methyl ethyl ketone)	78-93-3	18.00	90.0	ND	ND
Carbon disulfide	75-15-0	0.14	0.7	ND	ND
Carbon tetrachloride	56-23-5	0.20	1.0	ND	ND
Chlorobenzene	108-90-7	0.19	0.9	ND	ND
Chloroethane	75-00-3	2.00	10.0	ND	ND
Chloroform	67-66-3	0.21	1.0	ND	ND
Chloromethane	74-87-3	2.00	10.0	ND	ND
Dibromochloromethane	124-48-1	0.07	0.4	ND	ND
1,1-Dichloroethane	75-34-3	0.15	0.7	ND	ND
1,2-Dichloroethane	107-06-2	0.10	0.5	ND	ND
1,1-Dichloroethene	75-35-4	0.17	0.9	ND	ND
1,2-Dichloroethene (total)	540-59-0	0.14	0.7	ND	ND
1,2-Dichloropropane	78-87-5	0.12	0.6	ND	ND
cis-1,3-Dichloropropene	10061-01-5	0.21	1.1	ND	ND
trans-1,3-Dichloropropene	10061-02-6	0.05	0.3	ND	ND
Ethylbenzene	100-41-4	0.11	0.5	0.4E	0.8
2-Hexanone	591-78-6	2.00	10.0	ND	ND
Methylene chloride	75-09-2	0.90	4.5	2.3E	6.2
4-Methyl-2-pentanone (MIBK)	108-10-1	2.00	10.0	ND	ND
Styrene	100-42-5	0.14	0.7	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	0.17	0.9	ND	ND
Tetrachloroethene	127-18-4	0.12	0.6	ND	ND
Toluene	108-88-3	0.20	1.0	1.0	1.3
1,1,1-Trichloroethane	71-55-6	0.68	3.4	ND	ND
1,1,2-Trichloroethane	79-00-5	0.12	0.6	ND	ND
Trichloroethene	79-01-6	0.21	1.0	ND	ND
Vinyl acetate	108-05-4	0.14	0.7	ND	ND
Vinyl chloride	75-01-4	2.00	10.0	ND	ND
Xylenes (total)	1330-20-7	0.22	1.1	1.0E	2.5
1,2-Dichloroethane-d4 (surrogate)	% Recovery	[OK=76-114]		88	80
Toluene-d8 (surrogate)	% Recovery	[OK=88-110]		93	92
Bromofluorobenzene (surrogate)	% Recovery	[OK=86-115]		95	93

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Schappelow

KIBER ANALYTICAL SERVICES | GC/MS SVO RESULTS | LAB SAMPLE # 20212-1

KAI
TRC
Center: Drum No. 1
Sample #T11U1

SAMPLED (Date/Time/Init): 2/17/92, 15:15, SZ
ANALYSIS (Date/Time/Init): 2/27/92, 20:53, DLC
EXTRACTED (Date / Init) : 2/18/92, BC

Dilution Factor: 35.70
Extract Method: 3550
% Moisture: 20.1

Sample Matrix: SOLID
Analysis Method: 8270

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis ug/Kg Concentration	Apparent ug/Kg Blank Conc.
Acenaphthene	83-32-9	14.3	71.4	ND	ND
Acenaphthylene	208-96-8	17.9	75.0	ND	ND
Anthracene	120-12-7	10.7	46.4	ND	ND
Benz[a]anthracene	56-55-3	7.1	35.7	ND	ND
Benzo[b]fluoranthene	205-99-2	10.7	42.8	ND	ND
Benzo[k]fluoranthene	207-08-9	7.1	28.6	ND	ND
Benzoic acid	65-85-0	232.1	1153.1	ND	ND
Benzo[ghi]perylene	191-24-2	7.1	32.1	ND	ND
Benzo[a]pyrene	50-32-8	7.1	35.7	ND	ND
Benzyl alcohol	100-51-6	10.7	53.6	ND	ND
bis(2-Chloroethoxy)methane	111-91-1	10.7	42.8	ND	ND
bis(2-Chloroethyl)ether	111-44-4	10.7	50.0	ND	ND
bis(2-Chloroisopropyl)ether	108-60-1	17.9	75.0	ND	ND
bis(2-Ethylhexyl)phthalate	117-81-7	14.3	71.4	39E	24E
4-Bromophenyl phenyl ether	101-55-3	14.3	57.1	ND	ND
Butyl benzyl phthalate	85-68-7	17.9	75.0	ND	ND
4-Chloroaniline	106-47-8	10.7	42.8	ND	ND
4-Chloro-3-methylphenol	59-50-7	21.4	96.4	ND	ND
2-Chloronaphthalene	91-58-7	10.7	39.3	ND	ND
2-Chlorophenol	95-57-8	7.1	35.7	ND	ND
4-Chlorophenyl phenyl ether	59-50-7	21.4	96.4	ND	ND
Chrysene	218-01-9	14.3	67.8	ND	ND
Dibenz[a,h]anthracene	53-70-3	7.1	32.1	ND	ND
Dibenzofuran	132-64-9	17.9	89.3	ND	ND
Di-n-butylphthalate	84-74-2	10.7	42.8	<MDL	28E
1,2-Dichlorobenzene	95-50-1	7.1	35.7	ND	ND
1,3-Dichlorobenzene	541-73-1	10.7	46.4	ND	ND
1,4-Dichlorobenzene	106-46-7	10.7	42.8	ND	ND
3,3'-Dichlorobenzidine	91-94-1	25.0	117.8	ND	ND
2,4-Dichlorophenol	120-83-2	17.9	75.0	ND	ND
Diethylphthalate	84-66-2	14.3	71.4	ND	<MDL
2,4-Dimethylphenol	105-67-9	21.4	96.4	ND	ND
Dimethylphthalate	131-11-3	14.3	57.1	ND	ND
4,6-Dinitro-2-methylphenol	534-52-1	342.7	1702.9	ND	ND
2,4-Dinitrophenol	51-28-5	542.6	2702.5	ND	ND
2,4-Dinitrotoluene	121-14-2	92.8	457.0	ND	ND

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Schappelow

KIBER ANALYTICAL SERVICES | GC/MS SVO RESULTS | LAB SAMPLE # 20212-1

KAI
TRC
Center: Drum No. 1
Sample #T11U1

SAMPLED (Date/Time/Init): 2/17/92, 15:15, SZ
ANALYSIS (Date/Time/Init): 2/27/92, 20:53, DLC
EXTRACTED (Date / Init) : 2/18/92, BC

Dilution Factor: 35.70
Extract Method: 3550
% Moisture: 20.1

Sample Matrix: SOLID
Analysis Method: 8270

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis Concentration ug/Kg	Apparent Blank Conc. ug/Kg
2,6-Dinitrotoluene	606-20-2	64.3	314.2	ND	ND
Di-n-octyl phthalate	117-84-0	25.0	114.2	ND	ND
Fluoranthene	206-44-0	7.1	28.6	ND	ND
Fluorene	7782-41-4	17.9	89.3	ND	ND
Hexachlorobenzene	118-74-1	21.4	96.4	ND	ND
Hexachlorobutadiene	87-68-3	14.3	60.7	ND	ND
Hexachlorocyclopentadiene	77-47-4	64.3	314.2	ND	ND
Hexachloroethane	67-72-1	25.0	110.7	ND	ND
Indeno[1,2,3-cd]pyrene	193-39-5	10.7	46.4	ND	ND
Isophorone	78-59-1	10.7	53.6	ND	ND
2-Methylnaphthalene	91-57-6	7.1	35.7	ND	ND
2-Methylphenol	95-48-7	10.7	46.4	ND	ND
4-Methylphenol	106-44-5	14.3	53.6	ND	ND
Naphthalene	91-20-3	7.1	21.4	ND	ND
2-Nitroaniline	88-74-4	17.9	78.5	ND	ND
3-Nitroaniline	99-09-2	60.7	303.5	ND	ND
4-Nitroaniline	100-01-6	32.1	149.9	ND	ND
Nitrobenzene	98-95-3	10.7	53.6	ND	ND
2-Nitrophenol	88-75-5	21.4	100.0	ND	ND
4-Nitrophenol	100-01-6	232.1	1149.5	ND	ND
N-Nitrosodiphenylamine*	86-30-6	7.1	28.6	ND	ND
N-Nitrosodi-n-propylamine	621-64-7	14.3	71.4	ND	ND
Pentachlorophenol	87-86-5	274.9	1378.0	ND	ND
Phenanthrene	85-01-8	7.1	28.6	ND	ND
Phenol	108-95-2	10.7	50.0	ND	ND
Pyrene	129-00-0	17.9	85.7	ND	ND
1,2,4-Trichlorobenzene	120-82-1	14.3	67.8	ND	ND
2,4,5-Trichlorophenol	95-95-4	50.0	249.9	ND	ND
2,4,6-Trichlorophenol	88-06-2	75.0	374.9	ND	ND
2-Fluorophenol (surrogate std)	% Recovery	[OK=25-121]		30	34
Phenol-d6 (surrogate std)	% Recovery	[OK=24-113]		36	35
Nitrobenzene-d5 (surrogate std)	% Recovery	[OK=23-120]		55	64
2-Fluorobiphenyl (surrogate std)	% Recovery	[OK=30-115]		63	74
2,4,6-Tribromophenol (surrogate std)	% Recovery	[OK=19-122]		42	43
Terphenyl-d14 (surrogate std)	% Recovery	[OK=18-137]		85	76

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

*as diphenylamine

Dale Chappelow

KIBER ANALYTICAL SERVICES | GC/MS SVO RESULTS | LAB SAMPLE # 20212-2

KAI
TRC
Center: Drum No. 1
Sample #T11U2

SAMPLED (Date/Time/Init): 2/17/92, 15:25, SZ
ANALYSIS (Date/Time/Init): 2/27/92, 21:43, DLC
EXTRACTED (Date / Init) : 2/18/92, BC

Dilution Factor: 35.50
Extract Method: 3550
% Moisture: 15.3

Sample Matrix: SOLID
Analysis Method: 8270

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis ug/Kg Concentration	Apparent ug/Kg Blank Conc.
Acenaphthene	83-32-9	14.2	71.0	ND	ND
Acenaphthylene	208-96-8	17.8	74.6	ND	ND
Anthracene	120-12-7	10.7	46.2	ND	ND
Benz[a]anthracene	56-55-3	7.1	35.5	ND	ND
Benzo[b]fluoranthene	205-99-2	10.7	42.6	ND	ND
Benzo[k]fluoranthene	207-08-9	7.1	28.4	ND	ND
Benzoic acid	65-85-0	230.8	1146.6	ND	ND
Benzo[ghi]perylene	191-24-2	7.1	32.0	ND	ND
Benzo[a]pyrene	50-32-8	7.1	35.5	ND	ND
Benzyl alcohol	100-51-6	10.7	53.3	ND	ND
bis(2-Chloroethoxy)methane	111-91-1	10.7	42.6	ND	ND
bis(2-Chloroethyl)ether	111-44-4	10.7	49.7	ND	ND
bis(2-Chloroisopropyl)ether	108-60-1	17.8	74.6	ND	ND
bis(2-Ethylhexyl)phthalate	117-81-7	14.2	71.0	40E	22E
4-Bromophenyl phenyl ether	101-55-3	14.2	56.8	ND	ND
Butyl benzyl phthalate	85-68-7	17.8	74.6	ND	ND
4-Chloroaniline	106-47-8	10.7	42.6	ND	ND
4-Chloro-3-methylphenol	59-50-7	21.3	95.9	ND	ND
2-Chloronaphthalene	91-58-7	10.7	39.1	ND	ND
2-Chlorophenol	95-57-8	7.1	35.5	ND	ND
4-Chlorophenyl phenyl ether	59-50-7	21.3	95.9	ND	ND
Chrysene	218-01-9	14.2	67.5	ND	ND
Dibenz[a,h]anthracene	53-70-3	7.1	32.0	ND	ND
Dibenzofuran	132-64-9	17.8	88.8	ND	ND
Di-n-butylphthalate	84-74-2	10.7	42.6	<MDL	26E
1,2-Dichlorobenzene	95-50-1	7.1	35.5	ND	ND
1,3-Dichlorobenzene	541-73-1	10.7	46.2	ND	ND
1,4-Dichlorobenzene	106-46-7	10.7	42.6	ND	ND
3,3'-Dichlorobenzidine	91-94-1	24.8	117.1	ND	ND
2,4-Dichlorophenol	120-83-2	17.8	74.6	ND	ND
Diethylphthalate	84-66-2	14.2	71.0	ND	<MDL
2,4-Dimethylphenol	105-67-9	21.3	95.9	ND	ND
~~Dimethylphthalate~~	~~131-11-3~~	~~14.2~~	~~56.8~~	~~ND~~	~~ND~~
4,6-Dinitro-2-methylphenol	534-52-1	340.8	1693.4	ND	ND
2,4-Dinitrophenol	51-28-5	539.6	2687.4	ND	ND
2,4-Dinitrotoluene	121-14-2	92.3	454.4	ND	ND

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Chappelow

KIBER ANALYTICAL SERVICES | GC/MS SVO RESULTS | LAB SAMPLE # 20212-2

KAI
TRC
Center: Drum No. 1
Sample #T11U2

SAMPLED (Date/Time/Init): 2/17/92, 15:25, SZ
ANALYSIS (Date/Time/Init): 2/27/92, 21:43, DLC
EXTRACTED (Date / Init) : 2/18/92, BC

Dilution Factor: 33.50
Extract Method: 3550
% Moisture: 15.3

Sample Matrix: SOLID
Analysis Method: 8270

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis Concentration ug/Kg	Apparent Blank Conc. ug/Kg
2,6-Dinitrotoluene	606-20-2	60.3	294.8	ND	ND
Di-n-octyl phthalate	117-84-0	23.5	107.2	ND	ND
Fluoranthene	206-44-0	6.7	26.8	ND	ND
Fluorene	7782-41-4	16.8	83.8	ND	ND
Hexachlorobenzene	118-74-1	20.1	90.5	ND	ND
Hexachlorobutadiene	87-68-3	13.4	56.9	ND	ND
Hexachlorocyclopentadiene	77-47-4	60.3	294.8	ND	ND
Hexachloroethane	67-72-1	23.5	103.9	ND	ND
Indeno[1,2,3-cd]pyrene	193-39-5	10.0	43.6	ND	ND
Isophorone	78-59-1	10.0	50.3	ND	ND
2-Methylnaphthalene	91-57-6	6.7	33.5	ND	ND
2-Methylphenol	95-48-7	10.0	43.6	ND	ND
4-Methylphenol	106-44-5	13.4	50.3	ND	ND
Naphthalene	91-20-3	6.7	20.1	ND	ND
2-Nitroaniline	88-74-4	16.8	73.7	ND	ND
3-Nitroaniline	99-09-2	56.9	284.8	ND	ND
4-Nitroaniline	100-01-6	30.2	140.7	ND	ND
Nitrobenzene	98-95-3	10.0	50.3	ND	ND
2-Nitrophenol	88-75-5	20.1	93.8	ND	ND
4-Nitrophenol	100-01-6	217.8	1078.7	ND	ND
N-Nitrosodiphenylamine*	86-30-6	6.7	26.8	ND	ND
N-Nitrosodi-n-propylamine	621-64-7	13.4	67.0	ND	ND
Pentachlorophenol	87-86-5	258.0	1293.1	ND	ND
Phenanthrene	85-01-8	6.7	26.8	ND	ND
Phenol	108-95-2	10.0	46.9	ND	ND
Pyrene	129-00-0	16.8	80.4	ND	ND
1,2,4-Trichlorobenzene	120-82-1	13.4	63.7	ND	ND
2,4,5-Trichlorophenol	95-95-4	46.9	234.5	ND	ND
2,4,6-Trichlorophenol	88-06-2	70.4	351.8	ND	ND
2-Fluorophenol (surrogate std)	% Recovery	[OK=25-121]		48	34
Phenol-d6 (surrogate std)	% Recovery	[OK=24-113]		52	35
Nitrobenzene-d5 (surrogate std)	% Recovery	[OK=23-120]		91	64
2-Fluorobiphenyl (surrogate std)	% Recovery	[OK=30-115]		109	74
2,4,6-Tribromophenol (surrogate std)	% Recovery	[OK=19-122]		65	43
Terphenyl-d14 (surrogate std)	% Recovery	[OK=18-137]		112	76

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

*as diphenylamine

Dale Chappelow

KIBER ANALYTICAL SERVICES | GC/MS SVO RESULTS | LAB SAMPLE # 20212-3

KAI
TRC
Center: Drum No. 4
Sample #T14U3

SAMPLED (Date/Time/Init): 2/17/92, 15:40, SZ
ANALYSIS (Date/Time/Init): 2/27/92, 22:33, DLC
EXTRACTED (Date / Init) : 2/18/92, BC

Dilution Factor: 41.71
Extract Method: 3550
% Moisture: 32.4

Sample Matrix: SOLID
Analysis Method: 8270

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis ug/Kg Concentration	Apparent ug/Kg Blank Conc.
Acenaphthene	83-32-9	16.7	83.4	ND	ND
Acenaphthylene	208-96-8	20.9	87.6	ND	ND
Anthracene	120-12-7	12.5	54.2	ND	ND
Benz[a]anthracene	56-55-3	8.3	41.7	ND	ND
Benzo[b]fluoranthene	205-99-2	12.5	50.1	ND	ND
Benzo[k]fluoranthene	207-08-9	8.3	33.4	ND	ND
Benzoic acid	65-85-0	271.1	1347.2	ND	ND
Benzo[ghi]perylene	191-24-2	8.3	37.5	ND	ND
Benzo[a]pyrene	50-32-8	8.3	41.7	ND	ND
Benzyl alcohol	100-51-6	12.5	62.6	ND	ND
bis(2-Chloroethoxy)methane	111-91-1	12.5	50.1	ND	ND
bis(2-Chloroethyl)ether	111-44-4	12.5	58.4	ND	ND
bis(2-Chloroisopropyl)ether	108-60-1	20.9	87.6	ND	ND
bis(2-Ethylhexyl)phthalate	117-81-7	16.7	83.4	94	28E
4-Bromophenyl phenyl ether	101-55-3	16.7	66.7	ND	ND
Butyl benzyl phthalate	85-68-7	20.9	87.6	25E	ND
4-Chloroaniline	106-47-8	12.5	50.1	ND	ND
4-Chloro-3-methylphenol	59-50-7	25.0	112.6	ND	ND
2-Chloronaphthalene	91-58-7	12.5	45.9	ND	ND
2-Chlorophenol	95-57-8	8.3	41.7	ND	ND
4-Chlorophenyl phenyl ether	59-50-7	25.0	112.6	ND	ND
Chrysene	218-01-9	16.7	79.2	ND	ND
Dibenz[a,h]anthracene	53-70-3	8.3	37.5	ND	ND
Dibenzofuran	132-64-9	20.9	104.3	ND	ND
Di-n-butylphthalate	84-74-2	12.5	50.1	75	32E
1,2-Dichlorobenzene	95-50-1	8.3	41.7	ND	ND
1,3-Dichlorobenzene	541-73-1	12.5	54.2	ND	ND
1,4-Dichlorobenzene	106-46-7	12.5	50.1	ND	ND
3,3'-Dichlorobenzidine	91-94-1	29.2	137.6	ND	ND
2,4-Dichlorophenol	120-83-2	20.9	87.6	ND	ND
Diethylphthalate	84-66-2	16.7	83.4	ND	<MDL
2,4-Dimethylphenol	105-67-9	25.0	112.6	ND	ND
Dimethylphthalate	131-11-3	16.7	66.7	ND	ND
4,6-Dinitro-2-methylphenol	534-52-1	400.4	1989.6	ND	ND
2,4-Dinitrophenol	51-28-5	634.0	3157.4	ND	ND
2,4-Dinitrotoluene	121-14-2	108.4	533.9	ND	ND

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Schappelow

KIBER ANALYTICAL SERVICES | GC/MS SVO RESULTS | LAB SAMPLE # 20212-3

KAI
TRC
Center: Drum No. 4
Sample #T14U3

SAMPLED (Date/Time/Init): 2/17/92, 15:40, SZ
ANALYSIS (Date/Time/Init): 2/27/92, 22:33, DLC
EXTRACTED (Date / Init) : 2/18/92, BC

Dilution Factor: 41.71
Extract Method: 3550
% Moisture: 32.4

Sample Matrix: SOLID
Analysis Method: 8270

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis Concentration ug/Kg	Apparent Blank Conc. ug/Kg
2,6-Dinitrotoluene	606-20-2	75.1	367.0	ND	ND
Di-n-octyl phthalate	117-84-0	29.2	133.5	ND	ND
Fluoranthene	206-44-0	8.3	33.4	ND	ND
Fluorene	7782-41-4	20.9	104.3	ND	ND
Hexachlorobenzene	118-74-1	25.0	112.6	ND	ND
Hexachlorobutadiene	87-68-3	16.7	70.9	ND	ND
Hexachlorocyclopentadiene	77-47-4	75.1	367.0	ND	ND
Hexachloroethane	67-72-1	29.2	129.3	ND	ND
Indeno[1,2,3-cd]pyrene	193-39-5	12.5	54.2	ND	ND
Isophorone	78-59-1	12.5	62.6	ND	ND
2-Methylnaphthalene	91-57-6	8.3	41.7	ND	ND
2-Methylphenol	95-48-7	12.5	54.2	ND	ND
4-Methylphenol	106-44-5	16.7	62.6	ND	ND
Naphthalene	91-20-3	8.3	25.0	ND	ND
2-Nitroaniline	88-74-4	20.9	91.8	ND	ND
3-Nitroaniline	99-09-2	70.9	354.5	ND	ND
4-Nitroaniline	100-01-6	37.5	175.2	ND	ND
Nitrobenzene	98-95-3	12.5	62.6	ND	ND
2-Nitrophenol	88-75-5	25.0	116.8	ND	ND
4-Nitrophenol	100-01-6	271.1	1343.1	ND	ND
N-Nitrosodiphenylamine*	86-30-6	8.3	33.4	ND	ND
N-Nitrosodi-n-propylamine	621-64-7	16.7	83.4	ND	ND
Pentachlorophenol	87-86-5	321.2	1610.0	ND	ND
Phenanthrene	85-01-8	8.3	33.4	ND	ND
Phenol	108-95-2	12.5	58.4	ND	ND
Pyrene	129-00-0	20.9	100.1	<MDL	ND
1,2,4-Trichlorobenzene	120-82-1	16.7	79.2	ND	ND
2,4,5-Trichlorophenol	95-95-4	58.4	292.0	ND	ND
2,4,6-Trichlorophenol	88-06-2	87.6	438.0	ND	ND
2-Fluorophenol (surrogate std)	% Recovery	[OK=25-121]		28	34
Phenol-d6 (surrogate std)	% Recovery	[OK=24-113]		30	35
Nitrobenzene-d5 (surrogate std)	% Recovery	[OK=23-120]		45	64
2-Fluorobiphenyl (surrogate std)	% Recovery	[OK=30-115]		60	74
2,4,6-Tribromophenol (surrogate std)	% Recovery	[OK=19-122]		34	43
Terphenyl-d14 (surrogate std)	% Recovery	[OK=18-137]		76	76

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

*as diphenylamine

Dale Chappelow

KIBER ANALYTICAL SERVICES | GC/MS SVO RESULTS | LAB SAMPLE # 20212-4

KAI
TRC
Center: Drum No. 4
Sample #T14U4

SAMPLED (Date/Time/Init): 2/17/92, 15:52, SZ
ANALYSIS (Date/Time/Init): 2/27/92, 23:24, DLC
EXTRACTED (Date / Init) : 2/18/92, BC

Dilution Factor: 42.16
Extract Method: 3550
% Moisture: 32.4

Sample Matrix: SOLID
Analysis Method: 8270

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis ug/Kg Concentration	Apparent ug/Kg Blank Conc.
Acenaphthene	83-32-9	16.9	84.3	ND	ND
Acenaphthylene	208-96-8	21.1	88.5	ND	ND
Anthracene	120-12-7	12.6	54.8	ND	ND
Benz[a]anthracene	56-55-3	8.4	42.2	ND	ND
Benzo[b]fluoranthene	205-99-2	12.6	50.6	ND	ND
Benzo[k]fluoranthene	207-08-9	8.4	33.7	ND	ND
Benzoic acid	65-85-0	274.0	1361.8	ND	ND
Benzo[ghi]perylene	191-24-2	8.4	37.9	ND	ND
Benzo[a]pyrene	50-32-8	8.4	42.2	ND	ND
Benzyl alcohol	100-51-6	12.6	63.2	ND	ND
bis(2-Chloroethoxy)methane	111-91-1	12.6	50.6	ND	ND
bis(2-Chloroethyl)ether	111-44-4	12.6	59.0	ND	ND
bis(2-Chloroisopropyl)ether	108-60-1	21.1	88.5	ND	ND
bis(2-Ethylhexyl)phthalate	117-81-7	16.9	84.3	2900	28E
4-Bromophenyl phenyl ether	101-55-3	16.9	67.5	ND	ND
Butyl benzyl phthalate	85-68-7	21.1	88.5	<MDL	ND
4-Chloroaniline	106-47-8	12.6	50.6	ND	ND
4-Chloro-3-methylphenol	59-50-7	25.3	113.8	ND	ND
2-Chloronaphthalene	91-58-7	12.6	46.4	ND	ND
2-Chlorophenol	95-57-8	8.4	42.2	ND	ND
4-Chlorophenyl phenyl ether	59-50-7	25.3	113.8	ND	ND
Chrysene	218-01-9	16.9	80.1	ND	ND
Dibenz[a,h]anthracene	53-70-3	8.4	37.9	ND	ND
Dibenzofuran	132-64-9	21.1	105.4	ND	ND
Di-n-butylphthalate	84-74-2	12.6	50.6	17E	33E
1,2-Dichlorobenzene	95-50-1	8.4	42.2	ND	ND
1,3-Dichlorobenzene	541-73-1	12.6	54.8	ND	ND
1,4-Dichlorobenzene	106-46-7	12.6	50.6	ND	ND
3,3'-Dichlorobenzidine	91-94-1	29.5	139.1	ND	ND
2,4-Dichlorophenol	120-83-2	21.1	88.5	ND	ND
Diethylphthalate	84-66-2	16.9	84.3	ND	<MDL
2,4-Dimethylphenol	105-67-9	25.3	113.8	ND	ND
Dimethylphthalate	131-11-3	16.9	67.5	ND	ND
4,6-Dinitro-2-methylphenol	534-52-1	404.7	2011.0	ND	ND
2,4-Dinitrophenol	51-28-5	640.8	3191.5	ND	ND
2,4-Dinitrotoluene	121-14-2	109.6	539.6	ND	ND

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Schaeffer

KIBER ANALYTICAL SERVICES | GC/MS SVO RESULTS | LAB SAMPLE # 20212-4

KAI
TRC
Center: Drum No. 4
Sample #T14U4

SAMPLED (Date/Time/Init): 2/17/92, 15:52, SZ
ANALYSIS (Date/Time/Init): 2/27/92, 23:24, DLC
EXTRACTED (Date / Init) : 2/18/92, BC

Dilution Factor: 42.16
Extract Method: 3550
% Moisture: 32.4

Sample Matrix: SOLID
Analysis Method: 8270

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis Concentration ug/Kg	Apparent Blank Conc. ug/Kg
2,6-Dinitrotoluene	606-20-2	75.9	371.0	ND	ND
Di-n-octyl phthalate	117-84-0	29.5	134.9	51E	ND
Fluoranthene	206-44-0	8.4	33.7	ND	ND
Fluorene	7782-41-4	21.1	105.4	ND	ND
Hexachlorobenzene	118-74-1	25.3	113.8	ND	ND
Hexachlorobutadiene	87-68-3	16.9	71.7	ND	ND
Hexachlorocyclopentadiene	77-47-4	75.9	371.0	ND	ND
Hexachloroethane	67-72-1	29.5	130.7	ND	ND
Indeno[1,2,3-cd]pyrene	193-39-5	12.6	54.8	ND	ND
Isophorone	78-59-1	12.6	63.2	ND	ND
2-Methylnaphthalene	91-57-6	8.4	42.2	ND	ND
2-Methylphenol	95-48-7	12.6	54.8	ND	ND
4-Methylphenol	106-44-5	16.9	63.2	ND	ND
Naphthalene	91-20-3	8.4	25.3	ND	ND
2-Nitroaniline	88-74-4	21.1	92.8	ND	ND
3-Nitroaniline	99-09-2	71.7	358.4	ND	ND
4-Nitroaniline	100-01-6	37.9	177.1	ND	ND
Nitrobenzene	98-95-3	12.6	63.2	ND	ND
2-Nitrophenol	88-75-5	25.3	118.0	ND	ND
4-Nitrophenol	100-01-6	274.0	1357.6	ND	ND
N-Nitrosodiphenylamine*	86-30-6	8.4	33.7	ND	ND
N-Nitrosodi-n-propylamine	621-64-7	16.9	84.3	ND	ND
Pentachlorophenol	87-86-5	324.6	1627.4	ND	ND
Phenanthrene	85-01-8	8.4	33.7	ND	ND
Phenol	108-95-2	12.6	59.0	ND	ND
Pyrene	129-00-0	21.1	101.2	ND	ND
1,2,4-Trichlorobenzene	120-82-1	16.9	80.1	ND	ND
2,4,5-Trichlorophenol	95-95-4	59.0	295.1	ND	ND
2,4,6-Trichlorophenol	88-06-2	88.5	442.7	ND	ND
2-Fluorophenol (surrogate std)	% Recovery	[OK=25-121]		33	34
Phenol-d6 (surrogate std)	% Recovery	[OK=24-113]		34	35
Nitrobenzene-d5 (surrogate std)	% Recovery	[OK=23-120]		60	64
2-Fluorobiphenyl (surrogate std)	% Recovery	[OK=30-115]		77	74
2,4,6-Tribromophenol (surrogate std)	% Recovery	[OK=19-122]		41	43
Terphenyl-d14 (surrogate std)	% Recovery	[OK=18-137]		87	76

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

*as diphenylamine

Dale Schappelow

KIBER ANALYTICAL SERVICES | GC/MS SVO RESULTS | LAB SAMPLE # 20212-5

KAI
TRC
Center: Drum No. 7
Sample #T17U5

SAMPLED (Date/Time/Init): 2/17/92, 16:00, SZ
ANALYSIS (Date/Time/Init): 2/28/92, 00:14, DLC
EXTRACTED (Date / Init) : 2/18/92, BC

Dilution Factor: 185.7
Extract Method: 3550
% Moisture: 84.7

Sample Matrix: SOLID
Analysis Method: 8270

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis ug/Kg Concentration	Apparent ug/Kg Blank Conc.
Acenaphthene	83-32-9	74	371	ND	ND
Acenaphthylene	208-96-8	93	390	ND	ND
Anthracene	120-12-7	56	241	ND	ND
Benz[a]anthracene	56-55-3	37	186	ND	ND
Benzo[b]fluoranthene	205-99-2	56	223	ND	ND
Benzo[k]fluoranthene	207-08-9	37	149	ND	ND
Benzoic acid	65-85-0	1207	5998	ND	ND
Benzo[ghi]perylene	191-24-2	37	167	ND	ND
Benzo[a]pyrene	50-32-8	37	186	ND	ND
Benzyl alcohol	100-51-6	56	279	ND	ND
bis(2-Chloroethoxy)methane	111-91-1	56	223	ND	ND
bis(2-Chloroethyl)ether	111-44-4	56	260	ND	ND
bis(2-Chloroisopropyl)ether	108-60-1	93	390	ND	ND
bis(2-Ethylhexyl)phthalate	117-81-7	74	371	230E	120E
4-Bromophenyl phenyl ether	101-55-3	74	297	ND	ND
Butyl benzyl phthalate	85-68-7	93	390	ND	ND
4-Chloroaniline	106-47-8	56	223	ND	ND
4-Chloro-3-methylphenol	59-50-7	111	501	ND	ND
2-Chloronaphthalene	91-58-7	56	204	ND	ND
2-Chlorophenol	95-57-8	37	186	ND	ND
4-Chlorophenyl phenyl ether	59-50-7	111	501	ND	ND
Chrysene	218-01-9	74	353	ND	ND
Dibenz[a,h]anthracene	53-70-3	37	167	ND	ND
Dibenzofuran	132-64-9	93	464	ND	ND
Di-n-butylphthalate	84-74-2	56	223	<MDL	140E
1,2-Dichlorobenzene	95-50-1	37	186	ND	ND
1,3-Dichlorobenzene	541-73-1	56	241	ND	ND
1,4-Dichlorobenzene	106-46-7	56	223	ND	ND
3,3'-Dichlorobenzidine	91-94-1	130	613	ND	ND
2,4-Dichlorophenol	120-83-2	93	390	ND	ND
Diethylphthalate	84-66-2	74	371	ND	<MDL
2,4-Dimethylphenol	105-67-9	111	501	ND	ND
Dimethylphthalate	131-11-3	74	297	ND	ND
4,6-Dinitro-2-methylphenol	534-52-1	1783	8858	ND	ND
2,4-Dinitrophenol	51-28-5	2823	14057	ND	ND
2,4-Dinitrotoluene	121-14-2	483	2377	ND	ND

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Schuppelaw

KIBER ANALYTICAL SERVICES | GC/MS SVO RESULTS | LAB SAMPLE # 20212-5

KAI
TRC
Center: Drum No. 7
Sample #T17U5

SAMPLED (Date/Time/Init): 2/17/92, 16:00, SZ
ANALYSIS (Date/Time/Init): 2/28/92, 00:14, DLC
EXTRACTED (Date / Init) : 2/18/92, BC

Dilution Factor: 185.7
Extract Method: 3550
% Moisture: 84.7

Sample Matrix: SOLID
Analysis Method: 8270

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis Concentration ug/Kg	Apparent Blank Conc. ug/Kg
2,6-Dinitrotoluene	606-20-2	334.3	1634.2	ND	ND
Di-n-octyl phthalate	117-84-0	130.0	594.2	ND	ND
Fluoranthene	206-44-0	37.1	148.6	ND	ND
Fluorene	7782-41-4	92.9	464.3	ND	ND
Hexachlorobenzene	118-74-1	111.4	501.4	ND	ND
Hexachlorobutadiene	87-68-3	74.3	315.7	ND	ND
Hexachlorocyclopentadiene	77-47-4	334.3	1634.2	ND	ND
Hexachloroethane	67-72-1	130.0	575.7	ND	ND
Indeno[1,2,3-cd]pyrene	193-39-5	55.7	241.4	ND	ND
Isophorone	78-59-1	55.7	278.6	ND	ND
2-Methylnaphthalene	91-57-6	37.1	185.7	ND	ND
2-Methylphenol	95-48-7	55.7	241.4	ND	ND
4-Methylphenol	106-44-5	74.3	278.6	ND	ND
Naphthalene	91-20-3	37.1	111.4	ND	ND
2-Nitroaniline	88-74-4	92.9	408.5	ND	ND
3-Nitroaniline	99-09-2	315.7	1578.4	ND	ND
4-Nitroaniline	100-01-6	167.1	779.9	ND	ND
Nitrobenzene	98-95-3	55.7	278.6	ND	ND
2-Nitrophenol	88-75-5	111.4	520.0	ND	ND
4-Nitrophenol	100-01-6	1207.1	5979.5	ND	ND
N-Nitrosodiphenylamine*	86-30-6	37.1	148.6	ND	ND
N-Nitrosodi-n-propylamine	621-64-7	74.3	371.4	ND	ND
Pentachlorophenol	87-86-5	1429.9	7168.0	ND	ND
Phenanthrene	85-01-8	37.1	148.6	ND	ND
Phenol	108-95-2	55.7	260.0	ND	ND
Pyrene	129-00-0	92.9	445.7	ND	ND
1,2,4-Trichlorobenzene	120-82-1	74.3	352.8	ND	ND
2,4,5-Trichlorophenol	95-95-4	260.0	1299.9	ND	ND
2,4,6-Trichlorophenol	88-06-2	390.0	1949.9	ND	ND
2-Fluorophenol (surrogate std)	% Recovery	[OK=25-121]		15	34
Phenol-d6 (surrogate std)	% Recovery	[OK=24-113]		27	35
Nitrobenzene-d5 (surrogate std)	% Recovery	[OK=23-120]		44	64
2-Fluorobiphenyl (surrogate std)	% Recovery	[OK=30-115]		44	74
2,4,6-Tribromophenol (surrogate std)	% Recovery	[OK=19-122]		35	43
Terphenyl-d14 (surrogate std)	% Recovery	[OK=18-137]		70	76

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

*as diphenylamine

KIBER ANALYTICAL SERVICES | GC/MS SVO RESULTS | LAB SAMPLE # 20212-6

KAI
TRC
Center: Drum No. 7
Sample #T17U6

SAMPLED (Date/Time/Init): 2/17/92, 16:07, SZ
ANALYSIS (Date/Time/Init): 2/28/92, 01:04, DLC
EXTRACTED (Date / Init) : 2/18/92, BC

Dilution Factor: 172.9
Extract Method: 3550
% Moisture: 83.8

Sample Matrix: SOLID
Analysis Method: 8270

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis ug/Kg Concentration	Apparent ug/Kg Blank Conc.
Acenaphthene	83-32-9	69	346	ND	ND
Acenaphthylene	208-96-8	86	363	ND	ND
Anthracene	120-12-7	52	225	ND	ND
Benz[a]anthracene	56-55-3	35	173	ND	ND
Benzo[b]fluoranthene	205-99-2	52	207	ND	ND
Benzo[k]fluoranthene	207-08-9	35	138	ND	ND
Benzoic acid	65-85-0	1124	5585	ND	ND
Benzo[ghi]perylene	191-24-2	35	156	ND	ND
Benzo[a]pyrene	50-32-8	35	173	ND	ND
Benzyl alcohol	100-51-6	52	259	ND	ND
bis(2-Chloroethoxy)methane	111-91-1	52	207	ND	ND
bis(2-Chloroethyl)ether	111-44-4	52	242	ND	ND
bis(2-Chloroisopropyl)ether	108-60-1	86	363	ND	ND
bis(2-Ethylhexyl)phthalate	117-81-7	69	346	200E	110E
4-Bromophenyl phenyl ether	101-55-3	69	277	ND	ND
Butyl benzyl phthalate	85-68-7	86	363	ND	ND
4-Chloroaniline	106-47-8	52	207	ND	ND
4-Chloro-3-methylphenol	59-50-7	104	467	ND	ND
2-Chloronaphthalene	91-58-7	52	190	ND	ND
2-Chlorophenol	95-57-8	35	173	ND	ND
4-Chlorophenyl phenyl ether	59-50-7	104	467	ND	ND
Chrysene	218-01-9	69	329	ND	ND
Dibenz[a,h]anthracene	53-70-3	35	156	ND	ND
Dibenzofuran	132-64-9	86	432	ND	ND
Di-n-butylphthalate	84-74-2	52	207	<MDL	130E
1,2-Dichlorobenzene	95-50-1	35	173	ND	ND
1,3-Dichlorobenzene	541-73-1	52	225	ND	ND
1,4-Dichlorobenzene	106-46-7	52	207	ND	ND
3,3'-Dichlorobenzidine	91-94-1	121	571	ND	ND
2,4-Dichlorophenol	120-83-2	86	363	ND	ND
Diethylphthalate	84-66-2	69	346	ND	ND
2,4-Dimethylphenol	105-67-9	104	467	ND	ND
Dimethylphthalate	131-11-3	69	277	ND	ND
4,6-Dinitro-2-methylphenol	534-52-1	1660	8247	ND	ND
2,4-Dinitrophenol	51-28-5	2628	13089	ND	ND
2,4-Dinitrotoluene	121-14-2	450	2213	ND	ND

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

Dale Shuppelow

KIBER ANALYTICAL SERVICES | GC/MS SVO RESULTS | LAB SAMPLE # 20212-6

KAI
TRC
Center: Drum No. 7
Sample #T17U6

SAMPLED (Date/Time/Init): 2/17/92, 16:07, SZ
ANALYSIS (Date/Time/Init): 2/28/92, 01:04, DLC
EXTRACTED (Date / Init) : 2/18/92, BC

Dilution Factor: 172.9
Extract Method: 3550
% Moisture: 83.8

Sample Matrix: SOLID
Analysis Method: 8270

TARGET COMPOUND LIST	CAS Number	MDL	PQL	Dry-weight Basis Concentration ug/Kg	Apparent Blank Conc. ug/Kg
2,6-Dinitrotoluene	606-20-2	311.2	1521.5	ND	ND
Di-n-octyl phthalate	117-84-0	121.0	553.3	ND	ND
Fluoranthene	206-44-0	34.6	138.3	ND	ND
Fluorene	7782-41-4	86.5	432.3	ND	ND
Hexachlorobenzene	118-74-1	103.7	466.8	ND	ND
Hexachlorobutadiene	87-68-3	69.2	293.9	ND	ND
Hexachlorocyclopentadiene	77-47-4	311.2	1521.5	ND	ND
Hexachloroethane	67-72-1	121.0	536.0	ND	ND
Indeno[1,2,3-cd]pyrene	193-39-5	51.9	224.8	ND	ND
Isophorone	78-59-1	51.9	259.4	ND	ND
2-Methylnaphthalene	91-57-6	34.6	172.9	ND	ND
2-Methylphenol	95-48-7	51.9	224.8	ND	ND
4-Methylphenol	106-44-5	69.2	259.4	ND	ND
Naphthalene	91-20-3	34.6	103.7	ND	ND
2-Nitroaniline	88-74-4	86.5	380.4	ND	ND
3-Nitroaniline	99-09-2	293.9	1469.7	ND	ND
4-Nitroaniline	100-01-6	155.6	726.2	ND	ND
Nitrobenzene	98-95-3	51.9	259.4	ND	ND
2-Nitrophenol	88-75-5	103.7	484.1	ND	ND
4-Nitrophenol	100-01-6	1123.9	5567.4	ND	ND
N-Nitrosodiphenylamine*	86-30-6	34.6	138.3	ND	ND
N-Nitrosodi-n-propylamine	621-64-7	69.2	345.8	ND	ND
Pentachlorophenol	87-86-5	1331.3	6673.9	ND	ND
Phenanthrene	85-01-8	34.6	138.3	ND	ND
Phenol	108-95-2	51.9	242.1	ND	ND
Pyrene	129-00-0	86.5	415.0	<MDL	ND
1,2,4-Trichlorobenzene	120-82-1	69.2	328.5	ND	ND
2,4,5-Trichlorophenol	95-95-4	242.1	1210.3	ND	ND
2,4,6-Trichlorophenol	88-06-2	363.1	1815.5	ND	ND
2-Fluorophenol (surrogate std)	% Recovery	[OK=25-121]		13	34
Phenol-d6 (surrogate std)	% Recovery	[OK=24-113]		25	35
Nitrobenzene-d5 (surrogate std)	% Recovery	[OK=23-120]		34	64
2-Fluorobiphenyl (surrogate std)	% Recovery	[OK=30-115]		36	74
2,4,6-Tribromophenol (surrogate std)	% Recovery	[OK=19-122]		31	43
~~Terphenyl-d14 (surrogate std)~~	~~% Recovery~~	~~[OK=18-137]~~		~~67~~	~~76~~

