Carmen Johnson

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FMC Corporation

Lithium Division
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FMC

Certified Mail
Return Receipt Requested

November 26, 1997

North Carolina Department of Environment,
Health and Natural Resources
Division of Waste Management
Solid Waste Section
P.O. Box 27687
Raleigh, NC 27611-7687

DEC 1997
Received
Solid Waste
Section

Attn: Mr. James C. Coffey, Supervisor
Permitting Branch

Re: FMC Corporation - Lithium Division - Bessemer City
Industrial Solid Waste Landfill Permit No. 36-05
Landfill Design (Operations, Monitoring & Closure) Plan

Dear Mr. Coffey:

FMC Corporation's Lithium Division facility in Bessemer City ("FMC") is herewith submitting three (3) copies of the Landfill Design Plan requested in the Division of Waste Management's December 19, 1996 letter, over your signature. This Landfill Design Plan describes landfill Operations, Monitoring and Closure elements and is provided pursuant to the requirements of 15A NCAC 13B .0503(2)(d)(ii).

The FMC Landfill is used primarily for the disposal of ore tailings, the residual solids remaining after lithium has been extracted from locally mined spodumene ore. Currently, tailings represent over 90% of the wastes disposed in the landfill, with the remainder being primarily fly ash/bottom ash from onsite coal combustion and solids from the air pollution control scrubber installed on the ore decrepitation kiln. In 1998, FMC will phaseout its onsite ore extraction processes and transition to another source of lithium compounds to feed its downstream processes in Bessemer City.

With the cessation of ore extraction, FMC will no longer generate ore tailings (or operate the decrepitation kiln) and will implement offsite disposition of the ash streams. Thus, this Landfill Design Plan includes continued landfilling of a maximum of 320,000 cubic yards of waste after January 1, 1998 in an approximate 10.7 acre area within the existing landfill footprint towards the southern end of the FMC property. This area, referred to as the Vertical Expansion Area, will provide ample volume for disposal of tailings and ash

closed under the landfill closure plan and capped similarly; monitoring upgradient and downgradient of the ponds accomplished under the landfill monitoring program and directed to the Solid Waste Section. After the kiln is taken out of service, the Division of Water Quality will transfer lead agency responsibility to the Division of Waste Management, who is otherwise handling closure and monitoring activities. Lastly, as the RCRA Corrective Action Permit requires that a Work Plan be submitted for the implementation of Corrective Measures at SWMUs, prior to installation of the cap on the landfill Vertical Expansion Area and the Kiln Scrubber ponds, FMC will provide the RCRA Work Plan, based on this Landfill Design Plan, the Hazardous Waste Section.

If you have any questions, or require additional information, please contact me at 704/868-0806.

Very truly yours,

Barbara E. Ritchie
Environmental Manager

cc: Mr. William Meyer (letter only)
Mr. Preston Howard (" ")
Mr. James Carter (" ")
Ms. Beth Hartzell (with attached report)

Prepared for:

FMC Corporation
Lithium Division
Highway 161, Box 795
Bessemer City, North Carolina 28016
JEI Project No. 354.00, Task 02

Carmen Johnson
36-05 3/20/12

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36-05

DEC 1997
Received
Solid Waste
Section

FMC Corporation
Landfill Design Plan

November 24, 1997

Prepared by:

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436 Spring Garden Street
Greensboro, North Carolina 27401
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FMC CORPORATION
LANDFILL DESIGN PLAN

1.0 INTRODUCTION

Landfilling operations at FMC Corporation - Lithium Division in Bessemer City, North Carolina are currently regulated under an industrial landfill permit (Permit No. 36-05) issued in 1978 by the North Carolina Department of Human Resources, Division of Health Services, Sanitary Engineering Section. The facility is also regulated under a Hazardous Waste Permit (No. NCD 000 771 964) issued by the State of North Carolina in conjunction with the U. S. Environmental Protection Agency Region IV, RCRA Section 3004(u) Corrective Action Permit.

The North Carolina Department of Environment and Natural Resources, Solid Waste Section (the current name of the regulatory agency, hereafter referred to as the "Section") has notified FMC Corporation that a landfill design plan must be submitted to satisfy the requirements of North Carolina Solid Waste Management (NCSWM) Rule .0503(2)(d)(ii), if the industrial landfill continues to operate after January 1, 1998. The submittal requirements include:

- A Construction and Operational Plan, illustrating the vertical expansion of the waste footprint established as of January 1, 1998, shown in one-year phases;
- A Water Quality Monitoring Plan, demonstrating compliance with groundwater standards established under 15A NCAC 2L; and
- A Closure Plan, designed to ensure closure in compliance with the above referenced groundwater standards.

FMC Corporation is eliminating on-site generation of mineral processing wastes and will phase out the existing solid waste management units. However, it is possible that phasing out of on-site landfilling may not be completed before January 1, 1998, and that on-site management may be required for approximately twelve months following the closure deadline. Given that possibility, FMC Corporation is submitting this landfill design plan to satisfy the requirements of NCSWM Rule .0503(2)(d)(ii). The plan consists of six design drawings, the following narrative sections, and associated tables and appendices.

2.0 OPERATION PLAN FOR SOLID WASTE MANAGEMENT UNITS

2.1 Background

FMC Corporation's Lithium Division near Bessemer City, North Carolina operates a facility which generates mineral extraction wastes and miscellaneous processing wastes as by-products of the processing of lithium from locally mined spodumene ore. These operations began in approximately 1954 by Lithium Corporation of America. The extraction process, still in use today, includes decrepitation of the spodumene ore, acid roasting, neutralization and leach units to extract the lithium as aqueous lithium sulfate. The residual solid materials separated from the aqueous solution are known as ore tailings, and have been disposed on the site since the beginning of operations.

Between 1954 and approximately 1975, the residual tailings were sluiced with water into two large surface impoundments, created when two dams were constructed in the southeastern ends of the property. By approximately 1975, these impoundments were filled to the extent that tailings could no longer be sluiced into them by gravity. At that time, large filters were installed to dry the residual solids, and a belt conveyor was installed to move the tailings to a staging pile. From the staging pile, tailings were loaded into trucks and transported for on-site landfilling. This is the management process that continues today.

In addition to disposal of ore tailings, smaller amounts of miscellaneous non-hazardous waste have been landfilled on the site. These miscellaneous materials include ash from the coal-fired cogeneration boiler, solids removed from the scrubbing system on the spodumene ore decrepitation kiln, and other wastes listed in Table 1. However, on-site disposal of waste materials since June 1996 has consisted only of tailings, ash, and sludge from the kiln scrubber ponds when cleaning out of these ponds has been required. Ash was co-disposed with ore tailings in areas on the south end of the property designated on Drawing No. 1 as Tailings/Ash Disposal Areas. Landfilling in the Tailings/Ash Disposal Areas will be discontinued prior to January 1, 1998.

Until June 1996, the remainder of the miscellaneous non-hazardous wastes were co-disposed with tailings in one area designated as the Mixed Industrial Landfill (see Drawing No. 1). It is this area that has been of primary interest to the Section during permitting and inspection activities and is the focus of this design plan. After January 1, 1998, this area will remain open for disposal of ore tailings, ash, kiln scrubbing solids, and miscellaneous non-hazardous clean-up wastes as areas within the mineral extraction units are decommissioned. Miscellaneous waste expected during the decommissioning process are listed in Table 2. At this time, the quantities of these decommissioning wastes are unknown, but are not anticipated to exceed five thousand cubic yards. FMC Corporation will reuse materials when feasible and otherwise attempt to minimize the quantity of these wastes.

2.2 Previous Investigations

A RCRA Facility Investigation (RFI) was completed for FMC Corporation - Lithium Division's Bessemer City facility in September 1995 by Rust Environment & Infrastructure (Rust). During the facility investigation conducted pursuant to the hazardous waste permit requirements, the Mixed Industrial Landfill area was reviewed and included in the list of regulated solid waste management

units (SWMUs). In the RFI, this area was designated SWMU No. 12, the "sanitary" landfill. The four Tailings/Ash Disposal Areas were listed in the RFI as SWMU No. 5, the "industrial" landfill. The boundaries for these disposal areas have been updated since completion of that report. The new boundaries are generally in accordance with those indicated in the RFI but reflect better information from aerial photographs and historical information. To avoid confusion with the specific SWMUs included in the RFI, the designations used in the RFI are not used in this report.

2.3 Description of Waste Materials

A summary of the waste materials and reported quantities historically disposed at the site are provided in Table 1. The quantity of ore tailings has increased over time as more ore is being processed at the plant. According to the facility's Industrial Waste Landfill Annual Report for the period ending June 30, 1997, a total of 206, 760 tons of waste were disposed last year. Of this quantity, approximately 93 percent by weight was ore tailings, 6 percent was fly ash, and 1 percent was bottom ash. According to these quantities and an estimated density for the uncompacted tailings, approximately 200,000 cubic yards (cy) of waste were disposed on site last year.

2.4 Waste Placement

The waste material is transported from a staging pile near the processing facility to the landfill by tandem dump trucks. On average, approximately 550 cubic yards of waste are landfilled each day. The waste is spread and compacted by conventional earth moving equipment and is graded to prevent impoundment of water over waste. Moisture is added as needed for dust control to the working face and access roads.

2.5 Vertical Expansion Area

The Mixed Industrial Landfill is located to the southwest of the plant buildings, as shown on the Site Plan, Drawing No. 1. Of the total area, 10.7 acres will remain active after January 1, 1998 for a vertical expansion. Proposed maximum final fill contours and associated drainage and erosion control devices are indicated on Drawing No. 3. The proposed fill contours were designed using 4 horizontal to 1 vertical (4:1) side slopes and a minimum 5 percent top slope.

The estimated available volume in this area with the contours shown is 320,000 cy. Therefore, with projected disposal capacity requirements of approximately 200,000 cy, the volume available in the vertical expansion area is more than adequate to meet the disposal needs of the facility through the end of 1998, by which time mineral processing will have ceased. Final closure of the vertical expansion area will occur after decommissioning of mineral processing units. Slopes and contours will be consistent with this plan although all 320,000 cy of capacity in the vertical expansion area may not be used.

3.0 CLOSURE PLAN FOR SOLID WASTE MANAGEMENT UNITS

3.1 Background

Of the on-site disposal areas, only the Mixed Industrial Landfill is regulated under the requirements of North Carolina Solid Waste Management (NCSWM) Rule .0503(2)(d)(ii). Since a portion of this area is projected to operate as a vertical expansion after January 1, 1998, the landfill will require a final cap that is acceptable to the Solid Waste Section. FMC proposes to close the Mixed Industrial Landfill in accordance with the procedures described in this Closure Plan. The area for the vertical expansion and proposed maximum final fill contours are provided on Drawing No. 2.

3.2 Alternate Cover Material

FMC Corporation proposes to use the ore tailings generated from the on-site operations to construct the final landfill cap. According to the RFI, the ore tailings consist of approximately 75 percent aluminum silicate and a 25 percent mixture of calcium sulfate (gypsum) and calcium carbonate (limestone). The ore tailings are non-hazardous and have a consistent chemical composition and uniform particle size distribution. When removed from the filter circuit, the material contains approximately 25 to 30 percent moisture. A site reconnaissance indicated that the tailings will support vegetation, as evidenced by vigorous stands of vegetation over several of the old tailings disposal areas.

Two separate samples were collected and sent to soil testing laboratories for analysis. Index tests (i.e., plasticity and percent fines), moisture versus density (i.e., Standard Proctor compaction) tests, and permeability tests were performed in the laboratories. According to the USCS classification system, the material is described as light tan, slightly clayey, medium to fine sandy silt (ML). The Standard Proctor maximum dry densities reported for the two samples were 70.7 and 75.5 pounds per cubic foot (pcf), at optimum compaction moisture contents of 26.3 percent and 38.9 percent, respectively. The results of the two tests indicate Standard Proctor maximum dry densities within approximately 6 percent despite a relatively wide range in the samples' moisture contents. This appears to indicate that a wide range of moisture contents will be acceptable to achieve adequate compaction during placement of the soil.

Flexible walled laboratory permeability tests were performed on two remolded samples of the ore tailings in accordance with ASTM Method D 5084-90. One sample was compacted to a dry density of 69.6 pcf, which was 98.4 percent of the maximum density calculated for that sample from a Standard Proctor compaction test. The sample moisture content at the time of compaction was 29.3 percent. The vertical saturated hydraulic conductivity in the laboratory was calculated to be 5.1×10^{-5} cm/sec.

The second sample was compacted to a dry density of 75.1 pcf, which is 99.5 percent of the maximum density calculated for that sample from a Standard Proctor compaction test. The sample moisture content at the time of compaction was 40.5 percent. The vertical saturated hydraulic conductivity in the laboratory was calculated to be 4.95×10^{-6} cm/sec. The lower permeability of this sample compared to the first is expected with the higher compacted density of the second

sample.

A chemical analysis of the tailings indicated the presence of arsenic, barium, chromium, lead, and mercury at acceptable concentrations for disposal in an unlined facility. Furthermore, Toxicity Characteristic Leaching Procedure (TCLP) test on the ore tailings indicated that seven of the eight RCRA metals were below detection limits. Only barium was detected in the leachate at a concentration of 0.13 mg/l, which is far below both the regulatory level (100 mg/l) and the 2L groundwater standard (2 mg/l). Copies of the laboratory testing results are provided in Appendix I.

The results of a TCLP analysis of a composite sample of tailings, fly ash and bottom ash are also provided in Appendix I. Again, the results indicate that the material is acceptable for disposal in an unlined facility based on the Solid Waste Section's landfilling limits. Concentrations of seven of the eight metals were below analytical detection limits and/or 2L groundwater standards.

3.3 Alternative Closure Cap

The NCSWM Rules specify a regulatory minimum cap (RMC) section consisting of vegetative cover over 6 inches of topsoil and 18 inches of compacted soil layer (with a permeability, K, of less than or equal to 1×10^{-5} cm/sec). Given the above-described characteristics of the ore tailings generated from the on-site processing, FMC Corporation proposes to use ore tailings to construct the closure cap. EPA's Hydrologic Evaluation of Landfill Performance computer program (HELP3 Model) was used to compare the performance of a cap constructed with ore tailings with the RMC.

The input parameters for the cross section of the RMC were comparable to those used by the Section in *"Analysis of Landfill Closure Cap Systems and Associated Costs,"* (North Carolina Solid Waste Section, September 1995). The RMC was modeled by the NC Solid Waste Section in four layers using a six inch topsoil zone (material texture 13), a nine inch infiltration layer (material texture 23), a nine inch barrier layer (material texture 23), and a twelve inch infiltration layer of intermediate cover (material texture 13). The evaporative zone depth used in the model cannot extent into a barrier zone. Thus, the evaporative zone depth was set equal to the maximum allowable depth of 15 inches to correspond to the thickness of the top soil and upper infiltration layer. The infiltration rate for an acre of the RMC was calculated to be 8.33 inches (18.37 percent of the total rainfall).

The alternate cap system was modeled in this study as one 24-inch layer of ore tailings. The input parameters chosen were similar to those of material texture 23 from the above study, except that the saturated hydraulic conductivity was set equal to 5.1×10^{-5} cm/sec, as determined by the more conservative (i.e., higher) value obtained from the laboratory testing. The full 24-inch thickness of the cap was modeled as an infiltration zone; however, the evaporative zone depth was limited to 18 inches to correspond to the maximum allowed for a silty soil. The infiltration rate for 24 inches of compacted tailings was calculated to be 7.81 inches (17.22 percent), which exceeds the performance criteria of the RMC. The output from the HELP3 Model is provided in Appendix II.

3.4 Closure Cap Construction

The full thickness of the closure cap in the Mixed Industrial Landfill area will consist of ore tailings. Given the results of the HELP Model analyses, at least two feet of tailings will be placed and compacted over the vertical expansion area indicated in Drawing No. 2. Ore tailings may be stockpiled adjacent to the limits of the disposal area and used as needed to complete the final cover. FMC proposes to spread the tailings in 8 inch lifts, and compact each lift to a sufficient degree to achieve the desired permeability. A test section of the cover system will be constructed and tested to determine the specific construction parameters (i.e. moisture content and field density). The upper surface of the tailings will be amended with fertilizer, seeded and mulched to establish a vegetative cover.

All construction and seeding activities will be carried out in accordance with the "North Carolina Erosion and Sediment Control Planning and Design Manual". Appropriate construction quality assurance activities will be conducted to ensure that the cover is constructed in substantial accordance with the following plan, and with construction specifications.

3.5 Construction Quality Assurance

Assurance that construction of the compacted soil liner has been performed in accordance with the regulations shall be accomplished by use of CQA testing and visual observations. Specifically, pre-construction testing and construction testing shall be performed. Preliminary laboratory testing indicates that the ore tailings can be compacted to achieve a permeability of less than or equal to 1×10^{-5} cm/sec. However, an alternate cap section is proposed using materials with a permeability of up to 5.1×10^{-5} cm/sec. Therefore, the pre-construction laboratory testing shall consist of additional permeability testing of the ore tailings. The intent of the preconstruction testing will be to determine the range of moisture-density relationships that will result in compacted soil that meets the permeability criteria (i.e., the "Acceptable Zone").

To facilitate the CQA program, the following definitions apply:

- A layer is defined as a compacted stratum composed of several lifts constructed without joints.