E: Estimated , ND: Not Detected
MDL: Method Detection Limit
PQL: Practical Quantitation Limit

*as diphenylamine

Dale Schuppelow

KIBER ANALYTICAL SERVICES

LAB SAMPLE # 20212-1

TAL INORGANICS RESULTS

MATRIX : SOLID

KAI
TRC
Center: Drum No. 1
Sample #T11U1

SAMPLED (Date/Time/Init) : 2/17/92, 15:15, SZ
ICP ANALYSIS (Date/Init) : 3/10/92, ET
CV ANALYSIS (Date/Init) : 3/10/92, ET

TARGET ANALYTE LIST	EPA Method	DL	Result	Units
Total Aluminum (Al)	6010	3.0	17,100	mg/Kg
Total Antimony (Sb)	6010	2.6	<3.3	mg/Kg
Total Arsenic (As)	6010	2.4	3.7	mg/Kg
Total Barium (Ba)	6010	0.2	57.3	mg/Kg
Total Beryllium (Be)	6010	0.2	1.1	mg/Kg
Total Cadmium (Cd)	6010	0.2	<0.25	mg/Kg
Total Calcium (Ca)	6010	1.8	2300	mg/Kg
Total Chromium (Cr)	6010	0.4	28.9	mg/Kg
Total Cobalt (Co)	6010	0.6	9.0	mg/Kg
Total Copper (Cu)	6010	0.4	11.7	mg/Kg
Total Cyanide (CN)	9010	0.125	<0.16	mg/Kg
Total Iron (Fe)	6010	0.8	31,400	mg/Kg
Total Lead (Pb)	7421	0.2	12.7	mg/Kg
Total Magnesium (Mg)	6010	6.0	2880	mg/Kg
Total Manganese (Mn)	6010	0.2	106	mg/Kg
Total Mercury (Hg)	7471	0.005	0.08	mg/Kg
Total Nickel (Ni)	6010	0.8	16	mg/Kg
Total Potassium (K)	6010	52	491	mg/Kg
Total Selenium (Se)	6010	6.0	<7.6	mg/Kg
Total Silver (Ag)	6010	1.0	2.5	mg/Kg
Total Sodium (Na)	6010	2.6	179	mg/Kg
Total Thallium (Tl)	7841	0.4	<0.51	mg/Kg
Total Vanadium (V)	6010	0.4	52.9	mg/Kg
Total Zinc (Zn)	6010	0.2	28.1	mg/Kg

DL : Detection Limit

Dale Schappelow

KIBER ANALYTICAL SERVICES LAB SAMPLE # 20212-2

TAL INORGANICS RESULTS

MATRIX : SOLID

KAI
TRC
Center: Drum No. 1
Sample #T11U2

SAMPLED (Date/Time/Init) : 2/17/92, 15:25, SZ
ICP ANALYSIS (Date/Init) : 3/10/92, ET
CV ANALYSIS (Date/Init) : 3/10/92, ET

TARGET ANALYTE LIST	EPA Method	DL	Result	Units
Total Aluminum (Al)	6010	3.0	17,700	mg/Kg
Total Antimony (Sb)	6010	2.6	<3.6	mg/Kg
Total Arsenic (As)	6010	2.4	6.6	mg/Kg
Total Barium (Ba)	6010	0.2	80.7	mg/Kg
Total Beryllium (Be)	6010	0.2	1.5	mg/Kg
Total Cadmium (Cd)	6010	0.2	<0.28	mg/Kg
Total Calcium (Ca)	6010	1.8	3010	mg/Kg
Total Chromium (Cr)	6010	0.4	32.3	mg/Kg
Total Cobalt (Co)	6010	0.6	12.1	mg/Kg
Total Copper (Cu)	6010	0.4	14.5	mg/Kg
Total Cyanide (CN)	9010	0.125	<0.17	mg/Kg
Total Iron (Fe)	6010	0.8	32,100	mg/Kg
Total Lead (Pb)	7421	0.2	13.5	mg/Kg
Total Magnesium (Mg)	6010	6.0	4030	mg/Kg
Total Manganese (Mn)	6010	0.2	164	mg/Kg
Total Mercury (Hg)	7471	0.005	0.14	mg/Kg
Total Nickel (Ni)	6010	0.8	20.5	mg/Kg
Total Potassium (K)	6010	52	615	mg/Kg
Total Selenium (Se)	6010	6.0	<8.4	mg/Kg
Total Silver (Ag)	6010	1.0	2.6	mg/Kg
Total Sodium (Na)	6010	2.6	129	mg/Kg
Total Thallium (Tl)	7841	0.4	<0.56	mg/Kg
Total Vanadium (V)	6010	0.4	54.5	mg/Kg
Total Zinc (Zn)	6010	0.2	38.1	mg/Kg

DL : Detection Limit

Dave Schappelow

KIBER ANALYTICAL SERVICES

LAB SAMPLE # 20212-3

TAL INORGANICS RESULTS

MATRIX : SOLID

KAI
TRC
Center: Drum No. 4
Sample #T14U3

SAMPLED (Date/Time/Init) : 2/17/92, 15:40, SZ
ICP ANALYSIS (Date/Init) : 3/10/92, ET
CV ANALYSIS (Date/Init) : 3/10/92, ET

TARGET ANALYTE LIST	EPA Method	DL	Result	Units
Total Aluminum (Al)	6010	3.0	12,500	mg/Kg
Total Antimony (Sb)	6010	2.6	<3.6	mg/Kg
Total Arsenic (As)	6010	2.4	<3.4	mg/Kg
Total Barium (Ba)	6010	0.2	69.3	mg/Kg
Total Beryllium (Be)	6010	0.2	0.46	mg/Kg
Total Cadmium (Cd)	6010	0.2	<0.28	mg/Kg
Total Calcium (Ca)	6010	1.8	105,000	mg/Kg
Total Chromium (Cr)	6010	0.4	77.8	mg/Kg
Total Cobalt (Co)	6010	0.6	9.6	mg/Kg
Total Copper (Cu)	6010	0.4	14.1	mg/Kg
Total Cyanide (CN)	9010	0.125	<0.17	mg/Kg
Total Iron (Fe)	6010	0.8	10,500	mg/Kg
Total Lead (Pb)	7421	0.2	23.8	mg/Kg
Total Magnesium (Mg)	6010	6.0	31,800	mg/Kg
Total Manganese (Mn)	6010	0.2	237	mg/Kg
Total Mercury (Hg)	7471	0.005	5.2	mg/Kg
Total Nickel (Ni)	6010	0.8	201	mg/Kg
Total Potassium (K)	6010	52	824	mg/Kg
Total Selenium (Se)	6010	6.0	<8.4	mg/Kg
Total Silver (Ag)	6010	1.0	<1.4	mg/Kg
Total Sodium (Na)	6010	2.6	112	mg/Kg
Total Thallium (Tl)	7841	0.4	<0.56	mg/Kg
Total Vanadium (V)	6010	0.4	19.3	mg/Kg
Total Zinc (Zn)	6010	0.2	68.1	mg/Kg

DL : Detection Limit

Dale Schappelow

KIBER ANALYTICAL SERVICES LAB SAMPLE # 20212-4

TAL INORGANICS RESULTS

MATRIX : SOLID

KAI
TRC
Center: Drum No. 4
Sample #T14U4

SAMPLED (Date/Time/Init) : 2/17/92, 15:52, SZ
ICP ANALYSIS (Date/Init) : 3/10/92, ET
CV ANALYSIS (Date/Init) : 3/10/92, ET

TARGET ANALYTE LIST	EPA Method	DL	Result	Units
Total Aluminum (Al)	6010	3.0	13,800	mg/Kg
Total Antimony (Sb)	6010	2.6	<3.6	mg/Kg
Total Arsenic (As)	6010	2.4	<3.3	mg/Kg
Total Barium (Ba)	6010	0.2	66.2	mg/Kg
Total Beryllium (Be)	6010	0.2	0.48	mg/Kg
Total Cadmium (Cd)	6010	0.2	<0.27	mg/Kg
Total Calcium (Ca)	6010	1.8	37,500	mg/Kg
Total Chromium (Cr)	6010	0.4	75.2	mg/Kg
Total Cobalt (Co)	6010	0.6	12.0	mg/Kg
Total Copper (Cu)	6010	0.4	9.0	mg/Kg
Total Cyanide (CN)	9010	0.125	<0.17	mg/Kg
Total Iron (Fe)	6010	0.8	10,800	mg/Kg
Total Lead (Pb)	7421	0.2	16.4	mg/Kg
Total Magnesium (Mg)	6010	6.0	54,600	mg/Kg
Total Manganese (Mn)	6010	0.2	259	mg/Kg
Total Mercury (Hg)	7471	0.005	5.0	mg/Kg
Total Nickel (Ni)	6010	0.8	271	mg/Kg
Total Potassium (K)	6010	52	423	mg/Kg
Total Selenium (Se)	6010	6.0	<8.2	mg/Kg
Total Silver (Ag)	6010	1.0	<1.4	mg/Kg
Total Sodium (Na)	6010	2.6	157	mg/Kg
Total Thallium (Tl)	7841	0.4	<0.56	mg/Kg
Total Vanadium (V)	6010	0.4	16.5	mg/Kg
Total Zinc (Zn)	6010	0.2	35.9	mg/Kg

DL : Detection Limit

Dale Schappelow

KIBER ANALYTICAL SERVICES LAB SAMPLE # 20212-5

TAL INORGANICS RESULTS

MATRIX : SOLID

KAI
TRC
Center: Drum No. 7
Sample #T17U5

SAMPLED (Date/Time/Init) : 2/17/92, 16:00, SZ
ICP ANALYSIS (Date/Init) : 3/10/92, ET
CV ANALYSIS (Date/Init) : 3/10/92, ET

TARGET ANALYTE LIST	EPA Method	DL	Result	Units
Total Aluminum (Al)	6010	3.0	13,700	mg/Kg
Total Antimony (Sb)	6010	2.6	<12.1	mg/Kg
Total Arsenic (As)	6010	2.4	<11.2	mg/Kg
Total Barium (Ba)	6010	0.2	29.5	mg/Kg
Total Beryllium (Be)	6010	0.2	<0.93	mg/Kg
Total Cadmium (Cd)	6010	0.2	<0.93	mg/Kg
Total Calcium (Ca)	6010	1.8	168,000	mg/Kg
Total Chromium (Cr)	6010	0.4	105	mg/Kg
Total Cobalt (Co)	6010	0.6	11.8	mg/Kg
Total Copper (Cu)	6010	0.4	15.3	mg/Kg
Total Cyanide (CN)	9010	0.125	<0.60	mg/Kg
Total Iron (Fe)	6010	0.8	11,700	mg/Kg
Total Lead (Pb)	7421	0.2	43.6	mg/Kg
Total Magnesium (Mg)	6010	6.0	40,400	mg/Kg
Total Manganese (Mn)	6010	0.2	304	mg/Kg
Total Mercury (Hg)	7471	0.005	2.1	mg/Kg
Total Nickel (Ni)	6010	0.8	281	mg/Kg
Total Potassium (K)	6010	52	277	mg/Kg
Total Selenium (Se)	6010	6.0	<28.0	mg/Kg
Total Silver (Ag)	6010	1.0	<4.7	mg/Kg
Total Sodium (Na)	6010	2.6	134	mg/Kg
Total Thallium (Tl)	7841	0.4	<1.9	mg/Kg
Total Vanadium (V)	6010	0.4	25.4	mg/Kg
Total Zinc (Zn)	6010	0.2	784	mg/Kg

DL : Detection Limit

Dale Schappelear

KIBER ANALYTICAL SERVICES LAB SAMPLE # 20212-6

TAL INORGANICS RESULTS

MATRIX : SOLID

KAI
TRC
Center: Drum No. 7
Sample #T17U6

SAMPLED (Date/Time/Init) : 2/17/92, 16:07, SZ
ICP ANALYSIS (Date/Init) : 3/10/92, ET
CV ANALYSIS (Date/Init) : 3/10/92, ET

TARGET ANALYTE LIST	EPA Method	DL	Result	Units
Total Aluminum (Al)	6010	3.0	11,900	mg/Kg
Total Antimony (Sb)	6010	2.6	<13.1	mg/Kg
Total Arsenic (As)	6010	2.4	<12.1	mg/Kg
Total Barium (Ba)	6010	0.2	27.9	mg/Kg
Total Beryllium (Be)	6010	0.2	<1.0	mg/Kg
Total Cadmium (Cd)	6010	0.2	<1.0	mg/Kg
Total Calcium (Ca)	6010	1.8	147,000	mg/Kg
Total Chromium (Cr)	6010	0.4	109	mg/Kg
Total Cobalt (Co)	6010	0.6	14.0	mg/Kg
Total Copper (Cu)	6010	0.4	14.2	mg/Kg
Total Cyanide (CN)	9010	0.125	<0.63	mg/Kg
Total Iron (Fe)	6010	0.8	10,800	mg/Kg
Total Lead (Pb)	7421	0.2	45.4	mg/Kg
Total Magnesium (Mg)	6010	6.0	44,900	mg/Kg
Total Manganese (Mn)	6010	0.2	259	mg/Kg
Total Mercury (Hg)	7471	0.005	2.5	mg/Kg
Total Nickel (Ni)	6010	0.8	303	mg/Kg
Total Potassium (K)	6010	52	<262	mg/Kg
Total Selenium (Se)	6010	6.0	<30.3	mg/Kg
Total Silver (Ag)	6010	1.0	<5.1	mg/Kg
Total Sodium (Na)	6010	2.6	238	mg/Kg
Total Thallium (Tl)	7841	0.4	<2.0	mg/Kg
Total Vanadium (V)	6010	0.4	17.6	mg/Kg
Total Zinc (Zn)	6010	0.2	380	mg/Kg

DL : Detection Limit

Dale Schappelow

MOISTURE CONTENT DETERMINATION

REPORT FORM

PROJECT:	TRC TREATABILITY STUDY
PROJECT No.:	0192-417
SAMPLE No.:	T11MC
TESTING DATE:	25 FEBRUARY 1992
TESTED BY:	RKS

MOISTURE CONTENT (Dry Basis)			
1. MOISTURE TIN NO.	T11MC1	T11MC2	T11MC3
2. WT MOISTURE TIN (tare weight)	0.99 g	1.01 g	1.01 g
3. WT WET SOIL + TARE	45.22 g	40.21 g	43.58 g
4. WT DRY SOIL + TARE	36.51 g	32.45 g	34.97 g
5. WT WATER, Ww	8.71 g	7.76 g	8.61 g
6. WT DRY SOIL, Ws	35.52 g	31.44 g	33.96 g
7. MOISTURE CONTENT, W	24.52 %	24.68 %	25.35 %

MOISTURE CONTENT (Dry Basis)			
1. MOISTURE TIN NO.	T11MC4	T11MC5	
2. WT MOISTURE TIN (tare weight)	1.00 g	1.00 g	g
3. WT WET SOIL + TARE	30.89 g	46.91 g	g
4. WT DRY SOIL + TARE	24.89 g	38.31 g	g
5. WT WATER, Ww	6.00 g	8.60 g	g
6. WT DRY SOIL, Ws	23.89 g	37.31 g	g
7. MOISTURE CONTENT, W	25.12 %	23.05 %	%

417/T1DATA/T11MC

MOISTURE CONTENT DETERMINATION

REPORT FORM

PROJECT:	TRC TREATABILITY STUDY
PROJECT No.:	0192-417
SAMPLE No.:	T14MC
TESTING DATE:	25 FEBRUARY 1992
TESTED BY:	RKS

MOISTURE CONTENT (Dry Basis)			
1. MOISTURE TIN NO.	T14MC1	T14MC2	T14MC3
2. WT MOISTURE TIN (tare weight)	1.00 g	0.99 g	0.98 g
3. WT WET SOIL + TARE	32.46 g	36.69 g	36.25 g
4. WT DRY SOIL + TARE	24.93 g	28.36 g	27.57 g
5. WT WATER, Ww	7.53 g	8.33 g	8.68 g
6. WT DRY SOIL, Ws	23.93 g	27.37 g	26.59 g
7. MOISTURE CONTENT, W	31.47 %	30.43 %	32.64 %

MOISTURE CONTENT (Dry Basis)			
1. MOISTURE TIN NO.	T14MC4	T14MC5	
2. WT MOISTURE TIN (tare weight)	0.98 g	1.00 g	g
3. WT WET SOIL + TARE	33.57 g	31.28 g	g
4. WT DRY SOIL + TARE	25.78 g	24.05 g	g
5. WT WATER, Ww	7.79 g	7.23 g	g
6. WT DRY SOIL, Ws	24.80 g	23.05 g	g
7. MOISTURE CONTENT, W	31.41 %	31.37 %	%

417/T1DATA/T14MC

MOISTURE CONTENT DETERMINATION

REPORT FORM

PROJECT:	TRC TREATABILITY STUDY
PROJECT No.:	0192-417
SAMPLE No.:	T14MC
TESTING DATE:	25 FEBRUARY 1992
TESTED BY:	RKS

MOISTURE CONTENT (Dry Basis)			
1. MOISTURE TIN NO.	T14MC6	T14MC7	T14MC8
2. WT MOISTURE TIN (tare weight)	164.83 g	163.74 g	168.28 g
3. WT WET SOIL + TARE	355.98 g	309.80 g	303.02 g
4. WT DRY SOIL + TARE	313.65 g	276.23 g	272.60 g
5. WT WATER, Ww	42.33 g	33.57 g	30.42 g
6. WT DRY SOIL, Ws	148.82 g	112.49 g	104.32 g
7. MOISTURE CONTENT, W	28.44 %	29.84 %	29.16 %

MOISTURE CONTENT (Dry Basis)			
1. MOISTURE TIN NO.	T14MC9	T14MC10	
2. WT MOISTURE TIN (tare weight)	169.73 g	168.22 g	g
3. WT WET SOIL + TARE	282.82 g	329.05 g	g
4. WT DRY SOIL + TARE	254.85 g	294.87 g	g
5. WT WATER, Ww	27.97 g	34.18 g	g
6. WT DRY SOIL, Ws	85.12 g	126.65 g	g
7. MOISTURE CONTENT, W	32.86 %	26.99 %	%

417/T1DATA/T14MC8

MOISTURE CONTENT DETERMINATION

REPORT FORM

PROJECT:	TRC TREATABILITY STUDY
PROJECT No.:	0192-417
SAMPLE No.:	T17MC
TESTING DATE:	25 FEBRUARY 1992
TESTED BY:	RKS

MOISTURE CONTENT (Dry Basis)			
1. MOISTURE TIN NO.	T17MC1	T17MC2	T17MC3
2. WT MOISTURE TIN (tare weight)	0.98 g	1.00 g	0.99 g
3. WT WET SOIL + TARE	46.89 g	29.94 g	32.40 g
4. WT DRY SOIL + TARE	10.82 g	9.51 g	8.78 g
5. WT WATER, Ww	36.07 g	20.43 g	23.62 g
6. WT DRY SOIL, Ws	9.84 g	8.51 g	7.79 g
7. MOISTURE CONTENT, W	366.57 %	240.07 %	303.21 %

MOISTURE CONTENT (Dry Basis)			
1. MOISTURE TIN NO.	T17MC4	T17MC5	
2. WT MOISTURE TIN (tare weight)	1.00 g	0.99 g	g
3. WT WET SOIL + TARE	33.36 g	39.17 g	g
4. WT DRY SOIL + TARE	8.95 g	9.98 g	g
5. WT WATER, Ww	24.41 g	29.19 g	g
6. WT DRY SOIL, Ws	7.95 g	8.99 g	g
7. MOISTURE CONTENT, W	307.04 %	324.69 %	%

417/T1DATA/T17MC

UNIT WEIGHT DETERMINATION

REPORT SHEET

PROJECT:	TRC TREATABILITY STUDY
PROJECT No.:	0192-417
SAMPLE No.:	UNTREATED WASTE
TESTING DATE:	16 MARCH 1992
TESTED BY:	RKS
REVIEWED BY:	SJZ

MOISTURE CONTENT (Dry Basis)			
1. MOISTURE TIN NO.	SOIL	TILE	SLURRY
2. WT MOISTURE TIN (tare weight)	1.00 g	1.00 g	1.01 g
3. WT WET SOIL + TARE	57.07 g	35.66 g	43.20 g
4. WT DRY SOIL + TARE	46.27 g	27.16 g	11.17 g
5. WT WATER, Ww	10.80 g	8.50 g	32.03 g
6. WT DRY SOIL, Ws	45.27 g	26.16 g	10.16 g
7. MOISTURE CONTENT, W	23.86 %	32.49 %	315.26 %

UNIT WEIGHT (DENSITY)			
1. SAMPLE NO.	SOIL	TILE	SLURRY
2. WT OF MOLD (tare weight)	4279.3 g	4280.4 g	4280.7 g
3. WT OF MOLD + SOIL	6127.2 g	5532.1 g	5350.5 g
4. WT OF WET SOIL, W	1847.9 g	1251.7 g	1069.8 g
5. WT OF DRY SOIL, Ws	1492.0 g	944.7 g	257.6
5. SOIL VOLUME, V	0.033 ft^3	0.033 ft^3	0.033 ft^3
6. BULK UNIT WEIGHT	122.2 pcf	82.8 pcf	70.8 pcf
7. DRY UNIT WEIGHT	98.7 pcf	62.5 pcf	17.0 pcf

417/TIDATA/DENSITY

APPENDIX B

TRC
Environmental Solutions through Technology

APPENDIX B

ASBESTOS REPORTS

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ABD 002 1077

Hygeia Environmental Laboratories Inc.

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Los Angeles
New York
Utica

Cobb Corporate Center
350 Franklin Road/300
Marietta, Georgia
30067-7749
404-425-9901
FAX: 404-424-0185

Schweiger & Associates
106 Hamby Road, SE

Marietta, GA 30067

03/18/92

Subject: TEM Analysis of ~~Air~~ SLUDGE Samples
HELI Project Number:A169-92-005
Client Reference:Kiber and Associates

Dear Mr. Schweiger:

Please find enclosed the results of the analysis of the samples submitted to our laboratory on 02/26/92. The preparation and analysis was performed to the extent possible in accordance with an E.P.A. draft method, following one of three levels of analysis with some modification, developed by Yamate, Argwal and Gibbons for asbestos fibers in air using transmission electron microscopy (TEM) with selective area electron diffraction (SAED) and energy dispersive spectroscopy (EDS) x-ray micro-analysis.

This report contains copies of our TEM analysis summary sheet as well as copies of our TEM count sheets and any EDS spectra.

Hygeia Environmental Laboratories Inc. is accredited under the NIST/NVLAP Program (NVLAP lab # 1011-03) for airborne asbestos fiber analysis by transmission electron microscopy. However, this report does not constitute a product endorsement by NIST or any other U.S. government agency. This report contains information not covered under this accreditation.

Hygeia Environmental Laboratories Inc. and its personnel shall be liable only for the analyses in this report. Any use or interpretation of this report is not the responsibility of Hygeia. The sample filters will be retained for a period not to exceed thirty days unless we are requested to archive them for you; the grids will be retained for an indefinite period.

If you have any questions regarding your results, this report, or the analytical methods employed, please contact us at (404) 425-9901.

Sincerely,
Hygeia Environmental Laboratories Inc.

Maria Calcaterra

Analyst

Ken Rhodes

Supervisor of Electron Microscopy
HELI, Atlanta Region

ABD 002 1077

Lab Notes: The preparation and analyses of these samples was altered from the original procedure proposed due to the fact that these samples were not of an oil-based sludge as we were led to believe.

The preparation of these samples did involve homogenizing the samples, to the extent possible, with a hand-held homogenizer. After each sample had been weighed, one liter of prefiltered/deioninzed water was added to each sample to establish a volume as well as to create a suspension / solution. From this aqueous solution, an aliquot was taken and filtered onto a 0.22 micron Mixed Cellulose of Ester (MCE) filter with a 0.45 & 5.0 micron backup/support filters. All samples were mixed and shaken extensively before aliquots were taken. After drying, each filter was directly prepped to the extent possible in accordance with the prep procedure outlined under the AHERA method for analysis of air samples by TEM. The analysis of each sample was then performed to the extent possible in accordance with the EPA Level III analysis of the EPA/Yamate method. Results for each sample were calculated in asbestos structures per liter of solution as well as percent asbestos per sample, taking into account all dilutions and aliquots made.

Due to the fact that there is no standardized procedure that we know of in performing the preparation and analysis of these type samples, the technique utilized by the laboratory was considered to be the most appropriate procedure for addressing these samples. However, there is no documented proof of the validity or accuracy of this technique.

If you have any questions concerning the procedure described above, please do not hesitate to contact Ken Rhodes at 404/425-9901.

HYGEIA ENVIRONMENTAL LABORATORIES
a division of BSE Management Group, Inc.

YAMATE TEM ANALYSIS SUMMARY

HELI PROJECT#: A169-92-005
CLIENT: Schweiger & Associates
CLIENT PROJECT #/REFERENCE: 0192-417 / Alliance Study

FILTER TYPE/PORE SIZE: MCE / .22 µm
AVG. GRID OPENING (GO) AREA: 0.00885 mm²
Magnification Used: 20,000X
PREPARATION METHOD: EPA Level III(modified) / Indirect

DATE: 03 / 17 / 92
P.O. #: None Given
ANALYZED BY: [illegible]
ANALYZED BY: [illegible]
REVIEWED BY [illegible]

SAMPLE I.D. #		SAMPLE DESCRIP	Sampl VOL (L)	Wt. of Samp (gm)	ASBESTOS												
					AREA ANAL YZED (mm²)	STRUCTURES COUNTED							TYPES DET-ECTED	Str. Dens. s/mm²	Total asbestos mass ** (%)	CONC. s/liter	A.S.* s/litr
CLIENT	HELI					TOTAL	<5µm	≥5µm	F	C	B	M					
T14U7	45535-AT	Sludge	1.8	1301	0.009	105	91	14	94	-	3	8	+CH	1.1xE10	1.1xE-12	5.7xE12	5.4xE10
T14U8¥	45536-AT	Sludge	1.6	1028	0.009	105	89	16	83	1	10	11	+CH	9.5xE9	4.1xE-12	5.7xE12	5.4xE10
T14U8 ¥	45536-AT	Sludge	1.6	1028	0.009	88	73	15	70	1	3	14	+CH	1.6xE10	2.5xE-12	9.5xE12	1.1xE11
T14U9	45537-AT	Sludge	1.7	1324	0.018	138	118	20	127	2	1	8	+CH	6.6xE9	1.8xE-12	3.7xE12	2.7xE10
	Water Bl	W.B.	0.25	--	0.089	0	0	0	-	-	-	-	NSD	<11.3	--	<43,390	43,390
	Lab Blk	L.B.	--	--	0.089	0	0	0	-	-	-	-	NSD	<11.3	--	--	---

¥NOTE: A replicate quality control prep was made on sample 45536-AT. This involved taking different aliquots from the same sample and prepping each filtrate separately. The results indicate both preps contain the same magnitude of asbestiform structures.

*A.S.= Analytical Sensitivity, which is calculated on the probability of detecting one asbestos fiber or structure in the total area examined.
+CH=Chrysotile Asbestos; NSD = No Asbestos Structures detected
** Total asbestos mass (%) =(grams of asbestos in sample / weight of sample in grams) x 100
gm=grams; litr=liter; mm²=square millimeters; s=asbestos structures; um=microns
"xE#" = exponent - base 10

HELI Electron Optics Laboratory Official [illegible]

Hygeia Environmental Laboratories Inc.

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350 Franklin Road/300
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Atlanta
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Los Angeles
New York
Utica

[ELI Project #A169-92-005
:lient: Schweiger & Associates
:lient Project: 0192-417 / Alliance Study

[ELI SAMPLE #	CLIENT SAMPLE #	Wt. of sample (grams)	(~) Approximate Volume of sample (l)/of aliquot(mls)		Total mass (g) of asbestos detected
5535-A	T14U7	1301	1.8	50 ul of a 1-25 ml dilution	1.4xE-11
5536-A	T14U8	1028	1.6	50 ul of a 1-25 ml dilution	4.2xE-11
5! A	T14U8	1028	1.6	50 ul of a 1-50 ml dilution	2.6xE-11
5! A	T14U9	1324	1.7	50 ul of a 1-25 ml dilution	2.3xE-11
:LANK	BLANK	132 (subtracted from each sample wt.)	0	250 mls of deionized/ prefiltered water	0

'otes:

) Weights of samples were obtained using a triple beam balance prior to prepping of samples. Weight of blank" container was subtracted from each sample weight obtained to obtain weight of sludge.
) Volumes for each sample are approximate volumes obtained by adding one (1) liter of prefiltered / eionized water to each sample and then comparing the displacement volume with a marked scale on he "blank" container. The marked scale was determined by placing known volumes of prefiltered / deionized 'ater, in increments of twenty-five (25) milliliters, and marking the meniscus of each addition with a .arking pen.
) Weight values are in units of "grams" (g); Volume values in units of "liter" (l), "milliliter" (ml) or "microliter" (ul).
) "xE#" = exponent - base 10.

FORMULA USED FOR CALCULATING RESULTS FOR SETTLED DUST SAMPLES BY TEM ANALYSIS

$$\text{Asbestos Concentration in structures/mm}^2 = \frac{(\text{\# of asbestiform structures}) \times (\text{Effective Collection Filter Area in mm}^2)}{(\text{\# of Grid Openings Analyzed}) \times (\text{Avg. Grid Opening in mm}^2) \times (\text{Surface Area Sampled in mm}^2) \times (\text{Dilution Factor})}$$

Asbestos Concentration

structures/mm²	x 100mm²/cm²	=	structures/cm²
structures/cm²	x 6.45 cm²/in²	=	structures/in²
structures/in²	x 144 in²/ft²	=	structures/ft²
structures/cm²	x 100	=	structures/100cm²

1.9225

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Page 1 of 1

YAMATE COUNT SHEET

LI PROJECT # A169-92-005
LI SAMPLE # 45535A
STRUMENT: JEOL 1200 EX
TH KEVEX EDX UNIT
C. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. T1447
AVERAGE G.O. AREA 0.00885 mm²
OF GO'S ANALYZED 1
TOTAL AREA ANALYZED 0.00885 mm²

ANALYST Ken Rhodes
DATE 3-13-92
VOLUME (L) ~~[illegible]~~ 1.8 ml
METHOD EPA Level III (mod) / Indirect
COMMENTS 50 ul of a 1 + 25 mil dil.
Total Asbestos mass = 1.4E-2 ng

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. Type	2 END Type	LENGTH (mm)	WIDTH (mm)	AVG FIB Dia. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	1	F	R	40	1	1	CH		0-8-1000	CH
			2	F	R	7	1	1	CH		0-8-1000	CH
			3	F	R	8	1	1	CH		0-7-1000	CH
			4	F	R	24	1	1	CH		0-8-1000	CH
			5	F	R	16	1	1	CH		0-7-1000	CH
			6	F	R	16	1	1	A		0-8-1000	CH
			7	F	R	24	1	1	CH		0-8-1000	CH
			8	F	R	16	1	1	CH		0-7-1000	CH
			9	B	R	80	4	4	CH		0-8-1000	CH
			10	F	R	40	1	1	A		0-9-1000	CH
			11	F	R	40	1	1	CH			CH
			12	F	R	40	1	1	CH			CH
			13	M	R	100	80	1	CH			CH
			14	F	R	50	1	1	CH		0-7-1000	CH
			15	F	R	60	1	1	CH		0-8-1000	CH
			16	F	R	16	1	1	CH			CH
			17	F	R	16	1	1	CH			CH
			18	F	R	40	1	1	A		0-7-1000	CH
			19	F	R	85	2	2	CH			CH
			20	F	R	16	1	1	CH			CH

B-7

: FIBER
: BUNDLE
: CLUSTER
: MATRIX
SD : NO STRUCTURES DETECTED

[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

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TEM COUNT SHEET (CONTINUED)

HELI PROJECT # A169-92-005
HELI SAMPLE # 45535-A

ANALYST Ken Rhodes
DATE 3-13-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS OBSERVATIONS 4 * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	21	F	R	35	1	1	CH		0-8-1000	CH
			22	F	R	80	4	4	CH		0-8-1000	CH
			23	F	R	8	1	1	CH			CH
			24	F	R	16	1	1	CH			CH
			25	F	R	24	1	1	CH		0-8-1000	CH
			26	F	R	40	1	1	CH			CH
			27	F	R	100	1	1	CH			CH
			28	F	R	45	1	1	CH			CH
			29	F	R	50	1	1	A		0-7-1000	CH
			30	F	R	40	1	1	CH			CH
			31	F	R	16	1	1	CH			CH
			32	F	R	40	1	1	CH			CH
			33	F	R	16	1	1	CH		0-8-1000	CH
			34	F	R	16	1	1	CH			CH
			35	F	R	70	1	1	A		0-7-1000	CH
			36	F	R	40	1	1	A		0-8-1000	CH
			37	F	R	16	1	1	CH			CH
			38	F	R	16	1	1	CH			CH
			39	F	D	45	1	1	CH	92000		CH
			40	F	R	16	1	1	CH			CH
			41	F	R	16	1	1	CH		0-7-1000	CH
			42	F	R	50	1	1	A		0-8-1000	CH
			43	F	R	50	2	2	CH			CH
			44	F	R	8	1	1	CH			CH
			45	F	R	16	1	1	CH			CH
			46	F	R	120	1	1	A		0-8-1000	CH
			47	F	R	40	1	1	CH			CH
			48	F	R	8	1	1	CH			CH
			49	F	R	39	1	1	CH			CH
			50	F	R	40	1	1	CH			CH
			51	B	R	80	2	2	CH		0-8-1000	CH

For 1,2,3,4,5 see page 1
*Values n alized to Si=10

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TEM COUNT SHEET (CONTINUED)

ELI PROJECT # A169-92-005
ELI SAMPLE # 45535-A

ANALYST Ken Rhoden
DATE 3-13-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	–	52	F	R	40	1	1	CH		0-8-1000	CH
			53	F	R	16	1	1	CH			CH
			54	F	R	9	1	1	CH			CH
			55	F	R	8	1	1	CH			CH
			56	F	R	12	1	1	CH			CH
			57	F	R	120	2	2	CH		0-8-1000	CH
			58	F	R	16	1	1	CH			CH
			59	F	R	8	1	1	CH			CH
			60	F	R	8	1	1	CH			CH
			61	M	R	16	8	1	CH		0-7-1000	CH
			62	F	R	24	1	1	CH			CH
			63	F	R	40	1	1	CH			CH
			64	F	R	35	1	1	CH			CH
			65	F	R	45	1	1	CH		0-8-1000	CH
			66	F	R	16	1	1	CH			CH
			67	M	R	16	2	2	CH			CH
			68	M	R	80	2	2	CH			CH
			69	F	R	40	2	1	CH			CH
			70	F	R	24	1	1	A		0-8-1000	CH
			71	F	R	70	2	2	CH			CH
			72	M	R	16	4	2	CH			CH
			73	F	R	16	1	1	CH		0-7-1000	CH
			74	F	R	70	2	2	CH			CH
			75	F	R	8	1	1	CH			CH
			76	F	R	16	1	1	CH			CH
			77	M	R	40	16	1	CH			CH
			78	F	R	16	1	1	CH			CH
			79	F	R	70	1	1	CH		0-8-1000	CH
			80	F	R	16	1	1	CH			CH
			81	F	R	90	1	1	CH			CH
			82	M	R	80	40	1	CH			CH

B-9

or 1,2,3,4,5 see page 1
Values normalized to Si=10

I...IA ...VIR...ENT... LAL...ATO...S
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TEM COUNT SHEET (CONTINUED)

IELI PROJECT # A169-92-005
IELI SAMPLE # 45535-A

ANALYST Ken Rhodes
DATE 3-13-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	-		83	F	R	16	1	1	CH			CH
			84	F	R	16	1	1	CH			CH
			85	F	R	82	1	1	A		0-8-1000	CH
			86	F	R	14	2	2	CH			CH
			87	M	R	24	16	2	CH			CH
			88	F	R	40	2	2	CH			CH
			89	B	R	180	8	2	CH			CH
			90	F	R	40	1	1	CH			CH
			91	F	R	16	1	1	CH			CH
			92	F	R	16	1	1	CH			CH
			93	F	R	40	1	1	CH		0-9-1000	CH
			94	F	R	45	1	1	CH			CH
			95	F	R	40	1	1	CH			CH
			96	F	R	24	1	1	CH			CH
			97	F	R	16	1	1	A		0-8-1000	CH
			98	F	R	40	1	1	CH			CH
			99	F	R	16	1	1	CH			CH
			100	F	R	16	1	1	CH			CH
			101	F	R	16	1	1	CH		0-9-1000	CH
			102	F	R	16	1	1	CH			CH
			103	F	R	10	1	1	CH			CH
			104	F	R	12	1	1	CH			CH
			105	F	R	85	1	1	B		0-8-1000	CH

For 1,2,3,4,5 see page 1
*Values n(alized to Si=10

13-Mar-1992 15:34:40 Z= 12 Mg K

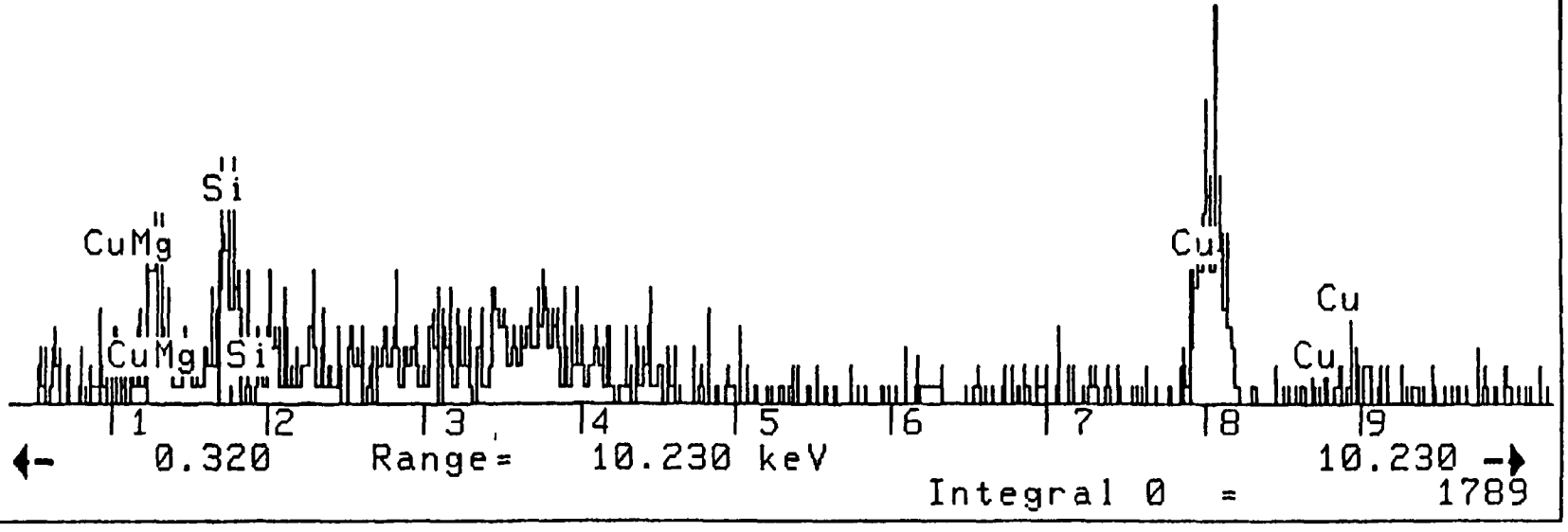
Execution time = 9 second

Vert= 50 counts Disp= 1 Preset= 30 secs Elapsed= 30 secs

HELI PROJECT #A169-92-005

HELI SAMPLE ID #45535-A

CHRYSOTILE STRUCTURE



13-Mar-1992 16:04:13 Z= 12 Mg K

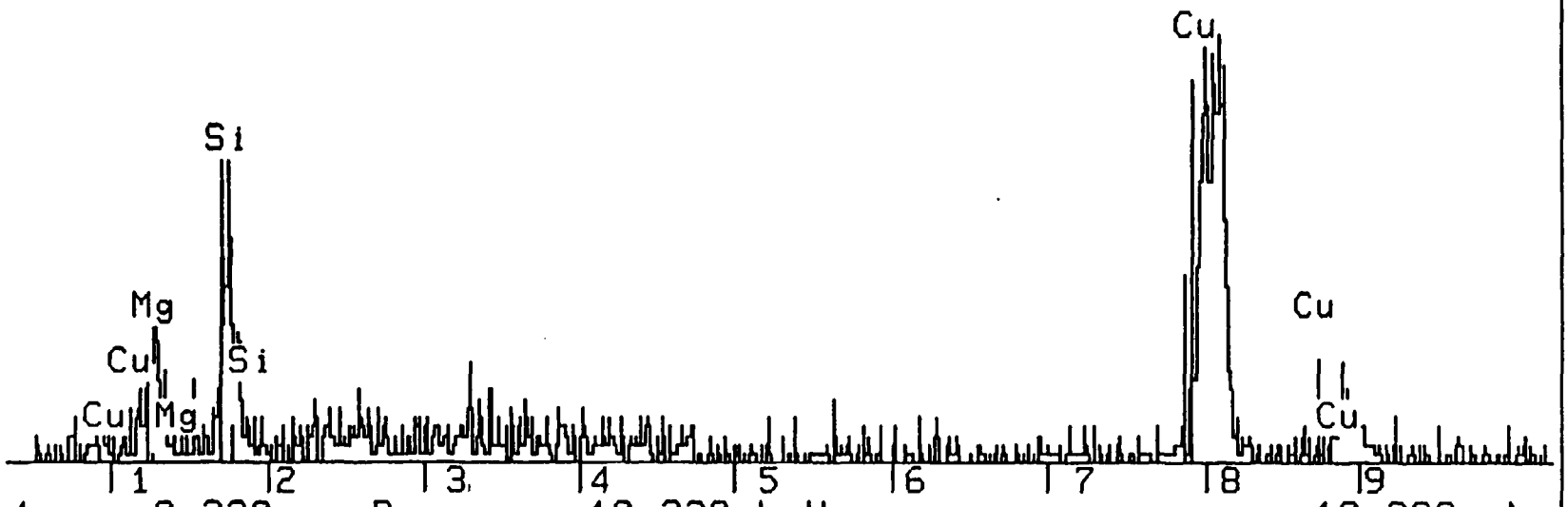
Execution time = 9 second

Vert= 100 counts Disp= 1 Preset= 30 secs Elapsed= 30 secs

HELI PROJECT #A169-92-005

HELI SAMPLE ID #45535-A

CHRYSOTILE STRUCTURE



← 0.320 Range= 10.230 keV 10.230 →

Integral 0 = 3236

HYGEIA ENVIRONMENTAL LABORATORIES
a divison of BSE Management Group, Inc.

YAMATE COUNT SHEET

HELI PROJECT # A169-92-005
HELI SAMPLE # 45536-AT
INSTRUMENT: JEOL 1200 EX
WITH KEVEX EDX UNIT
ACC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. T14UB
AVERAGE G.O. AREA 0.00885 mm²
OF GO'S ANALYZED 1
TOTAL AREA ANALYZED 0.00885 mm²

ANALYST Maria Calatan
DATE 3-16-92
VOLUME (L) ~1.6 L
METHOD EPA Level III (mod/indirect)
COMMENTS 50ml of a 1-> 25ml dil. (25ml) Total Asb. Mass = 4.2 x E-2 ng

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. Type	2 END Type	LENGTH (mm)	WIDTH (mm)	AVG FIB Dia. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	1	F	R	128	1	1	ND		0-9-10-0-0	CH
			2	F	R	16	1	1	CH		0-9-10-0-0	CH
			3	B	R	79	2	1	ND		0-8-10-0-0	CH
			4	F	R	80	1	1	CH		0-8-10-0-0	CH
			5	F	R	11	1	1	ND		0-9-10-0-0	CH
			6	F	R	83	1	1	CH		0-9-10-0-0	CH
			7	F	R	16	1	1	CH		0-9-10-0-0	CH
			8	F	R	35	1	1	ND		0-8-10-0-0	CH
			9	F	R	9	1	1	CH		0-9-10-0-0	CH
			10	F	R	12	1	1	CH		0-9-10-0-0	CH
			11	F	R	35	1	1	CH		0-9-10-0-0	CH
			12	F	R	45	1	1	ND		0-9-10-0-0	CH
			13	F	R	10	1	1	CH		0-9-10-0-0	CH
			14	F	R	60	1	1	CH		0-9-10-0-0	CH
			15	F	R	35	1	1	CH		0-9-10-0-0	CH
			16	F	R	70	1	1			0-9-10-0-0	CH
			17	F	R	30	1	1			0-9-10-0-0	CH
			18	F	R	9	1	1			0-9-10-0-0	CH
			19	F	R	45	1	1			0-9-10-0-0	CH
			20	F	R	120	1	1	CH			CH

B-13

F : FIBER
B : BUNDLE
C : CLUSTER
M : MATRIX
NSD : NO STRUCTURES DETECTED

[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

IYG EI IONI TAL BOI)RI
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TEM COUNT SHEET (CONTINUED)

HELI PROJECT # A169-92-005
HELI SAMPLE # 45536-AT

ANALYST Maria Calcaten
DATE 3-16-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	21	F	R	30	1	1			0-9-10-0-0	CH
			22	F	R	35	1	1			0-9-10-0-0	CH
			23	F	R	37	1	1	CH			CH
			24	F	R	10	1	1	CH			CH
			25	F	R	35	1	1	CH			CH
			26	B	R	80	1	1	CH			CH
			27	M	R	310	120	1	CH			CH
			28	F	R	37	1	1			0-9-10-0-0	CH
			29	B	R	16	20	1	CH			CH
			30	F	R	24	1	1	CH			CH
			31	M	R	70	24	1	CH			CH
			32	F	R	40	1	1	CH			CH
			33	F	R	8	1	1			0-9-10-0-0	CH
			34	F	R	16	1	1	CH			CH
			35	F	R	60	1	1	CH			CH
			36	F	R	50	1	1	CH			CH
			37	F	R	16	1	1	CH			CH
			38	F	R	40	1	1	CH			CH
			39	M	R	160	80	1			0-9-10-0-0	CH
			40	F	R	70	1	1	CH			CH
			41	F	R	60	1	1			0-9-10-0-0	CH
			42	B	R	50	8	1	CH			CH
			43	F	R	24	1	1			0-9-10-0-0	CH
			44	F	R	20	1	1	CH			CH
			45	F	R	16	1	1			0-9-10-0-0	CH
			46	M	R	35	35	1	CH			CH
			47	M	R	24	10	1	CH			CH
			48	F	R	20	1	1			0-9-10-0-0	CH
			49	F	R	16	1	1	CH			CH
			50	F	R	40	1	1			0-9-10-0-0	CH
			51	M	R	35	10	1	CH			CH

For 1,2,3,4,5 see page 1
*Values normalized to Si=10

...IA ... ...EN... LA...ATC...S
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TEM COUNT SHEET (CONTINUED)

ELI PROJECT # A169-92-005
ELI SAMPLE # 45536-AT

ANALYST Marie Celaton
DATE 3-16-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS OBSERVATIONS 4 * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	52	F	R	70	1	1	CH			CH
			53	F	R	24	1	1	CH			CH
			54	F	R	10	1	1			0-9-10-0-0	CH
			55	B	R	40	2	1			0-9-10-0-0	CH
			56	F	R	50	1	1	CH			CH
			57	F	R	30	1	1	CH			CH
			58	F	R	11	1	1			0-9-10-0-0	CH
			59	F	R	40	1	1			0-9-10-0-0	CH
			60	F	R	100	1	1	CH			CH
			61	B	R	45	1	1	CH			CH
			62	M	F	24	8	1	CH			CH
			63	F	R	20	1	1	CH			CH
			64	F	R	24	1	1	CH		0-9-10-0-0	CH
			65	F	R	32	1	1			0-9-10-0-0	CH
			66	F	R	24	1	1			0-9-10-0-0	CH
			67	F	R	16	1	1			0-9-10-0-0	CH
			68	F	R	81	1	1	CH			CH
			69	F	R	9	1	1	CH			CH
			70	F	R	35	1	1	CH			CH
			71	F	R	35	1	1	CH		0-7-10-0-0	CH
			72	B	R	50	1	1	CH			CH
			73	F	R	8	1	1	CH			CH
			74	F	R	30	1	1	CH			CH
			75	M	R	80	40	1	CH			CH
			76	F	R	40	1	1	CH			CH
			77	F	R	24	1	1			0-8-10-0-0	CH
			78	F	R	24	1	1	CH			CH
			79	F	R	20	1	1	CH			CH
			80	B	R	35	1	1	CH			CH
			81	B	R	35	1	1			0-8-10-0-0	CH
			82	F	R	75	1	1	CH			CH

or [1,2,3,4,5] see page 1
Values normalized to Si=10

I...IA ...VIR...ENT... LAL...ATO...S
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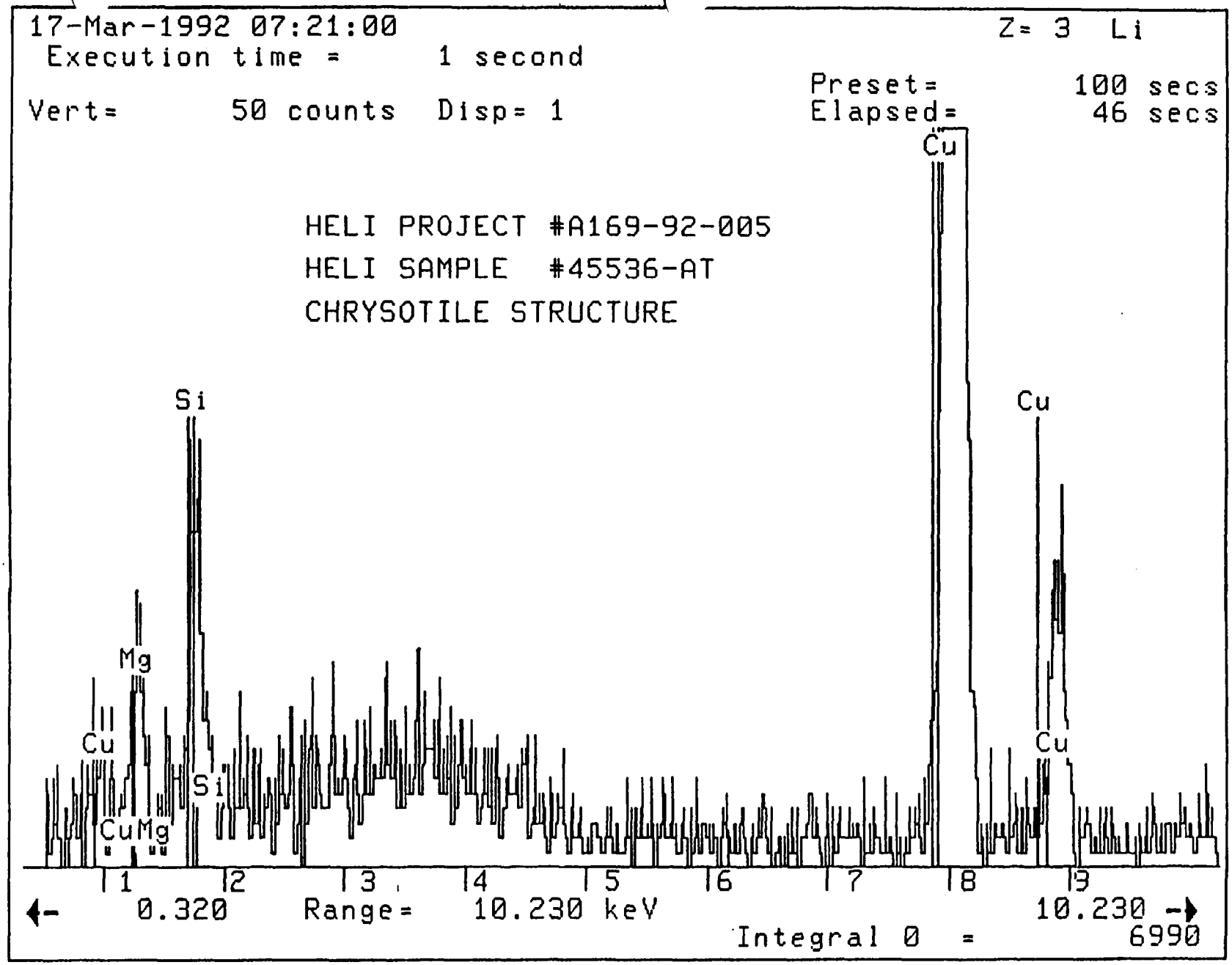
TEM COUNT SHEET (CONTINUED)

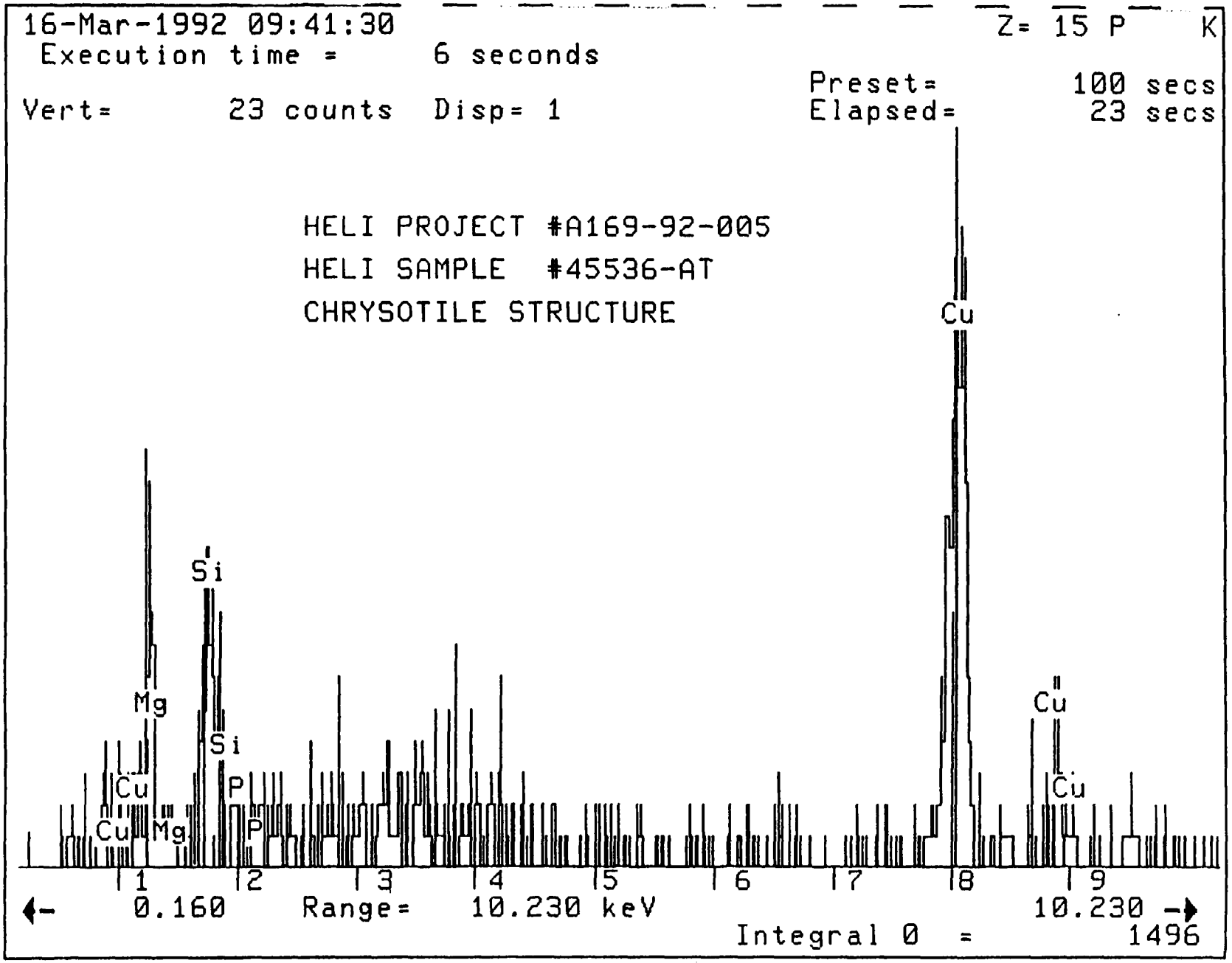
HELI PROJECT # A169-92-005
HELI SAMPLE # 45536-4

ANALYST Marie Calcaterra
DATE 3-16-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS OBSERVATIONS 4 * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	83	F	R	102	1	1	CH			CH
			84	F	R	30	1	1	CH			CH
			85	F	R	90	1	1			0-9-10-0-0	CH
			86	F	R	16	1	1	CH			CH
			87	M	R	40	1	1	CH			CH
			88	F	R	16	1	1	CH			CH
			89	F	R	80	1	1	CH			CH
			90	C	R	30	10	1			0-9-10-0-0	CH
			91	F	R	40	1	1			0-9-10-0-0	CH
			92	F	R	16	1	1	CH			CH
			93	F	R	8	1	1	CH			CH
			94	F	R	80	1	1	CH			CH
			95	F	R	80	1	1	CH			CH
			96	F	R	65	1	1	CH			CH
			97	F	R	45	1	1			0-9-10-0-0	CH
			98	M	R	45	16	1	CH			CH
			99	F	R	65	1	1	CH			CH
			100	F	R	24	1	1	CH		0-9-10-0-0	CH
			101	F	R	20	1	1	CH			CH
			102	M	R	50	16	1	CH			CH
			103	F	R	35	1	1	CH			CH
			104	F	R	16	1	1			0-9-10-0-0	CH
			105	F	R	80	1	1	CH			

For 1,2,3,4,5 see page 1
*Values ; malized to Si=10


17-Mar-1992 07:21:00
Execution time = 1 second
Z= 3 Li
Preset= 100 secs
Elapsed= 46 secs
Vert= 50 counts Disp= 1
HELI PROJECT #A169-92-005
HELI SAMPLE #45536-AT
CHRYSOTILE STRUCTURE
Cu
Si
Cu
Mg
Cu
Si
Cu
Mg
Cu
1
2
3
4
5
6
7
8
9
0.320
Range= 10.230 keV
10.230
Integral 0 = 6990


16-Mar-1992 09:41:30
Execution time = 6 seconds
Z= 15 P K
Preset= 100 secs
Elapsed= 23 secs
Vert= 23 counts Disp= 1
HELI PROJECT #A169-92-005
HELI SAMPLE #45536-AT
CHRYSOTILE STRUCTURE
Cu
Si
Mg
Si
Cu
P
Cu
Mg
P
Cu
Cu
1
2
3
4
5
6
7
8
9
0.160
Range= 10.230 keV
10.230
Integral 0 = 1496

:YGEIA ENVIRONMENTAL LABORATORIES
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YAMATE COUNT SHEET

:ELI PROJECT # A169-93-005
(ELI SAMPLE # 405360 A
NSTRUMENT: JEOL 1200 EX
'ITH KEVEX EDX UNIT
.CC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. T14 B
AVERAGE G.O. AREA 0.00555 mm²
OF GO'S ANALYZED 1
TOTAL AREA ANALYZED 0.00555 mm²

ANALYST Maria Colombo
DATE 3-17-93
VOLUME (L) ~1.6 L
METHOD EPA LLCM-1 III (and /or)
COMMENTS 50ml of a 1-> 50 ml dil
50 µl Total asbestos mass - 2.662 ng

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. Type	2 END Type	LENGTH (mm)	WIDTH (mm)	AVG FIB Dia. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS 4 OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	1	—	1	F	R	35	1	1	CH		0-9-10-0-0	CH
			2	F	R	30	1	1	ND		0-9-10-0-0	CH
			3	F	R	9	1	1	CH		0-9-10-0-0	CH
			4	F	R	42	1	1	ND		0-9-10-0-0	CH
			5	F	R	25	1	1	CH		ND	CH
			6	F	R	90	1	1	CH		ND	CH
			7	F	R	8	1	1	CH		ND	CH
	B-19		8	F	R	16	16	1	CH		0-9-10-0-0	CH
			9	F	R	40	1	1	CH		ND	CH
			10	F	R	35	1	1	CH		0-9-10-0-0	CH
			11	F	R	30	1	1	CH		ND	CH
			12	F	R	20	1	1	CH		ND	CH
			13	F	R	25	1	1	CH		0-9-10-0-0	CH
			14	F	R	21	1	1	CH			CH
			15	F	R	11	1	1	CH			CH
			16	F	R	16	1	1	CH			CH
			17	F	R	55	2	1	CH			CH
			18	F	R	40	1	1	CH			CH
			19	C	R	24	10	1			0-9-10-0-0	CH
			20	M	R	40	16	1			0-9-10-0-0	CH

F : FIBER
B : BUNDLE
C : CLUSTER
M : MATRIX
NSD : NO STRUCTURES DETECTED

[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

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TEM COUNT SHEET (CONTINUED)

HELI PROJECT # A169-92-005
HELI SAMPLE # 45536-AT

ANALYST Maria Calcaden
DATE 3-17-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS OBSERVATIONS 4 * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	1	-	21	F	R	35	1	1	CH			CH
			22	F	R	40	1	1			0-9-10-0-0	CH
			23	F	R	40	1	1			0-9-10-0-0	CH
			24	F	R	16	1	1	CH			CH
			25	F	R	150	1	1			0-9-10-0-0	CH
			26	F	R	45	2	1			0-9-10-0-0	CH
			27	F	R	70	1	1	←	CH		CH
			28	F	R	140	1	1			0-9-10-0-0	CH
			29	F	R	120	2	1	←	CH		CH
			30	F	R	20	1	1	←	CH		CH
			31	F	R	42	1	1	←	CH		CH
			32	M	R	95	40	1	←	CH		CH
			33	F	R	16	1	1	←	CH		CH
			34	F	R	200	1	1	CH			CH
			35	M	R	16	1	1	CH			CH
			36	M	R	16	10	1	CH			CH
			37	M	R	9	1	1			0-9-10-0-0	CH
			38	F	R	40	1	1			0-9-10-0-0	CH
			39	F	R	60	2	1			0-9-10-0-0	CH
			40	F	R	40	1	1	CH			CH
			41	F	R	70	1	1	CH			CH
			42	F	R	170	1	1	CH		0-9-10-0-0	CH
			43	F	R	20	1	1			0-9-10-0-0	CH
			44	F	R	11	1	1	CH			CH
			45	F	R	90	1	1	CH			CH
			46	F	R	25	1	1	CH		0-9-10-0-0	CH
			47	F	R	70	1	1			0-9-10-0-0	CH
			48	F	R	35	1	1	CH			CH
			49	M	R	65	35	1	CH			CH
			50	F	R	81	1	1	CH			CH
			51	F	R	16	1	1	CH			CH

For 1,2,3,4,5 see page 1
*Values normalized to Si=10

YGLIA ENVIRONMENTAL LABORATORIES
a divison of BSE Management Group, Inc.

TEM COUNT SHEET (CONTINUED)

ELI PROJECT # A169-92-005
ELI SAMPLE # 45536-AT

ANALYST Maria Calatu
DATE 3-17-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS OBSERVATIONS 4 * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	1	-	52	F	R	250	1	1	CH			CH
			53	F	R	50	1	1			0-9-10-0-0	CH
			54	F	R	24	1	1	CH			CH
			55	F	R	55	1	1	CH			CH
			56	F	R	45	1	1	CH			CH
			57	F	R	55	1	1			0-9-10-0-0	CH
			58	F	R	85	1	1	CH			CH
			59	M	R	100	32	1	CH			CH
			60	F	R	20	1	1	CH			CH
			61	F	R	45	1	1	CH			CH
			62	M	R	16	1	1			0-9-10-0-0	CH
			63	B	R	81	16	1			0-9-10-0-0	CH
			64	F	R	40	1	1			0-7-10-0-0	CH
			65	F	R	60	1	1	CH			CH
			66	F	R	65	1	1	CH			CH
			67	F	R	65	1	1	CH			CH
			68	M	R	16	1	1	CH			CH
			69	F	R	30	1	1	CH			CH
			70	F	R	70	1	1	CH			CH
			71	F	R	35	1	1			0-9-10-0-0	CH
			72	M	R	40	40	1	CH			CH
			73	F	R	76	1	1	CH			CH
			74	M	R	90	1	1	CH			CH
			75	F	R	20	1	1	CH			CH
			76	B	R	70	2	1	CH			CH
			77	B	R	24	2	1	CH	920004		CH
			78	F	R	16	1	1			0-9-10-0-0	CH
			79	F	R	20	1	1	CH			CH
			80	F	R	77	1	1			0-9-10-0-0	CH
			81	F	R	38	1	1	CH			CH
			82	F	R	16	1	1	CH			CH

For 1,2,3,4,5 see page 1
*Values normalized to Si=10

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a divison of BSE Management Group, Inc.

TEM COUNT SHEET (CONTINUED)

IELI PROJECT # A169-92-005
IELI SAMPLE # 45536-4+

ANALYST Maria Calcaterra
DATE 3-17-90

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS OBSERVATIONS 4 * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	1	—	83	M	R	16	1	1	CH			CH
			84	F	R	20	1	1	CH			CH
			85	M	R	200	120	1			0.9-10.0.0	CH
			86	F	R	17	1	1	CH			CH
			87	F	R	18	1	1	CH			CH
			88	F	R	29	1	1			0.9-10.0.0	CH

B-22

For 1,2,3,4,5 see page 1
*Values [illegible]malized to Si=10

YGEIA ENVIRONMENTAL LABORATORIES
a divison of BSE Management Group, Inc.

YAMATE COUNT SHEET

ELI PROJECT # A169.92.005
ELI SAMPLE # 45537.A
NSTRUMENT: JEOL 1200 EX
ITH KEVEX EDX UNIT
CC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. 71449
AVERAGE G.O. AREA 0.00885 mm²
OF GO'S ANALYZED 2
TOTAL AREA ANALYZED 0.0177 mm²

ANALYST Ken Rhodes
DATE 3-17-92
VOLUME (L) 11.7 L
METHOD EPA Level III (mod.) / indirect
COMMENTS 50 ml of a 1:25 ml dil.
Total Asbestos mass = 2.33E-2 ng

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS STR. Type[1]	END Type[2]	LENGTH (mm)	WIDTH (mm)	AVG FIB Dia. (mm)	SAED OBSRV.[3]	MICRO-GRAPH #	EDS OBSERVATIONS[4] * Na-Mg-Si-Ca-Fe	ASBESTOS CLASS[5]
1	1	—	1	F	R	16	1	1	CH		0.8-1000	CH
		—	2	F	R	8	1	1	CH		0.7-1000	CH
		—	3	F	R	40	1	1	CH		0.8-1000	CH
			4	F	R	35	1	1	A		0.9-1000	CH
			5	F	R	45	1	1	CH		0.10-1000	CH
			6	F	R	45	1	1	CH		0.8-1000	CH
			7	F	R	40	1	1	CH		0.9-1000	CH
			8	F	R	80	1	1	CH		0.8-1000	CH
			9	F	R	80	1	1	CH		0.8-1000	CH
			10	F	R	50	1	1	CH		0.8-1000	CH
			11	F	R	45	1	1	CH			CH
			12	F	R	80	4	1	CH		0.8-1000	CH
			13	F	R	80	2	2	CH			CH
			14	F	R	80	1	1	CH			CH
			15	F	R	45	2	2	CH		0.8-1000	CH
			16	F	R	45	1	1	CH			CH
			17	F	R	50	1	1	CH		0.7-1000	CH
			18	F	R	10	1	1	CH			CH
			19	F	R	40	1	1	CH		0.8-1000	CH
			20	F	R	16	1	1	CH		0.9-1000	CH

B-23

F : FIBER
B : BUNDLE
C : CLUSTER
M : MATRIX
NSD : NO STRUCTURES DETECTED

[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

I....IA ..../IR.....ENT.... LAL....ATO.....S
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TEM COUNT SHEET (CONTINUED)

HELI PROJECT # A169-92-005
HELI SAMPLE # 45537-A

ANALYST Ken Rhoden
DATE 3-17-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	–	21	F	R	16	1	1	CH		0-8-10-00	CH
			22	F	R	16	1	1	CH			CH
			23	F	R	70	1	1	CH			CH
			24	F	R	80	1	1	CH		0-7-1000	CH
			25	F	R	24	16	1	CH			CH
			26	F	R	40	1	1	CH			CH
			27	F	R	85	1	1	CH			CH
			28	F	R	16	1	1	CH		0-8-1000	CH
			29	F	R	30	1	1	CH			CH
			30	M	R	55	40	1	CH			CH
			31	M	R	40	16	1	CH		0-9-1000	CH
			32	F	R	40	1	1	CH		0-10-1000	CH
			33	F	R	45	1	1	CH			CH
			34	F	R	16	1	1	CH			CH
			35	F	R	16	1	1	CH			CH
			36	F	R	16	1	1	CH			CH
			37	F	R	16	1	1	CH		0-8-1000	CH
			38	F	R	40	1	1	CH			CH
			39	F	R	16	1	1	CH			CH
			40	F	R	80	1	1	CH			CH
			41	F	R	12	1	1	CH			CH
			42	F	R	16	1	1	CH		0-8-1000	CH
			43	F	R	35	1	1	CH			CH
			44	F	R	16	1	1	CH			CH
			45	F	R	40	1	1	CH			CH
			46	F	R	40	1	1	CH			CH
			47	F	R	16	1	1	CH			CH
			48	F	R	40	1	1	CH		0-8-1000	CH
			49	F	R	35	1	1	CH			CH
			50	F	R	45	1	1	CH			CH
			51	F	R	40	1	1	A		0-8-1000	CH

For [1,2,3,4,5] see page 1
*Values normalized to Si=10

TEM COUNT SHEET (CONTINUED)

ELI PROJECT # A169-92-005
ELI SAMPLE # 45537-A

ANALYST Ken Rhodes
DATE 3-17-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	52	M	R	40	24	1	A		0-8-1000	CH
			53	F	R	10	1	1	CH			CH
			54	F	R	40	1	1	CH			CH
			55	F	R	40	1	1	CH		0-8-1000	CH
			56	F	R	16	1	1	A		0-8-1000	CH
			57	M	R	50	16	1	CH			CH
			58	M	R	180	45	1	CH			CH
			59	F	R	16	1	1	A		0-7-1000	CH
			60	F	R	35	1	1	CH			CH
		—	61	F	R	120	1	1	CH			CH
			62	F	R	40	1	1	CH			CH
			63	B	R	60	8	1	CH		0-8-1000	CH
			64	F	R	45	1	1	CH			CH
			65	F	R	8	1	1	A		0-8-1000	CH
			66	F	R	8	1	1	CH		0-9-1000	CH
			67	F	R	40	1	1	CH			CH
			68	M	R	75	45	1	CH		0-8-1000	CH
			69	F	R	45	1	1	CH	92005		CH
			70	F	R	80	1	1	CH			CH
			71	F	R	40	1	1	CH			CH
			72	F	R	24	1	1	CH		0-8-1000	CH
			73	F	R	8	1	1	CH			CH
			74	F	R	16	1	1	CH			CH
			75	F	R	100	2	2	CH			CH
			76	F	R	24	1	1	CH		0-8-1000	CH
			77	F	R	16	1	1	CH		0-8-1000	CH
			78	F	R	40	1	1	CH			CH
			79	F	R	16	1	1	CH			CH
			80	F	R	40	3	1	CH			CH
			81	F	R	20	1	1	CH			CH
			82	M	R	50	40	1	CH		0-8-1000	CH

For [1,2,3,4,5] see page 1
*Values normalized to Si=10

[illegible]IA [illegible]/IR[illegible]ENT[illegible] LAB[illegible]ATO[illegible]S
a divison of BSE Management Group, Inc.

TEM COUNT SHEET (CONTINUED)

[ELI PROJECT # A169-92-005
[ELI SAMPLE # 45537-A

ANALYST Ken Rhodes
DATE 3-17-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	2	-	83	F	R	24	1	1	CH			CH
			84	F	R	16	1	1	CH			CH
			85	F	R	16	1	1	CH		0-8-1000	CH
			86	F	R	16	1	1	CH			CH
			87	F	R	80	1	1	CH			CH
			88	F	R	24	1	1	CH			CH
			89	F	R	40	1	1	CH			CH
			90	F	R	40	1	1	CH		0-9-1000	CH
			91	F	R	40	1	1	CH			CH
			92	F	R	80	1	1	CH			CH
			93	F	R	24	1	1	CH			CH
			94	F	R	16	1	1	CH			CH
			95	F	R	8	1	1	CH			CH
			96	F	R	45	1	1	CH		0-8-1000	CH
			97	F	R	45	1	1	CH			CH
			98	F	R	160	1	1	CH			CH
			99	F	R	16	1	1	CH			CH
			100	F	R	16	1	1	CH			CH
			101	F	R	40	1	1	CH		0-8-1000	CH
			102	F	R	16	1	1	CH			CH
			103	C	R	100	45	1	CH			CH
			104	M	R	100	80	1	CH			CH
			105	F	R	160	1	1	CH			CH
			106	F	R	70	1	1	CH		0-8-1000	CH
			107	F	R	45	1	1	CH			CH
			108	F	R	8	1	1	CH			CH
			109	F	R	40	2	2	CH			CH
			110	F	R	70	1	1	CH			CH
			111	F	R	40	1	1	CH			CH
			112	F	R	100	1	1	CH		0-8-1000	CH
			113	F	R	24	1	1	CH			CH
			114	F	R	120	1	1	CH			CH

For 1,2,3,4,5 see page 1
*Values normalized to Si=10

GEIA ENVIRONMENTAL LABORATORIES
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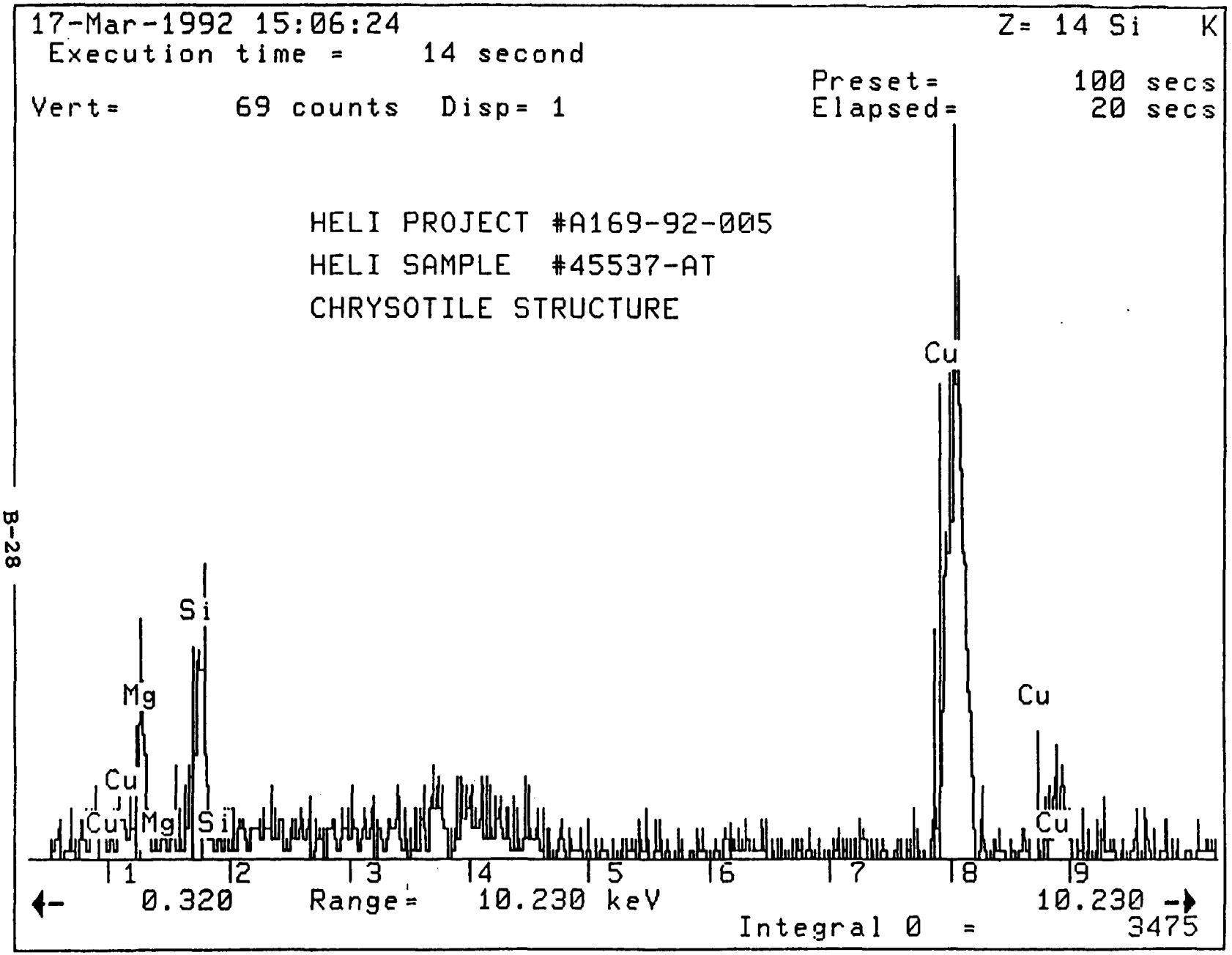
TEM COUNT SHEET (CONTINUED)

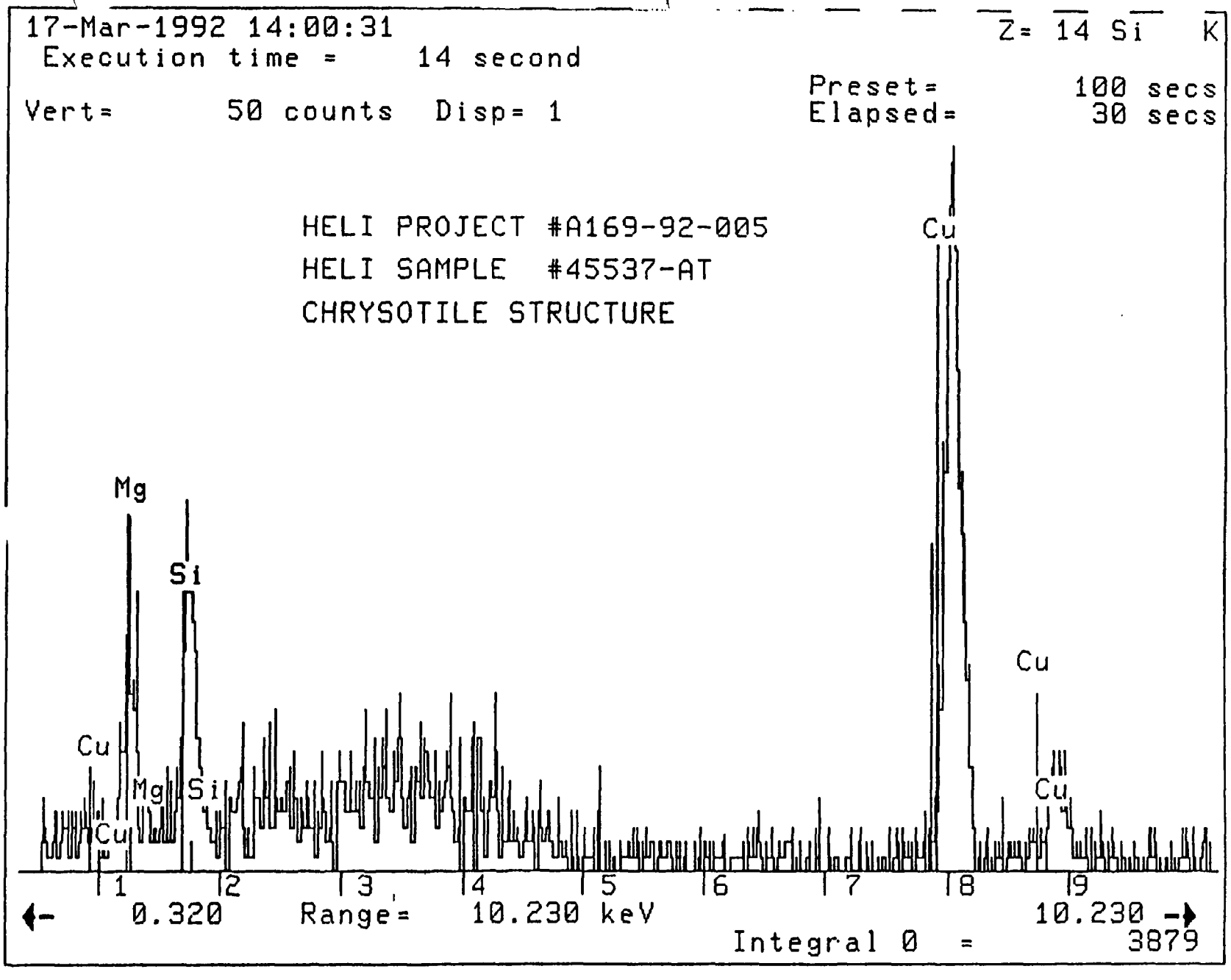
LI PROJECT # A169-92-005
LI SAMPLE # 45537-A

ANALYST Ken Rhodes
DATE 3-17-92

RID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	2	-	115	F	R	16	1	1	CH		0.8.1000	CH
			116	F	R	120	1	1	CH		0.8.1000	CH
			117	F	R	16	1	1	CH			CH
			118	F	R	45	1	1	CH			CH
			119	F	R	40	1	1	CH			CH
			120	F	R	60	1	1	CH			CH
			121	F	R	16	1	1	CH		0.9.1000	CH
			122	F	R	45	1	1	CH			CH
			123	F	R	40	1	1	CH			CH
			124	F	R	45	1	1	CH			CH
			125	F	R	40	1	1	CH			CH
			126	F	R	40	1	1	CH			CH
			127	F	R	16	1	1	CH			CH
			128	F	R	60	1	1	CH		0.8.1000	CH
			129	F	R	45	1	1	CH			CH
			130	F	R	45	1	1	CH			CH
			131	F	R	45	1	1	CH			CH
			132	F	R	16	1	1	CH			CH
			133	F	R	45	1	1	CH			CH
			134	F	R	16	1	1	CH		0.9.1000	CH
			135	F	R	45	1	1	CH			CH
			136	F	R	16	1	1	CH			CH
			137	F	R	40	1	1	CH			CH
			138	F	R	40	1	1	CH			CH

1,2,3,4,5 see page 1
values normalized to Si=10


17-Mar-1992 15:06:24
Z= 14 Si K
Execution time = 14 second
Preset= 100 secs
Elapsed= 20 secs
Vert= 69 counts Disp= 1
HELI PROJECT #A169-92-005
HELI SAMPLE #45537-AT
CHRYSOTILE STRUCTURE
Cu
Si
Mg
Cu
Cu
Mg
Si
Cu
Cu
1
2
3
4
5
6
7
8
9
0.320
Range= 10.230 keV
10.230
Integral 0 = 3475


17-Mar-1992 14:00:31
Execution time = 14 second
Z= 14 Si K
Preset= 100 secs
Elapsed= 30 secs
Vert= 50 counts Disp= 1
HELI PROJECT #A169-92-005
HELI SAMPLE #45537-AT
CHRYSOTILE STRUCTURE
Mg
Si
Cu
Cu
Mg
Si
Cu
Cu
Cu
1
2
3
4
5
6
7
8
9
0.320
Range= 10.230 keV
10.230
Integral 0 = 3879

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Page 1 of 1

YAMATE COUNT SHEET

LI PROJECT # A169-92-005
LI SAMPLE # Lab B1
STRUMENT: JEOL 1200 EX
TH KEVEX EDX UNIT
C. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. Lab B1
AVERAGE G.O. AREA 0.00885 mm²
OF GO'S ANALYZED 10
TOTAL AREA ANALYZED 0.0885 mm²

ANALYST Ken Schroeder
DATE 3-17-92
VOLUME (L) 0
METHOD EPA Level (II) mod. / indirect
COMMENTS

RID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. Type	2 END Type	LENGTH (mm)	WIDTH (mm)	AVG FIB Dia. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	0	NSD								
	2	—	0	NSD								
	3	—	0	NSD								
	4	—	0	NSD								
	5	—	0	NSD								
2	1	—	0	NSD								
	2	—	0	NSD								
	3	—	0	NSD								
	4	—	0	NSD								
	5	—	0	NSD								

B-30

: FIBER
: BUNDLE
: CLUSTER
: MATRIX
SD : NO STRUCTURES DETECTED

[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

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YAMATE COUNT SHEET

LI PROJECT # A169-92-005
LI SAMPLE # Lab Bl - Water
STRUMENT: JEOL 1200 EX
TH KEVEX EDX UNIT
C. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. Lab Bl - Water
AVERAGE G.O. AREA 0.00885 mm²
OF GO'S ANALYZED 10
TOTAL AREA ANALYZED 0.0885 mm²

ANALYST Ken Rhodes
DATE 3-17-92
VOLUME (L) 0
METHOD EPA Level III (mod)/indirect
COMMENTS

RID	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. Type	2 END Type	LENGTH (mm)	WIDTH (mm)	AVG FIB Dia. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	0	NSD								
	2	—	0	NSD								
	3	—	0	NSD								
	4	—	0	NSD								
	5	—	0	NSD								
2	B-31	—	0	NSD								
	7	—	0	NSD								
	8	—	0	NSD								
	9	—	0	NSD								
	10	—	0	NSD								

: FIBER
: BUNDLE
: CLUSTER
: MATRIX
SD : NO STRUCTURES DETECTED

[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

CHRYSOTILE SAED WORKSHEET

HECI ~~EAL~~ PROJECT #4169-92005

HECI ~~EAL~~ SAMPLE ID# 45535A

MICROGRAPH # 92000

CAMERA LENGTH 80cm

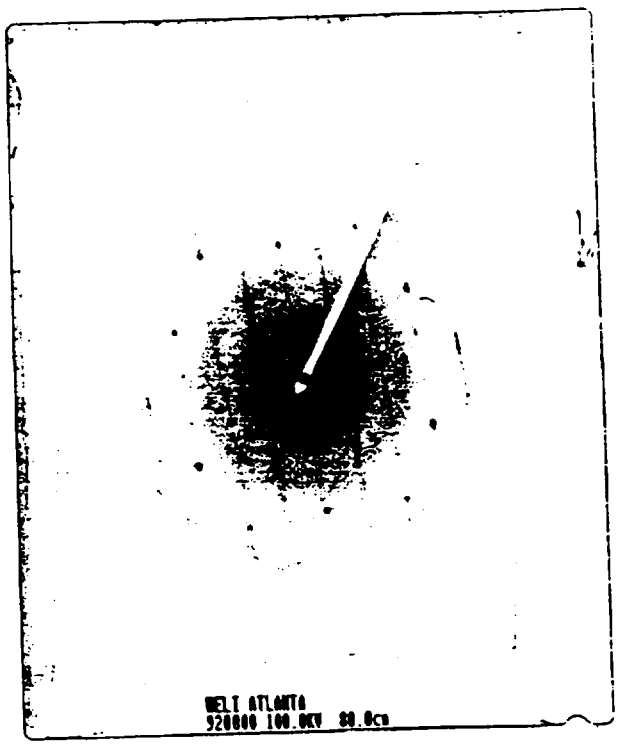
CAMERA CONSTANT 28.9mmÅ°

MEASURED REPEAT DISTANCE BETWEEN LAYER LINES 5.2mm

CALCULATED RECIPROCAL SPACE BETWEEN LAYER LINES 5.5mm

			Reference	Measured Å°
DOES THE PATTERN DISPLAY	(002)	? Yes	7.31Å	7.22
	(110)	? Yes	4.59Å	4.66
	(130)	? Yes	2.64Å	2.63

IF SO, IDENTIFY AND LABEL.