- A lift is defined as a segment of a layer composed of soil having a compacted thickness of six inches or less.

3.5.1 Construction Quality Evaluation Testing

Construction quality evaluation shall be performed on all components of construction. These evaluations shall be performed at the frequencies discussed in Section 3.6.1. Construction evaluation testing shall consist of visual observations of the work, in-place density/moisture content checks, investigations into the adequacy of layer bonding and clod destruction, elevation and thickness monitoring, and special testing. Evaluation of the construction work shall include the following:

- Observations and documentation of the water content, clod size and other physical properties of the soil during processing, placement and compaction;

- Observation and documentation of compacted lift's ability to accept and bond to subsequent lifts;

- Observation and documentation of the thickness of compacted and loosely placed lifts;

- Observation and documentation of the performance of the compaction and heavy hauling equipment on the construction surface (sheepsfoot penetration, pumping, cracking, etc.); and

- Observation and documentation of effectiveness for procedures used to prevent desiccation and/or freezing of completed lifts and layers.

Determinations of in-place moisture and density shall be performed in accordance with the following test methods and at the frequencies designated in Section 3.5.5.

Test	ASTM Standard No.
• Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)	D3017-88
• Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)	D2922-91

The in-place density test method shall cause minimal delay to the placement of subsequent lifts; therefore, the nuclear method is the method of choice. An acceptable test for soils used in structural or "controlled fill" applications (i.e. embankments, berms, backfill, soil liner, subgrade, etc.) will be defined as one which meets or exceeds the specified minimum density within the specified moisture range. An acceptable test for soils used in liner construction or similar applications will be defined as one which plots on the moisture-density plot within the "Acceptable Zone."

Questions concerning the accuracy of any single test shall be addressed by retesting in that or another location. All soil cap disturbances generated through testing and sampling shall be repaired and sealed using no less than 25% bentonite (pellets). Where appropriate, larger test holes shall be enlarged sufficiently to allow use of compacting equipment, backfilled with soil cap material in lifts not exceeding eight inches in loose thickness, and carefully recompacted by hand tamping at the proper moisture content to achieve minimum cap permeability.

3.5.2 Documentation

The Soils CQA Consultant shall document the activities associated with the construction of the soil cap. Such documentation will include, as a minimum, daily reports of construction activities and a summary technical report on the construction project. Forms and formats for reporting and documentation of specific material installations, tests, and so forth will be discussed and agreed upon at the pre-construction meeting.

3.5.3 Construction Monitoring

Construction of the cap and erosion and sediment control structures will be monitored and documented by a CQA consultant, on site as needed to verify the construction activities. All construction testing will be performed and documented by an independent testing laboratory working under the direction of the CQA consultant. The CQA consultant will be responsible for preparing daily and weekly reports.

Written daily reports shall include a record of observations, test data sheets, identification of problems encountered during construction, corrective measures taken and hours worked.

Weekly summary reports, when required, shall also report problems identified during the reporting period, any corrective measures taken, results of the last tests performed by the independent testing laboratory, and a drawing depicting approximate work progress. Overall progress shall also be documented, and a schedule for the next two weeks shall be included.

TESTING FREQUENCIES

CQA ACTIVITY	MINIMUM FREQUENCY
Visual Classification	Each load
Moisture Content	5/acre/lift
In-place Density	Minimum 5 per acre per lift
Clod size (visual)	Each lift

3.5.4 Certification

The CQA consultant(s) shall prepare a certification report addressing each major item identified above for each phase of construction under their areas of responsibility. Certification reports required by regulatory agencies will also be prepared and submitted as required. Subconsultants and testing laboratories shall also prepare certification reports for their respective areas of responsibility.

Certification will include assessments of compliance with the Contract Drawings and Specifications and physical sampling and testing. The certification report will also include:

- Record Drawings
- Scale drawings depicting the locations of construction testing when appropriate; and
- Statements pertaining to the extent of construction, i.e., depths, plan dimensions, elevations and thickness, with documentation of changes from the approved Contract Drawings and Specifications. Documentation of changes from the approved Contract Drawings and Specifications must be approved in writing by the owner or the owner's representative.

The summary technical report will provide an evaluation of the construction project. The report will certify the results of the various field tests and laboratory tests performed and assess whether or not the constructed project is in compliance with the Contract Drawings and Specifications.

3.6 In-Place Closure of Kiln Scrubber Ponds

The kiln scrubber ponds will be removed from service when the processing plant is decommissioned. In lieu of removing the pond material and disposing of it across the road in the vertical expansion area, FMC Corporation proposes to complete the closure of the ponds with the material in place. Stabilization methods and/or a stabilization layer, or other design features may be required to allow compaction of tailings on top of the scrubber material. Settlement plates may be considered to identify when the material in the ponds has consolidated sufficiently to allow construction of a closure cap.

4.0 WATER QUALITY MONITORING PLAN FOR SOLID WASTE MANAGEMENT UNITS

4.1 Background

A RCRA Facility Investigation (RFI) was completed for the FMC Corporation - Lithium Division site by Rust Environment and Infrastructure in September 1995. The general objectives of the RFI were to characterize the site hydrogeology (principally the shallow groundwater system), to assess and identify any existing degradation to the site environmental media, to identify any potential releases from 15 Solid Waste Management Units (SWMUs), and to identify any potential hazards such releases may potentially have on human health.

FMC's Hazardous Waste Storage permit contains corrective action provisions for all waste (not just hazardous waste) units at the facility. The areas used only for disposal of ore tailings and ash are labeled in the RFI as SWMU No.5; these units are referred to herein as the Tailings/Ash Disposal Areas. The area used for disposal of miscellaneous non-hazardous wastes in addition to tailings and ash is labeled in the RFI as SWMU No.12; this area is regulated by the Solid Waste Section and is referred to herein as the Mixed Industrial Landfill.

4.2 Site-wide Monitoring Plan

Twenty-nine groundwater monitoring wells are present on site to monitor the facility as a whole. The wells range in depth between 20 and approximately 100 feet. In addition to the groundwater monitoring wells, ten piezometers are located within the Eastern and Western Drainage Channels. The wells and piezometers are currently monitored under separate regulatory programs for hazardous waste, industrial waste, and storm water. However, because of the locations of some of these monitoring points in relation to site facilities, a single well can be used for different purposes under the separate environmental monitoring programs for the site.

FMC believes that future modifications to the monitoring well network, investigation and any corrective measures required to protect public health and the environment are best administered through a single regulatory agency for comprehensive management of the entire site.

4.3 Industrial Landfill Monitoring Network

The groundwater monitoring network for the Mixed Industrial landfill consists of one upgradient well (L-1) and four downgradient wells (L-2, L-3, L-4, and L-5). (These wells are included in the twenty-nine well network listed above). The L-series wells were approved by the Solid Waste Section as the original monitoring network for the landfill (correspondence from Michael Babuin, P. G., to Arthur Gillespie, Jr. of FMC, dated May 11, 1989). The facility was directed by Mr. Babuin to screen the wells in saprolite rather than bracketed into the water table.

Four additional wells (DC-1, DC-2, DC-5, and DC-6) were installed in the vicinity of the landfill in 1994 during completion of the RFI. Well DC-1 was installed as a deep well downgradient of the kiln scrubber ponds to monitor that SWMU, but this well is also located upgradient of the Mixed

Industrial Landfill and can be used as an upgradient well for that facility while remaining as a downgradient well for the ponds. Well DC-2 was installed as a shallow well southeast and downgradient of the ponds. The other two DC-series wells (DC-5 and DC-6) are shallow wells installed within the boundary of the Mixed Industrial Landfill; these wells are screened across the water table in ore tailings and saprolite.

Three other monitoring points were added to the network in June 1990. The monitoring points are in FMC's stormwater canal system located west of the industrial landfill. The locations of the monitoring wells and other monitoring points surrounding the disposal area are indicated on Drawing No. 4.

4.4 Groundwater Chemistry

Geologic profiles and groundwater chemistry are summarized on Drawing Nos. 5 and 6. The analytical results from July 1989 through April 1997 indicate that groundwater upgradient of the site in well L-1 has exhibited concentrations of acetone, acrolein, bromoform, chloroform, 4-methyl-2-pentanone (MIBK), and tetrachloroethylene (PCE) (see Table 3 and Appendix III). Acetone, acrolein, chloroform, MIBK, and PCE have been reported in downgradient wells L-4 and L-5 at significantly lesser concentrations than those present in the upgradient well. The presence of these organic compounds in wells L-1 and L-4, which are bedrock wells, and their absence in DC-5 and DC-6, which are shallow wells, suggests that the source of these groundwater contaminants is upgradient of the landfill.

Additional volatile organic parameters (benzene, 1,1-dichloroethane, 1,2-dichloroethane, 1,1,1-trichloroethane, trichlorofluoromethane, and xylenes) were reported present in wells DC-5 and DC-6 downgradient from the landfill. These compounds were not reported in the upgradient wells. However, these downgradient wells are screened across the potentiometric surface, whereas the upgradient wells are screened in a deeper portion of the aquifer. Upgradient groundwater concentrations are not available for a comparable position in the aquifer. Therefore, the presence of these compounds in the downgradient wells does not necessarily implicate the landfill as the source of the contamination, especially given the contamination documented in the existing wells upgradient from the landfill.

Groundwater samples from the wells have been analyzed for both total and dissolved metals concentrations. The analytical results are provided in Appendix III, and the maximum reported concentration for each parameter is provided in Table 4. The data indicates that concentrations of total metals vary considerably between sampling events and, with a few exceptions, are substantially higher than the corresponding filtered concentration. The variability in the total metals concentrations are likely the result of fluctuations in turbidity of the groundwater samples, and are assumed not to be representative of true concentrations of these metals in the groundwater.

Given the above assumption, the concentrations of inorganic constituents in groundwater from the referenced area appear to be of lesser concern. The constituents arsenic, lead, lithium, and selenium were detected in filtered samples. Selenium was below its NC 2L Standard, and a 2L Standard has not been established for lithium. The concentrations of arsenic and lead exceeded their 2L Standards

in one downgradient well (DC-6). Both of these high values, shown in Table 4, are the result of one sampling event that resulted in an anomalously high value. Results from three other events were below analytical detection limits or were concentrations that were below their respective NC 2L Standard.

4.5 Proposed Monitoring Plan

The mixed industrial landfill unit is currently regulated under Permit No. 36-05, issued by the Solid Waste Section. The monitoring network includes five wells (one upgradient and four downgradient), and three other monitoring points in the site's canal system. The approved monitoring plan requires that pH, conductivity, and temperature be recorded immediately upon sampling, and that the groundwater samples be analyzed for volatile organic compounds (EPA Method 8240), lithium, beryllium, and the eight RCRA heavy metals. The sampling frequency is semiannual.

FMC Corporation proposes to add wells DC-1, DC-2, DC-5, and DC-6 to the monitoring network for the landfill. Well DC-1 is located downgradient from the western kiln scrubber pond and upgradient from the Mixed Industrial landfill. DC-2 is located southeast and downgradient from the location of the kiln scrubber ponds, which are proposed for in-place closure. Wells DC-5 and DC-6 are installed in tailings within the Mixed Industrial Landfill.

The proposed monitoring program during operation of the landfill consists of pH, conductivity, temperature, EPA's Appendix I list of 47 volatile organic compounds by SW-846 Method 8260, the eight RCRA metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver), and beryllium and lithium for total metals analyses. FMC proposes to add chloride, fluoride and sulfate to the routine monitoring program. The proposed analytical schedule is semiannual sampling in April and October.

The mixed industrial landfill is located hydraulically downgradient from other SWMUs managed under the hazardous waste management permit. FMC Corporation acknowledges that background information for the shallow aquifer does not exist upgradient from the mixed industrial landfill. However, as noted above, FMC requests that modifications to the monitoring well network, investigation and any corrective measures required to protect public health and the environment be performed under the hazardous waste management permit.

A long-term monitoring plan for the facility will be developed under the RCRA Corrective Action Plan for the facility. Therefore, FMC requests that the water quality monitoring plan proposed above be used until closure of the unit, and that the post-closure monitoring plan required by the Solid Waste Section refer only to the requirements of the facility's hazardous waste management permit. Furthermore, FMC requests that all permitting and regulatory responsibility for the facility be transferred to the Hazardous Waste Section once on-site disposal is discontinued, and that the solid waste permit be terminated.

Tables

TABLE 1
ESTIMATE OF HISTORICAL ANNUAL WASTE DISPOSAL
FMC CORPORATION - LITHIUM DIVISION

Waste Material	Annual Tonnage	Annual Volume(cf)	Assumed Density (tcy)	Annual Volume (cy)
Tailings (spodumene filter cake)	**120,000.00**	-	1	120,000
Coal Fired Boiler Ash	**5,000.00**	**40,000.00**	-	1,481
Kiln Scrubber Solids	**500.00**	**10,000.00**	-	370
Misc. Solids (metal and fiber drums, used carbon anodes, wood pallets, paper, etc.	**12.50**	-	0.75	9.38
Waste Mud from Chlorine Recovery Unit	**18.50**	-	0.9	16.65
Waste from Lithium Metal Production	**7.00**	-	0.9	6.30
Waste from Lithium Bromide Production	**24.00**	-	0.9	21.60
Waste from Lithium Chloride Production	**15.00**	-	0.9	13.50
Filter Aid from Butyllithium Production	**3.75**	-	0.9	3.38
Lithium Hypochlorite Filter Cloths	**0.10**	**6.70**	-	0.25
Filter Tubes from Butyllithium Production	**0.10**	**10.00**	-	0.37
Filter Cartiridges from Lithium Diisopropyl Amide Production	**0.01**	**0.25**	-	0.01
Filter Cartridges from $LiAlCl_4$/SOCL Production	**0.01**	**0.25**	-	0.01
Filter Cartidges from Dibutylmagnesium Production	**0.04**	**2.00**	-	0.07
Filter Cartidges fro Phenyllithium Production	**0.01**	**0.25**	-	0.01
Plastic Bags from Magnesium Powder	**0.03**	**1.70**	-	0.06
Mineral Oil Recovery System Column Packing Solids	**0.01**	**800.00**	-	29.63
Filter Tubes from Lithium Hexamethyl Disilazide	**0.01**	**0.25**	-	0.01
Amberlite Ion Exchange Resins	3.50	**140.00**	-	5.19
Sandblasting Sand with paint flakes	**100.00**	1,917.00	-	**71.00**
Effluent Treatment Filter Cake	6.94	**156.00**	-	5.78
Total Annual Volume:	125,691.49	**53,034**		**122,035.04**

Note: 1. Boldface numbers were taken from Waste Data Sheets provided by FMC. Other quantities were calculated from assumed densities or converted to different units.

2. The assumed density for ore tailings is for uncompacted placement. The compacted density is estimated to be approximately 90 pcf.

TABLE 2
PROJECTED ANNUAL WASTE DISPOSAL AFTER JANUARY 1, 1998
FMC CORPORATION - LITHIUM DIVISION

Waste Material	Annual Tonnage	Annual Volume (cy)
Tailings (spodumene filter cake)	**192,500**	190,000
Coal Fired Boiler Ash	**14,500**	4,300
Kiln Scrubber Solids (In-place closure)	-	-
Decommissioning Wastes:	**Unknown**	5,000*
Lithium Carbonate		
Lithium Sulfate		
Limestone/Quicklime		
Sodium Sulfate		
Miscellaneous Wood		
Concrete		
Brick		
Fiberglass		
Rubber		
Foam Insulation		
Ceramics		
Estimated Maximum Annual Volume:		**199,300**

Note: * The total quantities of decommissioning wastes is unknown but they are not expected to exceed 5,000 cubic yards.

TABLE 3
SUMMARY OF GROUNDWATER ORGANIC CHEMISTRY
FMC Corporation: Mixed Industrial Landfill

Parameter	Abbr.	Units	2L Stand.	Maximum Reported Concentration in Well (ug/l)							
				Upgradient Wells		Downgradient Wells					
				L-1	DC-1	L-2	L-3	L-4	L-5	DC-5	DC-6
Acetone	-	ug/l	700	43**	32**	20**	ND	ND	ND	ND	ND
Acrolein	-	ug/l	-	8	11	ND	ND	ND	ND	ND	8
Benzene	B	ug/l	1	ND	ND	ND	ND	ND	ND	11	ND
Bromoform	BF	ug/l	0.19	17	ND	ND	ND	ND	ND	ND	ND
Chloroform	CF	ug/l	0.19	61	ND	ND	ND	7	ND	ND	ND
1,1-Dichloroethane	11-DCA	ug/l	700	ND	ND	ND	ND	ND	ND	ND	45
1,2-Dichloroethane	1,2 DCA	ug/l	0.38	ND	ND	ND	ND	ND	ND	ND	12
4-methyl-2-pentanone	MIBK	ug/l	-	210**	ND	34**	23**	25**	16**	ND	ND
Tetrachloroethylene	PCE	ug/l	0.7	210	ND	ND	ND	140	ND	ND	ND
1,1,1-Trichloroethane	111-TCA	ug/l	200	ND	ND	ND	ND	ND	ND	ND	9
Trichlorofluoromethane	TCFM	ug/l	2100	ND	ND	ND	ND	ND	ND	ND	38
Xylene	X	ug/l	530	ND	ND	ND	ND	ND	ND	ND	6

IMPORTANT: This table is provided to assist with interpretation of the tabulated data in Appendix III. Some of the maximum values given above are anomalous and are not a statistically valid representation of groundwater quality.