SAEDCHRY 3/28

CHRYSOTILE SAED WORKSHEET

~~EAL~~ HECI PROJECT # A169-92-005

~~EAL~~ HECI SAMPLE ID# 45536A

MICROGRAPH # 92004

CAMERA LENGTH 80.0 cm

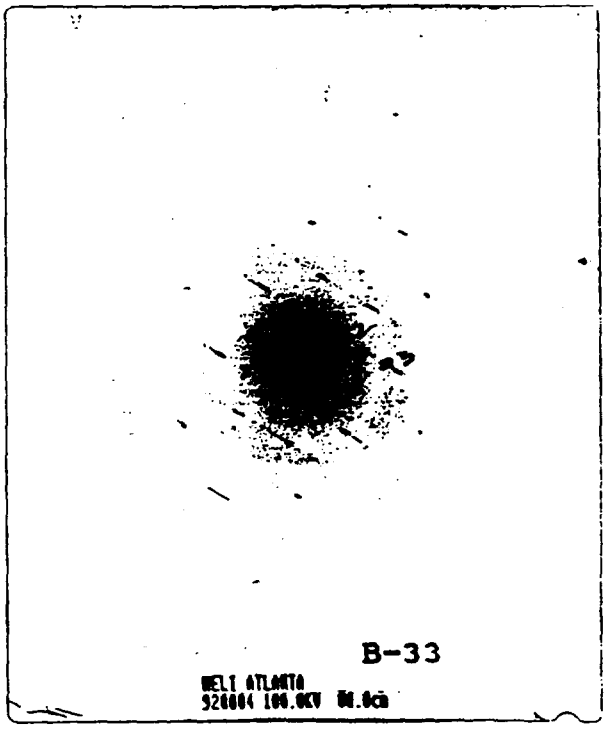
CAMERA CONSTANT 28.9 mmÅ

MEASURED REPEAT DISTANCE BETWEEN LAYER LINES 5.4 mm

CALCULATED RECIPROCAL SPACE BETWEEN LAYER LINES 5.35 nm

			Reference	Measured Å
DOES THE PATTERN DISPLAY	(002)	? Yes	7.31Å	6.88
	(110)	? Yes	4.59Å	4.25
	(130)	? Yes	2.64Å	2.58

IF SO, IDENTIFY AND LABEL.



SAEDCHRY 3/28

CHRYSOTILE SAED WORKSHEET

HELI ~~EAL~~ PROJECT # A169-92-005

HELI ~~EAL~~ SAMPLE ID# 45537-A

MICROGRAPH # 92005

CAMERA LENGTH 80 cm

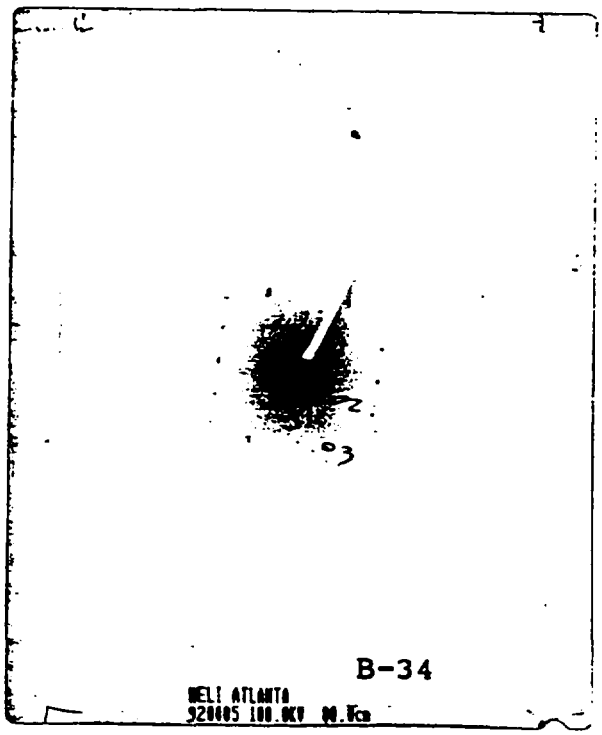
CAMERA CONSTANT 28.9 mmÅ°

MEASURED REPEAT DISTANCE BETWEEN LAYER LINES 5.2 mm

CALCULATED RECIPROCAL SPACE BETWEEN LAYER LINES 95.5 nm

			Reference	Measured
DOES THE PATTERN DISPLAY	(002)	? Yes	7.31Å	7.22
	(110)	? Yes	4.59Å	4.66
	(130)	? Yes	2.64Å	2.63

IF SO, IDENTIFY AND LABEL.



SAEDCHRY 3/28

KIBER ASSOCIATES, INC.
Environmental Specialists

24 February 1992

Hygeia Environmental Labs
350 Franklin Road
Suite 300
Marietta, GA 30067

Subject: Asbestos Content Testing

Dear sirs:

Enclosed are three samples for asbestos content analysis. These are in addition to samples previously sent by KIBER on 17 February 1992. Please include the results of these with the analyses of the previous samples. Also, please call Steve Zarlinski at KIBER to confirm these arrangements and receipt of these materials. Attached is the chain of custody which corresponds to these samples. Thank you.

Sincerely,
Kiber Associates, Inc.

Robert Semenak
Environmental Scientist

Enclosure

417/SZ064

4000 Dekalb Technology Parkway, N.E. • Suite 200 • Atlanta, Georgia 30340
(404) 455-3944 FAX (404) 451-0155

KIBER ASSOCIATES, INC.
4000 DEKALB TECHNOLOGY PARKWAY
SUITE 200
ATLANTA, GEORGIA 30340

(404) 455-3944
FAX (404) 451-0155

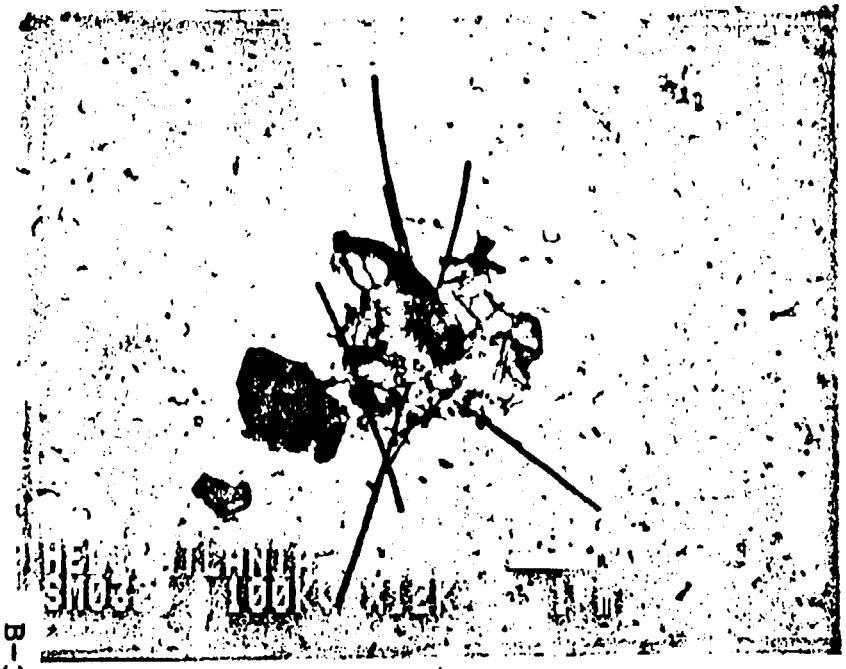
SAMPLE CHAIN OF CUSTODY RECORD

PROJECT NAME	PROJECT NUMBER
Treatability Study	0192-417
SAMPLERS: (signature)	REMARKS/COMMENTS: All test results with Level III QA and Deliverables.

SAMPLE NUMBER	LAB ** NUMBER	DATE	TIME	STATION LOCATION	# OF CNTRS	ANALYTICAL PARAMETERS AND REMARKS
T1407		2-24-92	17:12	CENTER : DRUM No. 4	1	Asbestos Content (by TEM)
T1408		2-24-92	17:20	CENTER : DRUM No. 4	1	Asbestos Content (by TEM)
T1409		2-24-92	17:25	CENTER : DRUM No. 4	1	Asbestos Content (by TEM)

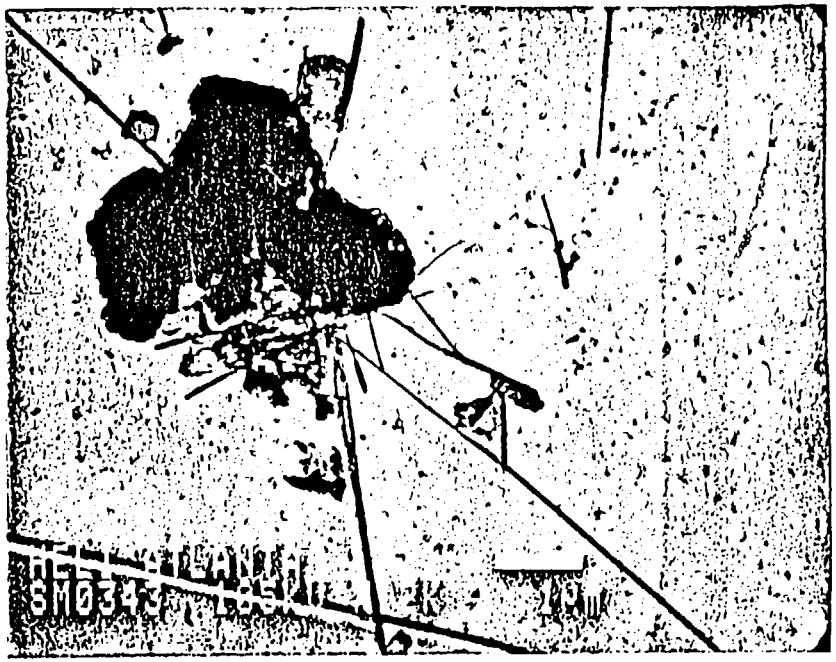
RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	
	2/24/92	17:40		2/24/92
RELINQUISHED BY:	DATE	TIME	RECEIVED BY:	

** - TO BE COMPLETED BY LAB ACCEPTING SAMPLES



HELI Sample # 45535-A

(ABOVE) HELI Sample #45535-A
Chrysotile matrix



45535-AT - HELI Sample #

(ABOVE) HELI Sample Id#45535-A
Chrysotile matrix

Hygeia Environmental Laboratories Inc.

Atlanta
Boston
Los Angeles
New York
Utica

Cobb Corporate Center
350 Franklin Road/300
Marietta, Georgia
30067-7749
404-425-9901
FAX: 404-424-0185

Schweiger & Associates
106 Hamby Road, SE

Marietta, GA 30067

03/12/92

Subject: TEM Analysis of Sludge Samples
HELI Project Number:A169-92-004
Client Reference:0192-417 Alliance Study

Dear Mr. Schweiger:

Please find enclosed the results of the analysis of the samples submitted to our laboratory on 02/19/92. The preparation and analysis was performed to the extent possible in accordance with an EPA draft method, following one of three levels of analysis with some modification developed by Yamate, Argwal and Gibbons for asbestos fibers in air using transmission electron microscopy (TEM) with selective area electron diffraction (SAED) and energy dispersive spectroscopy (EDS) x-ray micro-analysis.

This report contains a copy of our TEM analysis summary sheet as well as copies of our TEM count sheets and any EDS spectra.

Hygeia Environmental Laboratories Inc. is accredited under the NIST/NVLAP Program (NVLAP lab # 1011-03) for airborne asbestos fiber analysis by transmission electron microscopy. However, this report does not constitute a product endorsement by NIST or any other U.S. government agency. This report contains information not covered under the scope of our accreditation.

Hygeia Environmental Laboratories Inc. and its personnel shall be liable only for the analyses in this report. Any use or interpretation of this report is not the responsibility of Hygeia. The sample filters will be retained for a period not to exceed thirty days unless we are requested to archive them for you; the grids will be retained for an indefinite period.

If you have any questions regarding your results, this report, or the analytical methods employed, please contact us at (404) 425-9901.

Sincerely,
Hygeia Environmental Laboratories Inc.

Ken Rhodes
Analyst

Ken Rhodes
Supervisor of Electron Microscopy
HELI, Atlanta Region

Lab Notes: The preparation and analyses of these samples was altered from the original procedure proposed, due to the fact that these samples were not of an oil-based sludge as we were led to believe.

The preparation of these samples did involve homogenizing the samples, to the extent possible, with a hand-held homogenizer. After each sample had been weighed, one liter of prefiltered/deionized water was added to each sample to establish a volume as well as to create a suspension/ solution. From this aqueous solution, an aliquot was taken and filtered onto a 0.22 micron Mixed Cellulose of Ester (MCE) filter with a 0.45 & 5.0 micron backup/support filters. All samples were mixed and shaken extensively before aliquots were taken. After drying, each filter was directly prepped to the extent possible in accordance with the prep procedure outlined under the AHERA method for analysis of air samples by TEM. The analysis of each sample was then performed to the extent possible in accordance with the EPA Level III analysis of the EPA/Yamate method. Results for each sample were calculated in asbestos structures per liter of solution as well as percent asbestos per sample, taking into account all dilutions and aliquots made.

Hygeia makes no claims as to the validity or accuracy of the preparation or analysis of these samples. However, we do feel that the preparation technique chosen as well as the analysis does produce a reasonable result for the type of material present in each sample.

If you have any questions concerning the procedure described above, please do not hesitate to contact Ken Rhodes, TEM Lab Supervisor @ 404/425-9901.

AUD 001 117

HYGEIA **ENVIRONMENTAL LABORATORIES**
a division of BSE Management Group, Inc.

YAMATE TEM ANALYSIS SUMMARY

HELI PROJECT#: A169-92-004
CLIENT: Schweiger & Associates
CLIENT PROJECT #/REFERENCE: 0192-417 / Alliance Study

FILTER TYPE/PORE SIZE: MCE / .22 µm
AVG. GRID OPENING (GO) AREA: 0.00790 mm²
Magnification Used: 20,000X
PREPARATION METHOD: EPA Level III(modified) / Indirect

DATE: 03 / 11 / 92
P.O. #: None Given
ANALYZED BY: Ken Rhodes
REVIEWED BY: Maria Calaten

SAMPLE I.D. #		SAMPLE DESCRIP	Sampl VOL (L)	Wt. of Samp (gm)	ASBESTOS												
					AREA ANALYZED (mm²)	STRUCTURES COUNTED							TYPES DETECTED	Str. Dens. s/mm²	Total asbestos mass ** (%)	CONC. s/liter	A.S.* s/litr
CLIENT	HELI					TOTAL	<5µm	≥5µm	F	C	B	M					
T11U1	45070-AT	Sludge	3.8	1736	0.158	5	3	2	3	-	-	2	+CH	2.4xE4	1.2xE-11	6.1xE6	1.2xE6
T11U2	45071-AT	Sludge	1.8	2084	0.158	6	3	3	4	-	-	2	+CH	3.4xE4	1.8xE-12	1.8xE7	3.0xE6
T11U3	45072-AT	Sludge	1.45	1517	0.016	112	86	26	87	2	3	20	+CH	5.1xE9	7.4xE-12	3.4xE12	3.0xE10
T14U4	45073-AT	Sludge	1.7	1534	0.008	114	68	46	64	2	2	46	+CH	1.2xE9	2.1xE-11	6.9xE11	6.1xE9
17U5	45074-AT	Sludge	2.25	1670	0.032	102	64	38	68	1	7	26	+CH	3.6xE9	2.2xE-11	1.5xE12	1.5xE10
'17U6	45075-AT	Sludge	2.45	1726	0.032	100	66	34	70	-	3	27	+CH	3.9xE9	1.8xE-11	1.5xE12	1.5xE10
	Water Bl	W.B.	0.2	--	0.079	0	0	0	-	-	-	-	NSD	<12.7	--	<60,759	60,759
	Lab Bl	L.B.	--	--	0.079	0	0	0	-	-	-	-	NSD	<12.7	--	--	---

*A.S.= Analytical Sensitivity, which is calculated on the probability of detecting one asbestos fiber or structure in the total area examined.
+CH=Chrysotile Asbestos; NSD = No Asbestos Structures detected
** Total asbestos mass (%) =(grams of asbestos in sample / weight of sample in grams) x 100
gm=grams; litr=liter; mm²=square millimeters; s=asbestos structures; um=microns
"xE#" = exponent - base 10

HELI Electron Optics Laboratory Official Maria Calaten

Hygeia Environmental Laboratories Inc.

Cobb Corporate Center
350 Franklin Road/300
Marietta, Georgia
30067-7749
404-425-9901
FAX: 404-424-0185

Atlanta
Boston
Los Angeles
New York
Utica

HELI Project #A169-92-004
Client: Schweiger & Associates
Client Project: 0192-417 / Alliance Study

HELI SAMPLE #	CLIENT SAMPLE #	Wt. of sample (grams)	(~) Approximate Volume of sample (l)/of aliquot(mls)		Total mass (g) of asbestos detected
45070-A	T11U1	1736	3.8	5	2.05xE-10
45071-A	T11U2	2084	1.8	2	3.77xE-11
4 2-A	T14U3	1517	1.45	50 ul of a 1-25 ml dilution	1.13xE-10
4 3-A	T14U4	1534	1.7	500 ul of a 1-25 ml dilution	3.20xE-10
45074-A	T17U5	1670	2.25	50 ul of a 1-25 ml dilution	3.76xE-10
45075-A	T17U6	1726	2.45	50 ul of a 1-25 ml dilution	3.10xE-10
BLANK	BLANK	132 (subtracted from each sample wt.)	0	200 mls of deionized/ prefiltered water	0

Notes:

1) Weights of samples were obtained using a triple beam balance prior to prepping of samples. Weight of "blank" container was subtracted from each sample weight obtained to obtain weight of sludge.
2) Volumes for each sample are approximate volumes obtained by adding one (1) liter of prefiltered / deionized water to each sample and then comparing the displacement volume with a marked scale on the "blank" container. The marked scale was determined by placing known volumes of prefiltered / deionized water, in increments of twenty-five (25) milliliters, and making the meniscus of each addition with a marking pen.
3) Weight values are in units of "grams" (g); Volume values in units of "liter" (l), "milliliter" (ml) or "microliter" (ul).
4) "xE#" exponent - base 10.

YAMATE COUNT SHEET

HELI PROJECT # A169-92-004
HELI SAMPLE # 45070 A
INSTRUMENT: JEOL 1200 EX
WITH KEVEX EDX UNIT
ACC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. T11 W1
AVERAGE G.O. AREA 0.00790 mm²
OF GO'S ANALYZED 20
TOTAL AREA ANALYZED 0.158 mm²

ANALYST Ken Rhoades
DATE 9.9.92
VOLUME (L) 3.8 Liters
METHOD EPA Level III (and)/indirect
COMMENTS

Asbestos → Total mass = 0.205 ng

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	WIDTH (mm)	AVG FIB DIA (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	0	NSD								
	2	—	0	NSD								
	3	—	0	NSD								
	4	—	0	NSD								
	5	—	0	NSD								
	6	—	1	M	R	104	80	1	A		0.8-1000	CH
	7	—	0	NSD								
	8	—	0	NSD								
	9	—	2	F	R	16	2.0	2.0	CH		0.7-1000	CH
B-43	10	—	0	M	R		(240) 240	0.4	A		Al-9 Si-10	NA
	11	—	3	F	R	22.0	0.4	0.4	CH		0.8-1000	CH
	12	—	0	NSD								
	13	—	0	NSD								
	14	—	0	NSD								
	15	—	0	NSD								
	16	—	4	M	R	400	104	100	CH		0.8-1000	CH
	17	—	0	NSD								
	18	—	5	F	R	16.0	2	2	CH		0.8-1000	CH
	19	—	0	NSD								
	20	—	0	NSD								

[1]F : FIBER
B : BUNDLE
C : CLUSTER
M : MATRIX
NSD : NO STRUCTURES DETECTED

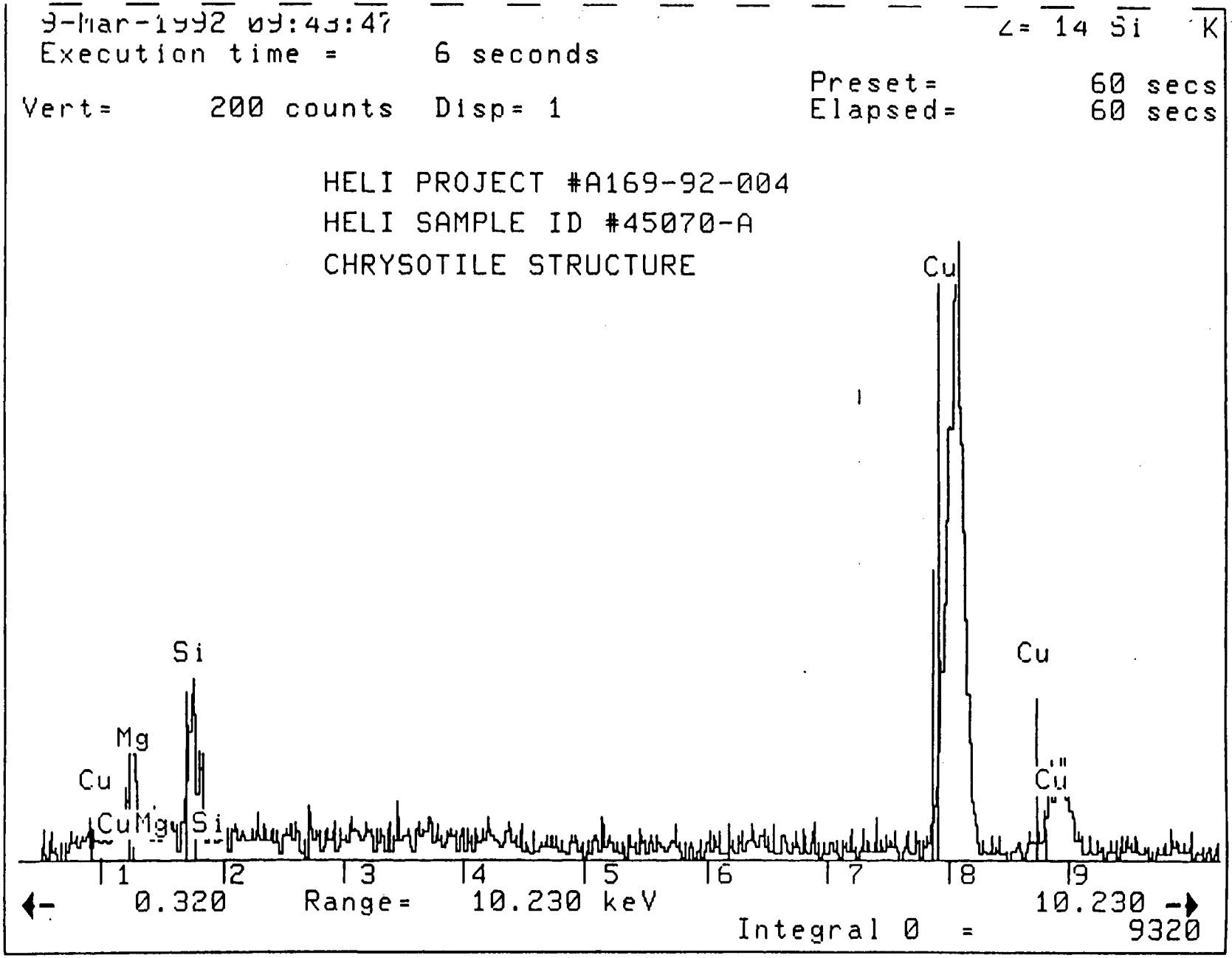
[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

ng = nanogram (10^{-9})

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable


9-Mar-1992 09:43:47
Execution time = 6 seconds
Z= 14 Si K
Preset= 60 secs
Elapsed= 60 secs
Vert= 200 counts Disp= 1
HELI PROJECT #A169-92-004
HELI SAMPLE ID #45070-A
CHRYSOTILE STRUCTURE
Cu
Cu
Si
Mg
Cu
Cu
Mg
Si
Cu
1
2
3
4
5
6
7
8
9
0.320
Range= 10.230 keV
10.230
Integral 0 = 9320

a isc f l Ma eme Gr , I...

YAMATE COUNT SHEET

HELI PROJECT # A169-92-004
HELI SAMPLE # 45071-A
INSTRUMENT: JEOL 1200 EX
WITH KEVEX EDX UNIT
ACC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. T1102
AVERAGE G.O. AREA 0.00790 mm²
OF GO'S ANALYZED 20
TOTAL AREA ANALYZED 0.158 mm²

ANALYST Ben Rhodes
DATE 3-9-92
VOLUME (L) 1.8 L
METHOD EPA Level III (mod.)/indirect
COMMENTS

Asbestos-Total Mass = 0.0377 ng

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	WIDTH (mm)	AVG FIB DIA (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	0	NSD								
	2	—	0	NSD								
	3	—	0	NSD								
	4	—	0	NSD								
	5	—	0	NSD								
	6	—	0	NSD								
	7	—	1	F	R	20	2	2	CH		0.8-1000	CH
	8	—	0	NSD								
	9	—	0	NSD								
B-45	10	—	0	NSD								
	11	—	2	M	R	104	20	2	CH		0.8-1000	CH
	12	—	0	NSD								
	13	—	0	M	R	24	20	2	A		Al 9 Si 10	NA
	14	—	0	NSD								
	15	—	3	F	R	16	2	2	CH		0.7-1000	CH
	16	—	0	NSD								
	17	—	0	NSD								
	18	—	0	NSD								
	19	—	4	F	R	32.0	2	2	CH		0.8-1000	CH
	20	—	5	F	R	160	4	2	CH		0-9-1000	CH
			6	M	R	160	160	2	CH		0.10-1000	CH

[1]F : FIBER
B : BUNDLE
C : CLUSTER
M : MATRIX
NSD : NO STRUCTURES DETECTED

[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

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YAMATE COUNT SHEET

HELI PROJECT # A169-92-004
HELI SAMPLE # 45071-A
INSTRUMENT: JEOL 1200 EX
WITH KEVEX EDX UNIT
ACC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. T1102
AVERAGE G.O. AREA 0.00790 mm²
OF GO'S ANALYZED 20
TOTAL AREA ANALYZED 0.158 mm²

ANALYST [illegible]
DATE 3-11-92
VOLUME (L)
METHOD EPA Level III (mod) [illegible]
COMMENTS QC

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. Type	2 END Type	LENGTH (mm)	WIDTH (mm)	AVG FIB Dia. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	1	—	0	NSD								
	2	—	0	NSD						1		
	3	—	1	F	R	40	1	1	CH		0-9-10-0-0	CH
	4	—	0	NSD								
	5	—	0	NSD								
	6	—	0	NSD								
	7	—	0	NSD								
B-46	8	—	2	M	R	35	35	1	CH		0-9-10-0-0	CH
	9	—	2	F	R	16	1	1	A		6-40 Al-9	NA
	10	—	3	M	R	80	40	2	ND		0-9-10-0-0	CH
			4	M	R	60	40	1	CH		0-9-10-0-0	CH
1	11	—	0	F	R	24	1	1	NA		ND	NA
1	12	—	0	NSD								
	13	—	0	NSD								
2	14	—	0	F	R	24	1	1	NA		ND	NA
	15	—	0	NSD								
	16	—	0	NSD								
	17	—	[illegible]	M	R	40	40	1	CH		0-9-10-0-0	CH
			6	F	R	40	1	1	CH		0-9-10-0-0	CH
	18	—	0	NSD								

[1]F : FIBER
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M : MATRIX
NSD : NO STRUCTURES DETECTED

[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

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YAMATE COUNT SHEET

HELI PROJECT # 4169 92 004
HELI SAMPLE #
INSTRUMENT: JEOL 1200 EX
WITH KEVEX EDX UNIT
ACC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / µm
CLIENT SAMPLE I.D.
AVERAGE G.O. AREA See Pg 1
OF GO'S ANALYZED
TOTAL AREA ANALYZED

ANALYST Maria Calafiore
DATE 3-11-92
VOLUME (L)
METHOD
COMMENTS

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. Type	2 END Type	LENGTH (mm)	WIDTH (mm)	AVG FIB Dia. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	19	—	0	~~[illegible]~~								
	20	—	7	F	R	24	2	1	CH	1	0-5-10-0-0	CH

B-47

[1]F : FIBER
B : BUNDLE
C : CLUSTER
M : MATRIX
NSD : NO STRUCTURES DETECTED

[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

9-Mar-1992 11:38:41 Z= 13 Al K

Execution time = 6 second

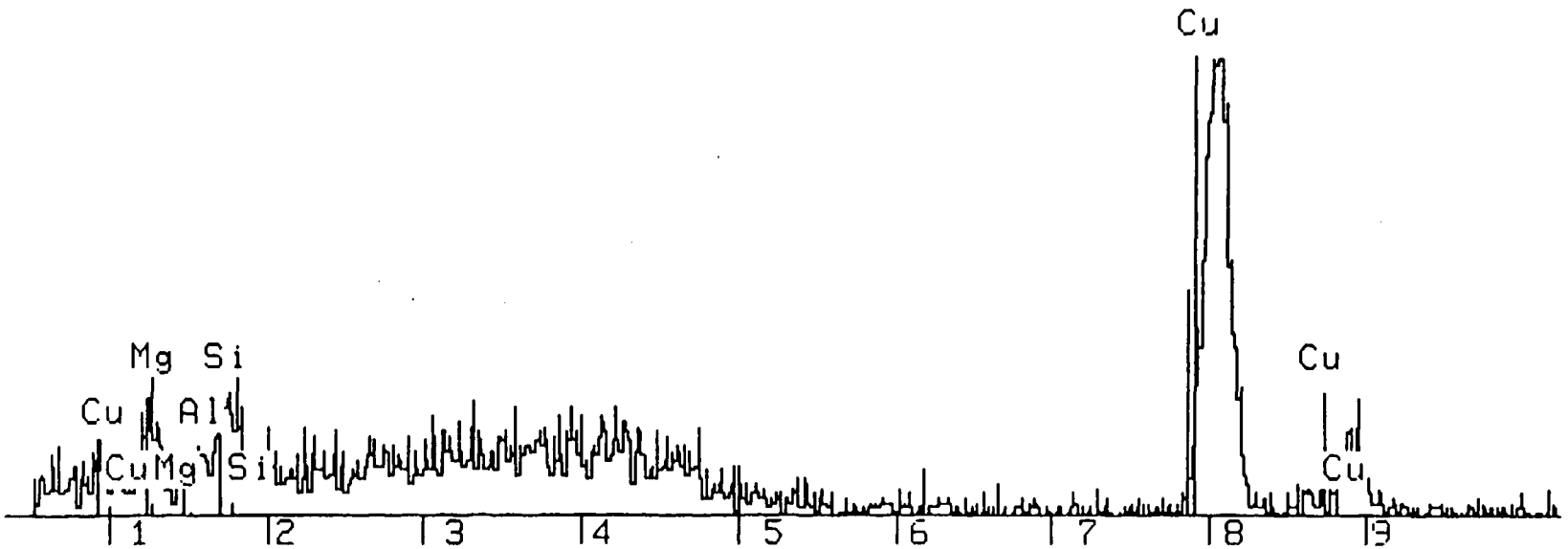
Preset= 60 secs

Vert= 200 counts Disp= 1 Elapsed= 30 secs

HELI PROJECT #A169-92-004

HELI SAMPLE ID #45071-A

CHRYSOTILE STRUCTURE



0.320 Range= 10.230 keV 10.230

Integral 0 = 9084

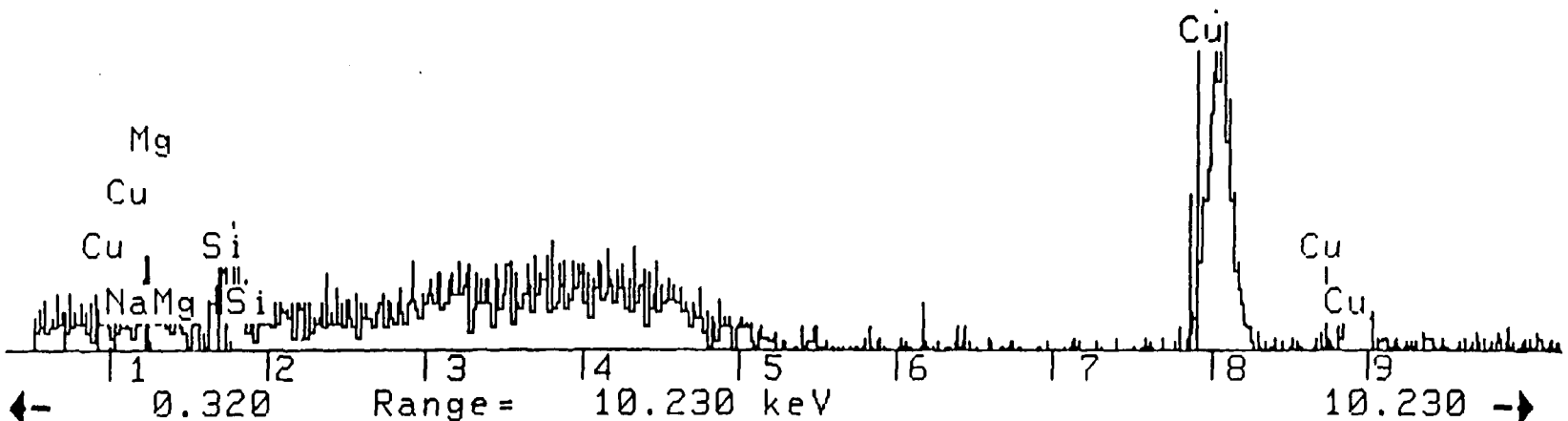
9-Mar-1992 11:43:09
Execution time = 17 second

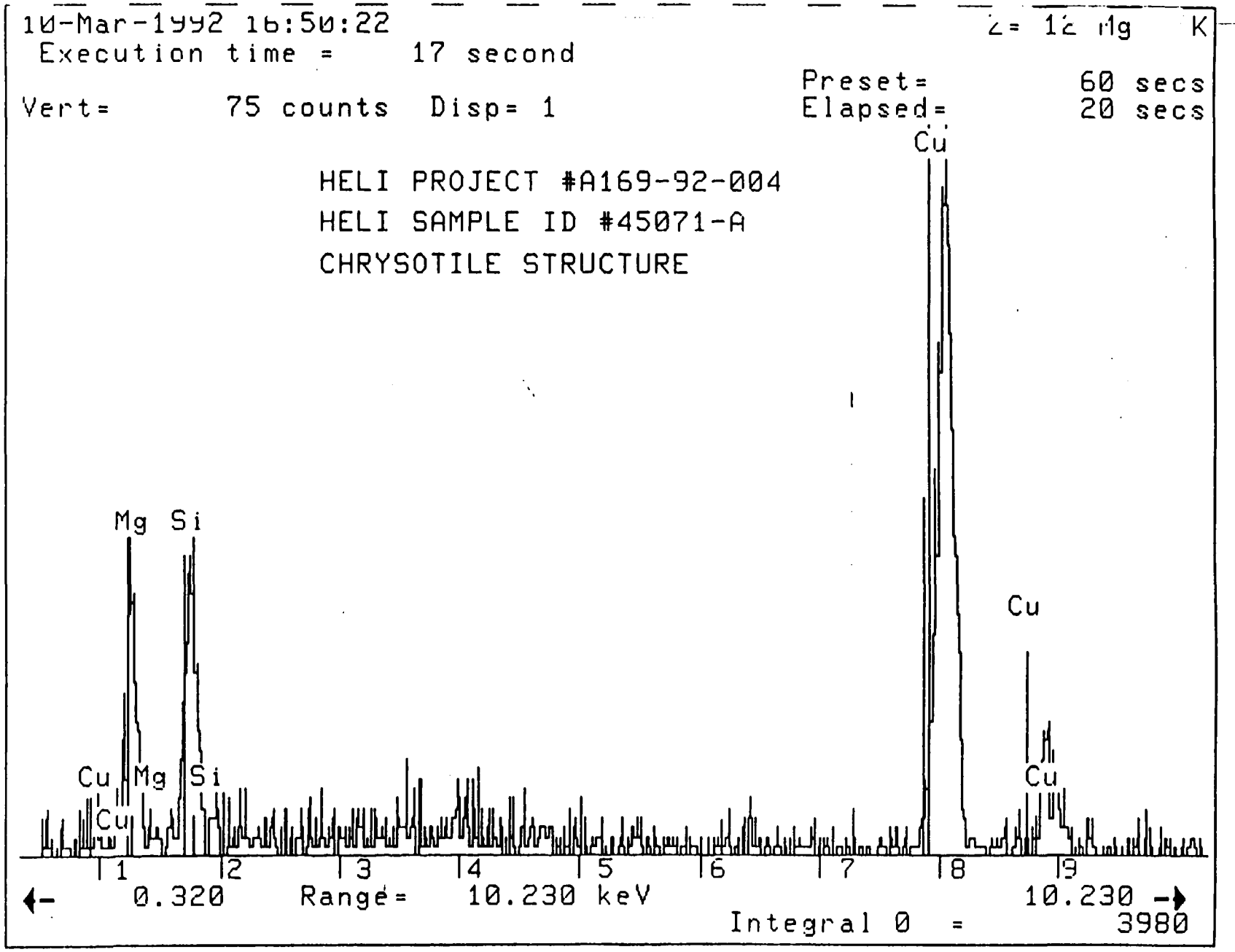
Z= 11 Na K

Vert= 200 counts Disp= 1

Preset= 60 secs
Elapsed= 34 secs

HELI PROJECT #A169-92-004
HELI SAMPLE ID #45071-A
CHRYSOTILE STRUCTURE




10-Mar-1992 16:50:22
Execution time = 17 second
Z= 12 Mg K
Preset= 60 secs
Elapsed= 20 secs
Vert= 75 counts Disp= 1
HELI PROJECT #A169-92-004
HELI SAMPLE ID #45071-A
CHRYSOTILE STRUCTURE
Cu
Mg Si
Cu
Cu Mg Si
Cu
Cu
1 2 3 4 5 6 7 8 9
0.320 Range= 10.230 keV 10.230
Integral 0 = 3980

YAMATE COUNT SHEET

HELI PROJECT # A169.92-004
HELI SAMPLE # 45072-A
INSTRUMENT: JEOL 1200 EX
WITH KEVEX EDX UNIT
ACC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. 71403
AVERAGE G.O. AREA 0.00790 mm²
OF GO'S ANALYZED 2
TOTAL AREA ANALYZED ~~0.00158~~ 0.0158 mm²

ANALYST Ken Rhodes
DATE 3.9.92
VOLUME (L) 1.45
METHOD EPA Level III (mod)/indirect
COMMENTS 50 ul of 1.725 ml del.

Asbestos Total mass = 0.113 ng

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS: STR. TYPE[1]	END TYPE[2]	LENGTH (mm)	WIDTH (mm)	AVG FIB DIA (mm)	SAED OBSRV.[3]	MICRO-GRAPH #	EDS OBSERVATIONS[4] * Na-Mg-Si-Ca-Fe	ASBESTOS CLASS[5]
1	1	—	1	F	R	12	1	1	CH		0.7.1000	CH
			2	F	R	12	1	1	A		0.7.1000	CH
			0	F	R	12	1	1	A		NO	NA
			3	F	R	140	1	1	CH		0.7.1000	CH
			4	M	R	40	20	1	CH		0.8.1000	CH
			5	F	R	40	1	1	CH		0.7.1000	CH
			6	M	R	40	20	1	CH		0.8.1000	CH
			7	F	R	11	1	1	CH		0.8.1000	CH
			8	F	R	40	1	1	CH		0.7.1000	CH
			9	F	R	45	1	1	CH		0.8.1000	CH
			10	F	R	24	1	1	A		0.9.1000	CH
			11	F	R	45	1	1	CH			CH
			12	F	R	40	1	1	CH			CH
			13	M	R	40	24	1	CH		0.8.1000	CH
			14	M	R	40	40	1	CH			CH
			15	F	R	60	1	1	CH			CH
			16	F	R	16	1	1	CH	910493	0.8.1000	CH
			17	F	R	9	1	1	CH			CH
			18	F	R	160	1	1	CH		0.7.1000	CH
			19	F	R	32	1	1	CH			CH

B-51

[1] F : FIBER
B : BUNDLE
C : CLUSTER
M : MATRIX
NSD : NO STRUCTURES DETECTED

[2] Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3] ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4] NO=Not Observable

[5] CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

GEIA ENVIRONMENTAL LABORATORIES
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T E M C O U N T S H E E T (CONTINUED)

LI PROJECT # A169-92-004
LI SAMPLE # 45022.A

ANALYST Ken Rhodes
DATE 3-9-92

RID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH mm	Width (mm)	Avg. Fb Dia.	3 SAED OBSRV.	MICRO-GRAPH #	EDS 4 OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	A	—	20	F	R	12	1	1	CH			CH
			21	F	R	180	1	1	CH			CH
			22	F	R	45	1	1	CH		0.7 1000	CH
			23	F	R	40	1	1	CH			CH
			24	F	R	24	1	1	A		0.7 1000	CH
			25	F	R	175	2	1	CH			CH
			26	M	R	40	16	1	CH			CH
			27	F	R	24	1	1	A		0.8-1000	CH
			28	B	R	165	2	1	CH			CH
			29	F	R	16	1	1	CH			CH
			30	F	R	16	1	1	CH			CH
			31	M	R	40	16	1	CH		0.8-1000	CH
			32	F	R	45	1	1	CH			CH
			33	M	R	16	8	1	A		0.8-1000	CH
			34	F	R	24	1	1	CH		0.8-1000	CH
			35	F	R	40	1	1	CH			CH
			36	F	R	40	1	1	CH			CH
			37	F	R	40	2	1	CH			CH
			38	F	R	12	1	1	A		0-7-1000	CH
			39	F	R	12	1	1	CH			CH
			40	M	R	40	1	1	CH		0-8-1000	CH
			41	F	R	32	1	1	CH			CH
			42	M	R	45	8	1	CH			CH
			43	F	R	50	1	1	CH			CH
			44	F	R	32	1	1	A		0-8-1000	CH
			45	F	R	16	1	1	CH		0-8-1000	CH
			46	B	R	125	50	1	CH			CH
			47	F	R	45	1	1	A		0.8.1000	CH
			48	F	R	40	1	1	CH			CH
			49	M	R	40	40	1	CH		0.8.1000	CH
			50	F	R	11	1	1	CH			CH

1,2,3,4,5 see page 1

HYGEIA ENVIRONMENTAL LABORATORIES
a divison of BSE Management Group, Inc.

TEM COUNT SHEET (CONTINUED)

HELI PROJECT # A169.92.004
HELI SAMPLE # 45072-A

ANALYST Ken Rhoden
DATE 3-9-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS 4 OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	51	F	R	24	1	1	CH		0.8.1000	CH
			52	F	R	32	1	1	CH			CH
			53	F	R	55	1	1	A		0.7.1000	CH
			54	F	R	16	1	1	CH			CH
			55	F	R	16	1	1	CH		0.8.1000	CH
			56	M	R	40	40	1	CH			CH
			57	F	R	40	1	1	CH			CH
			58	F	R	8	1	1	CH			CH
			59	F	R	90	2	2	CH		0.7.1000	CH
			60	F	R	24	1	1	CH			CH
			61	F	R	80	1	1	A		0.8.1000	CH
			62	F	R	165	2	2	CH			CH
			63	F	R	45	1	1	CH			CH
			64	F	R	16	1	1	CH			CH
			65	C	R	165	16	1	CH			CH
			66	F	R	40	1	1	CH			CH
			67	F	R	32	1	1	CH		0.7.1000	CH
			68	M	R	70	70	1	A		0.8.1000	CH
			69	F	R	16	1	1	CH			CH
			70	F	R	16	1	1	CH			CH
			71	F	R	16	1	1	CH			CH
			72	F	R	8	1	1	CH			CH
			73	F	R	16	1	1	CH		0.8.1000	CH
			74	F	R	85	1	1	A		0.8.1000	CH
			75	F	R	45	1	1	CH		0.7.1000	CH
			76	F	R	16	1	1	CH			CH
			77	F	R	80	1	1	CH			CH
			78	M	R	45	8	1	CH			CH
			79	F	R	24	1	1	CH			CH
			80	F	R	16	1	1	CH		0.7.1000	CH
			81	F	R	89	1	1	CH			CH

For 1,2,3,4,5 see page 1
Values normalized to Si=10

YGEIA ENVIRONMENTAL LABORATORIES
a divison of BSE Management Group, Inc.

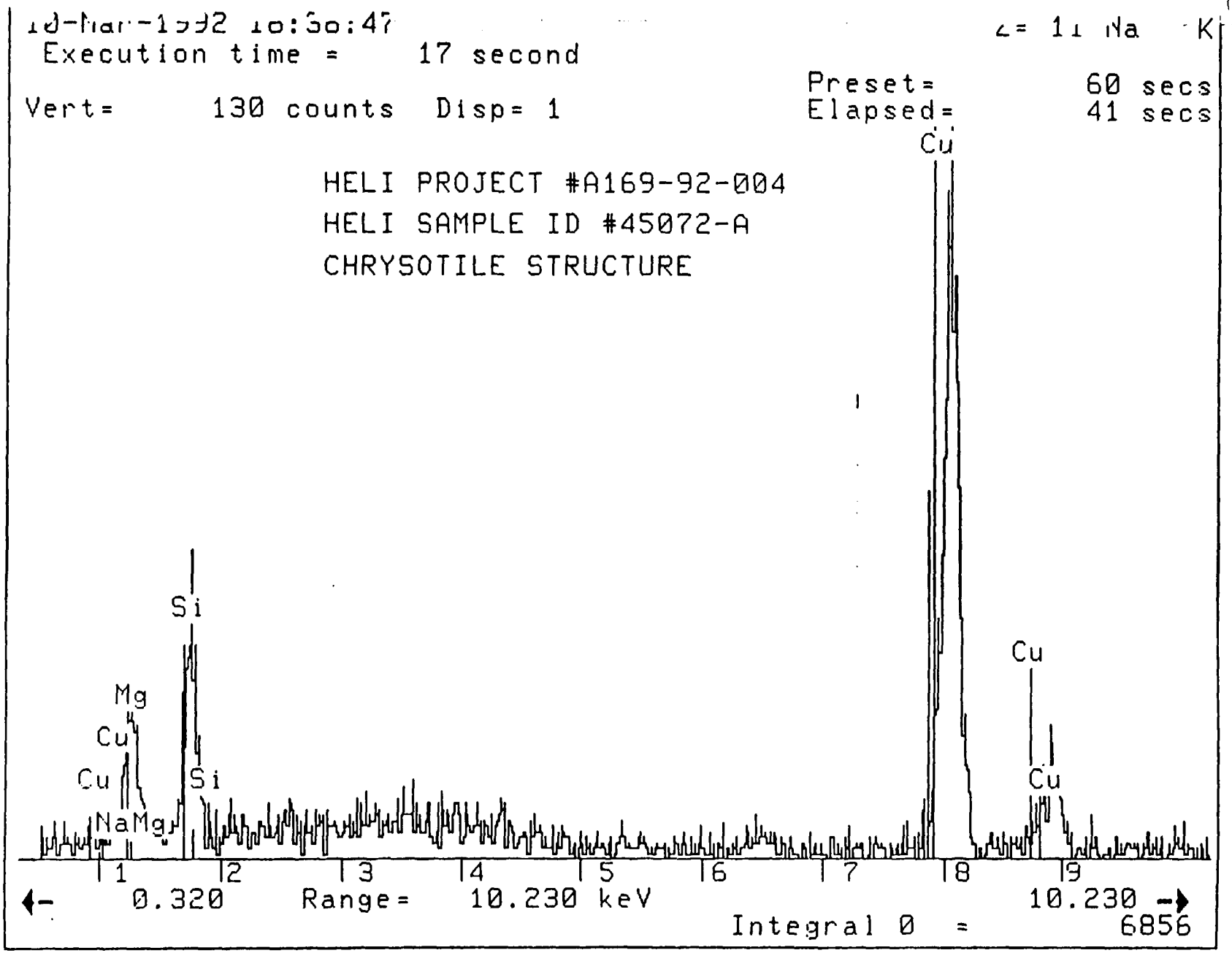
TEM COUNT SHEET (CONTINUED)

ELI PROJECT # A169-92 004
ELI SAMPLE # 45072-A

ANALYST Ken Rhoden
DATE 3-9-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (µm)	Width - mm	A.F.D mm	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	-	82	F	R	16	1	1	CH			CH
			83	F	R	16	1	1	CH			CH
			84	F	R	8	1	1	CH			CH
			85	M	R	40	40	1	CH	1	0-7-1000	CH
			86	F	R	16	1	1	A		0-8-1000	CH
	2	—	87	M	R	320	320	1	CH			CH
			88	B	R	175	8	1	CH			CH
			89	F	R	8	1	1	CH		0-7-1000	CH
			90	F	R	16	1	1	CH			CH
			91	F	R	8	1	1	A		0-7-1000	CH
			92	F	R	80	1	1	CH			CH
			93	C	R	90	40	1	CH			CH
			94	M	R	80	80	1	CH		0-8-1000	CH
			95	M	R	24	8	1	CH			CH
			96	F	R	40	1	1	CH			CH
			97	F	R	40	1	1	CH		0-8-1000	CH
			98	F	R	16	1	1	CH			CH
			99	F	R	24	1	1	A		0-7-1000	CH
			100	F	R	40	1	1	CH			CH
			101	M	R	35	16	1	CH			CH
			102	F	R	35	1	1	CH			CH
			103	F	R	16	1	1	A		0-8-1000	CH
			104	F	R	16	1	1	CH			CH
			105	M	R	85	40	2	CH			CH
			106	F	R	90	2	2	CH			CH
			107	F	R	100	1	1	CH		0-7-1000	CH
			108	M	R	160	160	1	CH			CH
			109	F	R	240	1	1	CH			CH
			110	F	R	120	2	2	CH			CH
			111	F	R	90	1	1	CH		0-8-1000	CH
			112	F	R	40	40	1	CH			CH

or 1,2,3,4, .e page 1
Values normalized to Si=10


10-Mar-1992 10:30:47
Execution time = 17 second
Z= 11 Na K
Vert= 130 counts Disp= 1
Preset= 60 secs
Elapsed= 41 secs
HELI PROJECT #A169-92-004
HELI SAMPLE ID #45072-A
CHRYSOTILE STRUCTURE
Cu
Si
Mg
Cu
Cu
Na
Mg
Si
Cu
Cu
1
2
3
4
5
6
7
8
9
0.320
Range= 10.230 keV
10.230
Integral 0 = 6856

HELI ENVIRONMENTAL LABORATORIES
a divison of BSE Management Group, Inc.

YAMATE COUNT SHEET

HELI PROJECT # A169-92-004
HELI SAMPLE # 45073-A
INSTRUMENT: JEOL 1200 EX
WITH KEVEX EDX UNIT
ACC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. T144
AVERAGE G.O. AREA 0.00790 mm²
OF GO'S ANALYZED 1
TOTAL AREA ANALYZED 0.00790 mm²

ANALYST Ken Rhodes
DATE 3-1-92
VOLUME (L) 1.7
METHOD EPA Level III (mod.) / indirect
COMMENTS 50AR of a 1:25 ml dil
Asbestos - Total mass = 0.32 ng

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. Type	2 END Type	LENGTH (mm)	WIDTH (mm)	AVG FIB Dia. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	1	—	1	M	R	40	40	1	CH	1	0.8-1000	CH
			2	F	R	35	1	1	CH		0.9-1000	CH
			3	F	R	9	1	1	CH		0.8-1000	CH
			4	M	R	160	40	1	CH		0.8-1000	CH
			5	M	R	80	24	1	CH		0.7-1000	CH
			6	M	R	160	16	1	CH		0.8-1000	CH
			7	F	R	100	2	2	CH		0.7-1000	CH
			8	M	R	240	80	2	A		0.8-1000	CH
			9	F	R	40	1	1	CH		0.9-1000	CH
			10	M	R	50	40	2	A		0.8-1000	CH
			11	M	R	16	8	1	CH			CH
			12	F	R	45	1	1	A		0.7-1000	CH
			13	F	R	16	1	1	CH			CH
			14	F	R	40	1	1	CH			CH
			15	M	R	160	80	1	CH			CH
			16	F	R	40	1	1	CH			CH
			17	F	R	40	1	1	A		0.8-1000	CH
			18	F	R	40	1	1	CH			CH
			19	F	R	16	1	1	CH			CH
			20	C	R	40	40	2	A		0.7-1000	CH

[1]F : FIBER
B : BUNDLE
C : CLUSTER
M : MATRIX
NSD : NO STRUCTURES DETECTED

[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

TEM COUNT SHEET (CONTINUED)

HELI PROJECT # A169-92-004
HELI SAMPLE # 45073-A

ANALYST Ken Rhodes
DATE 3-11-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS 4 OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	1	—	21	M	R	40	8	1	CH			CH
			22	F	R	8	1	1	CH			CH
			23	M	R	40	40	2	CH			CH
			24	F	R	140	1	1	A		0.7 1000	CH
			25	F	R	40	2	2	CH	1		CH
			26	F	R	16	1	1	CH			CH
			27	F	R	24	1	1	CH			CH
			28	F	R	16	1	1	CH			CH
			29	F	R	16	1	1	CH			CH
			30	F	R	9	1	1	A		0.7 1000	CH
			31	M	R	80	40	1	CH			CH
			32	M	R	80	40	1	CH			CH
			33	F	R	8	1	1	CH			CH
			34	F	R	8	1	1	CH			CH
			35	F	R	50	1	1	A		0.7 1000	CH
			36	F	R	16	1	1	CH			CH
			37	F	R	16	1	1	CH			CH
			38	M	R	40	16	1	CH	910496	0.8 1000	CH
			39	F	R	40	1	1	CH			CH
			40	F	R	70	1	1	CH			CH
			41	F	R	80	1	1	CH			CH
			42	F	R	80	1	1	CH			CH
			43	F	R	90	1	1	CH			CH
			44	F	R	24	1	1	A		0.8 1000	CH
			45	M	R	175	80	1	CH			CH
			46	F	R	40	1	1	CH			CH
			47	F	R	8	1	1	A		0.8 1000	CH
			48	M	R	40	8	1	CH			CH
			49	F	R	40	1	1	CH			CH
			50	M	R	160	80	1	CH			CH
			51	M	R	160	160	1	CH			CH

For 1,2,3,4,5 see page 1
*Values normalized to Si=10

a divison of BSE Management Group, Inc.

TEM COUNT SHEET (CONTINUED)

HELI PROJECT # A16B.92-004
HELI SAMPLE # 45073.A

ANALYST Ken Rhode
DATE 3-11-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	1	B-	52	F	R	24	1	1	CH			CH
			53	F	R	40	1	1	CH			CH
			54	M	R	160	40	1	CH			CH
			55	M	R	160	80	1	CH			CH
			56	F	R	40	1	1	CH	1	0.8-1000	CH
			57	C	R	40	40	1	CH			CH
			58	B	R	80	40	1	CH			CH
			59	M	R	85	80	1	CH			CH
			60	M	R	50	40	1	CH			CH
			61	M	R	320	160	1	CH		0.8-1000	CH
			62	F	R	50	1	1	CH			CH
			63	M	R	80	80	1	CH			CH
			64	M	R	160	80	1	CH			CH
			65	F	R	100	1	1	CH			CH
			66	F	R	80	1	1	CH			CH
			67	F	R	80	1	1	CH			CH
			68	F	R	40	1	1	CH			CH
			69	F	R	16	1	1	CH			CH
			70	F	R	16	1	1	CH		0.8-1000	CH
			71	M	R	160	80	2	CH			CH
			72	M	R	160	80	1	CH			CH
			73	M	R	160	80	1	CH			CH
			74	F	R	40	1	1	CH			CH
			75	M	R	160	80	1	CH			CH
			76	M	R	240	80	1	CH		0.8-1000	CH
			77	M	R	160	160	1	CH			CH
			78	M	R	160	40	1	CH			CH
			79	M	R	160	40	1	CH			CH
			80	M	R	160	80	1	CH			CH
			81	M	R	160	160	1	CH			CH
			82	F	R	~~25~~ 32	2	1	CH			CH

For 1,2,3,4,5 see page 1
*Values normalized to Si=10

.. d... son .. B... lan , mer. ..rou.. In

Page 4 of 4

TEM COUNT SHEET (CONTINUED)

HELI PROJECT # A169.92-004
HELI SAMPLE # 45073.4

ANALYST Ken Rhodes
DATE 3-11-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS OBSERVATIONS 4 * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	1	—	83	F	R	45	1	1	CH			CH
			84	F	R	50	1	1	CH			CH
			85	F	R	16	1	1	CH			CH
			86	F	R	80	1	1	CH			CH
			87	F	R	60	1	1	CH			CH
			88	F	R	24	1	1	CH		0.8-1000	CH
			89	F	R	8	1	1	CH			CH
			90	M	R	40	40	1	CH			CH
			91	M	R	160	160	1	CH			CH
			92	F	R	80	1	1	CH			CH
			93	F	R	40	1	1	CH		0.7-1000	CH
			94	M	R	40	80	1	CH			CH
			95	F	R	39	1	1	CH			CH
			96	M	R	90	40	1	CH			CH
			97	M	R	160	40	2	CH			CH
			98	F	R	70	1	1	CH	910497		CH
			99	F	R	160	8	1	CH			CH
			100	F	R	40	1	1	CH		0.8-1000	CH
			101	F	R	40	1	1	CH			CH
			102	F	R	100	1	1	CH		0.7-1000	CH
			103	M	R	80	40	1	CH		0.8-1000	CH
			104	M	R	60	80	1	CH			CH
			105	F	R	16	1	1	CH			CH
			106	M	R	40	8	1	CH			CH
			107	B	R	80	16	1	CH		0.8-1000	CH
			108	M	R	160	80	1	CH			CH
			109	M	R	160	80	1	CH			CH
			110	M	R	80	160	1	CH			CH
			111	F	R	80	1	1	CH			CH
			112	F	R	60	1	1	CH			CH
			113	F	R	8	1	1	CH			CH
			114	M	R	90	40	1	CH			CH

For 1,2,3,4,5 see page 1
*Values normalized to Si=10

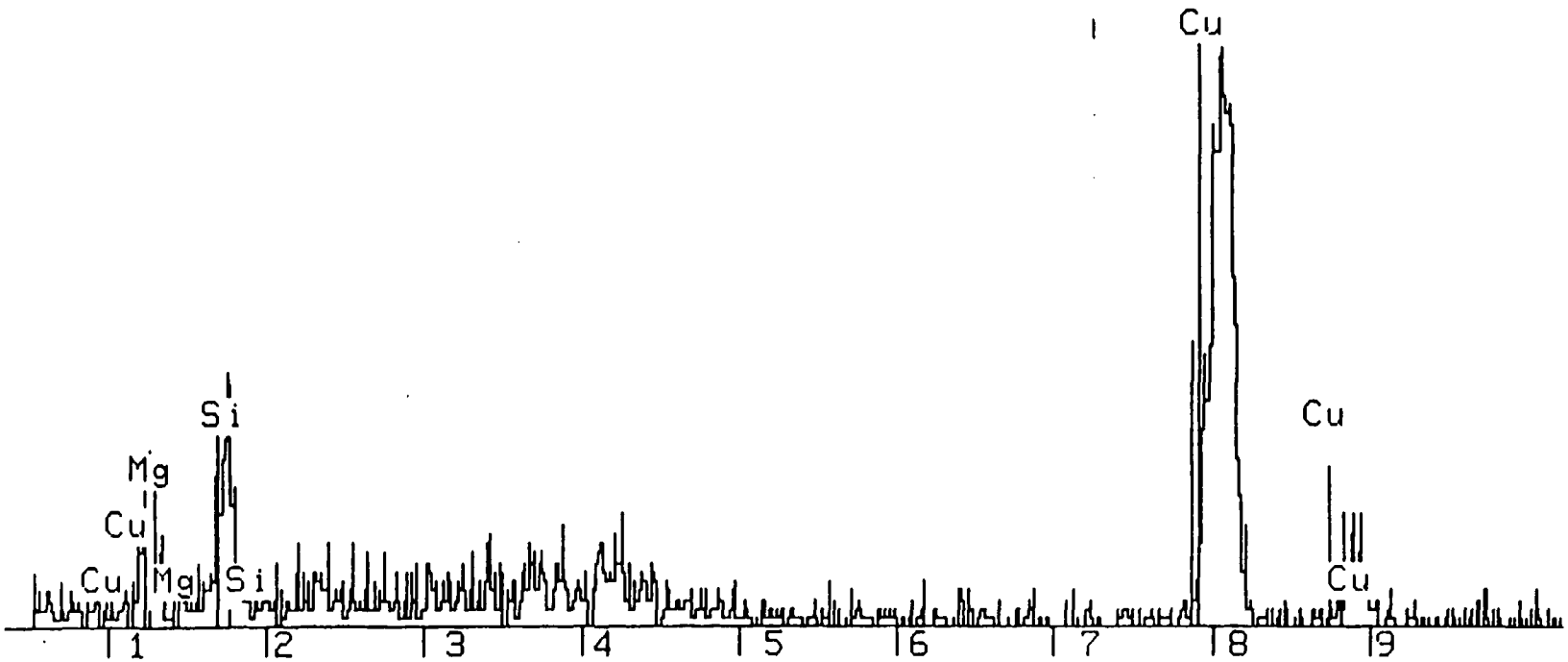
11-Mar-1992 14:11.21 Z= 12 Mg K

Execution time = 16 second

Vert= 100 counts Disp= 1

Preset= 60 secs
Elapsed= 21 secs

HELI PROJECT #A169-92-004
HELI SAMPLE ID #45073-A
CHRYSOTILE STRUCTURE



0.320 Range= 10.230 keV 10.230

Integral 0 = 3995

11-Mar-1992 13:54:30 Z= 12 Mg K

Execution time = 16 second

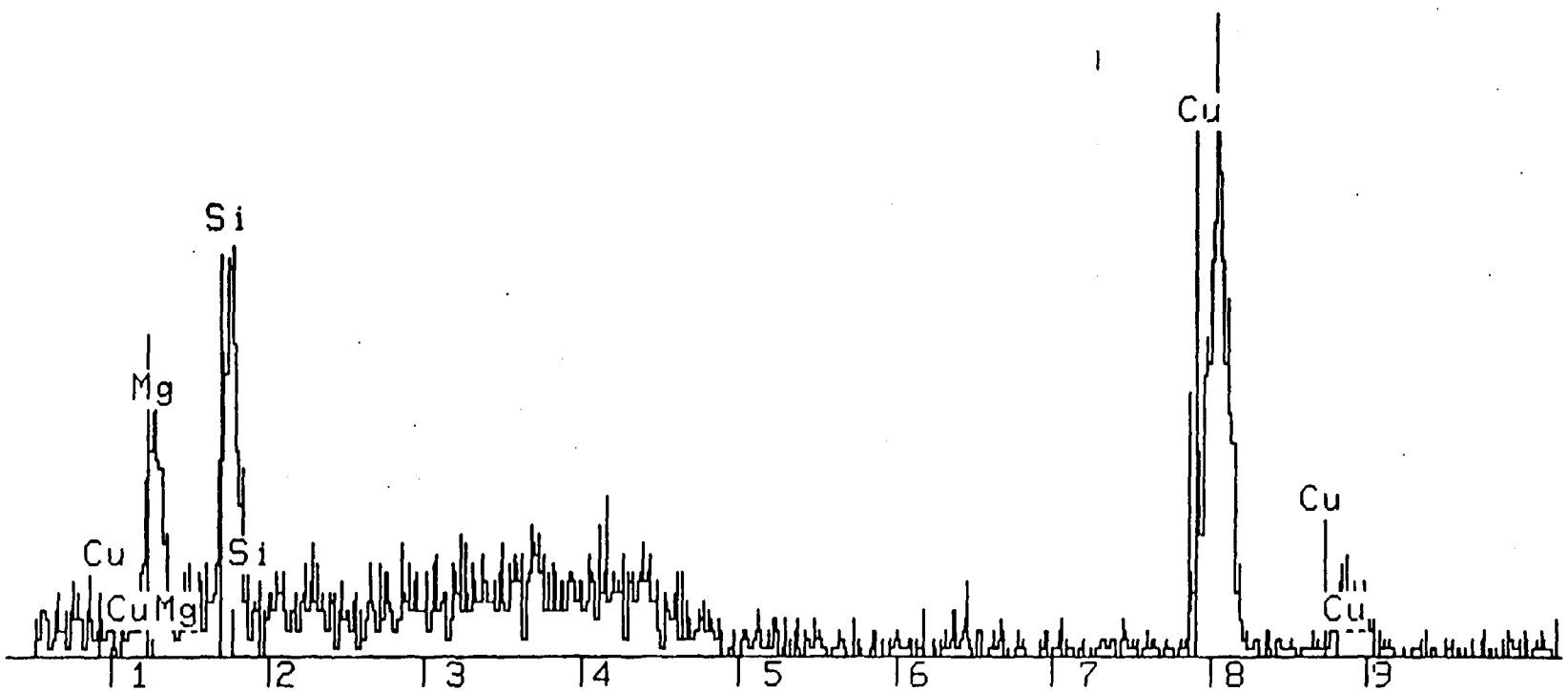
Preset= 60 secs

Vert= 100 counts Disp= 1 Elapsed= 24 secs

HELI PROJECT #A169-92-004

HELI SAMPLE ID #45073-A

CHRYSOTILE STRUCTURE



0.320 Range= 10.230 keV 10.230

Integral 0 = 5152

YAMATE COUNT SHEET

HELI PROJECT # A169-92-004
HELI SAMPLE # 45074-A
INSTRUMENT: JEOL 1200 EX
WITH KEVEX EDX UNIT
ACC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. T1745
AVERAGE G.O. AREA 0.00790 mm²
OF GO'S ANALYZED 4
TOTAL AREA ANALYZED 0.0316 mm²

ANALYST Ken Rhodes
DATE 3-10-92
VOLUME (L) 2.25
METHOD EPA Level II (mod) / indirect
COMMENTS 50ul of a 1:25 dil.

Asbestos Total mass = 0.375 ng

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	WIDTH (mm)	AVG FIB DIA (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	1	—	1	B	R	30	4	1	CH		0-8-1000	CH
			2	F	R	16	1	1	CH		0-8-1000	CH
			3	M	R	240	320	1	CH		0-8-1000	CH
			4	F	R	40	1	1	CH		0-8-1000	CH
			5	F	R	50	1	1	CH		0-7-1000	CH
			6	F	R	24	1	1	CH		0-8-1000	CH
			7	F	R	16	1	1	A		0-7-1000	CH
			8	F	R	165	1	1	CH			CH
			9	B	R	160	1	2	CH			CH
			10	F	R	40	1	1	CH	910494	0-8-1000	CH
			11	B	R	16	2	2	CH			CH
			12	F	R	40	1	1	CH		0-7-1000	CH
			13	B	R	40	4	1	CH		0-8-1000	CH
			14	F	R	40	1	1	CH			CH
			15	F	R	40	1	1	CH		0-7-1000	CH
			16	F	R	45	1	1	CH		0-8-1000	CH
			17	F	R	40	1	1	CH		0-7-1000	CH
			18	F	R	40	1	1	R		0-7-1000	CH
			19	F	R	70	2	1	CH			CH
			20	F	R	16	1	1	CH			CH

B-62

[1] F : FIBER
B : BUNDLE
C : CLUSTER
M : MATRIX
NSD : NO STRUCTURES DETECTED

[2] Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3] ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4] NO=Not Observable

[5] CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

YGEIA ENVIRONMENTAL LABORATORIES
a divison of BSE Management Group, Inc.

T E M C O U N T S H E E T (CONTINUED)

ELI PROJECT # A169-92-004
ELI SAMPLE # 45074-A

ANALYST Ken Rhodes
DATE 3-10-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width 5 (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS 4 OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	1	–	21	F	R	90	1.0	1.0	CH		0-8-1000	CH
			22	F	R	50	1.0	1.0	CH			CH
			23	F	R	50	1	1	CH			CH
			24	F	R	45	1	1	A	1	0-7-1000	CH
			25	F	R	160	2	1	CH			CH
			26	F	R	40	1	1	CH			CH
			27	F	R	16	1	1	A		0-7-1000	CH
			28	F	R	40	2	2	CH			CH
			29	F	R	8	1	1	CH			CH
	2	–	30	F	R	38	1	1	CH			CH
			31	F	R	24	1	1	CH		0-8-1000	CH
			32	M	R	40	40	1	CH			CH
			33	M	R	40	40	1	CH			CH
			34	M	R	320	240	1	CH			CH
			35	M	R	40	40	1	A		0-7-1000	CH
			36	M	R	160	160	1	CH			CH
			37	B	R	45	2	2	CH			CH
			38	F	R	45	2	2	CH			CH
			39	F	R	12	1	1	A		0-8-1000	CH
			40	F	R	16	1	1	CH			CH
			41	F	R	8	1	1	CH			CH
			42	M	R	40	20	1	CH			CH
			43	M	R	60	24	1	CH			CH
			44	M	R	160	40	1	CH		0-8-1000	CH
			45	F	R	90	2	2	CH			CH
			46	F	R	16	1	1	CH			CH
			47	F	R	24	1	1	CH			CH
			48	F	R	90	2	2	CH			CH
			49	F	R	100	1	1	CH		0-7-1000	CH
			50	F	R	24	1	1	CH		0-8-1000	CH
			51	B	R	40	2	2	CH			CH

or 1,2,3,4,5 see page 1
Values normalized to Si=10

:GEIA ENVIRONMENTAL LABORATORIES
a divison of BSE Management Group, Inc.

T E M C O U N T S H E E T (CONTINUED)

:LI PROJECT # A160-92 004
:LI SAMPLE # 45074-A

ANALYST Ken Rhodes
DATE 3-10-92

:RID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS 4 OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	2	–	52	M	R	100	40	1	CH		0-9-1000	CH
			53	F	R	160	1	1	A		0-9-1000	CH
			54	F	R	80	1	1	CH		0-8-1000	CH
			55	M	R	160	80	1	CH			CH
	3	–	56	F	R	40	1	1	CH			CH
			57	F	R	160	1	1	CH		0-7-1000	CH
			58	M	R	160	16	1	CH			CH
			59	F	R	80	1	1	A		0-7-1000	CH
			60	F	R	40	1	1	CH			CH
			61	M	R	160	80	1	CH			CH
			62	M	R	80	80	1	A		0-7-1000	CH
			63	M	R	40	40	1	CH			CH
			64	F	R	8	1	1	CH			CH
			65	F	R	8	1	1	CH			CH
			66	F	R	16	1	1	CH		0-8-1000	CH
			67	F	R	240	1	1	CH			CH
			68	M	R	160	160	1	CH			CH
			69	F	R	8	1	1	CH			CH
			70	F	R	16	1	1	CH			CH
			71	M	R	40	40	1	CH		0-8-1000	CH
			72	F	R	85	1	1	CH		0-9-1000	CH
			73	F	R	120	1	1	CH		0-8-1000	CH
			74	F	R	80	1	1	A		0-7-1000	CH
			75	F	R	80	1	1	CH			CH
			76	M	R	320	240	2	CH			CH
			77	F	R	16	1	1	CH			CH
			78	M	R	80	1	1	A		0-9-1000	CH
			79	M	R	160	80	1	CH		0-8-1000	CH
1	4	–	80	F	R	40	2	2	CH			CH
			81	F	R	240	1	1	CH			CH
			82	F	R	12	1	1	CH			CH

1 2 3 4 5

GEIA ENVIRONMENTAL LABORATORIES
a divison of BSE Management Group, Inc.

T E M C O U N T S H E E T (CONTINUED)

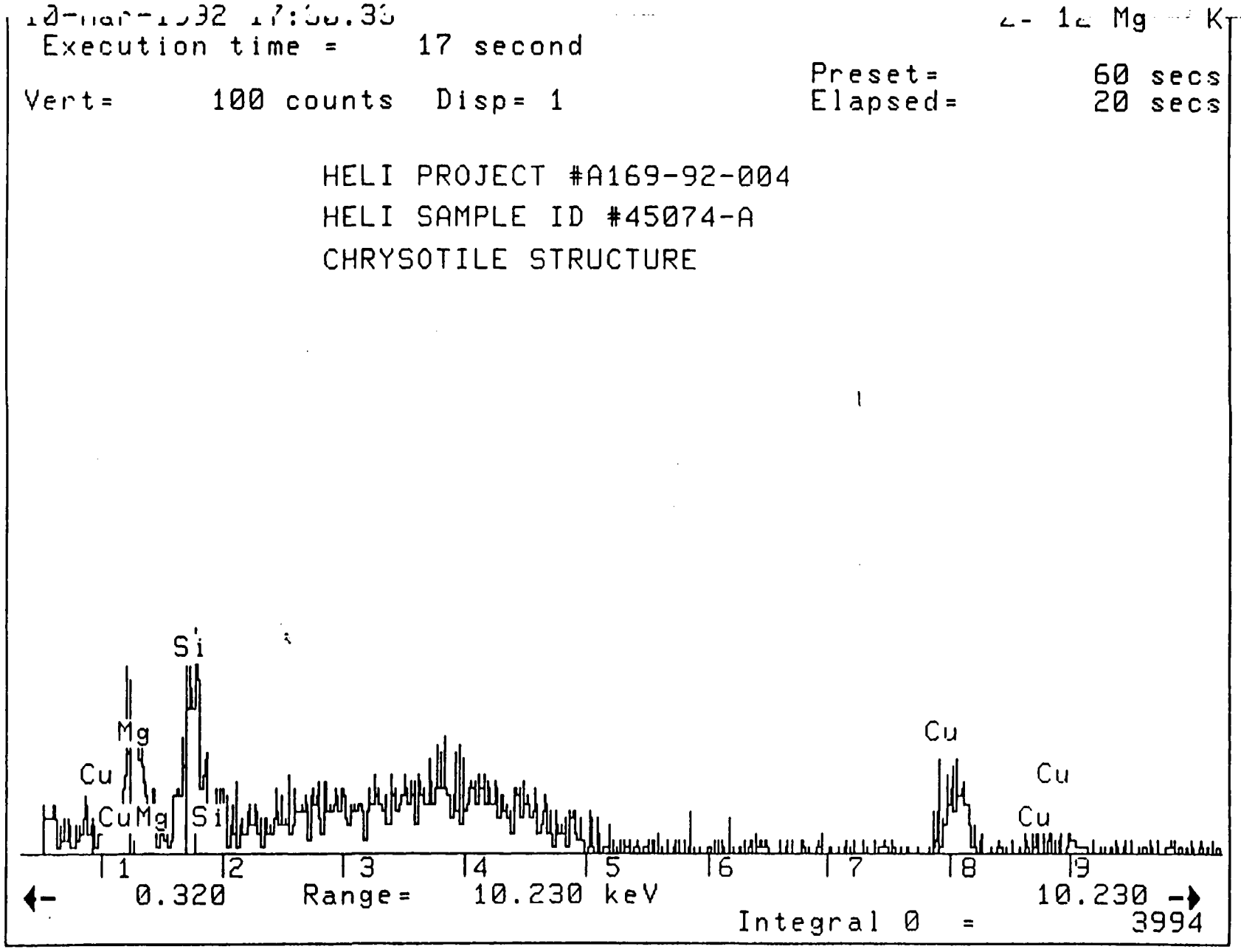
LI PROJECT # A169.92.001
LI SAMPLE # 45074.A

ANALYST [signature]
DATE 3 16 92

RID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS 4 OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	4	—	83	M	R	320	240	1	CH			CH
			84	M	R	16	16	1	CH			CH
			85	F	R	16	2	2	CH			CH
			86	F	R	80	1	1	CH		0-8-1000	CH
			87	M	R	45	2	2	CH			CH
			88	A	R	16	16	2	CH			CH
			89	F	R	160	1	1	CH			CH
			90	F	R	40	1	1	A		0-7-1000	CH
			91	F	R	16	1	1	CH			CH
			92	F	R	160	2	2	CH			CH
			93	F	R	16	1	1	CH			CH
			94	F	R	16	1	1	A		0-8-1000	CH
			95	C	R	160	160	1	CH			CH
			96	F	R	160	1	1	CH			CH
			97	M	R	160	160	2	CH			CH
			98	M	R	16	16	1	A		0-7-1000	CH
			99	F	R	40	1	1	CH			CH
			100	F	R	16	1	1	CH			CH
			101	F	R	80	1	1	CH			CH
			102	M	R	160	80	1	CH			CH

B-65

[1,2,3,4,5] see page 1
*values normalized to Si=10


10-Mar-1992 17:30.33
Execution time = 17 second
Vert= 100 counts Disp= 1
Preset= 60 secs
Elapsed= 20 secs
HELI PROJECT #A169-92-004
HELI SAMPLE ID #45074-A
CHRYSOTILE STRUCTURE
Si
Mg
Cu
Cu
Mg
Si
Cu
Cu
Cu
1
2
3
4
5
6
7
8
9
0.320
Range= 10.230 keV
10.230
Integral 0 = 3994

10-Mar-1992 17:56:17 Z= 12 Mg K

Execution time = 17 second

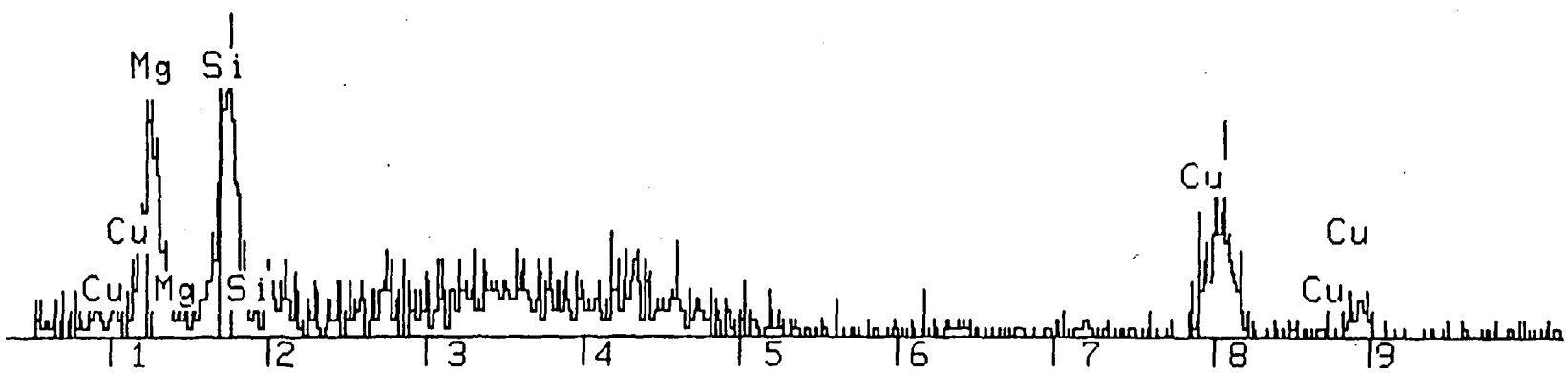
Preset= 60 secs

Vert= 100 counts Disp= 1 Elapsed= 19 secs

HELI PROJECT #A169-92-004

HELI SAMPLE ID #45074-A

CHRYSOTILE STRUCTURE



← 0.320 Range= 10.230 keV 10.230 →

Integral 0 = 3131

HIGEIA ENVIRONMENTAL LABORATORIES
a divison of BSE Management Group, Inc.

YAMATE COUNT SHEET

HELI PROJECT # A169-92-004
HELI SAMPLE # 45075.A
INSTRUMENT: JEOL 1200 EX
WITH KEVEX EDX UNIT
ACC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. T17U5
AVERAGE G.O. AREA 0.00790 mm²
OF GO'S ANALYZED 4
TOTAL AREA ANALYZED 0.0316 mm²

ANALYST Ken Rhodes
DATE 3-11-92
VOLUME (L) 2.45
METHOD EPA Level III (mod.) / indirect
COMMENTS soil of a 1-25 mil dil.
Total asbestos mass = 0.31 ng

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. Type	2 END Type	LENGTH (mm)	WIDTH (mm)	AVG FIB Dia. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	1	F	R	45	1	1	CH	1	0-8-1000	CH
			2	F	R	8	1	1	CH		0-7-1000	CH
			3	F	R	40	1	1	CH		0-8-1000	CH
			4	F	R	16	1	1	CH		0-8-1000	CH
			5	M	R	240	160	1	CH		0-8-1000	CH
			6	F	R	9	1	1	CH		0-9-1000	CH
			7	F	R	16	1	1	CH		0-8-1000	CH
			8	M	R	100	40	1	A		0-7-1000	CH
			9	F	R	80	1	1	CH		0-8-1000	CH
			10	F	R	45	1	1	CH			CH
			11	F	R	16	1	1	A		0-7-1000	CH
			12	F	R	8	1	1	CH			CH
			13	F	R	45	1	1	CH			CH
			14	F	R	16	1	1	CH			CH
			15	M	R	70	16	1	CH			CH
			16	F	R	16	1	1	A		0-8-1000	CH
			17	F	R	24	1	1	CH			CH
			18 ~~20~~	F	R	10	1	1	CH			CH
			19 ~~21~~	F	R	40	1	1	CH			CH
			20 ~~22~~	F	R	45	1	1	CH			CH

[1]F : FIBER
B : BUNDLE
C : CLUSTER
M : MATRIX
NSD : NO STRUCTURES DETECTED

[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

a divison of BSE Management Group, Inc.