Notes:

1. The analytical results from the L-series wells were obtained from 15 events performed between 7/89 and 4/97 (see Appendix II).
2. The analytical results from the DC-series wells were obtained from quarterly events performed in 1994 (see Appendix II).
3. The L-series wells and DC-1 are deep wells screened in bedrock and/or saprolite, while DC-5 and DC-6 intersect the potentiometric surface.
4. * Proposed 2L Standard
5. ** (Shaded Rows) Probable laboratory artifacts. See June 11, 1997 letter of explanation in Appendix III.

JOYCE ENGINEERING, INC.

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TABLE 4
SUMMARY OF INORGANIC GROUNDWATER CHEMISTRY
FMC Corporation: Mixed Industrial Landfill

Parameter	Abbr.	Units	2L Stand.	Maximum Reported Concentration in Well (ug/l)							
				Upgradient Wells		Downgradient Wells					
				L-1	DC-1	L-2	L-3	L-4	L-5	DC-5	DC-6
pH	pH	S.U.	6.5-8.5	4.79-7.60	4.74-5.06	5.79-7.55	6.93-8.60	6.04-8.60	4.76-7.80	6.00-6.21	5.44-5.97
Specific Conductance	SC	umhos	-	11680	2370	173	299	2630	458	4290	6370
Chloride	Cl	mg/l	250	560	280	8.2	8.5	170	9.2	85	420
Fluoride	F	mg/l	2	1	21	0.1	0.2	0.11	0.13	0.2	1.2
Sulfate	S	mg/l	250	8,300	1300	18	29	1100	154	2900	6400
Arsenic, Total	As	ug/l	50	50	100	81	5.7	41	40	520	382
Barium, Total	Ba	ug/l	2000	710	248	1400	37	30	79	1400	ND
Beryllium, Total	Be	ug/l	2*	30	890	9	ND	ND	20	90	9
Cadmium, Total	Cd	ug/l	5	3.7	78	ND	ND	ND	14	7	ND
Chromium, Total	Cr	ug/l	50	340	250	990	70	110	70	780	40
Lead, Total	Pb	ug/l	15	22	48	37	12	7	280	100	100
Lithium, Total	Li	mg/l	-	310	55	0.11	0.094	0.29	0.093	3.1	0.23
Mercury, Total	Hg	ug/l	1.1	3	0.4	ND	0.3	ND	ND	ND	0.2
Selenium, Total	Se	ug/l	50	7	6	ND	ND	ND	ND	ND	ND
Silver, Total	Ag	ug/l	18	10	ND	ND	ND	ND	86	ND	ND
Arsenic, Filtered	As	ug/l	50	40.9	22.6	ND	ND	ND	ND	11.6	148
Barium, Filtered	Ba	ug/l	2000	ND	ND	ND	ND	ND	ND	ND	ND
Beryllium, Filtered	Be	ug/l	2*	6.7	49	ND	ND	ND	ND	ND	ND
Cadmium, Filtered	Cd	ug/l	5	ND	ND	ND	ND	ND	ND	ND	ND
Chromium, Filtered	Cr	ug/l	50	11.2	16	ND	ND	ND	ND	ND	ND
Lead, Filtered	Pb	ug/l	15	3.9	3.9	ND	ND	ND	ND	ND	21.2
Lithium, Filtered	Li	mg/l	-	258	62.6	0.014	0.035	0.072	0.019	0.41	0.23
Mercury, Filtered	Hg	ug/l	1.1	0.28	0.2	ND	ND	ND	ND	ND	ND
Selenium, Filtered	Se	ug/l	50	12.2	0.177	ND	ND	ND	ND	14	5.9
Silver, Filtered	Ag	ug/l	18	ND	ND	ND	ND	ND	ND	ND	ND

IMPORTANT: This table is provided to assist with interpretation of the tabulated data in Appendix III. Some of the maximum values given above are anomalous and are not a statistically valid representation of groundwater quality.

Notes:

1. The results from the L-series wells were obtained from 15 events performed between 7/89 and 4/97 (see Appendix III).
2. The results from the DC-series wells and the filtered metals analyses were obtained from quarterly events performed in 1994 (see Appendix III).
3. The L-series wells and DC-1 are deep wells screened in bedrock and/or saprolite, while DC-5 and DC-6 intersect the potentiometric surface.
4. * Proposed 2L Standard

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APPENDIX I

Soil Laboratory Test Results

PRODUCT BULLETIN

LITHCOA LITHIUM CORPORATION OF AMERICA · P. O. BOX 8, BESSEMER CITY, N. C. 28016
A SUBSIDIARY OF GULF RESOURCES & CHEMICAL CORPORATION

SPODUMENE FILTER CAKE

USE: Raw material for brick manufacture.

ORIGIN AND NATURE OF MATERIAL:

This by-product material is produced in the Ellestad—Laute process(U.S. Patent 2,516,109) in which α-spodumene ore is converted to β-spodumene by heating at 1100°C., and roasted with sulfuric acid to produce lithium sulfate, neutralized with limestone, and filtered to separate the solids from the lithium sulfate liquors.

The solid filter cake is essentially spodumene ore with its lithium sites substituted with hydrogen, mixed with calcium sulfate and calcium carbonate from the neutralization process. It is predominatly an aluminum silicate, having consistent chemical composition and uniform particle size distribution from year to year. As removed from the filter circuit, this material contains approximately 25 to 30 percent water.

FIRING CHARACTERISTICS:

Process filter cake is a non-plastic aluminum silicate base mixture with a fine particle size distribution. It may be mixed with various bonding clays to produce light-colored brick of outstanding structural strength. Because of the finely ground nature and the chemical composition of this material, bricks with very smooth surface texture may be produced.* Combinations of this material with bonding clays may be used as the basic material for brick of variety of colors.

Spodumene Filter Cake may be mixed with auxiliary fluxes to produce practical fluxing additives. Possible auxiliary fluxes include glass, sodium silicate, feldspar, talc, bentonite, rasorite, and soda ash. The filter cake can be used as an additive to reduce cracking during the bricks' drying process. This material, when substituted for Seracite clay, substantially reduces cracking. The residual Li_2O values in this material improves thermal shock characteristics for most brick mixes. Mixtures containing this material as a component have shown reduced firing breakage losses.

Thermal decomposition of spodumene filter cake results in loss of CO_2 between 1400° to 1650°F. Sulfate decomposition to sulfur oxides does not occur below 2150°F. Most brick firing is done at or below this temperature and sulfur gas emissions are not a problem.

* Patent Applied For. Serial No. 562,354, March 26, 1975

SUMMARY OF LABORATORY TEST DATA

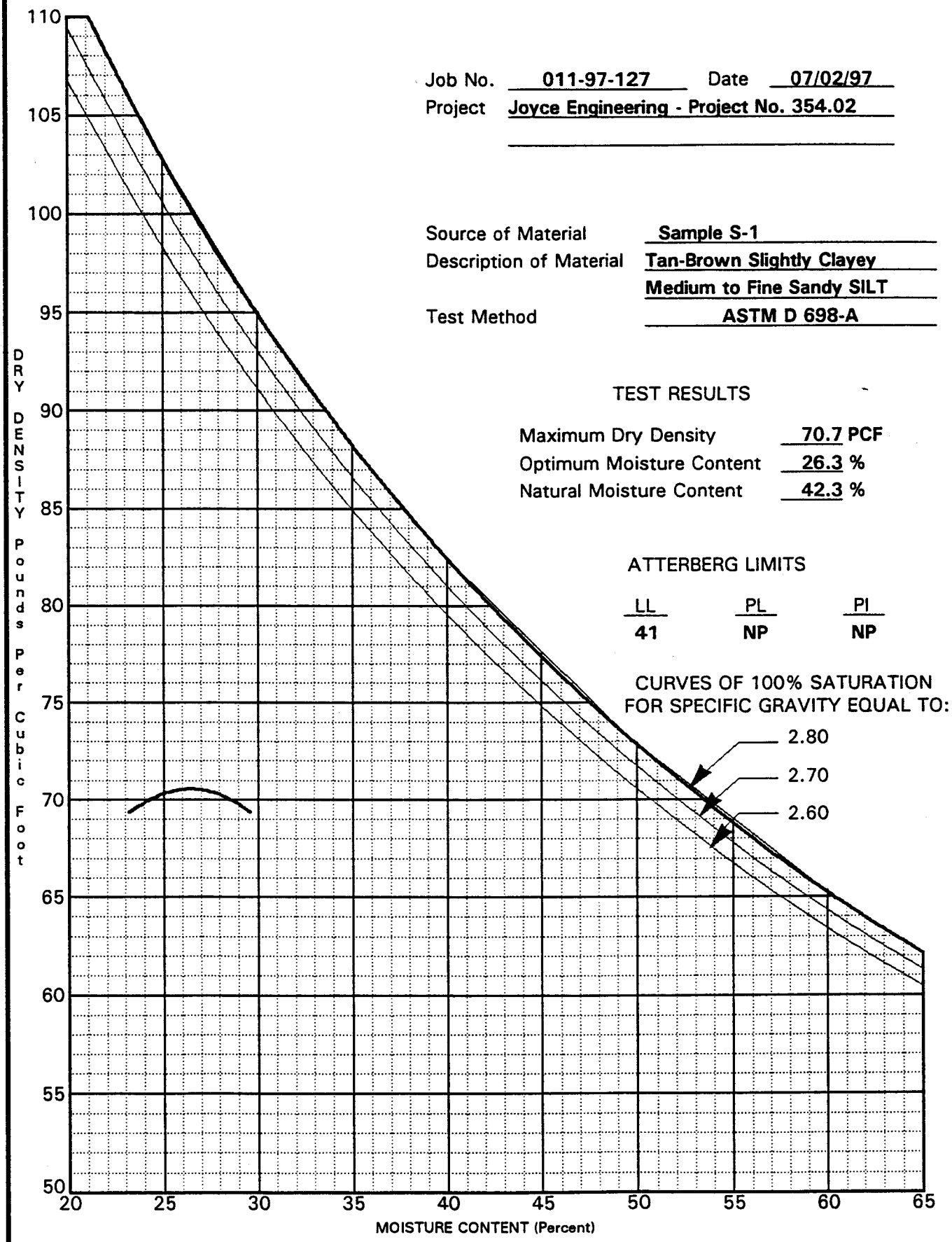
Boring No.	Sample Depth (ft.)	Sample Type[2]	Natural Moisture Content (%)	USCS Class.	Atterberg Limits			Standard Proctor Curve		Remolded Data		Permeability (cm\sec.)
					L.L.	P.L.	P.I.	Max. Dry Density (pcf)	Opt. Water Content (%)	Dry Density (pcf)	Water Content (%)	
S-1	N/A	Bag	42.3	ML	41	NP	NP	70.7	26.3	69.6	29.3	5.1 E-5

[1]Graphic Presentations of Results of Triaxial, Consolidation, CBR, Proctor, Grain Size, and other tests follow this summary.

[2]SS = Split Spoon Sample (ASTM D-1586)
UD = Undisturbed Sample (ASTM D-1587)

TRIGON ENGINEERING CONSULTANTS, INC.
GREENSBORO, NORTH CAROLINA

JOB NUMBER: 011-97-127



Job No. 011-97-127 Date 07/02/97

Project Joyce Engineering - Project No. 354.02

Source of Material Sample S-1

Description of Material Tan-Brown Slightly Clayey Medium to Fine Sandy SILT

Test Method ASTM D 698-A

TEST RESULTS

Maximum Dry Density	70.7 PCF
Optimum Moisture Content	26.3 %
Natural Moisture Content	42.3 %

ATTERBERG LIMITS

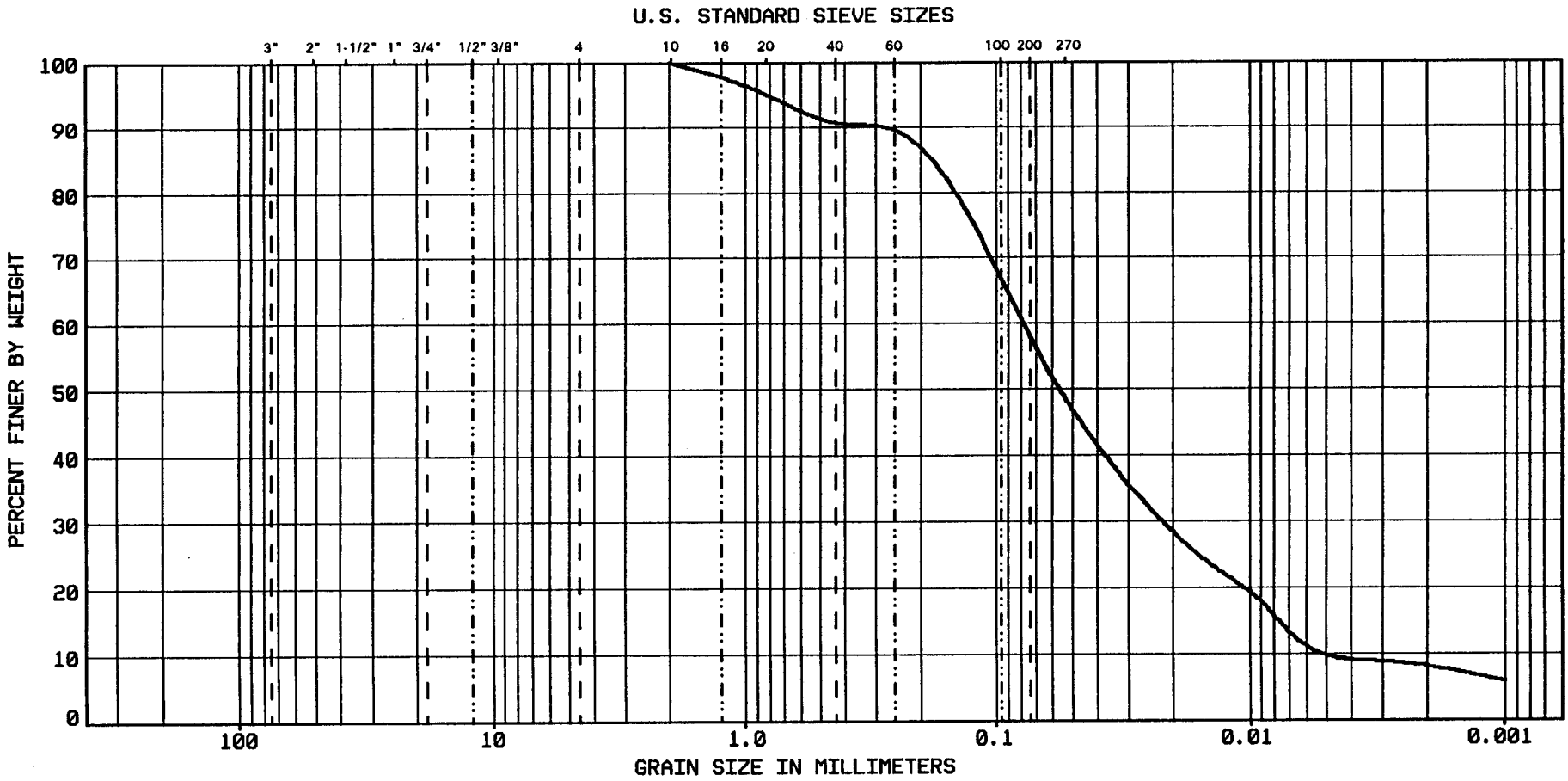
LL	PL	PI
41	NP	NP

CURVES OF 100% SATURATION FOR SPECIFIC GRAVITY EQUAL TO:

MOISTURE-DENSITY RELATIONSHIP

TRIGON ENGINEERING CONSULTANTS, INC.

Greensboro, North Carolina



BOULDERS	COBBLES	GRAVEL		SAND			FINES	
		COARSE	FINE	COARSE	MEDIUM	FINE	SILT SIZES	CLAY SIZES

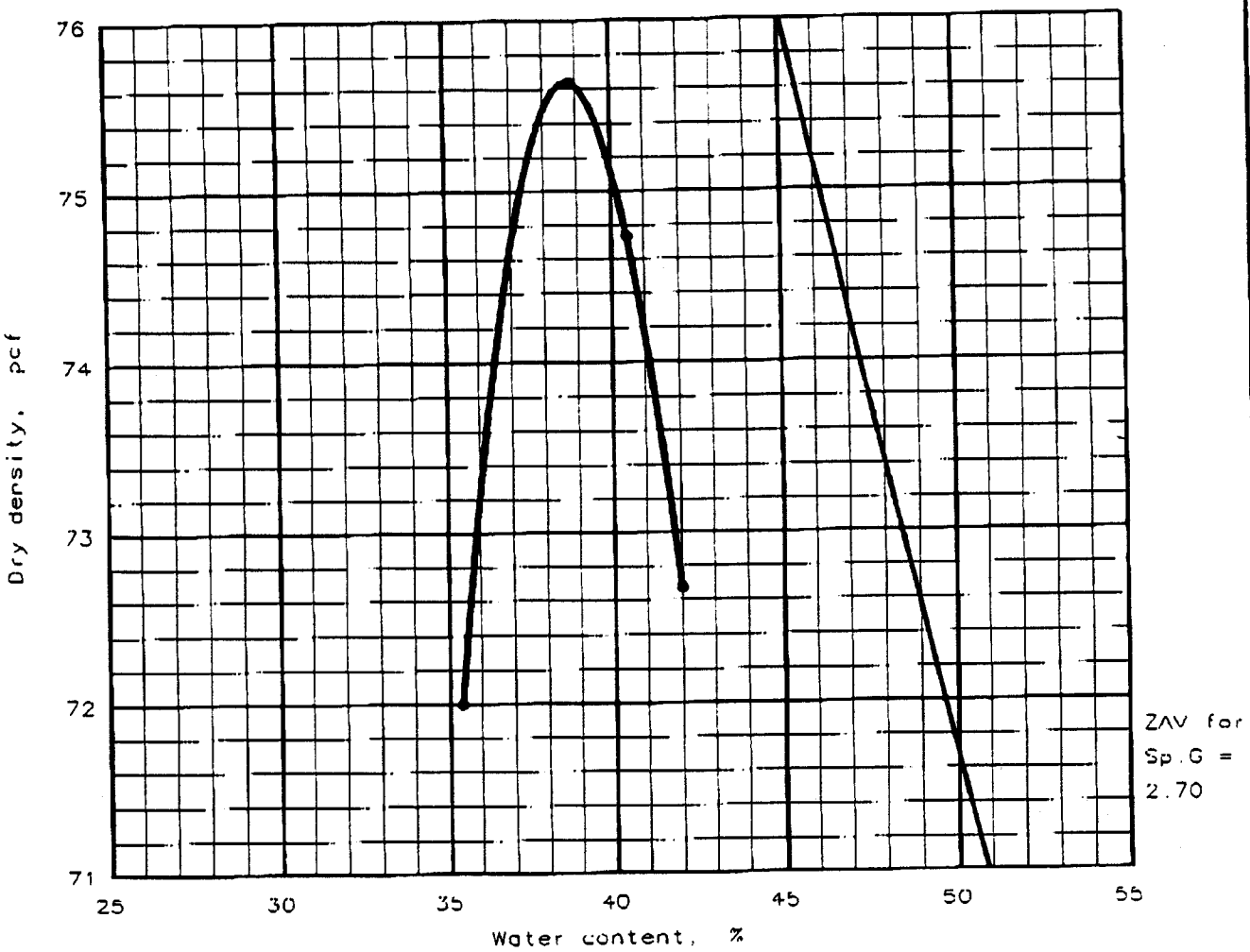
BORING NO.	DEPTH(FT)	NMC %	LL	PL	PI	DESCRIPTION OR CLASSIFICATION
S-1	N/A	42.3	41	NP	NP	Tan-Brown Slightly Clayey Medium to Fine Sandy SILT

GRAIN SIZE DISTRIBUTION

JOB NO. 011-97-127

TRIGON

MOISTURE-DENSITY RELATIONSHIP



Test specification: ASTM D 698-91 Procedure A, Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
			38.9 %					

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 75.5 pcf Optimum moisture = 38.5 %	BROWN GRAY SANDY SILT
Project No.: 97092 Project: FMC CORPORATION Location: T-1 Date: 8-14 1997	Remarks: TAILINGS
MOISTURE-DENSITY RELATIONSHIP **Geo-Environmental Consultants, Inc.**	Sample ID. T-1

Geo-Environmental Consultants, Inc.

SUMMARY OF LABORATORY TESTING

Flexible Wall Permeability Test
ASTM D 5084-90

Project Name:	FMC CORPORATION
Project No:	97092
Date:	8/12/97 To
Sample ID:	T-1
Material Description:	Brown Gray Tailings

Proctor Data:	
Maximum Dry Density (pcf) :	75.5
Optimum Moisture Content (%) :	38.5
Test Data:	
Initial Dry Density (pcf) :	75.1
Initial Moisture Content (%) :	40.5
Sample Length (cm) :	11.6
Sample Area (cm^2) :	81.1
Average Temperature (°C) :	21.0
Hydraulic Conductivity K (cm/sec) :	4.95E-06
Saturated:	Yes

PRELIMINARY

Pace Analytical

Pace Analytical Services, Inc.
9800 Kincey Avenue, Suite 100
Huntersville, NC 28078
Tel: 704-875-9092
Fax: 704-875-9091

. Barbara Ritchie
Page 3

March 01, 1996
PACE Project Number: 660131505

Client Reference: Metals Analysis

PACE Sample Number:			92 0543637	
Date Collected:			01/31/96	
Date Received:			01/31/96	
Client Sample ID:			Ore	
Parameter	Units	MDL	Tailings	DATE ANALYZED
INORGANIC ANALYSIS				
RCRA METALS				
Arsenic	mg/kg	0.50	8.7	02/19/96
Barium	mg/kg	2.0	6.0	02/27/96
Cadmium	mg/kg	1.0	ND	02/27/96
Chromium	mg/kg	1.0	7.4	02/27/96
Lead	mg/kg	0.50	3.3	02/21/96
Mercury	mg/kg	0.040	0.16	02/19/96
Selenium	mg/kg	0.50	ND	02/15/96
Silver	mg/kg	0.50	ND	02/27/96

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Pace Analytical Services, Inc.
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Huntersville, NC 28078
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Fax: 704-875-9091

Pace Analytical

Ms. Barbara Ritchie
Page 8

March 01, 1996
PACE Project Number: 660131505

Client Reference: Metals Analysis

PACE Sample Number:			92 0543645	
Date Collected:			01/31/96	
Date Received:			01/31/96	
Client Sample ID:			Ore Tailings leachate (4)	
Parameter	Units	MDL		DATE ANALYZED
INORGANIC ANALYSIS				
TCLP RCRA TOXICITY METALS				
Arsenic	mg/L	0.005	ND	02/19/96
Barium 100 RCRA	mg/L	0.02	0.13	02/26/96
Cadmium	mg/L	0.010	ND	02/26/96
Chromium	mg/L	0.010	ND	02/26/96
Lead	mg/L	0.10	ND	02/26/96
Mercury	mg/L	0.0002	ND	02/19/96
Selenium	mg/L	0.005	ND	02/16/96
Silver	mg/L	0.005	ND	02/26/96

RCRA Metals in Liquids

Analytical Methods: Barium, Cadmium, Chromium, Lead, Silver - EPA 200.7
Arsenic, Selenium - EPA 200.9
Mercury - EPA 245.1

Digestion Methods: Mercury - EPA 245.1
All Others - 200.2

These data have been reviewed and are approved for release.

Dan H. Jones
Inorganic Department

REPORT OF LABORATORY ANALYSIS

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Pace Analytical

Ms. Barbara Ritchie
Page 4

August 08, 1997
PACE Project Number: 670710526

Client Reference: Laboratory Analysis

PACE Sample Number:			92 0138090		
Date Collected:			06/26/97		
Date Received:			07/10/97		
Client Sample ID:			Composite Tailings Fly/Bottom (1)		
Parameter	Units	PRL		METHOD	DATE ANALYZED
INORGANIC ANALYSIS					
INDIVIDUAL PARAMETERS					
Cadmium	mg/L	0.001	0.003	213.2	08/07/97
Lead	mg/L	0.005	ND	239.2	08/05/97
Silver	mg/L	0.005	ND	272.2	08/06/97
TCLP RCRA TOXICITY METALS				6010A	
Arsenic	mg/L	0.005	ND		07/16/97
Barium	mg/L	0.020	0.17		07/21/97
Chromium	mg/L	0.020	0.11		07/21/97
Mercury	mg/L	0.0002	ND		07/16/97
Selenium	mg/L	0.005	ND		07/16/97

These data have been reviewed and are approved for release.

Margaret S. Harding
Manager, Laboratory Operations

REPORT OF LABORATORY ANALYSIS

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APPENDIX II

Help Model Output

```
******************************************************************************
******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.04    (10 APRIL 1995)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:     C:\HELP3\FMCRMC\DATA4.D4
TEMPERATURE DATA FILE:       C:\HELP3\FMCRMC\DATA7.D7
SOLAR RADIATION DATA FILE:   C:\HELP3\FMCRMC\DATA13.D13
EVAPOTRANSPIRATION DATA:     C:\HELP3\FMCRMC\DATA11.D11
SOIL AND DESIGN DATA FILE:   C:\HELP3\FMCRMC\DATA26.D10
OUTPUT DATA FILE:            C:\HELP3\FMCRMC\FINAL27.OUT


TIME:  15:11     DATE:   7/14/1997


******************************************************************************

     TITLE:  FMC CORP. - ALTERNATE CAP - 24" COMPACTED TAILINGS

******************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   0
          THICKNESS                    =     24.00   INCHES
          POROSITY                     =      0.4610 VOL/VOL
          FIELD CAPACITY               =      0.3600 VOL/VOL
          WILTING POINT                =      0.2030 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3621 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.509999991000E-04 CM/SEC
```

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	89.10	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	18.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	6.391	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	8.298	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.654	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	8.691	INCHES
TOTAL INITIAL WATER	=	8.691	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
CHARLOTTE NORTH CAROLINA

STATION LATITUDE	=	35.20	DEGREES
MAXIMUM LEAF AREA INDEX	=	2.00	
START OF GROWING SEASON (JULIAN DATE)	=	83	
END OF GROWING SEASON (JULIAN DATE)	=	312	
EVAPORATIVE ZONE DEPTH	=	18.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	7.50	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	64.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	67.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	70.00	%

NOTE: PRECIPITATION DATA FOR GREENSBORO NORTH CAROLINA
WAS ENTERED FROM THE DEFAULT DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CHARLOTTE NORTH CAROLINA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
40.50	42.90	50.40	60.30	68.20	75.00
78.50	77.90	72.00	60.70	50.70	42.60

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CHARLOTTE NORTH CAROLINA
AND STATION LATITUDE = 35.20 DEGREES

****

ANNUAL TOTALS FOR YEAR 1974

	INCHES	CU. FEET	PERCENT
PRECIPITATION	45.47	165056.094	100.00
RUNOFF	4.650	16881.125	10.23
EVAPOTRANSPIRATION	31.924	115885.445	70.21
PERC./LEAKAGE THROUGH LAYER 1	8.894952	32288.676	19.56
CHANGE IN WATER STORAGE	0.000	0.859	0.00
SOIL WATER AT START OF YEAR	8.691	31546.754	
SOIL WATER AT END OF YEAR	8.691	31547.613	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.010	0.00

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ANNUAL TOTALS FOR YEAR 1975

	INCHES	CU. FEET	PERCENT
PRECIPITATION	56.51	205131.281	100.00
RUNOFF	9.277	33674.562	16.42
EVAPOTRANSPIRATION	35.025	127141.281	61.98
PERC./LEAKAGE THROUGH LAYER 1	11.936111	43328.086	21.12
CHANGE IN WATER STORAGE	0.272	987.320	0.48
SOIL WATER AT START OF YEAR	8.691	31547.613	
SOIL WATER AT END OF YEAR	8.963	32534.934	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.031	0.00

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ANNUAL TOTALS FOR YEAR 1976

	INCHES	CU. FEET	PERCENT
PRECIPITATION	34.64	125743.187	100.00
RUNOFF	3.606	13089.129	10.41
EVAPOTRANSPIRATION	26.321	95544.844	75.98
PERC./LEAKAGE THROUGH LAYER 1	5.209452	18910.311	15.04
CHANGE IN WATER STORAGE	-0.496	-1801.066	-1.43
SOIL WATER AT START OF YEAR	8.963	32534.934	
SOIL WATER AT END OF YEAR	8.467	30733.867	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.036	0.00

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ANNUAL TOTALS FOR YEAR 1977

	INCHES	CU. FEET	PERCENT
PRECIPITATION	34.26	124363.805	100.00
RUNOFF	5.115	18566.289	14.93
EVAPOTRANSPIRATION	25.707	93315.773	75.03
PERC./LEAKAGE THROUGH LAYER 1	3.377985	12262.086	9.86
CHANGE IN WATER STORAGE	0.060	219.612	0.18
SOIL WATER AT START OF YEAR	8.467	30733.867	
SOIL WATER AT END OF YEAR	8.527	30953.479	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.045	0.00

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ANNUAL TOTALS FOR YEAR 1978

	INCHES	CU. FEET	PERCENT
PRECIPITATION	55.97	203171.109	100.00
RUNOFF	10.311	37429.516	18.42
EVAPOTRANSPIRATION	36.080	130970.133	64.46
PERC./LEAKAGE THROUGH LAYER 1	9.648411	35023.730	17.24
CHANGE IN WATER STORAGE	-0.070	-252.313	-0.12
SOIL WATER AT START OF YEAR	8.527	30953.479	
SOIL WATER AT END OF YEAR	8.458	30701.166	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.042	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1974 THROUGH 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	4.54	1.88	4.38	2.21	4.14	2.73
	5.32	4.79	5.44	3.60	2.36	3.98
STD. DEVIATIONS	2.16	1.22	2.58	1.21	2.31	1.09
	5.09	3.03	2.32	3.18	0.62	0.26
RUNOFF						
TOTALS	0.794	0.073	0.434	0.212	0.352	0.082
	1.304	0.784	1.321	0.722	0.052	0.462
STD. DEVIATIONS	0.877	0.133	0.793	0.367	0.626	0.088
	1.830	0.746	1.154	1.127	0.044	0.142
EVAPOTRANSPIRATION						
TOTALS	1.592	1.900	2.895	2.547	4.091	3.312
	3.319	3.252	2.631	2.828	1.443	1.200
STD. DEVIATIONS	0.256	0.254	0.527	0.634	1.718	0.911
	2.364	1.018	1.080	0.648	0.520	0.097

PERCOLATION/LEAKAGE THROUGH LAYER 1

TOTALS	2.4831	0.6610	0.6940	0.2545	0.2913	0.0958
	0.4157	0.4425	0.6529	0.3229	0.0931	1.4066
STD. DEVIATIONS	1.3412	0.5588	1.3309	0.2239	0.5927	0.1406
	0.8406	0.6038	0.8993	0.6361	0.1091	0.7487

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1974 THROUGH 1978

	INCHES		CU. FEET	PERCENT
PRECIPITATION	45.37	(10.898)	164693.1	100.00
RUNOFF	6.592	(2.9962)	23928.12	14.529
EVAPOTRANSPIRATION	31.011	(4.8159)	112571.50	68.352
PERCOLATION/LEAKAGE THROUGH LAYER 1	7.81338	(3.46364)	28362.578	17.22147
CHANGE IN WATER STORAGE	-0.047	(0.2819)	-169.12	-0.103

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PEAK DAILY VALUES FOR YEARS 1974 THROUGH 1978

	(INCHES)	(CU. FT.)
PRECIPITATION	4.73	17169.900
RUNOFF	2.868	10411.3906
PERCOLATION/LEAKAGE THROUGH LAYER 1	0.811576	2946.02026
SNOW WATER	2.68	9734.1289

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4100

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.2030

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FINAL WATER STORAGE AT END OF YEAR 1978

LAYER	(INCHES)	(VOL/VOL)
1	8.4576	0.3524
SNOW WATER	0.000	

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.04    (10 APRIL 1995)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:     C:\HELP3\FMCRMC\DATA4.D4
TEMPERATURE DATA FILE:       C:\HELP3\FMCRMC\DATA7.D7
SOLAR RADIATION DATA FILE:   C:\HELP3\FMCRMC\DATA13.D13
EVAPOTRANSPIRATION DATA:     C:\HELP3\FMCRMC\DATA11.D11
SOIL AND DESIGN DATA FILE:   C:\HELP3\FMCRMC\DATA21.D10
OUTPUT DATA FILE:            C:\HELP3\FMCRMC\FINAL20.OUT


TIME:  12:23     DATE:   7/14/1997


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     TITLE:  FMC CORPORTATION - RMC

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                  LAYER  1
                                  --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER  13
          THICKNESS                    =      6.00   INCHES
          POROSITY                     =      0.4300 VOL/VOL
          FIELD CAPACITY               =      0.3210 VOL/VOL
          WILTING POINT                =      0.2210 VOL/VOL
          INITIAL SOIL WATER CONTENT   =      0.3198 VOL/VOL
          EFFECTIVE SAT. HYD. COND.    =  0.330000003000E-04 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  3.00
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.
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LAYER 2

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 23

THICKNESS	=	9.00	INCHES
POROSITY	=	0.4610	VOL/VOL
FIELD CAPACITY	=	0.3600	VOL/VOL
WILTING POINT	=	0.2030	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3837	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.900000032000E-05	CM/SEC

LAYER 3

TYPE 3 - BARRIER SOIL LINER
MATERIAL TEXTURE NUMBER 23

THICKNESS	=	9.00	INCHES
POROSITY	=	0.4610	VOL/VOL
FIELD CAPACITY	=	0.3600	VOL/VOL
WILTING POINT	=	0.2030	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.4610	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.900000032000E-05	CM/SEC

LAYER 4

TYPE 1 - VERTICAL PERCOLATION LAYER
MATERIAL TEXTURE NUMBER 13

THICKNESS	=	12.00	INCHES
POROSITY	=	0.4300	VOL/VOL
FIELD CAPACITY	=	0.3210	VOL/VOL
WILTING POINT	=	0.2210	VOL/VOL
INITIAL SOIL WATER CONTENT	=	0.3525	VOL/VOL
EFFECTIVE SAT. HYD. COND.	=	0.330000003000E-04	CM/SEC

GENERAL DESIGN AND EVAPORATIVE ZONE DATA

NOTE: SCS RUNOFF CURVE NUMBER WAS USER-SPECIFIED.