TEM COUNT SHEET (CONTINUED)

HELI PROJECT # A169-92-004
HELI SAMPLE # 45075-A

ANALYST Ken Rhodes
DATE 3-11-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	21	23	F	R	80	1	1	CH			CH
		22	24	F	R	16	1	1	CH			CH
		23	25	F	R	80	1	1	A		0.7 1000	CH
		24	26	B	R	50	1	1	CH			CH
		25	27	F	R	320	1	1	CH	1		CH
		26	28	B	R	90	1	1	CH			CH
		27	29	M	R	60	16	1	CH			CH
		28	30	F	R	8	1	1	CH			CH
		29	31	M	R	80	80	1	CH			CH
		30	32	M	R	100	40	1	ND		0.8 1000	CH
		31	33	F	R	24	1	1	CH			CH
	2	32	34	M	R	480	240	2	CH			CH
		33	35	F	R	24	2	1	CH		0.8 1000	CH
		34	36	F	R	16	1	1	CH	910495		CH
		35	37	M	R	30	2	2	CH			CH
		36	38	F	R	40	1	1	CH			CH
		37	39	F	R	32	2	1	CH			CH
		38	40	M	R	240	200	1	CH		0.7 1000	CH
		39	41	M	R	1160	32	2	CH			CH
		40	42	F	R	240	2	2	CH			CH
		41	43	F	R	40	1	1	CH			CH
		42	44	F	R	35	1	1	CH			CH
		43	45	M	R	45	20	1	CH			CH
		44	46	F	R	70	2	2	CH		0.8 1000	CH
		45	47	M	R	85	80	2	CH			CH
		46	48	F	R	8	1	1	CH			CH
		47	49	B	R	240	32	1	CH		0.8 1000	CH
		48	50	F	R	90	1	1	A		0.7 1000	CH
		49	51	F	R	70	1	1	CH			CH
		50	52	F	R	7	1	1	CH			CH
		51	53	F	R	9	1	1	CH			CH

For 1,2,3,4,5 see page 1
*Values normalized to Si=10

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TEM COUNT SHEET (CONTINUED)

HELI PROJECT # A169-92-004
HELI SAMPLE # 45075-A

ANALYST [illegible]
DATE 3-11-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	2	- 52	54	F	R	16	1	1	CH			CH
		53	55	F	R	16	1	1	CH			CH
		54	56	F	R	8	1	1	CH			CH
		55	57	F	R	12	1	1	A		0.7 1000	CH
		56	58	F	R	8	1	1	CH	1		CH
		57	59	F	R	7	1	1	A		0.8 1000	CH
		58	60	F	R	8	1	1	CH			CH
		59	61	F	R	40	2	2	CH			CH
		60	62	F	R	35	1	1	CH			CH
2	3	- 61	63	M	R	160	160	1	CH			CH
		62	64	M	R	90	20	1	CH		0.8 1000	CH
		63	65	M	R	520	90	1	A		0.7 1000	CH
		64	66	M	R	160	160	2	CH			CH
		65	67	F	R	16	1	1	CH			CH
		66	68	F	R	100	1	1	CH			CH
		67	69	F	R	24	1	1	CH			CH
		68	70	F	R	8	1	1	CH			CH
		69	71	M	R	82	40	1	CH		0.8 1000	CH
		70	72	M	R	85	40	2	CH		0.8 1000	CH
		71	73	M	R	95	40	1	CH			CH
		72	74	F	R	16	1	1	A		0.7 1000	CH
		73	75	F	R	24	1	1	CH			CH
		74	76	F	R	160	1	1	CH			CH
		75	77	F	R	8	1	1	CH		0.8 1000	CH
		76	78	M	R	40	8	1	CH			CH
		77	79	F	R	79	1	1	CH			CH
		78	80	F	R	16	1	1	CH			CH
		79	81	F	R	8	1	1	CH			CH
	4	- 80	82	F	R	8	1	1	CH			CH
		81	83	F	R	40	1	1	CH			CH
		82	84	M	R	85	80	1	CH		0.8 1000	CH

For 1,2,3,4,5 see page 1
*Values normalized to Si=10

a division of BSL Management Group, Inc.

TEM COUNT SHEET (CONTINUED)

HELI PROJECT # A169-92-004
HELI SAMPLE # 45075-A

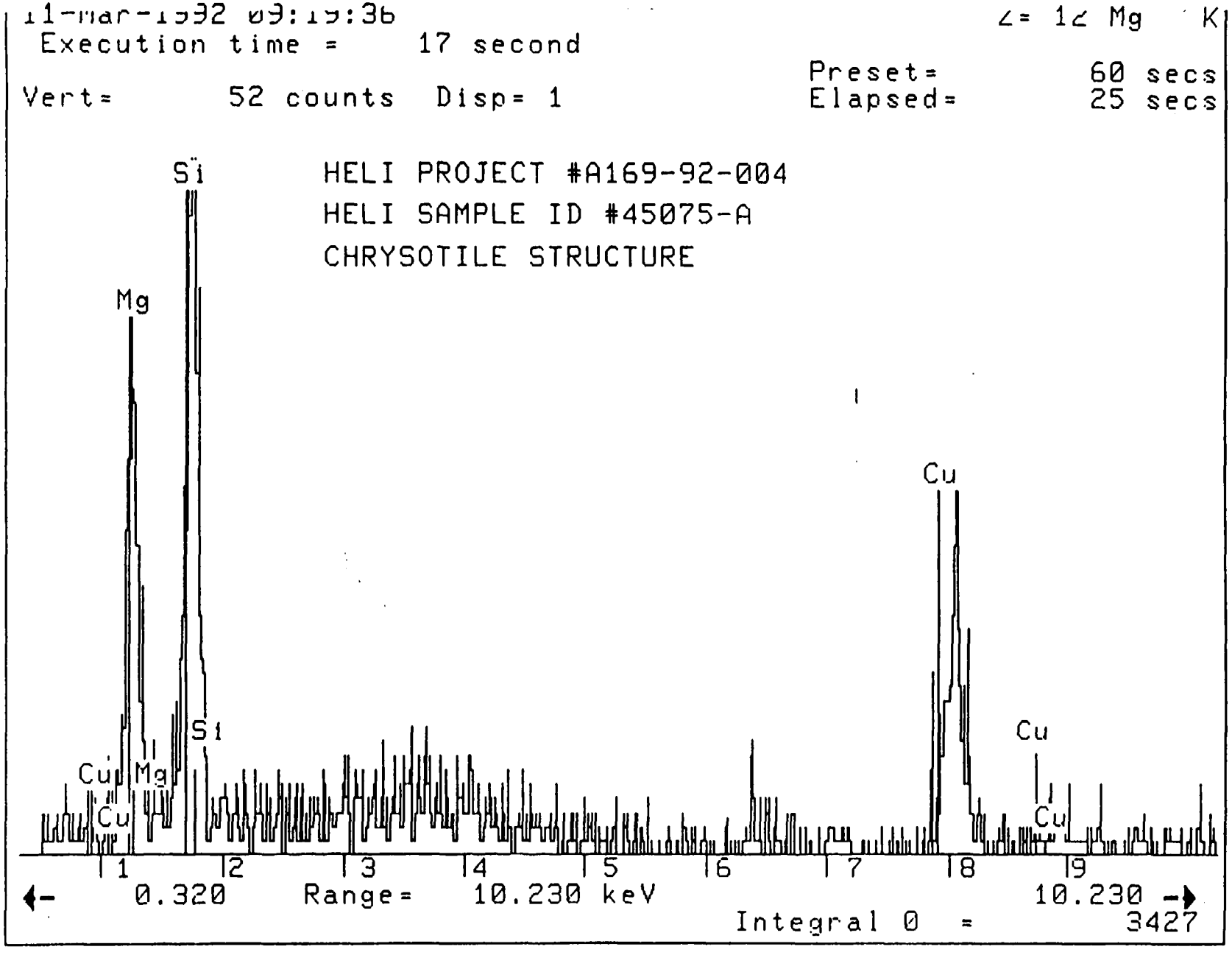
ANALYST Ken Rhodes
DATE 3-11-92

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. TYPE	2 END TYPE	LENGTH (mm)	Width (mm)	A.F.D. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	EDS OBSERVATIONS 4 * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
2	4	83	85	F	R	12	1	1	CH			CH
		84	86	M	R	160	160	1	CH			CH
		85	87	M	R	240	160	2	CH			CH
		86	88	F	R	50	1	1	CH		0.7/1000	CH
		87	89	F	R	55	1	1	CH			CH
		88	90	F	R	7	1	1	CH	1		CH
		89	91	F	R	82	1	1	CH		0.8-1000	CH
		90	92	F	R	24	1	1	CH			CH
		91	93	M	R	85	40	1	CH			CH
		92	94	F	R	24	1	1	NA		0.7/1000	CH
		93	95	F	R	40	1	1	CH		0.8-1000	CH
		94	96	F	R	6	1	1	CH			CH
		95	97	F	R	240	1	1	CH			CH
		96	98	F	R	16	1	1	A		0.7/1000	CH
		97	99	M	R	160	40	2	CH			CH
		98	100	M	R	85	40	2	CH			CH
		99	101	M	R	120	40	2	CH			CH
		100	102	F	R	16	1	1	CH			CH

For 1,2,3,4,5 see page 1
*Values normalized to Si=10

B-71

460 002 1148


11-Mar-1992 09:19:36
Execution time = 17 second
Z= 12 Mg K
Preset= 60 secs
Elapsed= 25 secs
Vert= 52 counts Disp= 1
HELI PROJECT #A169-92-004
HELI SAMPLE ID #45075-A
CHRYSOTILE STRUCTURE
Si
Mg
Cu
Mg
Cu
Si
Cu
Cu
Cu
1
2
3
4
5
6
7
8
9
0.320
Range= 10.230 keV
10.230
Integral 0 = 3427

ABD 002 1149

11-Mar-1992 09:29:06 Z= 12 Mg K

Execution time = 16 second

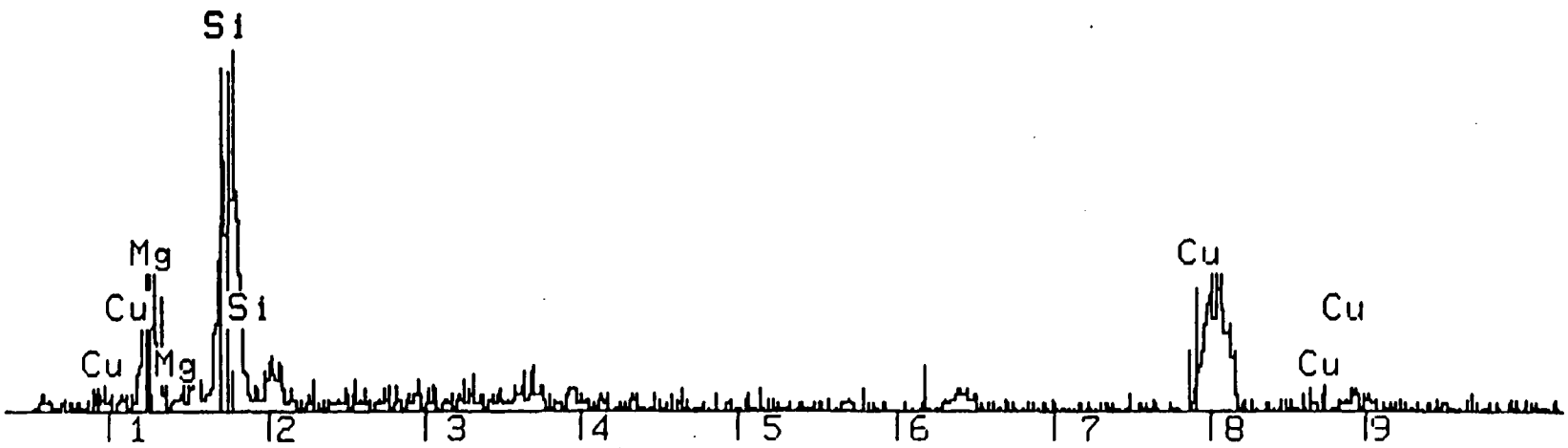
Preset= 60 secs

Vert= 200 counts Disp= 1 Elapsed= 20 secs

HELI PROJECT #A169-92-004

HELI SAMPLE ID #45075-A

CHRYSOTILE STRUCTURE



0.320 Range= 10.230 keV 10.230

Integral 0 = 3666

HYGEIA ENVIRONMENTAL LABORATORIES
a divison of BSE Management Group, Inc.

YAMATE COUNT SHEET

HELI PROJECT # A169-92-004
HELI SAMPLE # Water Blank
INSTRUMENT: JEOL 1200 EX
WITH KEVEX EDX UNIT
ACC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. Water B1
AVERAGE G.O. AREA 0.00790 mm²
OF GO'S ANALYZED 10
TOTAL AREA ANALYZED 0.0790 mm²

ANALYST [illegible]
DATE 3-11-92
VOLUME (L) 200 mls
METHOD EPA Level III (mod) / fiber count
COMMENTS 200 mls

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS STR. Type [1]	END Type [2]	LENGTH (mm)	WIDTH (mm)	AVG FIB Dia. (mm)	SAED OBSRV. [3]	MICRO-GRAPH #	EDS OBSERVATIONS [4] * Na-Mg-Si-Ca-Fe	ASBESTOS CLASS [5]
2	1	-	0	NSD						1		
	2	-	0	F	R	16	1	1	ND		Al-9 Si-10	NA
			0	F	R	24	1	1	NA		Al-9 Si-10	NA
	3	-	0	NSD								
	4	-	0	F	R	35	2	2	NA		Al-9 Si-10	NA
	5	-	0	NSD								
	6	-	0	F	R	16	1	1	NA		Al-9 Si-10	NA
	7	-	0	NSD								
	8	-	0	F	R	40	2	2	NA		Al-9 Si-10	NA
	9	-	0	NSD								
	10	-	0	F	R	40	4	4	NA		Al-9 Si-10	NA

[1] F : FIBER
B : BUNDLE
C : CLUSTER
M : MATRIX
NSD : NO STRUCTURES DETECTED

[2] Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3] ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4] NO=Not Observable

[5] CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

HYGEIA ENVIRONMENTAL LABORATORIES
a divison of BSE Management Group, Inc.

YAMATE COUNT SHEET

HELI PROJECT # A169-92-004
HELI SAMPLE # Lab B1
INSTRUMENT: JEOL 1200 EX
WITH KEVEX EDX UNIT
ACC. VOLTAGE 100 kV

FILTER TYPE/PORE SIZE MCE / 0.22 µm
CLIENT SAMPLE I.D. Lab B1
AVERAGE G.O. AREA 0.00790 mm²
OF GO'S ANALYZED 10
TOTAL AREA ANALYZED 0.0790 mm²

ANALYST [illegible]
DATE 3-11-92
VOLUME (L) 0
METHOD EPA Level III (mod/indirect
COMMENTS

GRID #	GO #	INDEX POS.	STR. #	MORPHOLOGY OBSERVATIONS 1 STR. Type	2 END Type	LENGTH (mm)	WIDTH (mm)	AVG FIB Dia. (mm)	3 SAED OBSRV.	MICRO-GRAPH #	4 EDS OBSERVATIONS * Na-Mg-Si-Ca-Fe	5 ASBESTOS CLASS
1	1	—	0	NSD						1		
	2	—	0	NSD								
	3	—	0	NSD								
	4	—	0	NSD								
	5	—	0	NSD								
B-75	6	—	0	NSD								
	7	—	0	NSD								
	8	—	0	NSD								
	9	—	0	NSD								
	10	—	0	NSD								

[1]F : FIBER
B : BUNDLE
C : CLUSTER
M : MATRIX
NSD : NO STRUCTURES DETECTED

[2]Characteristic description of fiber end appearance. (D=dovetailed, F=flat, R=rounded S=stepped, T=tubular)

*Values normalized to Si=10

[3]ND=No Diffraction obtained
A=Ambiguous
CHRY=Chrysotile
AMPH=Amphibole
NEG=Negative ID
NA=Non-Asbestos
[4]NO=Not Observable

[5]CH=Chrysotile
RB=Riebeckite
GR=Grunerite
TR=Tremolite
AC=Actinolite
AN=Anthophyllite
NA=Not Applicable

CHRYSOTILE SAED WORKSHEET

HELI
EAL PROJECT # A109-92-009

HELI
~~EAL~~ SAMPLE ID# 45070-A

MICROGRAPH # 910499

CAMERA LENGTH 80cm

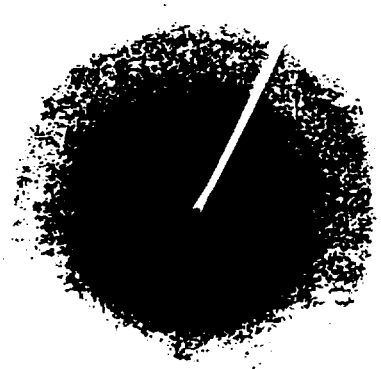
CAMERA CONSTANT 27.9mm Å

MEASURED REPEAT DISTANCE BETWEEN LAYER LINES _____

CALCULATED RECIPROCAL SPACE BETWEEN LAYER LINES _____

			Reference	Measured Å
DOES THE PATTERN DISPLAY	1 (002) ?	Yes	7.31Å	7.2
	2 (110) ?	Yes	4.59Å	4.5
	3 (130) ?	Yes	2.64Å	2.58

IF SO, IDENTIFY AND LABEL.



HELI ATLANTA
910499 100.0KV 80.0cm

SAEDCHRY 3/28

CHRYSOTILE SAED WORKSHEET

HCCI ~~EAL~~ PROJECT # A169-92 004

HCCI ~~EAL~~ SAMPLE ID# 45011A

MICROGRAPH # 910498

CAMERA LENGTH 80 cm

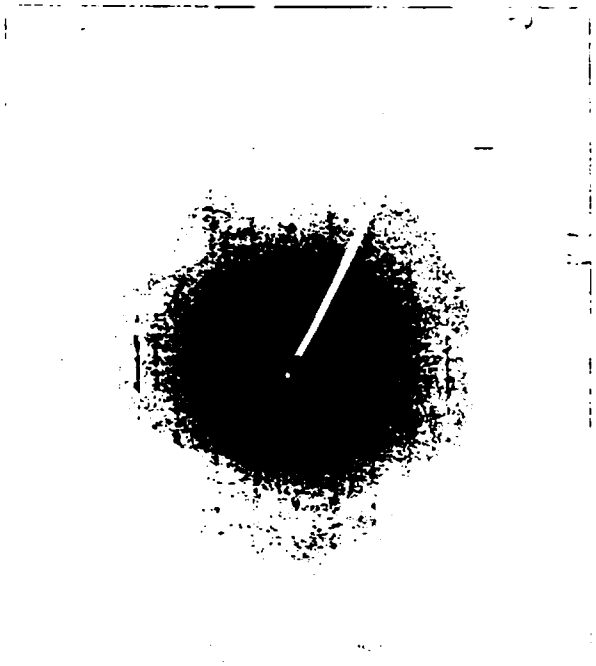
CAMERA CONSTANT 27.9 mm Å

MEASURED REPEAT DISTANCE BETWEEN LAYER LINES 5.3 mm

CALCULATED RECIPROCAL SPACE BETWEEN LAYER LINES 0.53 mm

			Reference	Measured
DOES THE PATTERN DISPLAY	1 (002)	? yes	7.31Å	7.0
	2 (110)	? yes	4.59Å	4.5
	3 (130)	? yes	2.64Å	2.5 Å

IF SO, IDENTIFY AND LABEL.



SAEDCHRY 3/28

HCCI ATLANTA
910498 100.0KV 80.0cm

CHRYSOTILE SAED WORKSHEET

HCCI ~~EAL~~ PROJECT # A1C092-004

HCCI ~~EAL~~ SAMPLE ID# 45072-4

MICROGRAPH # 910493

CAMERA LENGTH 80 cm

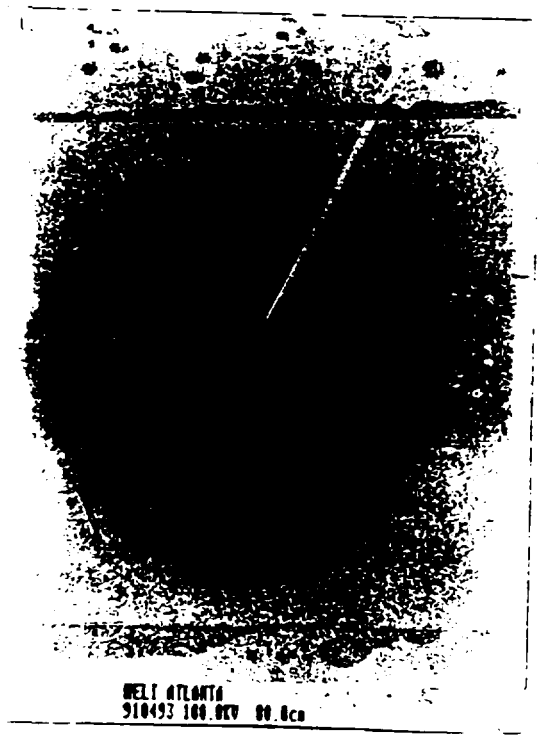
CAMERA CONSTANT 27.9 mm Å

MEASURED REPEAT DISTANCE BETWEEN LAYER LINES 54 mm

CALCULATED RECIPROCAL SPACE BETWEEN LAYER LINES 0.52 nm

			Reference	Measured Å
DOES THE PATTERN DISPLAY	1 (002)	? Yes	7.31Å	7.0
	2 (110)	? Yes	4.59Å	4.21 Å
	3 (130)	? Yes	2.64Å	2.49 Å

IF SO, IDENTIFY AND LABEL.



SAEDCHRY 3/28

CHRYSOTILE SAED WORKSHEET

~~EAL~~ MELI PROJECT # A169-92-004

~~EAL~~ MELI SAMPLE ID# 45 073.4

MICROGRAPH # 910496

CAMERA LENGTH 80cm

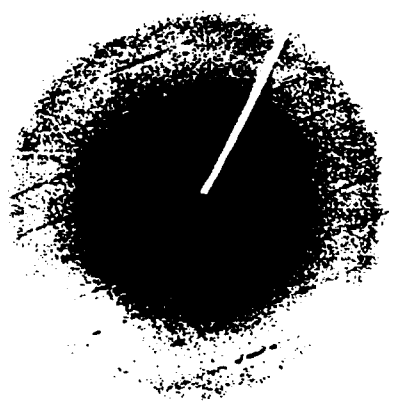
CAMERA CONSTANT 27.9mmÅ

MEASURED REPEAT DISTANCE BETWEEN LAYER LINES 5.4mm

CALCULATED RECIPROCAL SPACE BETWEEN LAYER LINES 0.52mm

			Reference	Measured
DOES THE PATTERN DISPLAY	1 (002)	? yes	7.31Å	7.34
	2 (110)	? yes	4.59Å	4.98Å
	3 (130)	? yes	2.64Å	2.53Å

IF SO, IDENTIFY AND LABEL.



SAEDCHRY 3/28

MELI ATLANTA
910496 100.0KV 80.0cm

CHRYSOTILE SAED WORKSHEET

~~EAL~~ HCCI PROJECT # 4169-92 CON

~~EAL~~ HCCI SAMPLE ID# 45073-A

MICROGRAPH # 910497

CAMERA LENGTH 80 cm

CAMERA CONSTANT 27.9 mm Å

MEASURED REPEAT DISTANCE BETWEEN LAYER LINES 5.4 mm

CALCULATED RECIPROCAL SPACE BETWEEN LAYER LINES 0.52 mm

			Reference	Measured Å
DOES THE PATTERN DISPLAY	1 (002)	? Yes	7.31Å	7.0
	2 (110)	? Yes	4.59Å	4.5
	3 (130)	? yes	2.64Å	2.5

IF SO, IDENTIFY AND LABEL.

SAEDCHRY 3/28

BELL ATLANTA
910497 100.0KV 80.0cm

CHRYSOTILE SAED WORKSHEET

HCLI ~~EAL~~ PROJECT # A169-92-004

HCLI ~~EAL~~ SAMPLE ID# 45074-A

MICROGRAPH # 916494

CAMERA LENGTH 30 cm

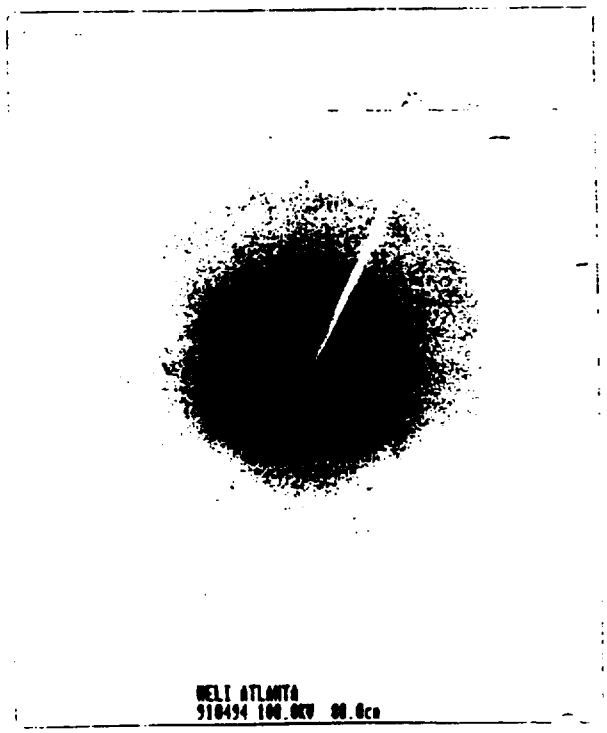
CAMERA CONSTANT 27.9 m-Å

MEASURED REPEAT DISTANCE BETWEEN LAYER LINES 5.4mm

CALCULATED RECIPROCAL SPACE BETWEEN LAYER LINES 0.52nm

			Reference	Measured Å
DOES THE PATTERN DISPLAY	(002)	? Yes	7.31Å	7.0
	(110)	? Yes	4.59Å	4.35Å
	(130)	? Yes	2.64Å	2.54Å

IF SO, IDENTIFY AND LABEL.



SAEDCHRY 3/28

CHRYSOTILE SAED WORKSHEET

HCCI ~~EAL~~ PROJECT # A169-92-009

HCCI ~~EAL~~ SAMPLE ID# 45675 A

MICROGRAPH # 910495

CAMERA LENGTH 80

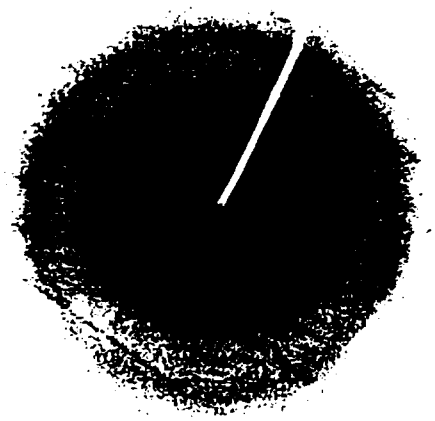
CAMERA CONSTANT 27.9mm Å

MEASURED REPEAT DISTANCE BETWEEN LAYER LINES 5.5mm

CALCULATED RECIPROCAL SPACE BETWEEN LAYER LINES 0.51nm

			Reference	Measured Å
DOES THE PATTERN DISPLAY	1 (002)	? Yes	7.31Å	7.54
	2 (110)	? Yes	4.59Å	4.5Å
	3 (130)	? Yes	2.64Å	2.58Å

IF SO, IDENTIFY AND LABEL.



MELI ATLANTA
910495 100.0KV 80.0cm

SAEDCHRY 3/28

KIBER ASSOCIATES, INC.
4000 DEKALB TECHNOLOGY PARKWAY
SUITE 200
ATLANTA, GEORGIA 30340

Delivered in two Boxes

(404) 455-3944
FAX (404) 451-0155

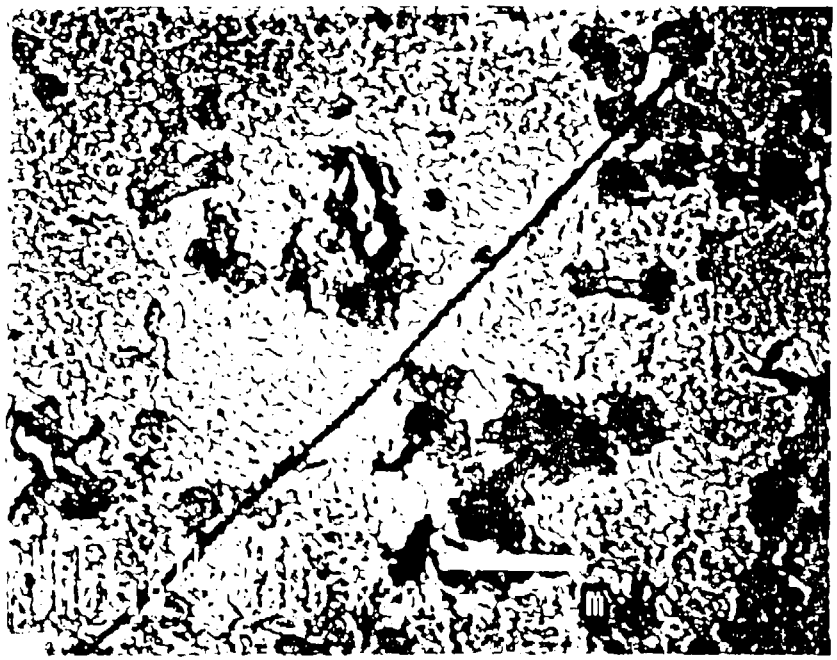
SAMPLE CHAIN OF CUSTODY RECORD

PROJECT NAME	PROJECT NUMBER
Alliance Treatability Study	0192-417
SAMPLERS:(signature) [signature]	REMARKS/COMMENTS ALL TEST RESULTS WITH LEVEL III QA AND DELIVERABLES.

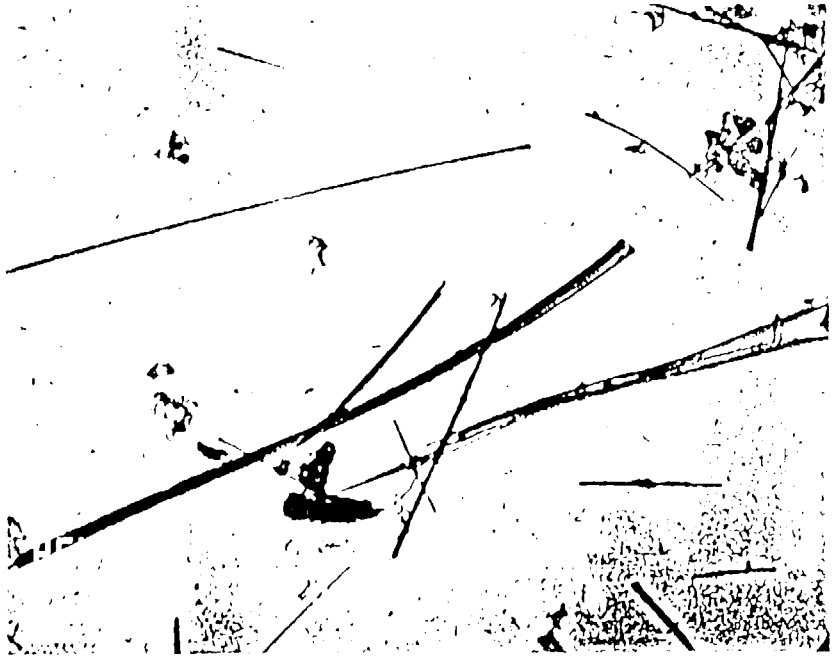
SAMPLE NUMBER	LAB ** NUMBER	DATE	TIME	STATION LOCATION	# OF CNTRS	ANALYTICAL PARAMETERS AND REMARKS
T11U1	45070A	2/17/92		Center: Drum No. 1	1	Asbestos Content (by TEM)
T11U2	45071A	2/17/92		Center: Drum No. 1	1	Asbestos Content (by TEM)
T14U3	45072A	2/17/92		Center: Drum No. 4	1	Asbestos Content (by TEM)
T14U4	45073A	2/17/92		Center: Drum No. 4	1	Asbestos Content (by TEM)
T17U5	45074A	2/17/92		Center: Drum No. 7	1	Asbestos Content (by TEM)
T17U6	45075A	2/17/92		Center: Drum No. 7	1	Asbestos Content (by TEM)

RELINQUISHED BY:	DATE	TIME	RECEIVED BY:
[signature]	2/18/92	13:30	[signature] 2-19-92
RELINQUISHED BY:	DATE	TIME	RECEIVED BY:

** - TO BE COMPLETED BY LAB ACCEPTING SAMPLES



HELI Sample # 45071-A



HELI Sample # 45073-A

(ABOVE) HELI Sample #45071-A
- Chrysotile fiber amongst clay particulate.

(Above) HELI Sample # 45073-A
- Various chrysotile structures

HELI Sample #45075-A
- Notice length and twisting morphology of chrysotile structures

HELI Sample # 45075-A

APPENDIX C

TRC
Environmental Solutions through Technology

APPENDIX C

NEW VERNON ROAD
ANALYTICAL TEST RESULTS

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COMPUCHEM LABORATORIES, INC. P.O. Box 12652 3308 Chapel Hill/Nelson Highway Research Triangle Park, NC 27709 (919) 549-8263

RECEIVED
AUG 20 1992
S & M BRANCH

SDG Narrative #BGA01
Case #18542
Contract #68D00159
CompuChem Laboratories, Inc.

SAMPLE IDENTIFICATIONS: BGA01, BGA02, BGA03, BGG98, BGH97, BGH98

These soil samples were received August 1, 1992 in good condition, with the proper Traffic Reports (TR), sealed in a cooler. Analyses were scheduled in accordance with the TR. Volatile, semivolatile, and pesticide analyses were performed as requested on these samples. Holding time requirements were met for all of these samples.

All pertinent Quality Assurance and Laboratory notices for Case #18542 SDG #BGA01 are included in the sample data package.

VOLATILES

There were volatile Target Compound List (TCL) analytes identified above the Contract Required Quantitation Limit (CRQL) in all of these samples. One Tentatively Identified Compound (TIC) was found in three of these samples.

The common laboratory contaminants methylene chloride and/or acetone were identified above the CRQL in all of these samples. Methylene chloride was also found in the associated method blank.

The TIC found in BGA01, BGA02, and BGA03 was assessed as a laboratory artifact and therefore may not be a sample constituent.

The associated method blank met all quality control criteria. BGA02 was used as the original to prepare the duplicate matrix spikes. The associated duplicate matrix spikes met all quality control criteria with one exception. The Relative Percent Difference (RPD) of 1,1-dichloroethene was flagged as an outlier in the comparison of the duplicate matrix spikes.

SEMIVOLATILES

There were semivolatile TCL analytes identified above the CRQL in three of these samples. TICs were found in all of these samples.

The TCL analyte di-n-butylphthalate was identified above the CRQL in BGA03. The TCL analytes phenanthrene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, and benzo(g,h,i)perylene were identified above the CRQL in BGG98 and BGH97. BGG98 also contained the TCL analytes acenaphthylene, acenaphthene, fluorene, anthracene, carbazole, and dibenz(a,h)anthracene above the CRQL.

The 'X' flag is used to denote indistinguishable coeluting isomers.

The TICs found in these samples could be characterized as hydrocarbons, carboxylic acids, phthalates, siloxanes, poly-aromatic hydrocarbon (PAH), benzonaphthothiophene and unknowns.

In the analysis of the initial extract of BGA03, the recoveries of three acid and one base surrogates failed quality control criteria. The sample was reextracted. In the analysis of the reextract, the recoveries of two acid and one base surrogates again failed quality control criteria. We have attributed the failing surrogate recoveries to the particular sample matrix. We have reported and billed for both analyses.

In the initial undiluted analysis of BGG98, the quantitation report values of several TCL analytes exceeded the instrument's analytical range. The sample was reanalyzed at a 3:1 dilution to bring the quantitation report values into range. We have reported and billed for both analyses.

In the initial analysis of BGH97, the response of the internal standard D12-perylene failed quality control criteria. The sample was reanalyzed and again failed response criteria for this internal standard. We have attributed the failing internal standard response to the particular matrix of the sample. We have reported and billed for both analyses. In the second analysis, the quantitation report value of the coeluting isomers of benzo(b)fluoranthene and benzo(k)fluoranthene are is above 80 ng. However, since the two peaks are coeluting, the instrument's analytical range is doubled to 160 ng. According to our Systems Coordinator, the ForMaster software is unable to make the distinction between the two analytical ranges. Therefore the isomers are incorrectly flagged with an 'E' in the reanalysis.

The associated method blanks met all quality control criteria with two exceptions. The recoveries of one acid and one base surrogate failed quality control criteria in SBLK33.

BGA02 was used as the original to prepare the duplicate matrix spikes. The associated duplicate matrix spikes met all quality control criteria with three exceptions. The RPDs of 1,4-dichlorobenzene, 1,2,4-trichlorobenzene, and acenaphthene are flagged as outliers in the comparison of the duplicate matrix spikes.

PESTICIDES

There were pesticide TCL analytes identified above the CRQL in two of these samples. The advisory surrogates did not meet recovery criteria in all of these samples.

The TCL analyte alpha-chlordane was identified above the CRQL in BGG98 and BGH97. BGG98 also contained the TCL analytes endrin and endosulfan sulfate above the CRQL. BGH97 also

COMPUCHEM LABORATORIES, INC.

contained the TCL analytes dieldrin, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and gamma-chlordane above the CRQL.

The recovery of the advisory surrogate tetrachloro-m-xylene (TCX) fell below quality control criteria limits on the RTX-1701 column in the analyses of BGA03 and BGG98. However, the recoveries were greater than our internal minimum acceptance criteria of twenty percent (20%), which indicates possible extraction efficiency problems. Therefore we have reported the data without reanalysis.

In the initial undiluted analysis of BGH97, the concentration of 4,4'-DDT exceeded the instrument's calibration range. The sample was reanalyzed at a 5:1 dilution to bring the concentration into range. We have reported and billed for both analyses. Due to severe matrix interference, the recovery of one of the advisory surrogates could not be calculated for either analysis of BGH97. This interference also affected the presentation of retention time data for these analyses as well. In accordance with the Statement of Work (SOW), we have reported this data without further analysis.

The associated method blank met all quality control criteria. BGA02 was used as the original to prepare the duplicate matrix spikes. The associated duplicate matrix spikes met all quality control criteria.

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in the hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or his designee, as verified by the following signature.