SCS RUNOFF CURVE NUMBER	=	89.10	
FRACTION OF AREA ALLOWING RUNOFF	=	100.0	PERCENT
AREA PROJECTED ON HORIZONTAL PLANE	=	1.000	ACRES
EVAPORATIVE ZONE DEPTH	=	15.0	INCHES
INITIAL WATER IN EVAPORATIVE ZONE	=	5.372	INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE	=	6.729	INCHES
LOWER LIMIT OF EVAPORATIVE STORAGE	=	3.153	INCHES
INITIAL SNOW WATER	=	0.000	INCHES
INITIAL WATER IN LAYER MATERIALS	=	13.751	INCHES
TOTAL INITIAL WATER	=	13.751	INCHES
TOTAL SUBSURFACE INFLOW	=	0.00	INCHES/YEAR

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
CHARLOTTE NORTH CAROLINA

STATION LATITUDE	=	35.20	DEGREES
MAXIMUM LEAF AREA INDEX	=	2.00	
START OF GROWING SEASON (JULIAN DATE)	=	83	
END OF GROWING SEASON (JULIAN DATE)	=	312	
EVAPORATIVE ZONE DEPTH	=	15.0	INCHES
AVERAGE ANNUAL WIND SPEED	=	7.50	MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY	=	64.00	%
AVERAGE 2ND QUARTER RELATIVE HUMIDITY	=	67.00	%
AVERAGE 3RD QUARTER RELATIVE HUMIDITY	=	74.00	%
AVERAGE 4TH QUARTER RELATIVE HUMIDITY	=	70.00	%

NOTE: PRECIPITATION DATA FOR GREENSBORO NORTH CAROLINA
WAS ENTERED FROM THE DEFAULT DATA FILE.

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CHARLOTTE NORTH CAROLINA

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
40.50	42.90	50.40	60.30	68.20	75.00
78.50	77.90	72.00	60.70	50.70	42.60

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR CHARLOTTE NORTH CAROLINA
AND STATION LATITUDE = 35.20 DEGREES

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ANNUAL TOTALS FOR YEAR 1974

	INCHES	CU. FEET	PERCENT
PRECIPITATION	45.47	165056.094	100.00
RUNOFF	6.010	21817.801	13.22
EVAPOTRANSPIRATION	30.615	111133.133	67.33
PERC./LEAKAGE THROUGH LAYER 3	8.848633	32120.537	19.46
AVG. HEAD ON TOP OF LAYER 3	0.0255		
PERC./LEAKAGE THROUGH LAYER 4	8.859882	32161.373	19.49
CHANGE IN WATER STORAGE	-0.015	-56.220	-0.03
SOIL WATER AT START OF YEAR	13.750	49914.223	
SOIL WATER AT END OF YEAR	13.735	49858.004	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	0.003	0.00

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ANNUAL TOTALS FOR YEAR 1975

	INCHES	CU. FEET	PERCENT
PRECIPITATION	56.51	205131.281	100.00
RUNOFF	11.017	39990.445	19.50
EVAPOTRANSPIRATION	33.222	120597.094	58.79
PERC./LEAKAGE THROUGH LAYER 3	11.163473	40523.406	19.75
AVG. HEAD ON TOP OF LAYER 3	0.0289		
PERC./LEAKAGE THROUGH LAYER 4	11.529950	41853.719	20.40
CHANGE IN WATER STORAGE	0.741	2690.073	1.31
SOIL WATER AT START OF YEAR	13.735	49858.004	
SOIL WATER AT END OF YEAR	14.476	52548.078	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.052	0.00

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ANNUAL TOTALS FOR YEAR 1976

	INCHES	CU. FEET	PERCENT
PRECIPITATION	34.64	125743.187	100.00
RUNOFF	4.069	14771.800	11.75
EVAPOTRANSPIRATION	25.446	92369.547	73.46
PERC./LEAKAGE THROUGH LAYER 3	6.515968	23652.963	18.81
AVG. HEAD ON TOP OF LAYER 3	0.0187		
PERC./LEAKAGE THROUGH LAYER 4	5.941374	21567.187	17.15
CHANGE IN WATER STORAGE	-0.817	-2965.306	-2.36
SOIL WATER AT START OF YEAR	14.476	52548.078	
SOIL WATER AT END OF YEAR	13.659	49582.770	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.042	0.00

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ANNUAL TOTALS FOR YEAR 1977

	INCHES	CU. FEET	PERCENT
PRECIPITATION	34.26	124363.805	100.00
RUNOFF	5.301	19240.910	15.47
EVAPOTRANSPIRATION	24.591	89266.805	71.78
PERC./LEAKAGE THROUGH LAYER 3	4.166988	15126.168	12.16
AVG. HEAD ON TOP OF LAYER 3	0.0115		
PERC./LEAKAGE THROUGH LAYER 4	4.288228	15566.268	12.52
CHANGE IN WATER STORAGE	0.080	289.853	0.23
SOIL WATER AT START OF YEAR	13.659	49582.770	
SOIL WATER AT END OF YEAR	13.739	49872.625	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.026	0.00

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ANNUAL TOTALS FOR YEAR 1978

	INCHES	CU. FEET	PERCENT
PRECIPITATION	55.97	203171.109	100.00
RUNOFF	11.417	41442.785	20.40
EVAPOTRANSPIRATION	33.644	122126.297	60.11
PERC./LEAKAGE THROUGH LAYER 3	11.177893	40575.750	19.97
AVG. HEAD ON TOP OF LAYER 3	0.0281		
PERC./LEAKAGE THROUGH LAYER 4	11.057949	40140.355	19.76
CHANGE IN WATER STORAGE	-0.148	-538.247	-0.26
SOIL WATER AT START OF YEAR	13.739	49872.625	
SOIL WATER AT END OF YEAR	13.591	49334.375	
SNOW WATER AT START OF YEAR	0.000	0.000	0.00
SNOW WATER AT END OF YEAR	0.000	0.000	0.00
ANNUAL WATER BUDGET BALANCE	0.0000	-0.087	0.00

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1974 THROUGH 1978

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	4.54	1.88	4.38	2.21	4.14	2.73
	5.32	4.79	5.44	3.60	2.36	3.98
STD. DEVIATIONS	2.16	1.22	2.58	1.21	2.31	1.09
	5.09	3.03	2.32	3.18	0.62	0.26
RUNOFF						
TOTALS	0.905	0.057	0.530	0.254	0.335	0.071
	1.518	1.028	1.531	0.817	0.059	0.460
STD. DEVIATIONS	0.979	0.103	0.999	0.460	0.586	0.068
	2.176	1.081	1.385	1.325	0.048	0.176
EVAPOTRANSPIRATION						
TOTALS	1.504	1.707	2.844	2.310	3.892	3.139
	3.233	3.103	2.590	2.724	1.288	1.170
STD. DEVIATIONS	0.226	0.356	0.487	0.539	1.823	0.853
	2.262	0.879	0.899	0.751	0.548	0.195

PERCOLATION/LEAKAGE THROUGH LAYER 3

TOTALS	2.4764	0.6627	0.7140	0.3710	0.2871	0.1568
	0.3616	0.3678	0.7784	0.3662	0.0504	1.7823
STD. DEVIATIONS	1.0726	0.6769	1.2320	0.2593	0.6419	0.3506
	0.5997	0.5348	0.7781	0.8154	0.1074	1.0359

PERCOLATION/LEAKAGE THROUGH LAYER 4

TOTALS	2.2152	1.0506	0.7459	0.3707	0.4465	0.1674
	0.2446	0.4257	0.6530	0.4411	0.1466	1.4281
STD. DEVIATIONS	0.9323	0.6347	1.0562	0.3013	0.7610	0.2858
	0.4434	0.4958	0.6778	0.4730	0.2145	0.8275

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 3

AVERAGES	0.0710	0.0259	0.0214	0.0161	0.0107	0.0070
	0.0135	0.0118	0.0251	0.0128	0.0019	0.0534
STD. DEVIATIONS	0.0242	0.0283	0.0364	0.0128	0.0240	0.0156
	0.0231	0.0174	0.0234	0.0285	0.0039	0.0308

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1974 THROUGH 1978

	INCHES		CU. FEET	PERCENT
PRECIPITATION	45.37	(10.898)	164693.1	100.00
RUNOFF	7.563	(3.4101)	27452.75	16.669
EVAPOTRANSPIRATION	29.504	(4.2660)	107098.59	65.029
PERCOLATION/LEAKAGE THROUGH LAYER 3	8.37459	(3.04218)	30399.766	18.45843
AVERAGE HEAD ON TOP OF LAYER 3	0.023	(0.007)		
PERCOLATION/LEAKAGE THROUGH LAYER 4	8.33548	(3.16241)	30257.781	18.37222
CHANGE IN WATER STORAGE	-0.032	(0.5568)	-115.97	-0.070

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PEAK DAILY VALUES FOR YEARS 1974 THROUGH 1978

	(INCHES)	(CU. FT.)
PRECIPITATION	4.73	17169.900
RUNOFF	3.226	11711.6357
PERCOLATION/LEAKAGE THROUGH LAYER 3	0.325118	1180.17871
AVERAGE HEAD ON TOP OF LAYER 3	0.558	
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.312799	1135.45972
SNOW WATER	2.68	9734.1289

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4327

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.2102

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FINAL WATER STORAGE AT END OF YEAR 1978

LAYER	(INCHES)	(VOL/VOL)
1	1.7250	0.2875
2	3.2915	0.3657
3	4.1490	0.4610
4	4.4253	0.3688
SNOW WATER	0.000	

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APPENDIX III

Groundwater Analytical Data

FMC Corporation

Lithium Division
Highway 161
Box 795
Bessemer City North Carolina 28016
704 868 5300 Fax 704 868 5496

Certified Mail
Return Receipt Requested

June 11, 1997

North Carolina Department of Environment,
Health, and Natural Resources
Division of Waste Management
P.O. Box 27687
Raleigh, NC 27611-7687

Attn: Mr. Robert Lufty
Solid Waste Section

Re: FMC Corporation - Lithium Division - Bessemer City, Gaston County
Landfill Permit No. 36-05 - Semi-Annual Monitoring

Dear Mr. Lufty:

FMC Corporation's Lithium Division facility in Bessemer City ("FMC") is providing the North Carolina Department of Environment, Health and Natural Resources ("DEHNR") with the results of the semi-annual monitoring of groundwater and surface drainage for FMC's industrial landfill, No. 36-05. Enclosed with this letter are the following documents:

1. Summary tables of historical and current monitoring results for the five groundwater monitoring wells and three surface drainage sample locations

2. A map identifying the sample collection locations

3. Laboratory data and sample chain of custody reports

Data are very similar to the previous sampling results with the exception of the detection of 4-methyl-2-pentanone (MIBK) and acetone. The low level of detection and consistency throughout the samples suggests a laboratory artifact. Further, beginning with this round of sampling, FMC has started using a different analytical laboratory, further suggesting an issue at the lab. Future results will be closely examined to evaluate lab performance.

The next scheduled sampling event is in December 1997. If you have any questions or require additional information, please contact me at 704/868-0806.

Very truly yours,

Barbara E. Ritchie
Environmental Manager

Table 1
Industrial Landfill Area: Groundwater
Summary of Volatile Organic Analysis
Concentrations in ppb (ug/l)

Upgradient of Landfill

Monitoring Well	Sampling Date	Tetrachlorethene	Chloroform	Methylene Chloride	Bromoform	Acetone	4-Methyl-2-pentanone (MIBK)
L-1	7/89	36	<5	<5	9.6		
	7/90	69	10	<5	17		
	9/91	82	12	<5	9		
	7/92	110	16	<5	11		
	5/93	110	21	<5	9		
	11/93	100	19	<5	6		
	6/94	83	34	<5	7		
	12/94	98	41	<5	6		
	5/95	93	37	<5	7.7		
	12/95	210	56	<5	7.5		
	5/96	190	60	<5	8.5		
	12/96	140	61	<5	8.0		
	4/97	>5	27	<5	<5	43	210

Downgradient of Landfill

Monitoring Well	Sampling Date	Tetrachlorethene	Chloroform	Methylene Chloride	Bromoform	Acetone	4-Methyl-2-pentanone (MIBK)
L-2	7/89	<5	<5	<5	<5		
	7/90	<5	<5	<5	<5		
	9/91	<5	<5	<5	<5		
	7/92	<5	<5	<5	<5		
	5/93	<5	<5	<5	<5		
	11/93	<5	<5	<5	<5		
	6/94	<5	<5	<5	<5		
	12/94	<5	<5	<5	<5		
	5/95	<5	<5	<5	<5		
	12/95	<5	<5	<5	<5		
	5/96	<5	<5	<5	<5		
	12/96	<5	<5	<5	<5		
	4/97	<5	<5	<5	<5	20	34

Table 1 (con't)

Monitoring Well	Sampling Date	Tetrachlorethene	Chloroform	Methylene Chloride	Bromoform	Acetone	4-Methyl-2-pentanone (MIBK)
L-3	7/89	<5	<5	<5	<5		
	7/90	<5	<5	<5	<5		
	9/91	<5	<5	<5	<5		
	7/92	<5	<5	<5	<5		
	5/93	<5	<5	<5	<5		
	11/93	<5	<5	<5	<5		
	6/94	<5	<5	<5	<5		
	5/95	<5	<5	<5	<5		
	12/95	<5	<5	<5	<5		
	5/96	<5	<5	<5	<5		
	12/96	<5	<5	<5	<5		
	4/97	<5	<5	<5	<5	<20	23
L-4	7/89	67	<5	<5	<5		
	7/90	48	<5	<5	<5		
	9/91	87	<5	<5	<5		
	7/92	140	<5	<5	<5		
	5/93	91	<5	<5	<5		
	11/93	91	<5	<5	<5		
	6/94	110	7	<5	<5		
	12/94	140	5	<5	<5		
	5/95	104	<5	<5	<5		
	12/95	100	<5	<5	<5		
	5/96	67	<5	<5	<5		
	12/96	100	5.2	<5	<5		
	4/97	25	<5	<5	<5	<20	25
L-5	7/89	<50	<50	1,700	<50		
	7/90	<5	<5	<5	<5		
	9/91	<5	<5	<5	<5		
	7/92	<5	<5	<5	<5		
	5/93	<5	<5	<5	<5		
	11/93	<5	<5	<5	<5		
	6/94	<5	<5	<5	<5		
	12/94	<5	<5	<5	<5		
	5/95	<5	<5	<5	<5		
	12/95	<5	<5	<5	<5		
	5/96	<5	<5	<5	<5		
	12/96	<5	<5	<5	<5		
	4/97	<5	<5	<5	<5	<20	16

Note: Groundwater analysis for Volatile Organic Compounds using EPA method SW-846 8240.

Table 2
Industrial Landfill Area: Groundwater
Inorganic Analysis - RCRA Metals
Concentrations in ppm (mg/l)

Upgradient of Landfill

Monitoring Well	Sampling Date	As	Se	Hg	Ba	Cd	Cr	Pb	Ag
L-1	7/89	<0.005	<0.005	0.0003	<0.1	0.003	0.017	<0.005	<0.01
	7/90	0.035	<0.005	0.0022	0.71	<0.50	0.34	0.022	<0.03
	9/91	<0.005	<0.005	0.0030	0.27	<0.01	0.14	<0.005	<0.05
	7/92	<0.005	<0.005	0.0018	<0.10	<0.005	0.04	<0.005	<0.01
	5/93	0.050	<0.005	<0.0002	0.66	<0.005	0.32	0.015	<0.01
	11/93	<0.010	<0.005	<0.0015	<0.20	<0.005	<0.01	<0.015	<0.01
	6/94	<0.010	<0.005	0.7	0.24	<0.005	0.12	<0.003	<0.010
	12/94	0.042	0.007	0.0014	0.0417	0.0037	0.0551	0.0057	<0.001
	5/95	<0.005	<0.0002	<0.0002	0.039	<0.01	0.028	<0.005	<0.005
	12/95	<0.005	0.0013	0.0013	<0.02	<0.01	<0.01	<0.005	0.01
	5/96	<0.005	0.0008	0.0008	<0.010	<0.010	<0.010	<0.005	0.01
	12/96	<0.010	0.0015	0.0015	0.014	<0.010	0.011	<0.005	<0.050
	4/97	0.024	<0.010	<0.00020	<0.10	<0.030	<0.030	<0.1	<0.020

Downgradient of Landfill

Monitoring Well	Sampling Date	As	Se	Hg	Ba	Cd	Cr	Pb	Ag
L-2	7/89	<0.005	<0.005	<0.0002	<0.1	<0.002	0.010	<0.005	<0.01
	7/90	<0.005	<0.01	<0.0005	<0.10	<0.01	<0.03	<0.005	<0.05
	9/91	<0.005	<0.005	<0.0005	<0.10	<0.01	<0.03	<0.005	<0.05
	7/92	<0.005	<0.005	<0.0005	<0.10	<0.005	<0.01	<0.005	<0.01
	5/93	<0.010	<0.005	<0.0005	1.4	<0.01	0.87	0.013	<0.01
	11/93	<0.010	<0.005	<0.0002	<0.20	<0.005	0.01	<0.003	<0.01
	6/94	0.081	<0.005	<0.0002	1.2	<0.005	0.99	0.037	<0.010
	12/94	<0.002	<0.002	<0.0002	0.0141	<0.001	0.0028	0.0011	<0.001
	5/95	<0.005	<0.005	<0.0002	0.067	<0.010	<0.010	0.01	<0.005
	12/95	<0.005	<0.005	<0.0002	0.06	<0.010	0.03	<0.005	<0.005
	5/96	<0.005	<0.005	<0.0002	0.012	<0.010	<0.010	<0.005	<0.010
	12/96	<0.005	<0.005	<0.0002	0.046	<0.010	0.025	<0.005	<0.050
	4/97	<0.010	<0.010	<0.00020	<0.10	<0.010	<0.030	<0.1	<0.020
L-3	7/89	0.005	<0.005	<0.0002	<0.1	<0.002	0.019	<0.005	<0.01
	7/90	<0.005	<0.01	<0.0005	<0.10	<0.01	<0.03	0.005	<0.05
	9/91	<0.005	<0.005	<0.0005	<0.10	<0.01	<0.03	<0.005	<0.05
	7/92	<0.005	<0.005	<0.0005	<0.10	<0.005	<0.01	0.012	<0.01

Table 2 (cont.)