Stephanie W. Winfield 8-19-92
Stephanie W. Winfield 8/19/92
Technical Reviewer

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGA01

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506390

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH006390C13

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. 26 Date Analyzed: 08/05/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	14	UJ
74-83-9	Bromomethane	14	U
75-01-4	Vinyl Chloride	14	U
75-00-3	Chloroethane	14	U
75-09-2	Methylene Chloride	21	~~B~~UJ
67-64-1	Acetone	14	UJ
75-15-0	Carbon Disulfide	14	U
75-35-4	1,1-Dichloroethene	14	U
75-34-3	1,1-Dichloroethane	14	U
540-59-0	1,2-Dichloroethene (total)	14	U
67-66-3	Chloroform	14	U
107-06-2	1,2-Dichloroethane	14	UJ
78-93-3	2-Butanone	14	UJ
71-55-6	1,1,1-Trichloroethane	14	U
56-23-5	Carbon Tetrachloride	14	U
75-27-4	Bromodichloromethane	14	U
78-87-5	1,2-Dichloropropane	14	U
10061-01-5	cis-1,3-Dichloropropene	14	U
79-01-6	Trichloroethene	14	U
124-48-1	Dibromochloromethane	14	U
79-00-5	1,1,2-Trichloroethane	14	U
71-43-2	Benzene	14	U
10061-02-6	Trans-1,3-Dichloropropene	14	U
75-25-2	Bromoform	14	U
108-10-1	4-Methyl-2-Pentanone	14	UJ
591-78-6	2-Hexanone	14	UJ
127-18-4	Tetrachloroethene	14	U
79-34-5	1,1,2,2-Tetrachloroethane	14	U
108-88-3	Toluene	14	U
108-90-7	Chlorobenzene	14	U
100-41-4	Ethylbenzene	14	U
100-42-5	Styrene	14	U
1330-20-7	Xylene (total)	14	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGA01

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506390

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH006390C13

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. 26 Date Analyzed: 08/05/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	LABORATORY ARTIFACT	0.58	7	J

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGA02

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506395

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH006395C13

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. 37 Date Analyzed: 08/05/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	16	UJ
74-83-9	Bromomethane	16	U
75-01-4	Vinyl Chloride	16	U
75-00-3	Chloroethane	16	U
75-09-2	Methylene Chloride	17	~~B~~ UJ
67-64-1	Acetone	16	UJ
75-15-0	Carbon Disulfide	16	U
75-35-4	1,1-Dichloroethene	16	U
75-34-3	1,1-Dichloroethane	16	U
540-59-0	1,2-Dichloroethene (total)	16	U
67-66-3	Chloroform	16 ~~2~~	~~BJ~~ U
107-06-2	1,2-Dichloroethane	16	UJ
78-93-3	2-Butanone	16	UJ
71-55-6	1,1,1-Trichloroethane	16	U
56-23-5	Carbon Tetrachloride	16	U
75-27-4	Bromodichloromethane	16	U
78-87-5	1,2-Dichloropropane	16	U
10061-01-5	cis-1,3-Dichloropropene	16	U
79-01-6	Trichloroethene	16	U
124-48-1	Dibromochloromethane	16	U
79-00-5	1,1,2-Trichloroethane	16	U
71-43-2	Benzene	16	U
10061-02-6	Trans-1,3-Dichloropropene	16	U
75-25-2	Bromoform	16	U
108-10-1	4-Methyl-2-Pentanone	16	UJ
591-78-6	2-Hexanone	16	UJ
127-18-4	Tetrachloroethene	16	U
79-34-5	1,1,2,2-Tetrachloroethane	16	U
108-88-3	Toluene	16	U
108-90-7	Chlorobenzene	16	U
100-41-4	Ethylbenzene	16	U
100-42-5	Styrene	16	U
1330-20-7	Xylene (total)	16	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGA02

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506395

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH006395C13

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. 37 Date Analyzed: 08/05/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	LABORATORY ARTIFACT	0.55	17	J

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGA03

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506401

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH006401A13

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. 9 Date Analyzed: 08/05/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	UJ
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	11	~~B~~UJ
67-64-1	Acetone	11	UJ
75-15-0	Carbon Disulfide	11	U
75-35-4	1,1-Dichloroethene	11	U
75-34-3	1,1-Dichloroethane	11	U
540-59-0	1,2-Dichloroethene (total)	11	U
67-66-3	Chloroform	11	U
107-06-2	1,2-Dichloroethane	11	UJ
78-93-3	2-Butanone	11	UJ
71-55-6	1,1,1-Trichloroethane	11	U
56-23-5	Carbon Tetrachloride	11	U
75-27-4	Bromodichloromethane	11	U
78-87-5	1,2-Dichloropropane	11	U
10061-01-5	cis-1,3-Dichloropropene	11	U
79-01-6	Trichloroethene	11	U
124-48-1	Dibromochloromethane	11	U
79-00-5	1,1,2-Trichloroethane	11	U
71-43-2	Benzene	11	U
10061-02-6	Trans-1,3-Dichloropropene	11	U
75-25-2	Bromoform	11	U
108-10-1	4-Methyl-2-Pentanone	11	UJ
591-78-6	2-Hexanone	11	UJ
127-18-4	Tetrachloroethene	11	U
79-34-5	1,1,2,2-Tetrachloroethane	11	U
108-88-3	Toluene	11	U
108-90-7	Chlorobenzene	11	U
100-41-4	Ethylbenzene	11	U
100-42-5	Styrene	11	U
1330-20-7	Xylene (total)	11	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGA03

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506401

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH006401A13

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. 9 Date Analyzed: 08/05/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 1

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	LABORATORY ARTIFACT	0.55	4	J

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGG98

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506403

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH006403A13

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. 21 Date Analyzed: 08/05/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	13	UJ
74-83-9	Bromomethane	13	U
75-01-4	Vinyl Chloride	13	U
75-00-3	Chloroethane	13	U
75-09-2	Methylene Chloride	22	~~B~~UJ
67-64-1	Acetone	35	J
75-15-0	Carbon Disulfide	13	U
75-35-4	1,1-Dichloroethene	13	U
75-34-3	1,1-Dichloroethane	13	U
540-59-0	1,2-Dichloroethene (total)	13	U
67-66-3	Chloroform	13	U
107-06-2	1,2-Dichloroethane	13	UJ
78-93-3	2-Butanone	13	UJ
71-55-6	1,1,1-Trichloroethane	13	U
56-23-5	Carbon Tetrachloride	13	U
75-27-4	Bromodichloromethane	13	U
78-87-5	1,2-Dichloropropane	13	U
10061-01-5	cis-1,3-Dichloropropene	13	U
79-01-6	Trichloroethene	13	U
124-48-1	Dibromochloromethane	13	U
79-00-5	1,1,2-Trichloroethane	13	U
71-43-2	Benzene	13	U
10061-02-6	Trans-1,3-Dichloropropene	13	U
75-25-2	Bromoform	13	U
108-10-1	4-Methyl-2-Pentanone	13	UJ
591-78-6	2-Hexanone	13	UJ
127-18-4	Tetrachloroethene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
108-88-3	Toluene	13	U
108-90-7	Chlorobenzene	13	U
100-41-4	Ethylbenzene	13	U
100-42-5	Styrene	13	U
1330-20-7	Xylene (total)	13	U

1E

VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGG98

Lab Name: COMPUCHEM.RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506403

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH006403A13

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. 21 Date Analyzed: 08/05/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGH97

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506404

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH006404A13

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. 25 Date Analyzed: 08/05/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	13	UJ
74-83-9	Bromomethane	13	U
75-01-4	Vinyl Chloride	13	U
75-00-3	Chloroethane	13	U
75-09-2	Methylene Chloride	29	BUJ
67-64-1	Acetone	24	J
75-15-0	Carbon Disulfide	13	U
75-35-4	1,1-Dichloroethene	13	U
75-34-3	1,1-Dichloroethane	13	U
540-59-0	1,2-Dichloroethene (total)	13	U
67-66-3	Chloroform	13	U
107-06-2	1,2-Dichloroethane	13	UJ
78-93-3	2-Butanone	13	UJ
71-55-6	1,1,1-Trichloroethane	13	U
56-23-5	Carbon Tetrachloride	13	U
75-27-4	Bromodichloromethane	13	U
78-87-5	1,2-Dichloropropane	13	U
10061-01-5	cis-1,3-Dichloropropene	13	U
79-01-6	Trichloroethene	13	U
124-48-1	Dibromochloromethane	13	U
79-00-5	1,1,2-Trichloroethane	13	U
71-43-2	Benzene	13	U
10061-02-6	Trans-1,3-Dichloropropene	13	U
75-25-2	Bromoform	13	U
108-10-1	4-Methyl-2-Pentanone	13	UJ
591-78-6	2-Hexanone	13	UJ
127-18-4	Tetrachloroethene	13	U
79-34-5	1,1,2,2-Tetrachloroethane	13	U
108-88-3	Toluene	13	U
108-90-7	Chlorobenzene	13	U
100-41-4	Ethylbenzene	13	U
100-42-5	Styrene	13	U
1330-20-7	Xylene (total)	13	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGH97

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506404

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH006404A13

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. 25 Date Analyzed: 08/05/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGH98

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506405

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH006405A13

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. 8 Date Analyzed: 08/05/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
74-87-3	Chloromethane	11	UJ
74-83-9	Bromomethane	11	U
75-01-4	Vinyl Chloride	11	U
75-00-3	Chloroethane	11	U
75-09-2	Methylene Chloride	23	~~B~~UJ
67-64-1	Acetone	18	J
75-15-0	Carbon Disulfide	11	U
75-35-4	1,1-Dichloroethene	11	U
75-34-3	1,1-Dichloroethane	11	U
540-59-0	1,2-Dichloroethene (total)	11	U
67-66-3	Chloroform	11	U
107-06-2	1,2-Dichloroethane	11	UJ
78-93-3	2-Butanone	11	UJ
71-55-6	1,1,1-Trichloroethane	11	U
56-23-5	Carbon Tetrachloride	11	U
75-27-4	Bromodichloromethane	11	U
78-87-5	1,2-Dichloropropane	11	U
10061-01-5	cis-1,3-Dichloropropene	11	U
79-01-6	Trichloroethene	11	U
124-48-1	Dibromochloromethane	11	U
79-00-5	1,1,2-Trichloroethane	11	U
71-43-2	Benzene	11	U
10061-02-6	Trans-1,3-Dichloropropene	11	U
75-25-2	Bromoform	11	U
108-10-1	4-Methyl-2-Pentanone	11	UJ
591-78-6	2-Hexanone	11	UJ
127-18-4	Tetrachloroethene	11	U
79-34-5	1,1,2,2-Tetrachloroethane	11	U
108-88-3	Toluene	11	U
108-90-7	Chlorobenzene	11	U
100-41-4	Ethylbenzene	11	U
100-42-5	Styrene	11	U
1330-20-7	Xylene (total)	11	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGH98

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506405

Sample wt/vol: 5.0 (g/mL) G Lab File ID: GH006405A13

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. 8 Date Analyzed: 08/05/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGA01

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506390

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GJ006390A07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 26 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/11/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	450	U
111-44-4	bis(2-Chloroethyl)Ether	450	U
95-57-8	2-Chlorophenol	450	U
541-73-1	1,3-Dichlorobenzene	450	U
106-46-7	1,4-Dichlorobenzene	450	U
95-50-1	1,2-Dichlorobenzene	450	U
95-48-7	2-Methylphenol	450	U
108-60-1	2,2'-Oxybis(1-Chloropropane)	450	U
106-44-5	4-Methylphenol	450	U
621-64-7	N-Nitroso-Di-n-Propylamine	450	U
67-72-1	Hexachloroethane	450	U
98-95-3	Nitrobenzene	450	U
78-59-1	Isophorone	450	U
88-75-5	2-Nitrophenol	450	U
105-67-9	2,4-Dimethylphenol	450	U
111-91-1	bis(2-Chloroethoxy)Methane	450	U
120-83-2	2,4-Dichlorophenol	450	U
120-82-1	1,2,4-Trichlorobenzene	450	U
91-20-3	Naphthalene	450	U
106-47-8	4-Chloroaniline	450	UJ
87-68-3	Hexachlorobutadiene	450	U
59-50-7	4-Chloro-3-Methylphenol	450	UJ
91-57-6	2-Methylnaphthalene	450	U
77-47-4	Hexachlorocyclopentadiene	450	UJ
88-06-2	2,4,6-Trichlorophenol	450	U
95-95-4	2,4,5-Trichlorophenol	1100	U
91-58-7	2-Chloronaphthalene	450	U
88-74-4	2-Nitroaniline	1100	UJ
131-11-3	Dimethyl Phthalate	450	U
208-96-8	Acenaphthylene	450	U
606-20-2	2,6-Dinitrotoluene	450	U
99-09-2	3-Nitroaniline	1100	UJ
83-32-9	Acenaphthene	450	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGA01

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506390

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GJ006390A07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 26 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/11/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1100	U
100-02-7	4-Nitrophenol	1100	U
132-64-9	Dibenzofuran	450	U
121-14-2	2,4-Dinitrotoluene	450	UJ
84-66-2	Diethylphthalate	450	U
7005-72-3	4-Chlorophenyl-phenylether	450	U
86-73-7	Fluorene	450	U
100-01-6	4-Nitroaniline	1100	U
534-52-1	4,6-Dinitro-2-Methylphenol	1100	U
86-30-6	N-Nitrosodiphenylamine (1)	450	U
101-55-3	4-Bromophenyl-phenylether	450	UJ
118-74-1	Hexachlorobenzene	450	UJ
87-86-5	Pentachlorophenol	1100	U
85-01-8	Phenanthrene	450	U
120-12-7	Anthracene	450	U
86-74-8	Carbazole	450	UJ
84-74-2	Di-n-Butylphthalate	61	J
206-44-0	Fluoranthene	450	U
129-00-0	Pyrene	450	U
85-68-7	Butylbenzylphthalate	450	UJ
91-94-1	3,3'-Dichlorobenzidine	450	UJ
56-55-3	Benzo(a)Anthracene	450	U
218-01-9	Chrysene	450	U
117-81-7	bis(2-Ethylhexyl)Phthalate	450	UJ
117-84-0	Di-n-Octyl Phthalate	450	UJ
205-99-2	Benzo(b)Fluoranthene	450	U
207-08-9	Benzo(k)Fluoranthene	450	U
50-32-8	Benzo(a)Pyrene	450	U
193-39-5	Indeno(1,2,3-cd)Pyrene	450	U
53-70-3	Dibenz(a,h)Anthracene	450	U
191-24-2	Benzo(g,h,i)Perylene	450	U

(1) - Cannot be separated from Diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGA01

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506390

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GJ006390A07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 26 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/11/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.1

Number TICs found: 18

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	BLANK CONTAMINANT	5.25	140	~~BJ~~ R
2.	UNKNOWN	10.87	90	J
3.	UNKNOWN PHTHALATE	11.10	220	J
4.	UNKNOWN CARBOXYLIC ACID	11.47	360	J
5.	UNKNOWN HYDROCARBON	12.87	180	J
6.	LABORATORY ARTIFACT	13.27	360	J
7.	UNKNOWN	13.47	140	J
8.	UNKNOWN	13.77	630	J
9.	UNKNOWN	13.99	90	J
10.	UNKNOWN	14.30	90	J
11.	UNKNOWN	14.95	810	J
12.	UNKNOWN	15.65	630	J
13.	UNKNOWN	15.87	140	J
14.	UNKNOWN	16.04	450	J
15.	UNKNOWN	16.54	400	J
16.	UNKNOWN	16.60	450	J
17.	UNKNOWN	18.17	140	J
18.	UNKNOWN	18.85	500	J

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGA02

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506395

Sample wt/vol: 30.1 (g/mL) G Lab File ID: GH006395B07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 37 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/06/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	520	U
111-44-4	bis(2-Chloroethyl)Ether	520	U
95-57-8	2-Chlorophenol	520	U
541-73-1	1,3-Dichlorobenzene	520	U
106-46-7	1,4-Dichlorobenzene	520	U
95-50-1	1,2-Dichlorobenzene	520	U
95-48-7	2-Methylphenol	520	U
108-60-1	2,2'-Oxybis(1-Chloropropane)	520	U
106-44-5	4-Methylphenol	520	U
621-64-7	N-Nitroso-Di-n-Propylamine	520	U
67-72-1	Hexachloroethane	520	U
98-95-3	Nitrobenzene	520	U
78-59-1	Isophorone	520	U
88-75-5	2-Nitrophenol	520	U
105-67-9	2,4-Dimethylphenol	520	U
111-91-1	bis(2-Chloroethoxy)Methane	520	U
120-83-2	2,4-Dichlorophenol	520	U
120-82-1	1,2,4-Trichlorobenzene	520	U
91-20-3	Naphthalene	520	U
106-47-8	4-Chloroaniline	520	U J
87-68-3	Hexachlorobutadiene	520	U
59-50-7	4-Chloro-3-Methylphenol	520	U
91-57-6	2-Methylnaphthalene	520	U
77-47-4	Hexachlorocyclopentadiene	520	U J
88-06-2	2,4,6-Trichlorophenol	520	U
95-95-4	2,4,5-Trichlorophenol	1300	U
91-58-7	2-Chloronaphthalene	520	U
88-74-4	2-Nitroaniline	1300	U
131-11-3	Dimethyl Phthalate	520	U
208-96-8	Acenaphthylene	520	U
606-20-2	2,6-Dinitrotoluene	520	U
99-09-2	3-Nitroaniline	1300	~~U~~ R
83-32-9	Acenaphthene	520	U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGA02

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506395

Sample wt/vol: 30.1 (g/mL) G Lab File ID: GH006395B07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 37 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/06/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1300	UJ
100-02-7	4-Nitrophenol	1300	UJ
132-64-9	Dibenzofuran	520	U
121-14-2	2,4-Dinitrotoluene	520	U
84-66-2	Diethylphthalate	520	U
7005-72-3	4-Chlorophenyl-phenylether	520	U
86-73-7	Fluorene	520	U
100-01-6	4-Nitroaniline	1300	U
534-52-1	4,6-Dinitro-2-Methylphenol	1300	UJ
86-30-6	N-Nitrosodiphenylamine (1)	520	U
101-55-3	4-Bromophenyl-phenylether	520	U
118-74-1	Hexachlorobenzene	520	UJ
87-86-5	Pentachlorophenol	1300	U
85-01-8	Phenanthrene	520	U
120-12-7	Anthracene	520	U
86-74-8	Carbazole	520	U
84-74-2	Di-n-Butylphthalate	520	U
206-44-0	Fluoranthene	520	U
129-00-0	Pyrene	520	U
85-68-7	Butylbenzylphthalate	520	U
91-94-1	3,3'-Dichlorobenzidine	520	U
56-55-3	Benzo(a)Anthracene	520	U
218-01-9	Chrysene	520	U
117-81-7	bis(2-Ethylhexyl)Phthalate	520	U
117-84-0	Di-n-Octyl Phthalate	520	U
205-99-2	Benzo(b)Fluoranthene	520	U
207-08-9	Benzo(k)Fluoranthene	520	U
50-32-8	Benzo(a)Pyrene	520	U
193-39-5	Indeno(1,2,3-cd)Pyrene	520	U
53-70-3	Dibenz(a,h)Anthracene	520	U
191-24-2	Benzo(g,h,i)Perylene	520	U

(1) - Cannot be separated from Diphenylamine

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGA02

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506395

Sample wt/vol: 30.1 (g/mL) G Lab File ID: GH006395B07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 37 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/06/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.1

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	BLANK CONTAMINANT	5.52	160	~~BJ~~ R
2.	UNKNOWN PHTHALATE	11.42	210	J

Use this analyses

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGA03

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506401

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GH006401B07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 9 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/07/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	360	UJ
111-44-4	bis(2-Chloroethyl)Ether	360	U
95-57-8	2-Chlorophenol	360	UJ
541-73-1	1,3-Dichlorobenzene	360	U
106-46-7	1,4-Dichlorobenzene	360	U
95-50-1	1,2-Dichlorobenzene	360	U
95-48-7	2-Methylphenol	360	UJ
108-60-1	2,2'-Oxybis(1-Chloropropane)	360	U
106-44-5	4-Methylphenol	360	UJ
621-64-7	N-Nitroso-Di-n-Propylamine	360	U
67-72-1	Hexachloroethane	360	U
98-95-3	Nitrobenzene	360	U
78-59-1	Isophorone	360	U
88-75-5	2-Nitrophenol	360	UJ
105-67-9	2,4-Dimethylphenol	360	UJ
111-91-1	bis(2-Chloroethoxy)Methane	360	U
120-83-2	2,4-Dichlorophenol	360	UJ
120-82-1	1,2,4-Trichlorobenzene	360	U
91-20-3	Naphthalene	360	U
106-47-8	4-Chloroaniline	360	UJ
87-68-3	Hexachlorobutadiene	360	U
59-50-7	4-Chloro-3-Methylphenol	360	UJ
91-57-6	2-Methylnaphthalene	360	U
77-47-4	Hexachlorocyclopentadiene	360	UJ
88-06-2	2,4,6-Trichlorophenol	360	UJ
95-95-4	2,4,5-Trichlorophenol	880	UJ
91-58-7	2-Chloronaphthalene	360	U
88-74-4	2-Nitroaniline	880	U
131-11-3	Dimethyl Phthalate	360	U
208-96-8	Acenaphthylene	360	U
606-20-2	2,6-Dinitrotoluene	360	U
99-09-2	3-Nitroaniline	880	~~U~~R
83-32-9	Acenaphthene	360	U

Use This Analysis

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGA03

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506401

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GH006401B07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 9 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/07/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	880	UJ
100-02-7	4-Nitrophenol	880	UJ
132-64-9	Dibenzofuran	360	U
121-14-2	2,4-Dinitrotoluene	360	U
84-66-2	Diethylphthalate	360	U
7005-72-3	4-Chlorophenyl-phenylether	360	U
86-73-7	Fluorene	360	U
100-01-6	4-Nitroaniline	880	U
534-52-1	4,6-Dinitro-2-Methylphenol	880	UJ
86-30-6	N-Nitrosodiphenylamine (1)	360	U
101-55-3	4-Bromophenyl-phenylether	360	U
118-74-1	Hexachlorobenzene	360	UJ
87-86-5	Pentachlorophenol	880	UJ
85-01-8	Phenanthrene	360	U
120-12-7	Anthracene	360	U
86-74-8	Carbazole	360	U
84-74-2	Di-n-Butylphthalate	1200	
206-44-0	Fluoranthene	360	U
129-00-0	Pyrene	360	U
85-68-7	Butylbenzylphthalate	360	U
91-94-1	3,3'-Dichlorobenzidine	360	U
56-55-3	Benzo(a)Anthracene	360	U
218-01-9	Chrysene	360	U
117-81-7	bis(2-Ethylhexyl)Phthalate	360	U
117-84-0	Di-n-Octyl Phthalate	360	U
205-99-2	Benzo(b)Fluoranthene	360	U
207-08-9	Benzo(k)Fluoranthene	360	U
50-32-8	Benzo(a)Pyrene	360	U
193-39-5	Indeno(1,2,3-cd)Pyrene	360	U
53-70-3	Dibenz(a,h)Anthracene	360	U
191-24-2	Benzo(g,h,i)Perylene	360	U

(1) - Cannot be separated from Diphenylamine

Vol Thru Envelope

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGA03

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506401

Sample wt/vol: 30.0 (g/mL) G Lab File ID: GH006401B07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 9 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/07/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 7.2

Number TICs found: 20

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	11.50	150	J
2.	UNKNOWN CARBOXYLIC ACID	11.77	290	J
3.	UNKNOWN HYDROCARBON	13.22	220	J
4.	UNKNOWN	13.27	220	J
5.	UNKNOWN	13.37	290	J
6.	UNKNOWN	13.55	220	J
7.	UNKNOWN	13.67	290	J
8.	UNKNOWN HYDROCARBON	13.85	290	J
9.	UNKNOWN HYDROCARBON	14.20	290	J
10.	UNKNOWN	14.25	290	J
11.	UNKNOWN HYDROCARBON	15.50	260	J
12.	UNKNOWN	15.59	510	J
13.	UNKNOWN	15.79	180	J
14.	UNKNOWN	16.05	180	J
15.	UNKNOWN	16.57	290	J
16.	UNKNOWN HYDROCARBON	17.32	510	J
17.	UNKNOWN	17.49	330	J
18.	UNKNOWN	19.99	220	J
19.	UNKNOWN	21.45	220	J
20.	UNKNOWN	22.24	180	J

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGG98DL

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506403

Sample wt/vol: 30.5 (g/mL) G Lab File ID: GD006403A07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 21 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/10/92

Injection Volume: 2.0(uL) Dilution Factor: 3.0

GPC Cleanup: (Y/N) Y pH: 7.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	1200	U
111-44-4	bis(2-Chloroethyl)Ether	1200	U
95-57-8	2-Chlorophenol	1200	U
541-73-1	1,3-Dichlorobenzene	1200	U
106-46-7	1,4-Dichlorobenzene	1200	U
95-50-1	1,2-Dichlorobenzene	1200	U
95-48-7	2-Methylphenol	1200	U
108-60-1	2,2'-Oxybis(1-Chloropropane)	1200	U
106-44-5	4-Methylphenol	1200	U
621-64-7	N-Nitroso-Di-n-Propylamine	1200	U
67-72-1	Hexachloroethane	1200	U
98-95-3	Nitrobenzene	1200	U
78-59-1	Isophorone	1200	U
88-75-5	2-Nitrophenol	1200	U
105-67-9	2,4-Dimethylphenol	1200	U
111-91-1	bis(2-Chloroethoxy)Methane	1200	U
120-83-2	2,4-Dichlorophenol	1200	U
120-82-1	1,2,4-Trichlorobenzene	1200	U
91-20-3	Naphthalene	200	DJ
106-47-8	4-Chloroaniline	1200	UJ
87-68-3	Hexachlorobutadiene	1200	U
59-50-7	4-Chloro-3-Methylphenol	1200	UJ
91-57-6	2-Methylnaphthalene	350	DJ
77-47-4	Hexachlorocyclopentadiene	1200	UJ
88-06-2	2,4,6-Trichlorophenol	1200	U
95-95-4	2,4,5-Trichlorophenol	3000	U
91-58-7	2-Chloronaphthalene	1200	U
88-74-4	2-Nitroaniline	3000	UJ
131-11-3	Dimethyl Phthalate	1200	U
208-96-8	Acenaphthylene	840	DJ
606-20-2	2,6-Dinitrotoluene	1200	U
99-09-2	3-Nitroaniline	3000	U
83-32-9	Acenaphthene	620	DJ

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGG98DL

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506403

Sample wt/vol: 30.5 (g/mL) G Lab File ID: GD006403A07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 21 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/10/92

Injection Volume: 2.0 (uL) Dilution Factor: 3.0

GPC Cleanup: (Y/N) Y pH: 7.2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	3000	U
100-02-7	4-Nitrophenol	3000	U
132-64-9	Dibenzofuran	330	DJ
121-14-2	2,4-Dinitrotoluene	1200	U
84-66-2	Diethylphthalate	1200	U
7005-72-3	4-Chlorophenyl-phenylether	1200	U
86-73-7	Fluorene	1300	D
100-01-6	4-Nitroaniline	3000	U
534-52-1	4,6-Dinitro-2-Methylphenol	3000	U
86-30-6	N-Nitrosodiphenylamine (1)	1200	U
101-55-3	4-Bromophenyl-phenylether	1200	U
118-74-1	Hexachlorobenzene	1200	U
87-86-5	Pentachlorophenol	3000	U
85-01-8	Phenanthrene	6300	D
120-12-7	Anthracene	1500	D
86-74-8	Carbazole	470	DJ
84-74-2	Di-n-Butylphthalate	1200	U
206-44-0	Fluoranthene	8200	D
129-00-0	Pyrene	7400	D
85-68-7	Butylbenzylphthalate	1200	U
91-94-1	3,3'-Dichlorobenzidine	1200	U
56-55-3	Benzo(a)Anthracene	6700	D
218-01-9	Chrysene	4200	D
117-81-7	bis(2-Ethylhexyl)Phthalate	1200	U
117-84-0	Di-n-Octyl Phthalate	1200	U
205-99-2	Benzo(b)Fluoranthene	9400	DX
207-08-9	Benzo(k)Fluoranthene	9400	DX
50-32-8	Benzo(a)Pyrene	4700	D
193-39-5	Indeno(1,2,3-cd)Pyrene	1800	D
53-70-3	Dibenz(a,h)Anthracene	640	DJ
191-24-2	Benzo(g,h,i)Perylene	1700	D

(1) - Cannot be separated from Diphenylamine

Use Tin Analyzer

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGG98DL

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506403

Sample wt/vol: 30.5 (g/mL) G Lab File ID: GD006403A07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 21 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/10/92

Injection Volume: 2.0(uL) Dilution Factor: 3.0

GPC Cleanup: (Y/N) Y pH: 7.2

Number TICs found: 20

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	5.13	1000	J
2.	METHYLANTHRACENE	11.62	1500	JN
3.	METHYLANTHRACENE	11.65	1000	JN
4.	METHYLPHENANTHRENE	11.70	750	JN
5.	UNKNOWN	11.77	2500	J
6.	DIMETHYLPHENANTHRENE	12.22	870	JN
7.	UNKNOWN	12.29	1000	J
8.	UNKNOWN	12.35	1100	J
9.	UNKNOWN PAH	12.92	1100	J
10.	UNKNOWN PAH	13.05	2100	J
11.	UNKNOWN PAH	13.14	1500	J
12.	UNKNOWN PAH	13.20	750	J
13.	UNKNOWN PAH	13.32	1500	J
14.	BENZONAPHTHOTHIOPHENE	13.94	3900	JN
15.	UNKNOWN	14.02	3100	J
16.	UNKNOWN	14.62	2400	J
17.	UNKNOWN	15.02	4500	J
18.	UNKNOWN	15.05	4700	J
19.	UNKNOWN	15.39	1900	J
20.	BENZOFLUORANTHENE	17.50	6100	JN

1B

Ud Flu Analyses

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGH97RE

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506404

Sample wt/vol: 30.4 (g/mL) G Lab File ID: GJ006404A07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 25 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/10/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	430	U
111-44-4	bis(2-Chloroethyl)Ether	430	U
95-57-8	2-Chlorophenol	430	U
541-73-1	1,3-Dichlorobenzene	430	U
106-46-7	1,4-Dichlorobenzene	430	U
95-50-1	1,2-Dichlorobenzene	430	U
95-48-7	2-Methylphenol	430	U
108-60-1	2,2'-Oxybis(1-Chloropropane)	430	U
106-44-5	4-Methylphenol	430	U
621-64-7	N-Nitroso-Di-n-Propylamine	430	U
67-72-1	Hexachloroethane	430	U
98-95-3	Nitrobenzene	430	U
78-59-1	Isophorone	430	U
88-75-5	2-Nitrophenol	430	U
105-67-9	2,4-Dimethylphenol	430	U
111-91-1	bis(2-Chloroethoxy)Methane	430	U
120-83-2	2,4-Dichlorophenol	430	U
120-82-1	1,2,4-Trichlorobenzene	430	U
91-20-3	Naphthalene	430	U
106-47-8	4-Chloroaniline	430	UJ
87-68-3	Hexachlorobutadiene	430	U
59-50-7	4-Chloro-3-Methylphenol	430	UJ
91-57-6	2-Methylnaphthalene	430	U
77-47-4	Hexachlorocyclopentadiene	430	UJ
88-06-2	2,4,6-Trichlorophenol	430	U
95-95-4	2,4,5-Trichlorophenol	1100	U
91-58-7	2-Chloronaphthalene	430	U
88-74-4	2-Nitroaniline	1100	UJ
131-11-3	Dimethyl Phthalate	430	U
208-96-8	Acenaphthylene	220	J
606-20-2	2,6-Dinitrotoluene	430	U
99-09-2	3-Nitroaniline	1100	U
83-32-9	Acenaphthene	71	J

Dil. for Analysis

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGH97RE

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506404

Sample wt/vol: 30.4 (g/mL) G Lab File ID: GJ006404A07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 25 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/10/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.8

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	1100	U
100-02-7	4-Nitrophenol	1100	U
132-64-9	Dibenzofuran	430	U
121-14-2	2,4-Dinitrotoluene	430	UJ
84-66-2	Diethylphthalate	430	U
7005-72-3	4-Chlorophenyl-phenylether	430	U
86-73-7	Fluorene	110	J
100-01-6	4-Nitroaniline	1100	UJ
534-52-1	4,6-Dinitro-2-Methylphenol	1100	U
86-30-6	N-Nitrosodiphenylamine (1)	430	U
101-55-3	4-Bromophenyl-phenylether	430	U
118-74-1	Hexachlorobenzene	430	U
87-86-5	Pentachlorophenol	1100	U
85-01-8	Phenanthrene	980	
120-12-7	Anthracene	280	J
86-74-8	Carbazole	120	J
84-74-2	Di-n-Butylphthalate	62	J
206-44-0	Fluoranthene	1800	
129-00-0	Pyrene	3000	
85-68-7	Butylbenzylphthalate	48	J
91-94-1	3,3'-Dichlorobenzidine	430	U
56-55-3	Benzo(a)Anthracene	1500	
218-01-9	Chrysene	1400	
117-81-7	bis(2-Ethylhexyl)Phthalate	180	J
117-84-0	Di-n-Octyl Phthalate	430	UJ
205-99-2	Benzo(b)Fluoranthene	3500	~~EX~~ J
207-08-9	Benzo(k)Fluoranthene	3500	~~EX~~
50-32-8	Benzo(a)Pyrene	1400	
193-39-5	Indeno(1,2,3-cd)Pyrene	1100	
53-70-3	Dibenz(a,h)Anthracene	310	J
191-24-2	Benzo(g,h,i)Perylene	1200	J

(1) - Cannot be separated from Diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGH97RE

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506404

Sample wt/vol: 30.4 (g/mL) G Lab File ID: GJ006404A07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 25 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/10/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.8

Number TICs found: 21

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	5.25	390	J
2.	BLANK CONTAMINANT	5.32	180	~~BJ~~ R
3.	UNKNOWN	6.28	440	J
4.	UNKNOWN SILOXANE	10.59	350	J
5.	UNKNOWN CARBOXYLIC ACID	10.90	310	J
6.	UNKNOWN SILOXANE	11.27	260	J
7.	UNKNOWN	11.49	310	J
8.	UNKNOWN CARBOXYLIC ACID	11.55	790	J
9.	METHYLANTHRACENE	11.67	440	J N
10.	UNKNOWN	11.79	610	J
11.	UNKNOWN SILOXANE	11.89	260	J
12.	UNKNOWN	12.35	750	J
13.	UNKNOWN	12.50	660	J
14.	UNKNOWN SILOXANE	12.95	480	J
15.	UNKNOWN PAH	13.09	350	J
16.	UNKNOWN PAH	13.24	260	J
17.	UNKNOWN	13.32	920	J
18.	UNKNOWN SILOXANE	13.52	350	J
19.	UNKNOWN SILOXANE	14.17	440	J
20.	UNKNOWN SILOXANE	14.94	4800	J
21.	UNKNOWN SILOXANE	15.89	4000	J

1B

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGH98

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506405

Sample wt/vol: 30.3 (g/mL) G Lab File ID: GH006405B07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 8 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/07/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
108-95-2	Phenol	360	U
111-44-4	bis(2-Chloroethyl)Ether	360	U
95-57-8	2-Chlorophenol	360	U
541-73-1	1,3-Dichlorobenzene	360	U
106-46-7	1,4-Dichlorobenzene	360	U
95-50-1	1,2-Dichlorobenzene	360	U
95-48-7	2-Methylphenol	360	U
108-60-1	2,2'-Oxybis(1-Chloropropane)	360	U
106-44-5	4-Methylphenol	360	U
621-64-7	N-Nitroso-Di-n-Propylamine	360	U
67-72-1	Hexachloroethane	360	U
98-95-3	Nitrobenzene	360	U
78-59-1	Isophorone	360	U
88-75-5	2-Nitrophenol	360	U
105-67-9	2,4-Dimethylphenol	360	U
111-91-1	bis(2-Chloroethoxy)Methane	360	U
120-83-2	2,4-Dichlorophenol	360	U
120-82-1	1,2,4-Trichlorobenzene	360	U
91-20-3	Naphthalene	360	U
106-47-8	4-Chloroaniline	360	U J
87-68-3	Hexachlorobutadiene	360	U
59-50-7	4-Chloro-3-Methylphenol	360	U
91-57-6	2-Methylnaphthalene	360	U
77-47-4	Hexachlorocyclopentadiene	360	U J
88-06-2	2,4,6-Trichlorophenol	360	U
95-95-4	2,4,5-Trichlorophenol	860	U
91-58-7	2-Chloronaphthalene	360	U
88-74-4	2-Nitroaniline	860	U
131-11-3	Dimethyl Phthalate	360	U
208-96-8	Acenaphthylene	360	U
606-20-2	2,6-Dinitrotoluene	360	U
99-09-2	3-Nitroaniline	860	~~U~~ R
83-32-9	Acenaphthene	360	U

1C
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGH98

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506405

Sample wt/vol: 30.3 (g/mL) G Lab File ID: GH006405B07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 8 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/07/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.9

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
51-28-5	2,4-Dinitrophenol	860	U J
100-02-7	4-Nitrophenol	860	U J
132-64-9	Dibenzofuran	360	U
121-14-2	2,4-Dinitrotoluene	360	U
84-66-2	Diethylphthalate	360	U
7005-72-3	4-Chlorophenyl-phenylether	360	U
86-73-7	Fluorene	360	U
100-01-6	4-Nitroaniline	860	U
534-52-1	4,6-Dinitro-2-Methylphenol	860	U J
86-30-6	N-Nitrosodiphenylamine (1)	360	U
101-55-3	4-Bromophenyl-phenylether	360	U
118-74-1	Hexachlorobenzene	360	U J
87-86-5	Pentachlorophenol	860	U
85-01-8	Phenanthrene	360	U
120-12-7	Anthracene	360	U
86-74-8	Carbazole	360	U
84-74-2	Di-n-Butylphthalate	360	U
206-44-0	Fluoranthene	360	U
129-00-0	Pyrene	360	U
85-68-7	Butylbenzylphthalate	360	U
91-94-1	3,3'-Dichlorobenzidine	360	U
56-55-3	Benzo(a)Anthracene	360	U
218-01-9	Chrysene	360	U
117-81-7	bis(2-Ethylhexyl)Phthalate	150	J
117-84-0	Di-n-Octyl Phthalate	360	U
205-99-2	Benzo(b)Fluoranthene	360	U
207-08-9	Benzo(k)Fluoranthene	360	U
50-32-8	Benzo(a)Pyrene	360	U
193-39-5	Indeno(1,2,3-cd)Pyrene	360	U
53-70-3	Dibenz(a,h)Anthracene	360	U
191-24-2	Benzo(g,h,i)Perylene	360	U

(1) - Cannot be separated from Diphenylamine

1F

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGH98

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506405

Sample wt/vol: 30.3 (g/mL) G Lab File ID: GH006405B07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: 8 decanted: (Y/N) N Date Extracted: 08/05/92

Concentrated Extract Volume: 500.0 (uL) Date Analyzed: 08/07/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: 6.9

Number TICs found: 22

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	UNKNOWN	5.38	180	J
2.	UNKNOWN	5.43	110	J
3.	BLANK CONTAMINANT	5.53	180	~~B~~ R
4.	UNKNOWN	6.03	140	J
5.	UNKNOWN PHTHALATE	11.44	140	J
6.	UNKNOWN CARBOXYLIC ACID	11.80	290	J
7.	UNKNOWN	13.19	220	J
8.	UNKNOWN HYDROCARBON	13.25	180	J
9.	LABORATORY ARTIFACT	13.67	180	J
10.	UNKNOWN	13.90	140	J
11.	UNKNOWN	14.25	610	J
12.	UNKNOWN	14.47	72	J
13.	UNKNOWN HYDROCARBON	15.52	180	J
14.	UNKNOWN	15.59	320	J
15.	UNKNOWN	16.35	72	J
16.	UNKNOWN	16.79	360	J
17.	UNKNOWN HYDROCARBON	17.35	720	J
18.	UNKNOWN	17.49	250	J
19.	UNKNOWN	20.04	570	J
20.	UNKNOWN	20.25	140	J
21.	UNKNOWN	25.52	250	J
22.	UNKNOWN	25.99	250	J

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGA01

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506390

Sample wt/vol: 30.30 (g/ml) G Lab File ID:

% Moisture: 26 decanted: (Y/N) N Date R ceived: 08/01/92

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 08/07/92

Concentrated Extract Volume 5000 (uL) Date Analyzed: 08/11/92

Injection Volume: 2.0 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) Y pH: 7.1 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	2.3	U
319-85-7	beta-BHC	2.3	U
319-86-8	delta-BHC	2.3	U
58-89-9	gamma-BHC (Lindane)	2.3	U
76-44-8	Heptachlor	2.3	U
309-00-2	Aldrin	2.3	U
1024-57-3	Heptachlor epoxide	2.3	U
959-98-8	Endosulfan I	2.3	U
60-57-1	Dieldrin	0.22	JPR
72-55-9	4,4'-DDE	0.16	JPR
72-20-8	Endrin	4.4	U
33213-65-9	Endosulfan II	4.4	U
72-54-8	4,4'-DDD	4.4	U
1031-07-8	Endosulfan sulfate	4.4	U
50-29-3	4,4'-DDT	4.4 ~~0.31~~	JPR
72-43-5	Methoxychlor	23	UJ
53494-70-5	Endrin ketone	4.4	U
7421-93-4	Endrin aldehyde	4.4	U
5103-71-9	alpha-Chlordane	0.15	JPN
5103-74-2	gamma-Chlordane	2.3	U
8001-35-2	Toxaphene	230	U
12674-11-2	Aroclor-1016	44	U
11104-28-2	Aroclor-1221	90	U
11141-16-5	Aroclor-1232	44	U
53469-21-9	Aroclor-1242	44	U
12672-29-6	Aroclor-1248	44	U
11097-69-1	Aroclor-1254	44	U
11096-82-5	Aroclor-1260	44	U

18542 BGA 01

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGA02

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506395

Sample wt/vol: 30.20 (g/ml) G Lab File ID:

% Moisture: 37 decanted: (Y/N) N Date Received: 08/01/92

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 08/07/92

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 08/11/92

Injection Volume: 2.0 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) Y pH: 7.1 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	2.7	U
319-85-7	beta-BHC	2.7	U
319-86-8	delta-BHC	2.7	U
58-89-9	gamma-BHC (Lindane)	2.7	U
76-44-8	Heptachlor	2.7	U
309-00-2	Aldrin	2.7	U
1024-57-3	Heptachlor epoxide	2.7	U
959-98-8	Endosulfan I	2.7	U
60-57-1	Dieldrin	5.2	U
72-55-9	4,4'-DDE	5.2	U
72-20-8	Endrin	5.2	U
33213-65-9	Endosulfan II	5.2	U
72-54-8	4,4'-DDD	5.2	U
1031-07-8	Endosulfan sulfate	5.2	U
50-29-3	4,4'-DDT	5.2 ~~0.17~~	~~JP~~ ~~W~~ R
72-43-5	Methoxychlor	27	UJ
53494-70-5	Endrin ketone	5.2	U
7421-93-4	Endrin aldehyde	5.2	U
5103-71-9	alpha-Chlordane	2.7	U
5103-74-2	gamma-Chlordane	2.7	U
8001-35-2	Toxaphene	270	U
12674-11-2	Aroclor-1016	52	U
11104-28-2	Aroclor-1221	110	U
11141-16-5	Aroclor-1232	52	U
53469-21-9	Aroclor-1242	52	U
12672-29-6	Aroclor-1248	52	U
11097-69-1	Aroclor-1254	52	U
11096-82-5	Aroclor-1260	52	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGA03

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506401

Sample wt/vol: 30.30 (g/ml) G Lab File ID:

% Moisture: 9 decanted: (Y/N) N Date Received: 08/01/92

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 08/07/92

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 08/11/92

Injection Volume: 2.0 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) Y pH: 7.2 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	1.8	U
319-85-7	beta-BHC	1.8	U
319-86-8	delta-BHC	1.8	U
58-89-9	gamma-BHC (Lindane)	1.8	U
76-44-8	Heptachlor	1.8	U
309-00-2	Aldrin	1.8	U
1024-57-3	Heptachlor epoxide	1.8	U
959-98-8	Endosulfan I	1.8	U
60-57-1	Dieldrin	0.23	JP
72-55-9	4,4'-DDE	3.6	U
72-20-8	Endrin	3.6	U
33213-65-9	Endosulfan II	3.6	U
72-54-8	4,4'-DDD	3.6	U
1031-07-8	Endosulfan sulfate	1.0	JPN
50-29-3	4,4'-DDT	3.6 ~~0.23~~	~~JPN~~ UR
72-43-5	Methoxychlor	18	UJ
53494-70-5	Endrin ketone	3.6	U
7421-93-4	Endrin aldehyde	3.6	U
5103-71-9	alpha-Chlordane	1.8	U
5103-74-2	gamma-Chlordane	0.12	J
8001-35-2	Toxaphene	180	U
12674-11-2	Aroclor-1016	36	U
11104-28-2	Aroclor-1221	73	U
11141-16-5	Aroclor-1232	36	U
53469-21-9	Aroclor-1242	36	U
12672-29-6	Aroclor-1248	36	U
11097-69-1	Aroclor-1254	36	U
11096-82-5	Aroclor-1260	8.1	J

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGG98

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506403

Sample wt/vol: 30.40 (g/ml) G Lab File ID:

% Moisture: 21 decanted: (Y/N) N Date Received: 08/01/92

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 08/07/92

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 08/11/92

Injection Volume: 2.0 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) Y pH: 7.2 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	2.1	U
319-85-7	beta-BHC	2.1	U
319-86-8	delta-BHC	0.80	~~JP~~ R
58-89-9	gamma-BHC (Lindane)	2.1	U
76-44-8	Heptachlor	2.1	U
309-00-2	Aldrin	0.51	~~JP~~ R
1024-57-3	Heptachlor epoxide	2.0	JPN
959-98-8	Endosulfan I	2.1	U
60-57-1	Dieldrin	2.0	~~JP~~ R
72-55-9	4,4'-DDE	1.1	JP
72-20-8	Endrin	4.1	PJ
33213-65-9	Endosulfan II	4.1	U
72-54-8	4,4'-DDD	3.5	JPBN
1031-07-8	Endosulfan sulfate	4.2	~~P~~ N
50-29-3	4,4'-DDT	3.3	JPB
72-43-5	Methoxychlor	21	UJ
53494-70-5	Endrin ketone	4.1	U
7421-93-4	Endrin aldehyde	4.1	U
5103-71-9	alpha-Chlordane	2.4	~~P~~ R
5103-74-2	gamma-Chlordane	0.42	~~JP~~ R
8001-35-2	Toxaphene	210	U
12674-11-2	Aroclor-1016	41	U
11104-28-2	Aroclor-1221	84	U
11141-16-5	Aroclor-1232	41	U
53469-21-9	Aroclor-1242	41	U
12672-29-6	Aroclor-1248	41	U
11097-69-1	Aroclor-1254	41	U
11096-82-5	Aroclor-1260	41	U

Use this Analyte

1D

PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGH97DL

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506404 D50

Sample wt/vol: 30.30 (g/ml) G Lab File ID:

% Moisture: 25 decanted: (Y/N) N Date Received: 08/01/92

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 08/07/92

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 08/13/92

Injection Volume: 2.0 (uL) Dilution Factor: 5

GPC Cleanup: (Y/N) Y pH: 6.8 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	11	U
319-85-7	beta-BHC	11	U
319-86-8	delta-BHC	1.4	~~JPD~~ R
58-89-9	gamma-BHC (Lindane)	11	U
76-44-8	Heptachlor	11	U
309-00-2	Aldrin	11	U
1024-57-3	Heptachlor epoxide	1.1	~~JPD~~ R
959-98-8	Endosulfan I	11	U
60-57-1	Dieldrin	19	JPD
72-55-9	4,4'-DDE	19	JD
72-20-8	Endrin	0.59	JPDN
33213-65-9	Endosulfan II	22	U
72-54-8	4,4'-DDD	21	JPBDN
1031-07-8	Endosulfan sulfate	1.9	~~JPD~~ R
50-29-3	4,4'-DDT	96	BD
72-43-5	Methoxychlor	5.3	~~JPBD~~ R
53494-70-5	Endrin ketone	2.5	JPD
7421-93-4	Endrin aldehyde	22	U
5103-71-9	alpha-Chlordane	26	PDJN
5103-74-2	gamma-Chlordane	34	D
8001-35-2	Toxaphene	1100	U
12674-11-2	Aroclor-1016	220	U
11104-28-2	Aroclor-1221	440	U
11141-16-5	Aroclor-1232	220	U
53469-21-9	Aroclor-1242	220	U
12672-29-6	Aroclor-1248	220	U
11097-69-1	Aroclor-1254	220	U
11096-82-5	Aroclor-1260	220	U

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGH98

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: SDG No.: BGA01

Matrix: (soil/water) SOIL Lab Sample ID: 506405

Sample wt/vol: 30.20 (g/ml) G Lab File ID:

% Moisture: 8 decanted: (Y/N) N Date Received: 08/01/92

Extraction: (SepF/Cont/Sonc) SONC Date Extracted: 08/07/92

Concentrated Extract Volume: 5000 (uL) Date Analyzed: 08/11/92

Injection Volume: 2.0 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) Y pH: 6.9 Sulfur Cleanup: (Y/N) N

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/KG	Q
319-84-6	alpha-BHC	1.8	U
319-85-7	beta-BHC	1.8	U
319-86-8	delta-BHC	1.8	U
58-89-9	gamma-BHC (Lindane)	1.8	U
76-44-8	Heptachlor	1.8	U
309-00-2	Aldrin	1.8	U
1024-57-3	Heptachlor epoxide	0.093	J
959-98-8	Endosulfan I	1.8	U
60-57-1	Dieldrin	3.6	U
72-55-9	4,4'-DDE	0.14	~~JP~~ R
72-20-8	Endrin	3.6	U
33213-65-9	Endosulfan II	3.6	U
72-54-8	4,4'-DDD	3.6 ~~0.19~~	~~JPUR~~ R
1031-07-8	Endosulfan sulfate	3.6	U
50-29-3	4,4'-DDT	3.6 ~~0.15~~	~~JPUR~~ R
72-43-5	Methoxychlor	18	UJ
53494-70-5	Endrin ketone	3.6	U
7421-93-4	Endrin aldehyde	3.6	U
5103-71-9	alpha-Chlordane	1.8 ~~0.006~~	~~JPU~~ R
5103-74-2	gamma-Chlordane	1.8	U
8001-35-2	Toxaphene	180	U
12674-11-2	Aroclor-1016	36	U
11104-28-2	Aroclor-1221	72	U
11141-16-5	Aroclor-1232	36	U
53469-21-9	Aroclor-1242	36	U
12672-29-6	Aroclor-1248	36	U
11097-69-1	Aroclor-1254	36	U
11096-82-5	Aroclor-1260	36	U

COMPUCHEM LABORATORIES, INC. P.O Box 12652 3308 Chapel Hill/Nelson Highway Research Triangle Park, NC 27709 (919) 549-826

RECEIVED
AUG 18 1992
S & M BRANCH

SDG NARRATIVE SDG #BGG97
CASE #18542 CONTRACT #68D00159
COMPUCHEM LABORATORIES, INC.