Monitoring Well	Sampling Date	As	Se	Hg	Ba	Cd	Cr	Pb	Ag
	5/93	<0.010	<0.005	<0.0002	<0.20	<0.005	0.03	0.004	<0.01
	11/93	<0.01	<0.005	<0.0002	<0.20	<0.005	<0.01	<0.003	<0.01
L-3	6/94	<0.010	<0.005	<0.0002	0.011	<0.005	0.07	0.008	<0.010
	12/94	0.0067	<0.002	<0.0002	0.0205	<0.001	0.0089	<0.001	<0.001
	5/95	<0.005	<0.005	<0.0002	0.037	<0.010	<0.010	<0.005	<0.005
	12/95	<0.005	<0.005	<0.0002	0.02	<0.010	<0.010	<0.005	<0.005
	5/96	<0.005	<0.005	<0.0002	0.014	<0.010	<0.010	<0.005	<0.010
	12/96	<0.005	<0.005	0.0003	0.025	<0.010	<0.010	<0.005	<0.050
	4/97	<0.010	<0.010	<0.00020	<0.10	<0.010	<0.030	<0.1	<0.020
L-4	7/89	0.021	<0.005	<0.0002	<0.1	<0.002	0.048	0.005	<0.01
	7/90	<0.005	<0.01	<0.0005	<0.10	<0.01	<0.03	0.007	<0.05
	9/91	<0.005	<0.005	<0.0005	<0.10	<0.01	<0.03	<0.005	<0.05
	7/92	0.041	<0.005	<0.0005	<0.10	<0.005	0.11	0.007	<0.01
	5/93	0.012	<0.005	<0.0002	<0.20	<0.005	0.03	0.004	<0.01
	11/93	0.018	<0.005	<0.0002	<0.20	<0.005	0.03	<0.003	<0.01
	6/94	<0.010	<0.005	<0.0002	<0.20	<0.005	<0.010	<0.003	<0.010
	12/94	0.0022	<0.002	<0.0002	0.0249	<0.001	0.0021	<0.001	<0.001
	5/95	<0.005	<0.005	<0.0002	0.025	<0.010	<0.010	<0.005	<0.005
	12/95	0.009	<0.005	<0.0002	0.03	<0.010	<0.010	<0.005	<0.005
	5/96	<0.005	<0.005	<0.0002	0.012	<0.010	<0.010	<0.005	<0.010
	12/96	<0.005	<0.005	<0.0002	0.025	<0.020	<0.020	<0.005	<0.10
	4/97	<0.010	<0.010	<0.00020	<0.10	<0.010	<0.030	<0.1	<0.020
L-5	7/89	0.007	<0.005	<0.0002	<0.1	<0.002	0.014	0.008	<0.01
	7/90	<0.005	<0.01	<0.0005	<0.10	<0.01	<0.03	<0.005	<0.05
	9/91	<0.005	<0.005	<0.0005	<0.10	<0.01	<0.03	<0.005	<0.05
	7/92	0.006	<0.005	<0.0005	<0.10	<0.005	0.01	<0.005	<0.01
	5/93	0.021	<0.005	<0.0002	<0.20	<0.005	0.10	0.03	<0.01
	11/93	<0.010	<0.005	<0.0002	<0.20	<0.005	<0.01	<0.003	<0.01
	6/94	0.04	<0.005	<0.0002	<0.20	0.014	0.07	0.034	0.010
	12/94	<0.002	<0.002	<0.0002	0.0648	<0.001	0.00	0.0012	<0.001
	5/95	<0.005	<0.005	<0.0002	0.074	<0.010	<0.010	0.28	0.005
	12/95	<0.005	<0.005	<0.0002	0.07	<0.010	<0.010	<0.005	0.086
	5/96	<0.005	<0.005	<0.0002	0.054	<0.010	<0.010	<0.005	<0.010
	12/96	<0.005	<0.005	<0.0002	0.079	<0.010	<0.010	<0.005	<0.050
	4/97	<0.010	<0.010	<0.00020	<0.10	<0.010	<0.030	<0.1	<0.020
NCGW Standards (1)		0.05	0.01	0.0011	1.0	0.005	0.05	0.05	0.05

(1) NC Groundwater Classifications and Standards 15 NCAC 2L, May 11, 1989.

Table 3
Industrial Landfill Area: Groundwater
Inorganic Analysis - Additional Parameters
Concentrations in ppm (mg/l)

Upgradient of Landfill

Monitoring Well	Sampling Date	Be	Li	F	Cl	Sulfate	pH	Specific Conductivity (2)
L-1	7/89	<0.005	100.0	NA	NA	NA	7.6	4400
	7/90	0.02	140.0	0.34	410	6000	4.79	8380
	9/91	<0.01	180	0.4	410	2500	5.0	8400
	7/92	0.006	120	0.4	470	4200	5.5	8690
	5/93	0.03	180	0.3	460	4600	5.36	7380
	11/93	0.006	210	0.4	470	5000	5.37	7370
	6/94	0.013	220	0.4	460	4900	5.32	8400
	12/94	0.0081	236	0.4	560	5400	5.28	8160
	5/95	<0.010	229	0.53	470	7000	5	11680
	12/95	<0.010	250	0.44	470	6400	5.16	9410
	6/96	<0.010	310	0.58	410	8300	5.25	8190
	12/96	<0.010	272	0.55	350	5800	5.02	9390
	4/97	<0.010	265	0.54	507	5940	5.5	9.67

Downgradient of Landfill

Monitoring Well	Sampling Date	Be	Li	F	Cl	Sulfate	pH	Specific Conductivity (2)
L-2	7/89	<0.005	<5.0	NA	NA	NA	6.8	90
	7/90	<0.01	<0.03	0.10	3.2	4.4	6.45	112
	9/91	<0.01	<0.03	<0.1	3.6	6.1	6.8	116
	7/92	<0.005	<0.03	<0.1	4.1	7.1	6.9	127
	5/93	0.009	<1.0	<0.1	5.2	14	7.55	143
	11/93	<0.005	<1.0	<0.1	5.5	11	6.78	136
	6/94	0.008	<1.0	<0.10	5.9	14	6.45	118
	12/94	<0.001	0.0	<0.1	6.6	15	6.67	120
	5/95	<0.010	<0.02	<0.1	6.9	15	6.4	166
	12/95	<0.010	<0.01	<0.1	8.2	13	6.1	134
	5/96	<0.010	<0.1	<0.1	7.0	18	5.79	139
	12/96	<0.010	<0.1	<0.1	7.7	9.5	6.23	100
	4/97	<0.010	<0.020	<0.10	5.8	<2.0	7.2	173
L-3	7/89	<0.005	<5.0	NA	NA	NA	7.6	70
	7/90	<0.01	<0.03	0.15	3.6	11.0	8.21	195
	9/91	<0.01	<0.03	0.1	5.1	16	8.6	220
	7/92	<0.005	<0.03	0.1	5.1	14	8.1	235
	5/93	<0.005	<1.0	0.1	6.1	18	7.22	247
	11/93	<0.005	<1.0	0.1	5.7	19	7.94	232

Table 3 (cont.)

Monitoring Well	Sampling Date	Be	Li	F	Cl	Sulfate	pH	Specific Conductivity (2)
L-3	6/94	<0.005	<1.0	0.2	6.2	21	7.89	205
	12/94	<0.001	0.0086	0.1	7.1	24	6.93	215
	5/95	<0.010	<0.02	<0.1	7.4	18	7.8	299
	12/95	<0.010	<0.01	<0.1	7.2	26	7.71	230
	5/96	<0.010	<0.1	<0.2	7.3	27	8.9	230
	12/96	<0.010	<0.1	0.14	8.2	29	7.91	270
	4/97	<0.010	<0.020	<0.10	8.5	25.6	8.2	274
L-4	7/89	<0.005	<5.0	NA	NA	NA	7.4	1100
	7/90	<0.01	0.05	0.10	79.0	660.0	6.45	1480
	9/91	<0.01	0.05	0.1	84	810	6.4	1720
	7/92	<0.006	0.18	0.1	120	960	8.6	2090
	5/93	<0.005	<1.0	0.1	78	600	6.80	1680
	11/93	<0.005	<1.0	0.1	110	870	6.43	1705
	6/94	<0.005	<1.0	0.1	130	990	6.04	1770
	13/94	<0.001	0.00676	<0.1	150	980	6.22	1858
	5/95	<0.010	0.23900	0.1	120	900	6.21	2630
	12/95	<0.010	0.10000	0.11	120	1100	6.34	1990
	5/96	<0.010	0.10000	<0.2	88	790	6.1	1730
	12/96	<0.020	<0.1	0.11	170	1100	6.40	2200
	4/97	<0.010	<0.020	0.072	111	828	6.7	2229
L-5	7/89	<0.005	<5.0	NA	NA	NA	7.8	160
	7/90	<0.01	<0.03	0.10	5.8	67.0	6.29	216
	9/91	<0.01	<0.03	0.1	6.9	44	6.3	253
	7/92	<0.005	<0.03	<0.1	7.6	82	7.5	338
	5/93	0.02	<1.0	0.1	5.3	47	7.24	254
	11/93	<0.005	<1.0	<0.1	6.8	81	6.31	327
	6/94	<0.005	<1.0	<0.10	7.6	86	6.09	306
	12/94	<0.001	0.0182	<0.1	7.0	99	6.05	306
	5/95	<0.010	<0.02	0.13	4.5	100	5.88	426
	12/95	<0.010	0.0200	<0.1	7.5	120	5.85	364
	5/96	<0.010	<0.1	<0.2	5.6	140	4.76	353
	12/96	<0.010	<0.1	<0.1	9.2	150	6.00	450
	4/97	<0.010	<0.020	0.027	8.6	154	6.5	458
NCGW Standards (1)		0.004(3)	NL	2.0	250	250	6.5 - 8.5	NL

NA = Not Analyzed

NL = Not Listed

(1) NC Groundwater Classifications and Standards 15 NCAC 2L, May 11, 1989.

Table 4
Industrial Landfill Area: Surface Water
Inorganic Analysis - RCRA Metals

Concentrations in ppm (mg/l)

Upgradient of Landfill

Surface Water Station	Sampling Date	As	Se	Hg	Ba	Cd	Cr	Pb	Ag
SW-1	7/90	<0.005	<0.01	<0.0005	<0.10	<0.01	<0.03	<0.005	<0.05
	9/91	0.012	<0.005	<0.0005	<0.10	<0.01	<0.03	<0.005	<0.05
	7/92	0.011	<0.005	<0.0005	<0.10	<0.005	<0.01	<0.005	<0.01
	5/93	<0.010	<0.005	<0.0002	<0.20	<0.005	<0.10	<0.003	<0.01
	11/93	<0.010	<0.005	<0.0002	<0.2	<0.005	<0.01	<0.003	<0.01
(SW-6)	6/94	<0.010	<0.005	<0.0002	<0.20	<0.005	<0.010	<0.003	<0.010
	12/94	0.011	<0.005	<0.0002	<0.20	<0.005	<0.01	<0.003	<0.01
	5/95	0.045	<0.005	<0.0002	0.032	<0.010	<0.010	0.013	<0.005
	12/95	0.009	<0.005	<0.0002	0.02	0.01	<0.010	<0.005	<0.005
	5/96	0.008	<0.005	<0.0002	0.013	<0.010	<0.010	<0.005	<0.010
	12/96	0.013	<0.005	<0.0002	0.021	<0.010	<0.010	<0.005	<0.050
	4/97	0.012	<0.010	<0.0002	<0.1	<0.010	<0.03	<0.10	<0.02

Downgradient of Landfill

Surface Water Station	Sampling Date	As	Se	Hg	Ba	Cd	Cr	Pb	Ag
SW-2	7/90	<0.005	<0.01	<0.0005	<0.10	<0.01	<0.03	<0.005	<0.05
	9/91	<0.005	<0.005	<0.0005	<0.10	<0.01	<0.03	<0.005	<0.05
	7/92	<0.005	<0.005	<0.0005	<0.10	<0.005	<0.01	<0.005	<0.01
	5/93	<0.010	<0.005	<0.0002	<0.20	<0.005	<0.01	<0.003	<0.01
	11/93	<0.010	<0.005	<0.0002	<0.20	<0.005	<0.01	<0.003	<0.0.1
(SW-7)	6/94	<0.010	<0.005	<0.0002	<0.20	<0.005	<0.010	<0.003	<0.010
	5/95	<0.005	<0.005	<0.0002	0.051	<0.010	<0.010	<0.005	0.008
	5/95	<0.005	<0.005	<0.0002	0.051	<0.010	<0.010	<0.005	0.008
	12/95	<0.005	<0.005	0.0013	0.04	<0.010	<0.010	<0.005	<0.005
	5/96	<0.005	<0.005	<0.0002	0.026	<0.010	<0.010	<0.005	<0.010
	12/96	<0.005	<0.005	<0.0002	0.028	<0.010	<0.010	<0.005	<0.050
	4/97	<0.010	<0.010	<0.0002	<0.1	<0.010	<0.03	<0.10	<0.02
SW-3	7/90	0.05	<0.01	0.0024	1.8	0.11	0.13	0.070	<0.05
	9/91	<0.005	<0.005	<0.0005	<0.10	<0.01	<0.03	<0.005	<0.05
	7/92	<0.005	<0.005	<0.0005	<0.10	<0.005	<0.01	<0.005	<0.01
	5/93	<0.010	<0.005	<0.0002	<0.20	<0.005	<0.01	<0.003	<0.01
	11/93	<0.010	<0.005	<0.0002	<0.20	<0.005	<0.01	<0.003	<0.01
(SW-8)	6/94	<0.010	<0.005	<0.0002	<0.20	<0.005	<0.010	<0.003	<0.010
	12/94	<0.010	<0.005	<0.0002	<0.20	<0.005	<0.01	<0.003	<0.01
	5/95	<0.005	<0.005	<0.0002	0.034	<0.010	<0.010	<0.005	<0.005
	12/95	<0.005	<0.005	<0.0002	<0.02	<0.010	<0.010	<0.005	<0.005
	5/96	0.01	<0.005	0.0006	0.038	<0.010	<0.010	<0.005	<0.010
	12/96	<0.005	<0.005	<0.0002	0.015	<0.010	<0.010	<0.005	<0.050
	4/97	<0.010	<0.010	<0.0002	<0.1	<0.010	<0.03	<0.10	<0.02

NCSW Standards (1)	0.05	0.01	0.0011	1.0	0.005	0.050	0.050	0.05

(1) ND Surface Water Classifications and Standards 15 2L, May 11, 1989.