SAMPLE: BGG97

The sample listed above was received intact at fourteen degrees Celsius on 8-1-92. The chain-of-custody document was in order. The shipping container was properly sealed. This narrative summarizes the analysis of this field blank listed above for full analysis, according to the EPA OLM01.8 SOW. For the as-received volatile pH values please see the volatile batch sheets, directly behind the narrative.

Volatiles:
All sample and QC fractions were analyzed within holding times. The sample contained below CRQL concentrations of methylene chloride and chloroform. The sample contained no TICs. All sample and QC fractions met the system monitoring compounds recovery criteria. No matrix spike duplicates were generated since both samples were field blanks.

Semivolatiles:
All sample and QC fractions were extracted within holding times. The sample contained no TCLs above CRQL. All sample and QC fractions met the surrogate recovery criteria. No matrix spike duplicates were generated since both samples were field blanks.

Pesticides/PCBs:
All sample and QC fractions were extracted within holding times. The sample contained no TCLs above CRQL. The surrogate recovery results are summarized on Form 2. Since surrogate recovery criteria are advisory, samples which have recoveries greater than 20% are not reextracted. No matrix spike duplicates were generated since both samples were field blanks.

NOTE: The "Y" footnote denotes that while a TCL was confirmed by dual confirmation by GC/ECD, the criteria for confirmation by GC/MS were not met, when used on GC form 1s.

COMPUCHEM LABORATORIES, INC. P.O. Box 12652 3308 Chapel Hill/Nelson Highway Research Triangle Park, NC 27709 (919) 549-8263

NOTE: THIS DATA PACKAGE WAS PAGINATED FOR REFERENCE AND ACCOUNTABILITY.

NOTE: I CERTIFY THAT THIS DATA PACKAGE IS IN COMPLIANCE WITH THE TERMS AND CONDITIONS OF THE CONTRACT, BOTH TECHNICALLY AND FOR COMPLETENESS, FOR OTHER THAN THE CONDITIONS DETAILED ABOVE. RELEASE OF THE DATA CONTAINED IN THIS HARDCOPY DATA PACKAGE AND IN THE COMPUTER-READABLE DATA SUBMITTED ON FLOPPY DISKETTE HAS BEEN AUTHORIZED BY THE LABORATORY MANAGER OR HIS DESIGNEE, AS VERIFIED BY THE FOLLOWING SIGNATURE.

ERNowell

ELISABETH ROBINS NOWELL
TECHNICAL REVIEWER
8-14-92

1A
VOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGG97 FB

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGG97

Matrix: (soil/water) WATER Lab Sample ID: 506406

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: CN006406B56

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. ____ Date Analyzed: 08/04/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
74-87-3	Chloromethane	10	U
74-83-9	Bromomethane	10	U
75-01-4	Vinyl Chloride	10	U
75-00-3	Chloroethane	10	U
75-09-2	Methylene Chloride	5	BJ
67-64-1	Acetone	10	U
75-15-0	Carbon Disulfide	10	U
75-35-4	1,1-Dichloroethene	10	U
75-34-3	1,1-Dichloroethane	10	U
540-59-0	1,2-Dichloroethene (total)	10	U
67-66-3	Chloroform	13	
107-06-2	1,2-Dichloroethane	10	U
78-93-3	2-Butanone	10	U
71-55-6	1,1,1-Trichloroethane	10	U
56-23-5	Carbon Tetrachloride	10	U
75-27-4	Bromodichloromethane	10	U
78-87-5	1,2-Dichloropropane	10	U
10061-01-5	cis-1,3-Dichloropropene	10	U
79-01-6	Trichloroethene	10	U
124-48-1	Dibromochloromethane	10	U
79-00-5	1,1,2-Trichloroethane	10	U
71-43-2	Benzene	10	U
10061-02-6	Trans-1,3-Dichloropropene	10	U
75-25-2	Bromoform	10	U
108-10-1	4-Methyl-2-Pentanone	10	U
591-78-6	2-Hexanone	10	U
127-18-4	Tetrachloroethene	10	U
79-34-5	1,1,2,2-Tetrachloroethane	10	U
108-88-3	Toluene	10	U
108-90-7	Chlorobenzene	10	U
100-41-4	Ethylbenzene	10	U
100-42-5	Styrene	10	U
1330-20-7	Xylene (total)	10	U

1E
VOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGG97

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGG97

Matrix: (soil/water) WATER Lab Sample ID: 506406

Sample wt/vol: 5.0 (g/mL) ML Lab File ID: CN006406B56

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: not dec. ____ Date Analyzed: 08/04/92

GC Column: DB-624 ID: 0.530 (mm) Dilution Factor: 1.0

Soil Extract Volume: _____ (uL) Soil Aliquot Volume: _____(uL)

Number TICs found: 0

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q

1B
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGG97 FB

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGG97

Matrix: (soil/water) WATER Lab Sample ID: 506406

Sample wt/vol: 1000 (g/mL) ML Lab File ID: GH006406B07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: _____ decanted: (Y/N) ___ Date Extracted: 08/04/92

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 08/06/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ____

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
108-95-2	Phenol	5	BJ
111-44-4	bis(2-Chloroethyl)Ether	10	UJ
95-57-8	2-Chlorophenol	10	U
541-73-1	1,3-Dichlorobenzene	10	U
106-46-7	1,4-Dichlorobenzene	10	U
95-50-1	1,2-Dichlorobenzene	10	U
95-48-7	2-Methylphenol	10	U
108-60-1	2,2'-Oxybis(1-Chloropropane)	10	U
106-44-5	4-Methylphenol	10	U
621-64-7	N-Nitroso-Di-n-Propylamine	10	U
67-72-1	Hexachloroethane	10	U
98-95-3	Nitrobenzene	10	U
78-59-1	Isophorone	10	U
88-75-5	2-Nitrophenol	10	U
105-67-9	2,4-Dimethylphenol	10	U
111-91-1	bis(2-Chloroethoxy)Methane	10	U
120-83-2	2,4-Dichlorophenol	10	U
120-82-1	1,2,4-Trichlorobenzene	10	U
91-20-3	Naphthalene	10	U
106-47-8	4-Chloroaniline	10	U
87-68-3	Hexachlorobutadiene	10	U
59-50-7	4-Chloro-3-Methylphenol	10	U
91-57-6	2-Methylnaphthalene	10	U
77-47-4	Hexachlorocyclopentadiene	10	U
88-06-2	2,4,6-Trichlorophenol	10	U
95-95-4	2,4,5-Trichlorophenol	25	U
91-58-7	2-Chloronaphthalene	10	U
88-74-4	2-Nitroaniline	25	U
131-11-3	Dimethyl Phthalate	1	J
208-96-8	Acenaphthylene	10	U
606-20-2	2,6-Dinitrotoluene	10	U
99-09-2	3-Nitroaniline	25	UR
83-32-9	Acenaphthene	10	U

1C

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGG97

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGG97

Matrix: (soil/water) WATER Lab Sample ID: 506406

Sample wt/vol: 1000 (g/mL) ML Lab File ID: GH006406B07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: _____ decanted: (Y/N) ___ Date Extracted: 08/04/92

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 08/06/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ____

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L	Q
51-28-5	2,4-Dinitrophenol	25	UJ
100-02-7	4-Nitrophenol	25	U
132-64-9	Dibenzofuran	10	U
121-14-2	2,4-Dinitrotoluene	10	U
84-66-2	Diethylphthalate	1	J
7005-72-3	4-Chlorophenyl-phenylether	10	UJ
86-73-7	Fluorene	10	U
100-01-6	4-Nitroaniline	25	U
534-52-1	4,6-Dinitro-2-Methylphenol	25	U
86-30-6	N-Nitrosodiphenylamine (1)	10	U
101-55-3	4-Bromophenyl-phenylether	10	U
118-74-1	Hexachlorobenzene	10	U
87-86-5	Pentachlorophenol	25	U
85-01-8	Phenanthrene	10	U
120-12-7	Anthracene	10	U
86-74-8	Carbazole	10	U
84-74-2	Di-n-Butylphthalate	1	J
206-44-0	Fluoranthene	10	UJ
129-00-0	Pyrene	10	U
85-68-7	Butylbenzylphthalate	10	U
91-94-1	3,3'-Dichlorobenzidine	10	U
56-55-3	Benzo(a)Anthracene	10	U
218-01-9	Chrysene	10	U
117-81-7	bis(2-Ethylhexyl)Phthalate	7	BJ
117-84-0	Di-n-Octyl Phthalate	10	UJ
205-99-2	Benzo(b)Fluoranthene	10	U
207-08-9	Benzo(k)Fluoranthene	10	U
50-32-8	Benzo(a)Pyrene	10	U
193-39-5	Indeno(1,2,3-cd)Pyrene	10	U
53-70-3	Dibenz(a,h)Anthracene	10	U
191-24-2	Benzo(g,h,i)Perylene	10	U

(1) - Cannot be separated from Diphenylamine

1F
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

BGG97

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: _____ SDG No.: BGG97

Matrix: (soil/water) WATER Lab Sample ID: 506406

Sample wt/vol: 1000 (g/mL) ML Lab File ID: GH006406B07

Level: (low/med) LOW Date Received: 08/01/92

% Moisture: _____ decanted: (Y/N) ___ Date Extracted: 08/04/92

Concentrated Extract Volume: 1000 (uL) Date Analyzed: 08/06/92

Injection Volume: 2.0(uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) N pH: ____

Number TICs found: 2

CONCENTRATION UNITS:
(ug/L or ug/Kg) UG/L

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1.	BLANK CONTAMINANT	5.33	14	BJ
2.	LABORATORY ARTIFACT	14.87	19	BJ

1D
PESTICIDE ORGANICS ANALYSIS DATA SHEET

EPA SAMPLE NO.

BGG97 FB

Lab Name: COMPUCHEM,RTP Contract: 68D00159

Lab Code: COMPU Case No.: 18542 SAS No.: SDG No.: BGG97

Matrix: (soil/water) WATER Lab Sample ID: 506406

Sample wt/vol: 1000 (g/ml) ML Lab File ID:

% Moisture: decanted: (Y/N) Date Received: 08/01/92

Extraction: (SepF/Cont/Sonc) SEPF Date Extracted: 08/05/92

Concentrated Extract Volume: 10000 (uL) Date Analyzed: 08/06/92

Injection Volume: 2.0 (uL) Dilution Factor: 1

GPC Cleanup: (Y/N) N pH: Sulfur Cleanup: (Y/N) N

CONCENTRATION UNITS: (ug/L or ug/Kg) UG/L

CAS NO.	COMPOUND		Q
319-84-6	alpha-BHC	0.050	U J
319-85-7	beta-BHC	0.050	U
319-86-8	delta-BHC	0.050	U
58-89-9	gamma-BHC (Lindane)	0.050	U
76-44-8	Heptachlor	0.050	U
309-00-2	Aldrin	0.050	U
1024-57-3	Heptachlor epoxide	0.050	U
959-98-8	Endosulfan I	0.050	U
60-57-1	Dieldrin	0.10	U
72-55-9	4,4'-DDE	0.10	U
72-20-8	Endrin	0.10	U
33213-65-9	Endosulfan II	0.10	U
72-54-8	4,4'-DDD	0.10	U
1031-07-8	Endosulfan sulfate	0.10	U
50-29-3	4,4'-DDT	0.024	~~J~~ R
72-43-5	Methoxychlor	0.50	U J
53494-70-5	Endrin ketone	0.10	U
7421-93-4	Endrin aldehyde	0.10	U
5103-71-9	alpha-Chlordane	0.025	J
5103-74-2	gamma-Chlordane	0.050	U J
8001-35-2	Toxaphene	5.0	U
12674-11-2	Aroclor-1016	1.0	U
11104-28-2	Aroclor-1221	2.0	U
11141-16-5	Aroclor-1232	1.0	U
53469-21-9	Aroclor-1242	1.0	U
12672-29-6	Aroclor-1248	1.0	U
11097-69-1	Aroclor-1254	1.0	U
11096-82-5	Aroclor-1260	1.0	U

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COVER PAGE - INORGANIC ANALYSES DATA PACKAGE

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0109

Lab Code: SKINER Case No.: 18542 SAS No.: SDG No.: MBAK78

QW No.: 3/90

EPA Sample No.	Lab Sample ID.
MBAK78	08003-01S
MBAK79	08003-02S
MBAK80	08003-03S
MBAK81	08003-04S
MBAK82	08003-05S
MBAK83	08003-06S
MBAK83D	08003-06SD
MBAK83S	08003-06DS
MBAK84	08003-07S

Were ICP interelement corrections applied? Yes/No YES
Were ICP background corrections applied? Yes/No YES
If yes-were raw data generated before application of background corrections? Yes/No NO

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on floppy diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: Kirk Johnson Name: Kirk D. Johnson

Date: 9/8/92 Title: USEPA Data Manager

0001

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EPA SAMPLE NO.

MBAK78 FB

INORGANIC ANALYSIS DATA SHEET

Lab Name: SKINNER & SHEFMAN LABS. Contract: 68-D0-0109

Lab Code: SKINER Case No.: 18542 SAS No.: SDG No.: MBAK78

Matrix (soil/water): WATER Lab Sample ID: 08003-01S

Level (low/med): LOW Date Received: 08/01/92

% Solids: 0.0

Concentration Units (ug/L or mg/kg dry weight): UG/L

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	23.90	U	J	P
7440-36-0	Antimony	16.30	U		P
7440-38-2	Arsenic	2.80	B		F
7440-39-3	Barium	4.60	U		P
7440-41-7	Beryllium	0.70	U		P
7440-43-9	Cadmium	1.50	U		P
7440-70-2	Calcium	44.30	B		P
7440-47-3	Chromium	4.90	U		P
7440-48-4	Cobalt	3.50	U		P
7440-50-8	Copper	3.80	U		P
7439-89-6	Iron	7.60	U		P
7439-92-1	Lead	2.20	U		F
7439-95-4	Magnesium	40.10	U		P
7439-96-5	Manganese	4.40	U		P
7439-97-6	Mercury	0.20	U		CV
7440-02-0	Nickel	3.90	U		P
7440-09-7	Potassium	266.00	U		P
7782-49-2	Selenium	3.70	U	W	F
7440-22-4	Silver	4.80	U		P
7440-23-5	Sodium	218.00	B		P
7440-28-0	Thallium	1.60	U		F
7440-62-2	Vanadium	2.40	U		P
7440-66-6	Zinc	11.50	B	V	F
	Cyanide	10.00	U		CA

Color Before: COLORLESS Clarity Before: CLEAR Texture:

Color After: COLORLESS Clarity After: CLEAR Artifacts:

Comments:

0002

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MBAK84

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0109

Lab Code: SKINER Case No.: 18942 SAS No.: SDG No.: MBAK78

Matrix (soil/water): SOIL Lab Sample ID: 05003-075

Level (low/med): LOW Date Received: 08/01/92

% Solids: 73.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	11400.00			P	
7440-36-0	Antimony	4.10	U	N J	P	
7440-38-2	Arsenic	2.70		N J	F	
7440-39-3	Barium	60.80			P	
7440-41-7	Beryllium	0.36	B		P	
7440-43-9	Cadmium	0.38	U		P	
7440-70-2	Calcium	5050.00			P	
7440-47-3	Chromium	48.30		*	P	
7440-48-4	Cobalt	8.90	B		P	
7440-50-8	Copper	13.90		J	P	[illegible]
7439-89-6	Iron	11200.00		*	P	
7439-92-1	Lead	20.90		W SN J	P	
7439-95-4	Magnesium	16300.00			P	
7439-96-5	Manganese	122.00			P	
7439-97-6	Mercury	14.50		J	CV	[illegible]
7440-02-0	Nickel	99.10			P	
7440-09-7	Potassium	342.00	B		P	
7782-49-2	Selenium	~~1.40~~		~~N~~	P	
7440-22-4	Silver	1.20	U		P	
7440-23-5	Sodium	91.30	B		P	
7440-28-0	Thallium	0.41	U		P	
7440-62-2	Vanadium	29.80		*	P	
7440-66-6	Zinc	39.30		J	P	
	Cyanide	0.65	U		CA	

Color Before: BLACK Clarity Before: Texture: FINE

Color After: BLACK Clarity After: Artifacts: YES

Comments:
ROOTS

0008

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MBAK83

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0109

Lab Code: SKTNER Case No.: 18542 SAS No.: SDG No.: MBAK78

Matrix (soil/water): SOIL Lab Sample ID: 08003-065

Level (low/med): LOW Date Received: 05/01/92

% Solids: 78.3

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	10400.00			P	
7440-36-0	Antimony	4.10	U	N J	P	
7440-38-2	Arsenic	2.80		N J	F	
7440-39-3	Barium	52.70			P	
7440-41-7	Beryllium	0.35	B		P	
7440-43-9	Cadmium	0.32	U		P	
7440-70-2	Calcium	1570.00			P	
7440-47-3	Chromium	16.10		*	P	
7440-48-4	Cobalt	4.20	B		P	
7440-50-8	Copper	13.20		J	P	[illegible]
7439-89-6	Iron	16800.00		*	P	
7439-92-1	Lead	15.20		N J	F	
7439-95-4	Magnesium	1740.00			P	
7439-96-5	Manganese	89.80			P	
7439-97-6	Mercury	0.03	B	J	CV	[illegible]
7440-02-0	Nickel	7.60	B		P	
7440-09-7	Potassium	260.00	B		P	
7782-49-2	Selenium	0.94	U	WN	F	
7440-22-4	Silver	1.20	U		P	
7440-23-5	Sodium	150.00	B		P	
7440-28-0	Thallium	0.40	U		F	
7440-62-2	Vanadium	34.40		*	P	
7440-66-6	Zinc	30.90		J	P	
	Cyanide	0.59	U		CA	

Color Before: BROWN Clarity Before: Texture: FINE

Color After: BROWN Clarity After: Artifacts: YES

Comments:
ROCKS

0007

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MBAK82

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0104

Lab Code: SKINEP Case No.: 18540 SAS No.: SDG No.: MBAK78

Matrix (soil/water): SOIL Lab Sample ID: 08000-055

Level (low/med): LOW Date Received: 08/01/92

% Solids: 77.7

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	5500.00			P
7440-36-0	Antimony	4.00	U	N J	P
7440-38-2	Arsenic	2.60		N J	P
7440-39-3	Barium	31.00	B		P
7440-41-7	Beryllium	0.23	B		P
7440-43-9	Cadmium	0.37	U		P
7440-70-2	Calcium	867.00	B		P
7440-47-3	Chromium	7.60		*	P
7440-48-4	Cobalt	2.90	B		P
7440-50-8	Copper	7.80			P
7439-89-6	Iron	6770.00		*	P
7439-92-1	Lead	21.10		WSN J	P
7439-95-4	Magnesium	874.00	B		P
7439-96-5	Manganese	39.70			P
7439-97-6	Mercury	0.08	B	J	CV
7440-02-0	Nickel	5.00	B		P
7440-09-7	Potassium	155.00	B		P
7782-49-2	Selenium	~~1.90~~		~~+N~~	P
7440-22-4	Silver	1.20	U		P
7440-23-5	Sodium	88.20	B		P
7440-28-0	Thallium	0.38	U		P
7440-62-2	Vanadium	17.80		*	P
7440-66-6	Zinc	30.20		J	P
	Cyanide	0.60	U		CA

Color Before: BROWN Clarity Before: Texture: FINE

Color After: BROWN Clarity After: Artifacts:

Comments:

0006

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MBAK79

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0109

Lab Code: SKINER Case No.: 18542 SAS No.: SDG No.: MBAK78

Matrix (soil/water): SOIL Lab Sample ID: 08003-025

Level (low/med): LOW Date Received: 08/01/92

% Solids: 82.6

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	5610.00			P	
7440-36-0	Antimony	3.80	U	NJ	P	
7440-38-2	Arsenic	3.70		NJ	F	
7440-39-3	Barium	56.10			P	
7440-41-7	Beryllium	0.21	B		P	
7440-43-9	Cadmium	0.35	U		P	
7440-70-2	Calcium	7410.00			P	
7440-47-3	Chromium	14.20		*	F	
7440-48-4	Cobalt	11.20	B		P	
7440-50-8	Copper	55.30		J	P	DC [illegible]
7439-89-6	Iron	17500.00		*	P	
7439-92-1	Lead	159.00		NJ	F	
7439-95-4	Magnesium	5130.00			P	
7439-96-5	Manganese	396.00			P	
7439-97-6	Mercury	0.25		J	CV	[illegible]
7440-02-0	Nickel	20.20			P	
7440-09-7	Potassium	637.00	B		P	
7782-49-2	Selenium	~~0.91~~	~~B~~	~~UN~~	F	
7440-22-4	Silver	1.10	U		P	
7440-23-5	Sodium	671.00	B		P	
7440-28-0	Thallium	0.38	U		F	
7440-62-2	Vanadium	46.80		*	P	
7440-66-6	Zinc	112.00		J	P	DC [illegible]
	Cyanide	0.60	U		CA	

Color Before: BROWN Clarity Before: Texture: FINE

Color After: BROWN Clarity After: Artifacts: YES

Comments:
ROOTS, WOOD

C003

U.S. EPA - CLP
1

INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MBAK80

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0109

Lab Code: SKINER Case No.: 13542 SAS No.: SDG No.: MBAK78

Matrix (soil/water): SOIL Lab Sample ID: 08003-03S

Level (low/med): LOW Date Received: 08/01/92

% Solids: 85.1

Concentration Units (ug/L or mg/Kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M
7429-90-5	Aluminum	8850.00			P
7440-36-0	Antimony	3.80	U	NJ	P
7440-38-2	Arsenic	2.70		NJ	F
7440-39-3	Barium	53.40			P
7440-41-7	Beryllium	0.34	B		P
7440-43-9	Cadmium	0.35	U		P
7440-70-2	Calcium	7390.00			P
7440-47-3	Chromium	18.10		*	P
7440-48-4	Cobalt	8.80	B		P
7440-50-8	Copper	19.40		J	P
7439-89-6	Iron	14600.00		*	P
7439-92-1	Lead	16.80		N	F
7439-95-4	Magnesium	3750.00			P
7439-96-5	Manganese	257.00			P
7439-97-6	Mercury	0.11	B	J	CV
7440-02-0	Nickel	19.00			P
7440-09-7	Potassium	1280.00			P
7782-49-2	Selenium	0.86	U	WN	F
7440-22-4	Silver	1.10	U		P
7440-23-5	Sodium	111.00	B		P
7440-28-0	Thallium	0.37	U		F
7440-62-2	Vanadium	29.40		*	P
7440-66-6	Zinc	45.30		J	P
	Cyanide	0.58	U		CA

Color Before: BROWN Clarity Before: Texture: FINE

Color After: BROWN Clarity After: Artifacts:

Comments:

0004

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INORGANIC ANALYSIS DATA SHEET

EPA SAMPLE NO.

MBAK81

Lab Name: SKINNER & SHERMAN LABS. Contract: 68-D0-0109

Lab Code: SKINER Case No.: 18542 SAS No.: SDG No.: MBAK78

Matrix (soil/water): SOIL Lab Sample ID: 08003-04S

Level (low/med): LOW Date Received: 08/01/92

% Solids: 85.5

Concentration Units (ug/L or mg/kg dry weight): MG/KG

CAS No.	Analyte	Concentration	C	Q	M	
7429-90-5	Aluminum	8130.00			P	
7440-36-0	Antimony	3.50	U	NJ	P	
7440-38-2	Arsenic	4.10		NJ	P	
7440-39-3	Barium	40.30	B		P	
7440-41-7	Beryllium	0.34	B		P	
7440-43-9	Cadmium	0.32	U		P	
7440-70-2	Calcium	3580.00			P	
7440-47-3	Chromium	15.90		*	P	
7440-48-4	Cobalt	7.70	B		P	
7440-50-8	Copper	20.40		J	P	DC 1 8/92
7439-89-6	Iron	18400.00		*	P	
7439-92-1	Lead	13.00		NJ	P	
7439-95-4	Magnesium	2730.00			P	
7439-96-5	Manganese	221.00			P	
7439-97-6	Mercury	0.39		J	CV	DC 1 8/92
7440-02-0	Nickel	15.10			P	
7440-09-7	Potassium	609.00	B		P	
7782-49-2	Selenium	0.82	U	WN	F	
7440-22-4	Silver	1.00	U		P	
7440-23-5	Sodium	169.00	B		P	
7440-28-0	Thallium	0.35	U		F	
7440-62-2	Vanadium	34.50		*	P	
7440-66-6	Zinc	47.10		J	F	
	Cyanide	0.55	U		CA	

Color Before: BROWN Clarity Before: Texture: FINE

Color After: BROWN Clarity After: Artifacts: YES

Comments:
ROCKS

0005

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APPENDIX D

TRC
Environmental Solutions through Technology

APPENDIX D

SAMPLE CALCULATIONS - Task 2

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SAMPLE No. T27027

1. QUANTITY OF REAGENT AND WATER ADDED

$$X = A \times B$$

where, X = QUANTITY OF REAGENT OR WATER IN GRAMS

A = PERCENT OF REAGENT OR WATER ADDITION

B = QUANTITY OF WASTE USED

EXAMPLES: $X = (0.25)(150.0\,g)$
$= 37.5\,g$ of REAGENT USED

$X = (0.23)(150.0\,g)$
$= 34.5\,g$ of WATER USED TO SLURRY REAGENT

2. VOLUMETRIC EXPANSION

$$X = \frac{H_F - H_o}{H_o}(100)$$

where, X = VOLUMETRIC EXPANSION

H_o = HEIGHT of WASTE (inches)

H_F = HEIGHT OF TREATED MATERIAL (inches)

EXAMPLES: $X = \frac{2.36 - 1.68}{1.68}(100)$

$= 40\%$ VOLUME EXPANSION

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMPAD

EXAMPLE CALCULATIONS FROM RESULTS PRESENTED IN TABLE 1 FROM DATA ORIGINALLY PRESENTED IN TASK 1.

1. MOISTURE CONTENT

SAMPLE No. SOIL

$$w = \frac{W_W}{W_S}(100)$$

where, w = MOISTURE CONTENT, (%)

W_W = WEIGHT OF WATER, (g)

W_S = WEIGHT OF DRY SOIL, (g)

EXAMPLE: $w = \frac{10.85\,g}{45.57\,g}(100)$

$= 23.86\,\%$

2. BULK UNIT WEIGHT

$$\gamma_T = \frac{W}{V_T}$$

where, W = WEIGHT OF WET SOIL, lbs.

V_T = VOLUME OF SOIL, ft^3

EXAMPLE, $\gamma_T = \frac{1847.9\,g\left(\frac{lb}{453.6\,g}\right)}{0.033\,ft^3}$

$\gamma_T = 122.2$ pcf

3. DRY UNIT WEIGHT

$$\gamma_d = \frac{W_S}{V_T}$$

where, γ_d = DRY UNIT WEIGHT, pcf
W_S = WEIGHT OF DRY SOIL, lb
V_T = VOLUME of SOIL, ft^3

EXAMPLE: $$\gamma_d = \frac{1492.0\ g \left(\frac{lb}{453.6\ g}\right)}{0.033\ ft^3}$$

$$= 98.7\ pcf$$

$$W_S = \frac{W}{(1+w)}$$

$$= \frac{1847.9\ g}{(1+0.2386)}$$

$$= 1492.0\ g$$

22-141 50 SHEETS
22-142 100 SHEETS
22-144 200 SHEETS
AMPAD

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APPENDIX E

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APPENDIX E

SAMPLE CALCULATIONS - Task 3

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ALLIANCE PROJECT
SAMPLE CALCULATIONS
6/10/92

2. CORRECTED AREA

$$X = \frac{A_0}{(1-\epsilon)}$$

where, X = CORRECTED AREA
A_0 = INITIAL AREA
ϵ = STRAIN

$$X = \frac{7.07 \text{ in}^2}{(1-0.0075)} = 7.121 \text{ in}^2$$

3. STRAIN

$$X = \frac{\Delta L}{L_0}$$

where, X = AXIAL STRAIN
ΔL = SPECIMEN DEFORMATION
L_0 = INITIAL LENGTH

$$X = \frac{0.045 \text{ in}}{5.97 \text{ in}} = 0.0075 \text{ in./in.}$$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
6/10/92

4. UNCONFINED COMPRESSIVE STRENGTH (UCS)

$$X = \frac{P}{A_c}$$

where, X = UCS
P = COMPRESSIVE LOAD
A_c = CORRECTED AREA

$$X = \frac{1438 \text{ lbs.}}{7.121 \text{ in}^2} = 201.9 \text{ psi}$$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
6/10/92

B. POROSITY AND BULK DENSITY
SAMPLE No. T311-2

1. DRY BULK DENSITY

$$X = \frac{C}{B-A}$$

where,
X = DRY BULK DENSITY
C = OVEN-DRIED MASS
B = SATURATED SURFACE-DRIED MASS
A = IMMERSED MASS

$$X = \frac{283.74\,g}{367.24\,g - 167.30\,g} = 1.42\ g/cm^3$$

$$1.42\ \frac{g}{cm^3} \times 62.4\ pcf/g/cm^3 = 89\ pcf$$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
6/10/92

2. SATURATED BULK DENSITY.

$$X = \frac{B}{B-A}$$

$$= \frac{367.24g}{367.24g - 167.30g} = 1.84 \ g/cm^3$$

3. AS-CURED BULK DENSITY

* See TASK 2 REPORT

4. APPARENT POROSITY

$$X = \frac{B-C}{B-A}(100)$$

$$= \frac{367.24g - 283.74}{367.24g - 167.30}(100)$$

$$= 41.8\%$$

APPENDIX F

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APPENDIX F

SAMPLE CALCULATIONS - Task 4

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ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/8/92

III SAMPLE CALCULATIONS FOR TASK 4

A. SIEVE ANALYSIS

SAMPLE No. T14A

1. % RETAINED ON SIEVE No.

$$X_n = \frac{\Sigma W}{W_s}(100\%)$$

WHERE, X = % RETAINED ON SIEVE n

n = SIEVE No.

ΣW = TOTAL WEIGHT RETAINED ON ALL SIEVES $\geq$ SIEVE n IN SIZE

W_s = TOTAL INITIAL DRY WEIGHT OF SPECIMEN

$$X_{40} = \frac{(0+0.23+0+2.80+51.65+23.63+11.80)\,gr}{136.0\,gr}(100\%)$$

$$X_{40} = 66.26\,\%$$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/8/92

2. % PASSING SIEVE No.

$$X_n = 100\% - R_n$$

WHERE, X = % PASSING SIEVE No.
R = % RETAINED ON SIEVE No.
n = SIEVE No.

$$X_{40} = 100\% - 66.26\%$$

$$X_{40} = 33.74\%$$

B. PERMEABILITY
SAMPLE No. T412-7 PERM

1. B VALUE

$$X = \frac{PP - BP}{CP_2 - CP_1}$$

WHERE CP_1 = FIRST CELL PRESSURE
CP_2 = SECOND CELL PRESSURE
PP = PORE PRESSURE CORRESPONDING TO CP_2
BP = BACK PRESSURE CORRESPONDING TO CP_1

$$X = \frac{64.2 - 54.3}{65.0 - 55.0}$$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/8/92

2. CHANGE IN VOLUME (ΔV)

$X_n = 2TA$

WHERE, X = CHANGE IN VOLUME
n = TIME OF READING
T = READING IN LEFT TUBE
A = AREA OF TUBES = 0.1516 cm^2

$X_{13:12} = 2(16cm)(0.1516\ cm^2)$

$X_{13:12} = 4.85\ cm^3$

3. CHANGE IN INFLOW (ΔH_{in}) READING

$X_n = H_{in1} - H_{in2}$

WHERE, X = CHANGE IN INFLOW READING
n = TIME OF READING
H_{in1} = INFLOW BURETTE READING AT PREVIOUS n
H_{in2} = INFLOW BURETTE READING AT n

$X_{9:26} = 40.4\ cm - 40.0\ cm$

$X_{9:26} = 0.4\ cm$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/8/92

4. CHANGE IN OUTFLOW (ΔH_{out}) READING

$$X_n = H_{out\,2} - H_{out\,1}$$

WHERE, X = CHANGE IN OUTFLOW READING
n = TIME OF READING
$H_{out\,1}$ = OUTFLOW BURETTE READING AT PREVIOUS n
$H_{out\,2}$ = OUTFLOW BURETTE READING AT n

$$X_{15:13} = 2.0\,cm - 1.5\,cm$$

$$X_{15:13} = 0.5\,cm$$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/8/92

5. GRADIENT

$$X_n = \frac{(H_{in} - H_{out}) + \Delta P}{L}$$

WHERE, X = GRADIENT
n = TIME
H_{in} = INFLOW BURETTE READING AT n
H_{out} = OUTFLOW BURETTE READING AT n
ΔP = HIGH PRESSURE MINUS LOW PRESSURE IN cm OF WATER
L = SPECIMEN LENGTH

$$X_{9:26} = \frac{(40.0\,cm - -1.5\,cm) + 0\,cm}{6.23\,cm}$$

$$X_{9:26} = 6.1798$$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/8/92

6. HYDRAULIC CONDUCTIVITY

$$X_n = \frac{\left(\ln \frac{Grad_1}{Grad_2}\right)\left(\frac{aL}{2A}\right)}{\Delta t \ (60 \text{ sec/min})}$$

WHERE, X = HYDRAULIC CONDUCTIVITY
n = TIME OF READING
$Grad_1$ = GRADIENT AT PREVIOUS n
$Grad_2$ = GRADIENT AT n
a = BURETTE AREA = 0.1516 cm^2
L = SPECIMEN LENGTH
A = SPECIMEN AREA
Δt = CHANGE IN TIME SINCE PREVIOUS n

$$X_{15:13} = \frac{\left(\ln \frac{6.1798}{5.7785}\right)\left(\frac{0.1516 cm^2 * 6.23 cm}{2 * 46.54 cm^2}\right)}{347 \text{ min } (60 \text{ sec/min})}$$

$$X_{15:13} = 3.3 \times 10^{-8} \text{ cm/sec}$$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/8/92

C. WET/DRY DURABILITY

1. PERCENT VOLUME CHANGE
SAMPLE No. T411-5-1

$$X_{n,m} = \frac{V_{n,m} - V_i}{V_i}(100\%)$$

WHERE, X = PERCENT VOLUME CHANGE
n = CYCLE No.
m = WET OR DRY
$V_{n,m}$ = VOLUME AT CYCLE n AND CONDITION M
V_i = INITIAL VOLUME OF SPECIMEN

$$X_{6,wet} = \frac{41.16\ in^3 - 41.95\ in^3}{41.95\ in^3}(100\%)$$

$$X_{6,wet} = -1.88\%$$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/8/92

2. TOTAL MATERIAL LOSS
SAMPLE No. T411-5-2

$$X = \frac{M_i/(1+W_c) - M_F}{M_i/(1+W_c)} (100\%)$$

WHERE, X = TOTAL MATERIAL LOSS
M_i = INITIAL WEIGHT
W_c = MOISTURE CONTENT DIVIDED BY 100
M_F = FINAL WEIGHT

$$X = \frac{1186.87gr/(1+.3189) - 853.43gr}{1186.87gr/(1+.3189)} (100\%)$$

$X = 5.2\%$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/8/92

D. FREEZE/THAW DURABILITY

1. PERCENT VOLUME CHANGE

SAMPLE No. T411-FT7

$$X_n = \left(\frac{V_n - V_i}{V_i}\right)(100\%)$$

WHERE, X = PERCENT VOLUME CHANGE
n = CYCLE No.
V_n = VOLUME AT CYCLE n
V_i = INITIAL VOLUME

$$X_3 = \left(\frac{11.8236478\,in^3 - 11.7312756\,in^3}{11.7312756\,in^3}\right)(100\%)$$

$$X_3 = 0.79\%$$

2. MASS LOSS

SAMPLE No. T411-FT7

$$X_n = M - T$$

WHERE, X = MASS LOSS
n = CYCLE No.
M = DRY SOIL PLUS TARE WEIGHT
T = TARE WEIGHT

$$X_1 = 1.22\,gr - 1.11\,gr$$

$$X_1 = 0.11\,gr$$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/8/92

3. PERCENT MASS LOSS.
SAMPLE No. T411-FT7

$$X_n = \frac{M_L}{M_D}(100\%)$$

WHERE, X = PERCENT MASS LOSS
n = CYCLE No.
M_L = MASS LOSS AT CYCLE n
M_D = INITIAL DRY SOIL WEIGHT

$$X_1 = \frac{0.11\ gr}{265.76\ gr}(100\%)$$

$$X_1 = 0.04\ \%$$

4. CUMULATIVE MASS LOSS PERCENT
SAMPLE No. T411-FT7

$$X_n = \sum_{i=1}^{n} M_i$$

WHERE, X = CUMULATIVE MASS LOSS PERCENT
n = CYCLE No.
M_i = PERCENT MASS LOSS AT CYCLE

$$X_3 = \sum_{i=1}^{3} M_i$$

$$X_3 = 0.04 + 0.00 + 0.00$$

$$X_3 = 0.04$$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/8/92

5. PERCENT RELATIVE MASS LOSS
SAMPLE No. T411

$X_n = A_T - A_C$

WHERE, X = PERCENT RELATIVE MASS LOSS
n = CYCLE No.
A_T = AVERAGE PERCENT MASS LOSS FOR TEST SPECIMENS
A_C = AVERAGE PERCENT MASS LOSS FOR CONTROL SPECIMENS

$X_4 = 0.08\% - 0.01\%$

$X_4 = 0.07\%$

6. PERCENT CUMULATIVE RELATIVE MASS LOSS
SAMPLE No. T411

$X_n = \sum_{i=1}^{n} R_i$

WHERE, X = PERCENT CUMULATIVE RELATIVE MASS LOSS
n = CYCLE No.
R_i = RELATIVE MASS LOSS

$X_3 = 0.04 + 0.06 + 0.06$

$X_3 = 0.16$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/9/92

E. TRIAXIAL SHEAR TESTING
SAMPLE No. TS1

1. PERCENT STRAIN

$$X_n = \frac{\Delta L}{L_0}(100\%)$$

WHERE, X = PERCENT STRAIN
n = READING No.
ΔL = DEFORMATION
L_0 = TOTAL LENGTH

$$X_6 = \frac{0.008\,in}{5.26\,in}(100\%)$$

$$X_6 = 0.2\%$$

2. DEVIATOR STRESS

$$X_n = \frac{P}{A_C}$$

WHERE, X = DEVIATOR STRESS
n = READING No.
P = APPLIED LOAD
A_C = CORRECTED AREA

$$X_1 = \frac{20\,lb}{7.11\,in^2}$$

$$X_1 = 2.81\ psi$$

ALLIANCE PROJECT
SAMPLE CALCULATIONS
7/9/92

3. MAJOR STRESS

$$X_n = D + C$$

WHERE, X = MAJOR STRESS
n = READING NO.
D = DEVIATOR STRESS
C = CELL PRESSURE / MINOR STRESS

$$X_2 = 7.03 \text{ psi} + 10 \text{ psi}$$

$$X_2 = 17.03 \text{ psi}$$