Table 5
Industrial Landfill Area: Surface Water
Inorganic Analysis - Additional Parameters
Concentrations in ppm (mg/l)

Upgradient of Landfill

Surface Water Station	Sampling Date	Be	Li	F	Cl	Sulfate	pH	Specific Conductivity (2)
SW-1	7/90	<0.01	13	0.803	23	170	6.83	648
	9/91	<0.01	19	0.3	31	290	6.0	1031
	7/92	<0.005	17	0.2	33	500	7.4	1268
	5/93	<0.005	6.5	0.3	20	210	9.83	697
	11/93	<0.005	38	0.2	38	750	6.27	1710
(SW-6)	6/94	<0.005	1.3	0.8	5.1	310	6.97	826
	12/94	<0.005	39.0	0.2	40.0	750	6.2	1318
	6/95	<0.010	29.9	0.2	38.0	600	6.05	1949
	12/95	<0.010	34.0	0.13	31.0	650	6.16	1440
	6/96	<0.010	47.0	0.2	34.0	700	6.34	1310
	12/96	<0.010	49.0	0.26	42	940	6.27	9070
	4/97	<0.010	65.3	0.17	44.1	959	6.0	2129

Downgradient of Landfill

Surface Water Station	Sampling Date	Be	Li	F	Cl	Sulfate	pH	Specific Conductivity (2)
SW-2	7/90	<0.01	1.7	0.86	19	120	6.98	622
	9/91	<0.01	0.95	0.4	25	220	6.3	751
	7/92	<0.005	1.1	0.4	35	250	8.9	912
	5/93	<0.005	3.2	0.3	26	900	6.81	1060
	11/93	<0.005	2.3	0.2	29	210	7.4	883
(SW-7)	6/94	<0.005	<1.0	0.2	8.3	72	6.79	724
	12/94	<0.005	2	0.2	27	240	6.8	584
	6/95	<0.010	3.8	0.26	28	380	6.5	1050
	12/95	<0.010	3.5	0.3	19	260	6.89	897
	6/96	<0.010	4.0	0.47	21	380	6.59	864
	12/96	<0.010	2.0	0.53	25	200	7.43	2920
	4/97	<0.010	3.46	0.37	26	300	7.0	831
SW-3	7/90	<0.06	2.3	0.70	26	920	7.21	897
	9/91	<0.01	0.61	0.6	10	620	6.3	1420
	7/92	<0.005	0.38	0.4	16	190	7.8	678
	5/93	<0.005	1.2	0.3	15	260	7.04	827
	11/93	<0.005	<1.0	0.3	24	280	6.99	1042
	6/94	<0.005	1.1	0.2	10	130	7.67	894
(SW-8)	12/94	<0.005	0.75	0.2	17	260	7.23	495
	6/95	<0.010	1	0.26	18	190	6.18	926
	12/95	<0.010	0.8	0.17	9.1	170	6.02	162
	6/96	<0.010	0.9	0.27	56	110	5.91	150
	12/96	<0.010	0.9	0.28	12	180	6.15	3850
	4/97	<0.010	0.567	0.14	5.9	68.5	7.2	376
NCGW Standards (1)		0.004 (3)	NL	2.0	250	250	6.5 - 8.5	NL

(1) NC Groundwater Classifications and Standards 15 NCAC 2L, May 11, 1989.
(2) Specific Conductivity reported in ppb Mhos
(3) Federal Primary Drinking Water Standard
NL = Not Listed

Table 6

Industrial Landfill Area: Surface Water

Summary of Volatile Organic Analyses*

Concentrations of ppb (ug/l)

Upgradient of Landfill

Sample Station	Sampling Date	Acetone	Benzene	Ethylbenzene	4-Methyl 2-pentanone (MIBK)
SW-1	5/93	<10	<5	<5	
	11/93	<10	<5	<5	
(SW-6)	6/94	<10	<5.0	<5.0	
	12/94	NA	<5.0	<5.0	
	5/95	<100	<5.0	<5.0	
	12/95	<100	<5.0	<5.0	
	5/96	<100	<5.0	<5.0	
	12/96	<100	<5.0	<5.0	
	4/97	<100	<5.0	<5.0	23
SW-2	5/93	32	5	11	
	11/93	<10	<5	<5	
(SW-7)	6/94	<10	<5.0	<5.0	
	12/94	NA	<5.0	<5.0	
	5/95	<100	<5.0	<5.0	
	12/95	<100	<5.0	<5.0	
	5/96	<100	<5.0	<5.0	
	12/96	<100	<5.0	<5.0	
	4/97	<100	<5.0	<5.0	19
SW-3	5/93	<10	<5	<5	
	11/93	<10	<5	2	
(SW-8)	6/94	<10	<5.0	<5.0	
	12/94	NA	<5.0	<5.0	
	5/95	<100	<5.0	<5.0	
	12/95	<100	<5.0	<5.0	
	5/96	<100	<5.0	<5.0	
	12/96	<100	<5.0	<5.0	
	4/97	<100	<5.0	<5.0	17

*No volatile organic compounds were detected using EPA Method SW-846 8240 in Surface Water

samples SWI, SW2, and SW3 during the 7/90, 9/91 and 7/92 monitoring program. Quantiation limits were typically 5 ppb (ug/l).

NA = Not analyzed

Reference:RCRA Facility investigation - Draft Report.
Rust Environment & Infrastucture, September 29, 1995.

Table 6-10
Analytical Results
SWMUs 5, 10, 12

Parameter	Units	DC-5				DC-6				L-1				L-2				L-3			
		3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94
General/Inorganics																					
pH	SU	6	6.21	6.21	6.02	5.45	5.44	5.97	5.88	5.62	5.32	5.31	5.28	6.34	6.45	6.72	6.67	7.78	7.89	7.89	6.93
Specific Conductivity	µmhos	3007	1406	4290	3740	5560	1544	6370	5750	1008	8400	9130	8160	139	118	125	120	277	205	212	215
Temperature	°C	16.6	18.8	17.2	16.8	16.6	18.1	20.5	17.1	13.1	20.3	22.3	18	15.2	17	16.9	16.2	15.6	16.2	16.8	16.3
Turbidity	NTU		167.3	11.2	9.3		263.2	328.6	64.6		>1000	192	49.6		>1000	4.52	2.1		579.2	2.61	17.3
TDS	mg/l																				
Chloride	mg/l	85	81	63	69	240	260	420	250	490	460	610	560	5.3	5.9	6	6.6	6.1	6.2	7.5	7.1
Cyanide	mg/l					<0.01															
Fluoride	mg/l	0.2	0.2	0.2	0.2	1.2	0.5	0.6	1	0.3	0.4	0.4	0.4	<0.1	<0.1	<0.1	<0.1	0.2	0.2	0.1	0.1
Sulfate	mg/l	1500	2800	2900	2300	4900	4700	6400	5000	6600	4900	6800	5400	9.8	14	12	15	21	21	17	24
Sulfide	mg/l																				
Metals, Total																					
Antimony	mg/l									<0.06											
Arsenic	µg/l	520	<10	2.8 B	5.2 B	17	<10	382	185	11	<10	34.4	41.8	40	81	<2	<2	<10	11	<2	5.7 B
Barium	mg/l	1.4	<0.2	0.0167 B	0.017 B	<0.2	<0.2	0.0083 BV	0.0142 B	0.21	0.24	0.0368 B	0.0417 B		1.2	0.0139 B	0.0141 B	<0.2	<0.2	0.0204 B	0.0205 B
Beryllium	mg/l	0.09	<0.005	0.0018 B	0.0018 B	0.009	0.005	0.0022 B	<0.001	0.017	0.013	0.0077	0.0081	<0.005	0.008	<0.001	<0.001	<0.005	<0.005	<0.001	<0.001
Cadmium	mg/l	0.007	<0.005	<0.001	<0.001	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.001	0.0037 B	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.001	<0.001
Calcium	mg/l							110 V													
Chromium	mg/l	0.78	0.01 V	0.0059 B	0.0111	0.04	<0.01	0.0177 V	0.0315	0.12	0.12	0.0414	0.0551	0.41	0.99	<0.004	0.0028 B	0.03	0.07	0.0041 B	0.0069 B
Cobalt	mg/l									<0.05											
Copper	mg/l									<0.025											
Lead	µg/l	100	<3 V	<1	1.5 B	100	<3	40.1	17.8	33	<3	4.7	5.7	21	37	<1	1.1 B	4	8	1.7 B	<1
Lithium	mg/l	3.1	0.4	0.366 BV	0.266	0.097	0.23	0.1 V	0.143	210	220	232	236	0.042	0.11	<0.003 V	0.0087 B	0.049	0.094	0.0106 BV	0.0086 BV
Mercury	µg/l	<0.2	<0.2 V	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	3	0.7	1	1.4	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Nickel	mg/l									<0.04											
Selenium	µg/l	<5	<5 V	<2	2.1 BV	<5	<5	<2 V	<10	<5	<5	4.6 B	5 V	<5	<5	<2	<2	<5	<5	<2	<2
Silver	mg/l	<0.01	<0.01	<0.001	<0.001	<0.01	<0.01	<0.001 R	<0.005	<0.01	<0.01	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001
Thallium	mg/l									<0.01											
Tin	mg/l									<1											
Vanadium	mg/l									<0.05											
Zinc	mg/l									<0.02											
Metals, filtered																					
Antimony, filtered	mg/l																				
Arsenic, filtered	µg/l	<10	<10	11.6	9.2 B	<10	<10	254 V	148	<10	<10	32.2	40.9	<10	<10	<2	3 B	<10	<10	6.3 B	7.2 B
Barium, filtered	mg/l	<0.2	<0.2	0.0165 B	0.0149 B	<0.2	<0.2	0.008 BV	0.0092 B	<0.2	<0.2	0.0122 B	0.0118 B	<0.2	<0.2	0.0136 B	0.0131 B	<0.2	<0.2	0.0207 B	0.0198 B
Beryllium, filtered	mg/l	<0.005	<0.005	0.0017 B	0.0011 B	<0.005	<0.005	<0.001	<0.001	0.006	0.006	0.0057	0.0067	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.001	<0.001
Cadmium, filtered	mg/l	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	0.0011 B	0.0019 B	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.001	<0.001
Chromium, filtered	mg/l	<0.01	<0.01	0.003 B	0.0023 B	<0.01	<0.01	0.0044 B	0.0014 B	<0.01	<0.01	0.0092 B	0.0112	<0.01	<0.01	0.0018 B	0.0022 B	<0.01	<0.01	0.0027 B	0.0036 B
Cobalt, filtered	mg/l																				
Copper, filtered	mg/l																				
Lead, filtered	µg/l	<3	<3	1.5 B	<1	<3	<3	21.2	11.7	<3	<3	3.9	3.5	<3	<3	<1	<1	<3	<3	<1 V	<1
Lithium, filtered	mg/l	0.15	0.41	0.41 BV	0.281	0.059	0.23	0.089 BV	0.144	220	220	241	258	<0.01	0.014	<0.003 V	0.029 V	0.035	0.011	0.0067 B	0.0121 V
Mercury, filtered	µg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	0.21	0.28	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Table 6-10
Analytical Results
SWMUs 5, 10, 12

Parameter		DC-5				DC-6				L-1				L-2				L-3			
	Units	3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94
Nickel, filtered	mg/l																				
Selenium, filtered	µg/l	<5	<5	14	8.8	<5	<5	23.6 V	5.9	<5	<5	12.2	10.6 V	<5	<5	<2	<2	<5	<5	<2	<2
Silver, filtered	mg/l	<0.01	<0.01	<0.001	<0.001	<0.01	<0.01	<0.01 R	<0.001	<0.01	<0.01	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001
Thallium, filtered	mg/l																				
Tin, filtered	mg/l																				
Vanadium, filtered	mg/l																				
Zinc, filtered	mg/l																				
Volatile Organics																					
1,1,1,2-Tetrachloroethane	µg/l																				
1,1,1-Trichloroethane	µg/l	<5	<5	<5	<5	8	8	8	9	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-Tetrachloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-Trichloro-1,2,2-Trifluorethane	µg/l																				
1,1,2-Trichloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-Trichloroethene	µg/l																				
1,1-Dichloroethane	µg/l	<5	<5	<5	<5	15	45	13	15	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-Dichloroethene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dibromoethane	µg/l																				
1,2-Dichlorobenzene (o-)	µg/l									<5 JV				<5 JV				<5 JV			
1,2-Dichloroethane	µg/l	<5	<5	<5	<5	<5	12	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-Dichloroethene (total)	µg/l	<5	<5			<5	<5			<5	<5			<5	<5			<5	<5		
1,2-Dichloropropane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,3-Dichlorobenzene (m-)	µg/l	<5 JV				<5 JV				<5 JV				<5 JV				<5 JV			
1,4-Dichlorobenzene (p-)	µg/l	<5 JV				<5 JV				<5 JV				<5 JV				<5 JV			
2-Butanone	µg/l	<10	<10			<10	<10			<10	<10			<10	<10			<10	<10		
2-Chloro-1,3-Butadiene	µg/l																				
2-Chloroethylvinyl ether	µg/l	<10	<10	<10 V	<10	<10	<10	<10 V	<10	<10	<10	<10 V	<10	<10	<10	<10 V	<10	<10	<10	<10 V	<10
2-Hexanone	µg/l	<10	<10			<10	<10			<10	<10			<10	<10			<10	<10		
4-Methyl-2-pentanone	µg/l	<10	<10			<10	<10			<10	<10			<10	<10			<10	<10		
Acetone	µg/l	<10	<10			<10	<10			<10	<10			<10	<10			<10	<10		
Acetonitrile	µg/l																				
Acrolein	µg/l	<100	<100	<5	<100 R	<100	<100	8	<100	<100	<100	8	<100 R	<100	<100	<5	<100 R	<100	<100	<5	<100 R
Acrylonitrile	µg/l	<35	<35	<5	<35 V	<35	<35	<5	<35 V	<35	<35	<5	<35 V	<35	<35	<5	<35 V	<35	<35	<5	<35 V
Allyl Chloride	µg/l																				
Benzene	µg/l	11	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromodichloromethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromoform	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	8	7	8	6	<5	<5	<5	<5	<5	<5	<5	<5
Bromomethane /Methyl Bromide	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Carbon disulfide	µg/l	<5	<5			<5	<5			<5	<5			<5	<5			<5	<5		
Carbon Tetrachloride	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroethane	µg/l	<10	<10	<10	<10 V	<10	<10	<10	<10	<10	<10	<10	<10 V	<10	<10	<10	<10 V	<10	<10	<10	<10 V
Chloroform	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	24	34	42	41	<5	<5	<5	<5	<5	<5	<5	<5
Chloromethane /Methyl Chloride	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

Table 6-10
Analytical Results
SWMUs 5, 10, 12

Parameter	Units	DC-5				DC-6				L-1				L-2				L-3			
		3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94
Cis-1,2-Dichloroethene	µg/l				<10				<10				<10				<10				<10
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Dibromochloromethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Dibromomethane	µg/l																				
Ethyl Methacrylate	µg/l																				
Ethylbenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Iodomethane	µg/l																				
Methacrylonitrile	µg/l																				
Methyl Methacrylate	µg/l																				
Methylene chloride	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Pentachloroethane	µg/l																				
Styrene	µg/l	<5	<5			<5	<5			<5	<5			<5	<5			<5	<5		
Tetrachloroethene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	34	83	160	98	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trans-1,2-Dichloroethene	µg/l			<5	<5			<5	<5			<5	<5			<5	<5			<5	<5
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trans-1,4-Dichloro-2-Butene	µg/l																				
Trichloroethene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichlorofluoromethane	µg/l	<5 JV	<5	<5	<10 V	84 JV	160 V	38	<10 V	<5 JV	<5 JV	<5	<10 V	<5 JV	<5	<5	<10 V	<5 JV	<5	<5	<10 V
Vinyl acetate	µg/l	<10	<10			<10	<10			<10	<10			<10	<10			<10	<10		
Vinyl chloride	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Xylene, total	µg/l	<5	<5			6	<5			<5	<5			<5	<5			<5	<5		

Table 6-10
Analytical Results
SWMUs 5, 10, 12

Parameter	Units	L-4				L-5				SW-7		SW-8	Units	SED-7		SED-8	SB-13:1'-3'	SB-13:5'-7'	SB-13:7'-9'	SB-14:1'-3'	SB-14:7'-9'	SB-14:11'-13'
		3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	9/94	3/94		3/94	9/94	3/94	12/94	12/94	12/94	12/94	12/94	12/94
General/Inorganics																						
pH	SU	6.25	6.04	6.35	6.22	6.17	6.09	6.08	6.05	6.79	6.21	7.57										
Specific Conductivity	µmhos	1736	1770	1806	1858	292	306	292	305	724	512	894										
Temperature	°C	15.8	16.2	15.5	15.6	16	16.8	16.1	16.6	9.9	20.2	8.4										
Turbidity	NTU		49.7	1.02	1.4		>1000	11.2	13.72													
TDS	mg/l																					
Chloride	mg/l	130	130	160	150	7.1	7.6	6.5	7	8.3	22	10	mg/kg	28.5	<28	86.4						
Cyanide	mg/l												mg/kg									
Fluoride	mg/l	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	0.2	mg/kg	9.69	8	25.92						
Sulfate	mg/l	960	990	700	980	98	86	65	99	72	75	130	mg/kg	475	<56	1998						
Sulfide	mg/l												mg/kg									
Metals, Total																						
Antimony	mg/l												mg/kg									
Arsenic	µg/l	77	<10	2.3 B	2.2 B	48	40	<2	<2	<10	<2	<10	µg/kg	20900	19300 V	39420						
Barium	mg/l	<0.2	<0.2	0.0262 B	0.0249 B	<0.2	<0.2	0.0542 B	0.0548 B	<0.2	0.0486	<0.2 B	mg/kg	95	35 BV	194.4						
Beryllium	mg/l	<0.005	<0.005	<0.001	<0.001	0.01	0.014	<0.001	<0.001	<0.005	<0.001	<0.005	mg/kg	19	11.1 V	24.84						
Cadmium	mg/l	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.001	<0.001	<0.005	<0.001	<0.005	mg/kg	<0.95	0.23 BV	<2.7						
Calcium	mg/l												mg/kg									
Chromium	mg/l	0.16	<0.01	<0.001	0.0021 B	0.07	0.07	<0.001	0.0034 B	<0.01	<0.001	<0.01	mg/kg	34.2	18.1 V	54						
Cobalt	mg/l												mg/kg									
Copper	mg/l												mg/kg									
Lead	µg/l	12	<3	<1	<1	38	34	<1	1.2 B	<3	1.2	<3 B	µg/kg	34200	20800 V	22140						
Lithium	mg/l	0.29	0.073	0.0682 B	0.0676	0.093	0.086	0.0153 BV	0.0182 V	0.37	0.424	1.1 BV	mg/kg	703	348 V	648						
Mercury	µg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	µg/kg	<100	<240 V	<100						
Nickel	mg/l												mg/kg									
Selenium	µg/l	<5	<5	<2	<2	<5	<5	<2	<2	<5	<2	<5	µg/kg	<950	430 BV	<2700						
Silver	mg/l	<0.01	<0.01	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001	<0.01	<0.001	<0.01	mg/kg	<1.9	<0.21 V	<5.4						
Thallium	mg/l												mg/kg									
Tin	mg/l												mg/kg									
Vanadium	mg/l												mg/kg									
Zinc	mg/l												mg/kg									
Metals, filtered																						
Antimony, filtered	mg/l																					
Arsenic, filtered	µg/l	<10	<10	4.8 B	5.3 B	<10	<10	3.1 B	3.1 B													
Barium, filtered	mg/l	<0.2	<0.2	0.0253 B	0.0258 B	<0.2	<0.2	0.0553 B	0.0574 B													
Beryllium, filtered	mg/l	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.001	<0.001													
Cadmium, filtered	mg/l	<0.005	<0.005	<0.001	<0.001	<0.005	<0.005	<0.001	<0.001													
Chromium, filtered	mg/l	<0.01	<0.01	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001													
Cobalt, filtered	mg/l																					
Copper, filtered	mg/l																					
Lead, filtered	µg/l	<3	<3	<1	<1	<3	<3	1 B	<1													
Lithium, filtered	mg/l	0.071	0.072	0.0674 B	0.078	0.017	0.019	0.0183 BV	0.0189 V													
Mercury, filtered	µg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2													

Table 6-10
Analytical Results
SWMUs 5, 10, 12

Parameter	Units	L-4				L-5				SW-7		SW-8	Units	SED-7		SED-8	SB-13:1'-3'	SB-13:5'-7'	SB-13:7'-9'	SB-14:1'-3'	SB-14:7'-9'	SB-14:11'-13'
		3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	9/94	3/94		3/94	9/94	3/94	12/94	12/94	12/94	12/94	12/94	12/94
Nickel, filtered	mg/l																					
Selenium, filtered	µg/l	<5	<5	5.6 V	5.1 V	<5	<5	2.5 B	2.2 B													
Silver, filtered	mg/l	<0.01	<0.01	<0.001	<0.001	<0.01	<0.01	<0.001	<0.001													
Thallium, filtered	mg/l																					
Tin, filtered	mg/l																					
Vanadium, filtered	mg/l																					
Zinc, filtered	mg/l																					
Volatile Organics																						
1,1,1,2-Tetrachloroethane	µg/l												µg/kg									
1,1,1-Trichloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
1,1,2,2-Tetrachloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
1,1,2-Trichloro-1,2,2-Trifluorethane	µg/l												µg/kg									
1,1,2-Trichloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
1,1,2-Trichloroethene	µg/l												µg/kg									
1,1-Dichloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
1,1-Dichloroethene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
1,2-Dibromoethane	µg/l												µg/kg									
1,2-Dichlorobenzene (o-)	µg/l									<10		<10	µg/kg									
1,2-Dichloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
1,2-Dichloroethene (total)	µg/l	<5	<5			<5	<5			<5		<5	µg/kg	<9.5		<27						
1,2-Dichloropropane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
1,3-Dichlorobenzene (m-)	µg/l	<5 JV				<5 JV				<10		<10	µg/kg									
1,4-Dichlorobenzene (p-)	µg/l	<5 JV				<5 JV				<10		<10	µg/kg									
2-Butanone	µg/l	<10	<10			<10	<10			<10		<10	µg/kg	<19		<54						
2-Chloro-1,3-Butadiene	µg/l												µg/kg									
2-Chloroethylvinyl ether	µg/l	<10	<10	<10 V	<10	<10	<10	<10 V	<10	<10	<10	<10	µg/kg	<19	<23 V	<54						
2-Hexanone	µg/l	<10	<10			<10	<10			<10		<10	µg/kg	<19		<54						
4-Methyl-2-pentanone	µg/l	<10	<10			<10	<10			<10		<10	µg/kg	<19		<54						
Acetone	µg/l	<10	<10			<10	<10			<10		<10	µg/kg	<19		183.6						
Acetonitrile	µg/l												µg/kg									
Acrolein	µg/l	<100	<100	<5	<100 R	<100	<100	<5	<100 R	<100	<5	<100	µg/kg	<5	5.6	<5						
Acrylonitrile	µg/l	<35	<35	<5	<35 V	<35	<35	<5	<35 V	<35	<5	<35	µg/kg	<5	11	<5						
Allyl Chloride	µg/l												µg/kg									
Benzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27	<1	<1	<1	<1	<1	<1
Bromodichloromethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
Bromoform	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
Bromomethane /Methyl Bromide	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	µg/kg	<19	<23 V	<54						
Carbon disulfide	µg/l	<5	<5			<5	<5			<5		<5	µg/kg	<9.5		<27						
Carbon Tetrachloride	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
Chlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
Chloroethane	µg/l	<10	<10	<10	<10 V	<10	<10	<10	<10 V	<10	<10	<10	µg/kg	<19	<23 V	<54						
Chloroform	µg/l	6	7	5	5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
Chloromethane /Methyl Chloride	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	µg/kg	<19	<23 V	<54						

Table 6-10
Analytical Results
SWMUs 5, 10, 12

Parameter	Units	L-4				L-5				SW-7		SW-8	Units	SED-7		SED-8	SB-13:1'-3'	SB-13:5'-7'	SB-13:7'-9'	SB-14:1'-3'	SB-14:7'-9'	SB-14:11'-13'
		3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	9/94	3/94		3/94	9/94	3/94	12/94	12/94	12/94	12/94	12/94	12/94
Cis-1,2-Dichloroethene	µg/l				<10				<10				µg/kg									
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
Dibromochloromethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
Dibromomethane	µg/l												µg/kg									
Ethyl Methacrylate	µg/l												µg/kg									
Ethylbenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27	<1	<1	<1	<1	<1	<1
Iodomethane	µg/l												µg/kg									
Methacrylonitrile	µg/l												µg/kg									
Methyl Methacrylate	µg/l												µg/kg									
Methylene chloride	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
Pentachloroethane	µg/l												µg/kg									
Styrene	µg/l	<5	<5			<5	<5			<5		<5	µg/kg	<9.5		<27						
Tetrachloroethene	µg/l	130	110	130	140	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
Toluene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27	4	<1	7	<1	<1	<1
Trans-1,2-Dichloroethene	µg/l			<5	<5			<5	<5		<5		µg/kg		<12 V							
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
Trans-1,4-Dichloro-2-Butene	µg/l												µg/kg									
Trichloroethene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<9.5	<12 V	<27						
Trichlorofluoromethane	µg/l	<5 JV	<5	<5	<10 V	<5 JV	<5	<5	<10 V	<5 V	<5	<5 V	µg/kg	<9.5	<12 V	<27						
Vinyl acetate	µg/l	<10	<10			<10	<10			<10		<10	µg/kg	<19		<54						
Vinyl chloride	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	µg/kg	<19	<23 V	<54						
Xylene, total	µg/l	<5	<5			<5	<5			<5		<5	µg/kg	<9.5		<27	2	<1	2	<1	<1	<1

Table 6-11
Analytical Results
SWMU 6

Parameter	Units	DC-1				DC-2				SW-1		Units	SED-1		SB-1:0'-2'	SB-1:8'-10'	SB-1:18'-20'
		3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	9/94		3/94	9/94	3/94	3/94	3/94
General/Inorganics																	
pH	SU	5.06	4.74	4.92	4.74	4.96	4.99	5.14	4.51	3.01	2.35						
Specific Conductivity	µmhos	2370	2100	2220	2100	55	39	33	36	6610	1055						
Temperature	°C	17.4	17.8	18.2	17.8	17.2	17.9	18.3	17.8	26.8	30.2						
Turbidity	NTU		>1000	>200	>400		>1000	>200	>400								
TDS	mg/l			2300				<16									
Chloride	mg/l	170	180	280	190	2.4	3	2.7	2.4	180	330	mg/kg	109.2	68	43	<10	<10
Cyanide	mg/l											mg/kg					
Fluoride	mg/l	15	11	13	21	<0.1	<0.1	<0.1	<0.1	0.1	58	mg/kg	546	540	7	<1	<1
Sulfate	mg/l	1200	1300	1200	1100	5.3	4.6	4.4	2.4	4400	7100	mg/kg	1960	5800	780	24	35
Sulfide	mg/l											mg/kg					
Metals, Total																	
Antimony	mg/l											mg/kg					
Arsenic	µg/l	100	44	50.1	72.7	47	210	7.4 B	285	1300.3	1090	µg/kg	210000	124000	25000	9200	4300
Barium	mg/l	0.1	<0.2	0.141 B	0.248	0.047	3	0.61	0.694	0.62	0.609	mg/kg	74.2	46.3	20	<20	20
Beryllium	mg/l	0.89	0.058	0.0835	0.0616	4	0.025	0.027 B	0.007	0.44	0.761	mg/kg	7.98	12.3	1.8	1.2	1.2
Cadmium	mg/l	0.078	<0.005	0.0018 B	0.0015 B	<0.005	<0.005	<0.001	<0.001	0.02	0.0347	mg/kg	1.036	1	<0.5	<0.5	<0.5 V
Calcium	mg/l							4.4				mg/kg					
Chromium	mg/l	0.25	0.06	0.0563	0.149	1.1	0.71	0.0115	0.421	1.2	1.82	mg/kg	91	97.2	64	84	59
Cobalt	mg/l											mg/kg					
Copper	mg/l											mg/kg					
Lead	µg/l	48	9	18.5	17.6	1000	540	57.6	175	45	109	µg/kg	40600	33900	14000	17000	16000
Lithium	mg/l	50	55	49.4	52	<0.0006	0.42	0.0307 BV	0.202	270	313 V	mg/kg	1100	2070	240	2.4	1.8
Mercury	µg/l	0.4	<0.2	0.21	0.26	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	µg/kg	<100	<150	<100	<100	<100
Nickel	mg/l											mg/kg					
Selenium	µg/l	<5	<5	6	4.6 BV	<5	<5	<2	4.6 B	36	109 S	µg/kg	6020	4200	<500	<500	<500
Silver	mg/l	<0.01	<0.01	<0.001 V	<0.001	<0.01	<0.01	<0.001	<0.001	<0.01	0.004 B	mg/kg	<1.4	0.29 B	<5	<5 V	<5
Thallium	mg/l											mg/kg					
Tin	mg/l											mg/kg					
Vanadium	mg/l											mg/kg					
Zinc	mg/l											mg/kg					
Metals, filtered																	
Antimony, filtered	mg/l																
Arsenic, filtered	µg/l	<10	<10	21.2	22.6	<10	<10	3.1 B	<2								
Barium, filtered	mg/l	<0.2	<0.2	0.0191 B	0.0194 B	<0.2	<0.2	0.0314 B	0.0278 B								
Beryllium, filtered	mg/l	0.033	0.031	0.0435	0.049	<0.005	<0.005	<0.001	<0.001								
Cadmium, filtered	mg/l	<0.005	<0.005	0.0024 B	0.0017 B	<0.005	<0.005	<0.001	<0.001								
Chromium, filtered	mg/l	<0.01	<0.01	<0.001	0.016	<0.01	<0.01	<0.001	<0.001								

Table 6-11
Analytical Results
SWMU 6

Parameter	Units	DC-1 3/94	DC-1 6/94	DC-1 9/94	DC-1 12/94	DC-2 3/94	DC-2 6/94	DC-2 9/94	DC-2 12/94	SW-1 3/94	SW-1 9/94	Units	SED-1 3/94	SED-1 9/94	SB-1:0'-2' 3/94	SB-1:8'-10' 3/94	SB-1:18'-20' 3/94
Cobalt, filtered	mg/l																
Copper, filtered	mg/l																
Lead, filtered	µg/l	<3	<3	3.9	1.9 B	<3	<3	<1	<1								
Lithium, filtered	mg/l	60	61	55.7	62.6	0.013	0.033	0.0396 BV	0.115								
Mercury, filtered	µg/l	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2								
Nickel, filtered	mg/l																
Selenium, filtered	µg/l	<5	<5	0.0177	0.0119 V	<5	<5	2.3 B	<2								
Silver, filtered	mg/l	<0.01	<0.01	<0.001 V	<0.001	<0.01	<0.01	<0.001	<0.001								
Thallium, filtered	mg/l																
Tin, filtered	mg/l																
Vanadium, filtered	mg/l																
Zinc, filtered	mg/l																
Volatile Organics																	
1,1,1,2-Tetrachloroethane	µg/l											µg/kg					
1,1,1-Trichloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
1,1,2,2-Tetrachloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
1,1,2-Trichloro-1,2,2-Trifluorethane	µg/l											µg/kg					
1,1,2-Trichloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
1,1,2-Trichloroethene	µg/l											µg/kg					
1,1-Dichloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
1,1-Dichloroethene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
1,2-Dibromoethane	µg/l											µg/kg					
1,2-Dichlorobenzene (o-)	µg/l									<10		µg/kg					
1,2-Dichloroethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
1,2-Dichloroethene (total)	µg/l	<5	<5			<5	<5			<5		µg/kg	<7		<5	<5	<5
1,2-Dichloropropane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
1,3-Dichlorobenzene (m-)	µg/l	<5 JV				<5 JV				<10		µg/kg					
1,4-Dichlorobenzene (p-)	µg/l	<5 JV				<5 JV				<10		µg/kg					
2-Butanone	µg/l	<10	<10			<10	<10			30		µg/kg	<14		<10	<10	<10
2-Chloro-1,3-Butadiene	µg/l											µg/kg					
2-Chloroethylvinyl ether	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	µg/kg	<14	<14 V	<10	<10	<10
2-Hexanone	µg/l	<10	<10			<10	<10			<10		µg/kg	<14		<10	<10	<10
4-Methyl-2-pentanone	µg/l	<10	<10			<10	<10			<10		µg/kg	<14		<10	<10	<10
Acetone	µg/l	32	<10			<10	<10			110		µg/kg	77		14	<10	25
Acetonitrile	µg/l											µg/kg					
Acrolein	µg/l	<100	<100	11	<100 R	<100	<100	6.8	<100 R	<100	85	µg/kg	<5	18	<5	<5	<5
Acrylonitrile	µg/l	<35	<35	<5	<35 V	<35	<35	<5	<35 V	<35	6.2	µg/kg	<5	<7	<5	<5	<5
Allyl Chloride	µg/l											µg/kg					

Table 6-11
Analytical Results
SWMU 6

Parameter	Units	DC-1				DC-2				SW-1		Units	SED-1		SB-1:0'-2'	SB-1:8'-10'	SB-1:18'-20'
		3/94	6/94	9/94	12/94	3/94	6/94	9/94	12/94	3/94	9/94		3/94	9/94	3/94	3/94	3/94
Benzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	6
Bromodichloromethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
Bromoform	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
Bromomethane /Methyl Bromide	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	µg/kg	<14	<14 V	<10	<10	<10
Carbon disulfide	µg/l	<5	<5			<5	<5			<5		µg/kg	<7		<5	<5	<5
Carbon Tetrachloride	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
Chlorobenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7 V	<5	<5	<5
Chloroethane	µg/l	<10	<10	<10 V	<10 V	<10	<10	<10 V	<10 V	<10	<10	µg/kg	<14	<14 V	<10	<10	<10
Chloroform	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
Chloromethane /Methyl Chloride	µg/l	<10	<10	<10 V	<10	<10	<10	<10 V	<10	<10	<10	µg/kg	<14	<14	<10	<10	<10
Cis-1,2-Dichloroethene	µg/l				<10				<10			µg/kg					
Cis-1,3-Dichloropropene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
Dibromochloromethane	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
Dibromomethane	µg/l											µg/kg					
Ethyl Methacrylate	µg/l											µg/kg					
Ethylbenzene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
Iodomethane	µg/l											µg/kg					
Methacrylonitrile	µg/l											µg/kg					
Methyl Methacrylate	µg/l											µg/kg					
Methylene chloride	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
Pentachloroethane	µg/l											µg/kg					
Styrene	µg/l	<5	<5			<5	<5			<5		µg/kg	<7		<5	<5	<5
Tetrachloroethene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
Toluene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg	<7	<7	<5	<5	<5
Trans-1,2-Dichloroethene	µg/l			<5	<5			<5	<5		<5	µg/kg					
Trans-1,3-Dichloropropene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg			<5	<5	<5
Trans-1,4-Dichloro-2-Butene	µg/l											µg/kg					
Trichloroethene	µg/l	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	µg/kg			<5	<5	<5
Trichlorofluoromethane	µg/l	<5 JV	<5 JV	<5 JV	<10 JV	<5 JV	<5	<5	<10 V	<5 V	<5	µg/kg					
Vinyl acetate	µg/l	<10	<10			<10	<10			<10		µg/kg			<10	<10	<10
Vinyl chloride	µg/l	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	µg/kg			<10	<10	<10
Xylene, total	µg/l	<5	<5			<5	<5			<5		µg/kg			<5	<5	<5

Drawings Under Seperate
Cover